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# GROWTH BEFORE AND AFTER TRADE LIBERALIZATION[1]

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# GROWTH BEFORE AND AFTER TRADE LIBERALIZATION

## ABSTRACT

The empirical study of the impact of trade liberalization has not convinced the skeptics about the economic gains after trade reforms. Some have even argued that trade reforms have led to economic collapse and to deindustrialization. Using a sample that excludes countries that were subject to major exogenous disruptions, we note that post-reform economic growth was 1.2 percentage points higher than before the reforms. This is remarkable considering that pre-reform periods were characterized by highly expansionary state policies and large external borrowing, and that we eliminate the crisis years that preceded trade liberalization in the comparisons. Through multivariate fixed effects estimations we calculate that annual per capita GDP growth rates increased by up to 2.6 percentage points after the trade reforms, compared to a counterfactual that takes into consideration the evolution of several growth determinants. Moreover, trade liberalization has been followed by an acceleration in investment, exports of goods and services, and manufacturing exports, and as opposed to common belief, outward orientation did not lead to significant deindustrialization and actually seems to have increased export diversification. Acceleration occurred irrespective of income per capita level and was indeed quite significant in Sub-Saharan Africa. As expected, small countries benefited most from the reforms.

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## 1. INTRODUCTION

There is as yet no conclusive evidence about the economic impact of trade liberalization. Skeptics have shown the methodological shortcomings of the statistical techniques used in the studies to demonstrate the benefits of trade policy openness (e.g. Rodriguez and Rodrik, 2000 (RR); Rodrik, 2000). They also cite East Asian countries as examples of protective trade policies boosting economic growth. Liberalization supporters (e.g. Baldwin, 2003; Warner, 2003; Cline, 2004) claim that despite its caveats, the existing evidence indicates that open trade policies lead to better economic performance, stressing that there is no systematic evidence confirming the opposite hypothesis that protectionism leads to higher growth. Such different readings of the existing evidence demonstrate the inconclusiveness and highly ideological nature of the debate.

RR correctly note that trade theory does not conclude that under all circumstances reducing trade barriers leads to higher output. First, from a static point of view, reducing trade barriers that aimed to tackle market failures such as positive production externalities in import-competing sectors, would actually lead to a reduction of output. Second, under classical assumptions of constant returns to scale and assuming exogenous technological change, trade barriers have no effect on long-run growth, and only increase growth during the transition to a new steady state. Third, under several models of endogenous growth trade liberalization boosts output growth for the whole world, but not for all countries, depending on their initial endowments and levels of technological development.

However, in the particular context in which trade liberalization was undertaken in developing countries there was a strong presumption that dismantling trade barriers would lead to higher output levels and growth. First, in the overwhelming majority of developing countries, trade policy had fallen prey to rent-seeking and resulted in excessive levels of protection to politically powerful groups without any consideration of technical criteria. Such inefficient trade policy regimes led to isolation of many

small economies and therefore had a catastrophic effect on their output. Hence dismantling them was expected to induce economic recovery. Second, the economic stagnation generated during the period of Import Substitution Industrialization (ISI) was believed to be so significant, that even without assuming endogeneous technological change, the move to a free trade steady state was expected to take long enough that trade liberalization would lead to higher output growth for a decade or more. Since most empirical exercises in this literature typically considered 10 to 15 years after reform, trade liberalization should result in positive and significant estimates of its impact on growth, even if the technological change was exogeneous. Finally, increased trade is likely to bring higher growth to all countries under endogeneous growth models if we assume the existence of technological spillovers (Feenstra, 2004), and economists supportive of an outward orientation expected that the acceleration in exports, imports of intermediate inputs and foreign direct investment, prompted by trade policy openness, would lead to such spillovers.

Many have questioned the conclusions that trade reforms have led to better growth performance, and some have even gone ahead to argue that trade liberalization has been detrimental to the long-run growth of countries, especially in Africa. Some have suggested also that trade reforms have led to the "deindustrialization". Thus the question of what happened to countries after their trade reforms continues to be an important issue in the policy discussions of many developing countries. A key issue about this debate is that, almost all developing countries have liberalized their trade regimes over the last few decades (IEG, 2006). Thus, the issue of what happened to these countries is of interest beyond the question of whether or not all the changes can be attributed solely to the trade reforms.

By correcting several methodological deficiencies in existing event studies of trade reforms, the descriptive analysis and fixed effects estimations undertaken in this paper confirm that trade liberalization indeed has been followed by improved economic performance and a significant increase in economic growth compared to a counterfactual that considers other growth determinants. Furthermore, this improvement applies to most groups of developing countries. Section 2 briefly

reviews the empirical literature of trade liberalization and growth. Section 3 describes the methodology used in this paper to assess the impact of trade liberalization on output growth and other relevant economic variables. Section 4 presents the data used in this empirical exercise, the sample selected, and a description of the main economic patterns of countries in and out of the sample. The statistical evaluation of the economic outcome of trade liberalization is undertaken in Section 5. We implement the methodology described in Section 3, and test the robustness of its results using different specifications and time periods. Section 6 presents conclusions supported by the statistical evidence of Section 5.

## 2. LITERATURE REVIEW

Attempts to measure the impact of trade policy openness on growth go back several decades, but until the early 1990s it simply involved comparisons of GDP growth between opened and closed countries, or before and after trade liberalization (see Appendix 1). Classic examples of the pure before and after approach (so-called event studies) are two publications by the World Bank (Nash and Thomas, 1991; and Papageorgiou et al 1991) that identified a year of liberalization and after observing higher GDP growth after the reforms, concluded that trade liberalization indeed leads to higher growth. The major caveat under this approach is that it does not properly study or control for other factors that could have boosted growth after trade liberalization. For instance, it did not account for the fact that many countries liberalized trade and at the same time exited a communist regime, ended a political conflict, or rebounded from a short-term recession.

A representative study of the cross-country comparison approach is Balassa (1978), which concluded a positive relation between an outward oriented regime and economic growth by observing that countries that experience higher exports growth also had a significantly higher GDP growth, even after removing exports from GDP accounting. Since exports growth can be fostered by GDP growth itself or policies other than trade liberalization, then this observed relation does not demonstrate causality from trade policy to growth. An alternative path is taken in the 1987 WDR (World Bank,

1987), by providing a subjective measure of the outward orientation of trade policy and observing a positive cross-country relation to GDP growth. However, this subjective measure of policy orientation has been questioned in RR who shows evident misrepresentations of the trade policy stance in several countries under the WDR classification. Furthermore, as was the case with the before and after approach, making a cross-country comparison of GDP growth and attributing it to outward orientation, implicitly and arguably assumes that other determinants of economic growth are simply white noise.

The surge of the cross-country growth literature since Barro (1991), Barro and Sala-I-Martin (1991), and Mankiw et al (1992), which takes into account a range of potential determinants of GDP growth, gave researchers the opportunity to test the relation between trade openness and growth while properly taking into account the effect of other factors of growth. A seminal and most influential paper along this research path is Sachs and Warner (1995) (SW). Controlling for several growth factors (e.g. initial income, educational attainment, and government consumption) and introducing an index of trade policy openness, they replicate Barro (1991) regression on cross-country economic growth. The index of openness classifies countries as open or closed based on five criteria of average tariffs, coverage of non-tariff barriers, exchange rate distortion, export marketing boards, and socialist system of production. Their results show that countries classified as open grow, on average, by 2.45 percentage points higher than those under a closed trade regime. A number of researchers followed a similar cross-country methodology, using the Sachs and Warner index and/or other proxies of trade restrictiveness (e.g. Harrison, 1996; Wacziarg, 1998; Greenaway et al, 1998; Edwards, 1998). They overwhelmingly concluded that open trade policies lead to higher economic growth.

The widespread consensus that trade reforms led to faster growth was attacked by Rodriguez and Rodrik (2000), which showed the methodological faults in the five most representative empirical studies of the impact of trade openness on growth (Dollar, 1992; Ben-David, 1993; Sachs and Warner, 1995; Edwards, 1998; and Frankel and Romer, 1999). The most defining criticism was on SW paper and its trade openness index, noting that the index's components which most significantly determine its positive relation with growth (socialist system, exchange rate distortion, and exports marketing boards),

may be capturing the impact of other non trade-related policies. RR argue that the socialist system component is clearly associated to many other policies not related to trade, that the exports marketing board is notably correlated to a country being located in the stagnant African region, and that the exchange rate distortion may be the result of other macroeconomic policies.

The empirical attempts to capture the effect of trade liberalization on economic growth has since then faced the challenge of finding a proxy of trade policy openness that is robust to Rodrik and Rodriguez critiques[2]. Although Rodrik (2000) proposes using average tariffs to represent trade restrictiveness, as argued in Salinas (forthcoming) this indicator completely fails to capture other dimensions of trade restrictiveness[3] and is not even a rigorous representation of the restrictiveness of the tariff structure. In defense of the SW indicator, Warner (2003) provide evidence that the exchange rate distortion component reflects the trade policy stance more than anything else; that only some of the countries in Sub-Saharan Africa trigger the openness dummy on the basis of the export monopoly criterion; and that even after removing the countries that RR claim as misleading there is a positive impact on economic growth of having an open trade regime. Despite these arguments, we know that the Sachs and Warner indicator is far from an accurate measure of openness, as is based on a subjective weighting of imperfect measures of trade restrictiveness such as average tariffs and frequency of non-tariff barriers. Berg and Krueger (2003) argue that despite some technical deficiencies, the SW indicator is a fairly accurate indicator of trade restrictiveness, but such weak assertion obviously does not convince the skeptics about any evidence based on this indicator.

Dollar and Kraay (2004) take a different approach and try to measure the increase in trade policy openness (i.e. trade liberalization) by the change in trade flows between two periods in time. However, this indicator was promptly and convincingly criticized in Rodrik (2001) essentially for not recognizing the endogenous relation between trade flows and GDP growth, as Balassa (1978) failed to do more than

[2] Salinas (forthcoming) surveys the different measures of overall trade restrictiveness that have been proposed before and after RR and how they are all technically questionable or are not available for enough years and countries to be useful in panel regressions.

[3] For instance, Salinas (forthcoming) shows that since the 1980s there has been a low correlation between available, cross-country measures of unweighted average tariffs and the frequency of non-tariff barriers.

20 years before. Other papers trying to approximate trade policy openness through trade flows (Leamer, 1998; Hiscox and Kastner, 2002; Bolaky and Freund, 2004) are subject to the same criticism.

Wacziarg and Welch (2003) (WW) on the other hand, avoid the difficulties involved in measuring trade restrictiveness by performing a fixed effects regression based on the prior identification of trade liberalization episodes. This methodology was originally applied in SW, and despite the more sophisticated econometric technique involved, it is essentially an event study similar to those conducted until the early 1990s. Wacziarg and Welch do find an increase in GDP growth after trade liberalization. As the before and after studies of decades ago, WW assume that all the acceleration is attributable to trade liberalization despite the fact that several of the countries in their sample have simultaneously undergone enormous transformations and changes in the external environment. Their sample includes countries that have gone through the transition from socialism to the market economy, and countries that had conflicts and other non economic upheavals. There are also countries that are dependent on one or two highly volatile products and have fluctuations that can not easily be attributed to policy changes. In addition, defining years of reform based on the SW criteria leads to several misidentifications of liberalization episodes. These deficiencies are described in more detail in the following section, which proposes a correction of the before and after methodology as applied in SW and WW and previous event studies.

## 3. METHODOLOGY

The study of the impact of trade liberalization on economic growth is firmly rooted in the empirical literature on income convergence (e.g. Barro and Sala-I-Martin, 1991; Mankiw et al, 1992)[4]. The standard approach assumes a three-factor Cobb-Douglas production function:

$$Y_{i,t} = K_{i,t}^{\alpha} H_{i,t}^{\phi} (A_{i,t} L_{i,t})^{1-\alpha-\phi} \tag{1}$$

[4] Durlauf et al (2004) provide a detailed review of the empirical study of growth economics, including the income convergence hypothesis.

in which Y is aggregate income, K is physical capital, H is human capital, A is the efficiency level of each worker, and L is the size of the labor force, in country i and at time t. Greek letters represent the respective shares of each factor in production and constant returns to factors is assumed. Mankiw, Romer, and Weil (1993) show that under certain assumptions one can test the convergence hypothesis through a cross-country regression based on:

$$\gamma_i = g - \beta \log A + \beta \log y_{i,0} + \beta \frac{\alpha + \phi}{1-\alpha-\phi} \log(n_i + g + \delta) - \beta \frac{\alpha}{1-\alpha-\phi} \log s_{K,i} - \beta \frac{\phi}{1-\alpha-\phi} \log s_{H,i} + \varepsilon_i \quad (2)$$

where γ is growth of income per capita, g is the growth rate of A (i.e. growth rate of income per capita at the steady-state), $y_{i,0}$ is initial income per capita, $s_K$ is the saving rate for physical capital, $s_H$ is the saving rate for human capital, n is the growth rate of population, δ is the depreciation rate, and $\varepsilon_i$ is a residual composed of a random error term and a country-specific shock. Equation (2) assumes that the steady-state growth rate (g) is equal across countries, and that the labor force and population grow at the same rate. If β is found to be less than zero, then unconditional convergence is implied by the data[5]. Cross-country growth regressions as in Barro (1991) introduce a vector of control variables, $C_i$, to equation (2) that indirectly allows for heterogeneity in growth rates across countries.

$$\gamma_i = g - \beta \log A + \beta \log y_{i,0} + \beta \frac{\alpha + \phi}{1-\alpha-\phi} \log(n_i + g + \delta) - \beta \frac{\alpha}{1-\alpha-\phi} \log s_{K,i} - \beta \frac{\phi}{1-\alpha-\phi} \log s_{H,i} + \chi C_i + \varepsilon_i \quad (3)$$

Control variables such as geography, institutional quality, or population size are hence expected to have an impact on steady-state growth. Now if β is found to be less than zero this implies that there is conditional convergence among sample countries, that is, income per capita convergence conditional on control variables. The empirical research of trade liberalization and growth tests whether a measure of trade openness is one of these control variables. We can thus reduce equation (3) to:

$$\gamma_i = \alpha + \beta \log y_{i,0} + \Psi X_i + \zeta C_i + \delta TO + \varepsilon_i \quad (4)$$

[5] Mankiw et al (1993) find that holding population growth and capital accumulation constant, countries converge at the rate predicted by the augmented Solow model.

where TO is an index representing the degree of trade openness of an economy, $\alpha$ is a constant, and $X_i$ is composed of log A, log $(n_i+g+\delta)$, log $s_{K,i}$ and log $s_{H,i}$. OLS, IV, or GMM are commonly applied over a single cross-section of data including averages of each variable for the entire period, or over a panel of averages of 5-10 year subperiods. Several variables that have an impact on annual economic growth but not on the steady-state rate (e.g. fiscal balance, real exchange rate distortions, natural disasters) are left out of the analysis, implicitly and arguably assuming that their fluctuations even out over periods longer than 5 years. As mentioned in the previous section, the main obstacle to estimate equation (4) is defining an accurate measure of TO.

An alternative route taken to simplify the above specification and bypass the difficulty of measuring TO is to use fixed effects regressions on annual growth data (e.g. SW and WW). Since fixed effects or within group estimation transforms the variables in the above equation into deviations from the mean, those growth factors that are time invariant are dropped out from the equation. Geography is clearly a time invariant factor, while the overall institutional quality changes only gradually. Factors that generate fluctuations of annual growth around its steady-state are again assumed to even out over the periods under observation. Given these considerations the specification used for the fixed effects exercise is simply:

$$\gamma_{i,t} = \alpha + \pi POSTLIB_{i,t} + \mu_{i,t} \qquad (5)$$

in which the subindex t represents time, and POSTLIB is a dummy variable equal to zero in the years prior to trade liberalization, and one afterwards. Thus, $\pi$ measures the increase in GDP per capita growth attributed to trade reforms.

The present paper takes into account two important violations in SW and WW to the assumptions needed for the validity of their fixed effects estimations of $\pi$: incorrect identification of liberalization episodes and changes in omitted variables. In general, we address these issues through a new identification of trade liberalization episodes based on reviews conducted under the World Bank's Trade Assistance Evaluation (IEG, 2006); a sample selection that eliminates cases of extreme volatility in the

dependent variable; and fixed effects estimates of the following multivariate specification of Equation (5):

$$\gamma_{i,t} = \alpha + \pi POSTLIB_{i,t} + \beta \log y_{i,t-1} + \Psi X_{i,t} + \zeta C_{i,t} + \Omega \omega_{i,t} + \mu_{i,t} \quad (6)$$

in which we reintroduce determinants of growth dropped from equation (4), and add a vector of control variables $\omega_{\iota,\tau}$ that impact growth, but not its steady-state rate.

Along these lines we take several steps to ensure the validity of our estimates. First, to properly determine POSTLIB we need to ensure the correct identification of one trade liberalization episode per country. A major consideration here though is that most countries have undergone more than one liberalization program; some of them were reversed. For an event study it is obvious that reversed reforms should be excluded. The SW methodology, used also in WW, selects as year of reform the one in which the trade regime first meets its five well known criteria without any consecutive reversal. Although classifying countries as open or closed to trade based on the SW criteria makes sense in cross-country regressions, its application for fixed effects estimations is not optimal. Growth may have increased years before the SW criteria was met as a result of earlier reforms, and such acceleration would be considered part of the pre liberalization years. Most importantly, under these criteria, several countries that undertook strong trade liberalization (e.g. China, Croatia, India) are wrongly considered unreformed.

The exact timing of the major trade reform would always be debatable, but for most countries there is a consensus by economists with some knowledge of the countries in question. In others, the dates are rather close. Only in few cases, the years do vary by a large margin. Our list of liberalization episodes is taken from the World Bank's Trade Assistance Evaluation (IEG, 2006) used also in Jinjarak et al (forthcoming). It includes the most significant trade reform of each country, as determined through a

review of several literature sources[6]. The list of these episodes is presented in Appendix 3, together with the list used in WW.

Second, we note that although dropped from fixed effects estimates in SW and WW, income per capita does change over time and in many countries it multiplied significantly in a period of 20 years (e.g. East Asian countries). If, for instance, a country has significantly narrowed its income gap with respect to developed nations and unconditional convergence holds, then the exclusion of this variable would lead to a downward bias in the estimation of POSTLIB. We thus include the logarithm of income per capita of each country relative to the one in the U.S. for each year throughout our period of estimation (one-year lagged). The inclusion of this variable also should take into account the evolution of other determinants that are endogeneous to GDP per capita (institutional quality, human capital, and life expectancy) and thus evolve in parallel with the latter.

Third, we consider growth determinants suggested by the Solow growth model (X-variables in Equation (6)). Investment in human capital is usually approximated in growth regressions through the school enrollment rates. But although conventional wisdom and micro studies suggest a positive effect of education on economic growth, cross-country growth econometrics using enrollment has not confirmed this hypothesis. Several reasons have been proposed for this apparent contradiction (Pritchett, 1996; and Krueger and Lindahl, 2002). Recognizing these obstacles and the fact that investment in human capital generally has followed an upward trend in recent decades, we approximate its impact on growth by including year dummies or a time trend in our fixed effects estimates.

It is similarly complicated to control for the impact of changes in physical capital investment on growth. Because trade liberalization is expected to boost investment, this variable is usually considered as an outcome variable in empirical analysis. Thus, including it in the multivariate specification of Equation (2) would generate endogeneity in our estimates. If we exclude this variable, then our estimates of the coefficient of POSTLIB would be biased upwards (downwards) only if this omitted

[6] Such sources include World Bank and IMF country documents, WTO Trade Policy Reviews, and country reports from the Economist Intelligence Unit.

variable systematically increases (decreases) after reforms in our sample, and this increase (decrease) is prompted by a factor other than trade reform (e.g. savings policy, foreign direct investment policy). The only reason we think this could systematically be the case is if simultaneous structural adjustment reforms lead to higher investment. Nevertheless, we observe in Section 5 that there is only a mild increase in investment before and after trade liberalization, and therefore it cannot significantly explain an increase in output growth after reforms. We thus exclude this variable from most regressions, but include the investment share of output (two-years lagged) in one of our specifications to test for the robustness of our results.

Fourth, we observe that several variables in C, although assumed to vary only gradually, may have changed significantly over the period under our scrutiny[7]. Geography is constant but other factors listed in Appendix 2, are clearly not. Institutions can change over time and indeed, one vast and systematic institutional reform occurred during the period under consideration in this paper: transition from communism. This move launched a radical transformation from state-led to market institutions. The transition from communism is such a cataclysmic event, that we opt to remove transition economies from the sample. [8] [9]

Another control variable commonly included in growth regressions is population size, which we include in our regression in an instrumented form (two-year lagged) to avoid endogeneity with respect

[7] The control variables considered in this study is taken from a list from Bosworth and Collins (2003), which includes those most commonly used in the empirical growth literature. See Appendix 2.

[8] A similar but less dramatic event is the implementation of structural adjustment reforms. Given that basically all developing countries have undertaken trade liberalization as part of structural adjustment programs, we maintain structural adjusters in the sample (see footnote 5). These reforms (exchange rate reform, fiscal adjustment, privatization of imports and exports companies, openness to foreign capital, etc) are complementary to trade liberalization. Thus, as in Baldwin (2003), our conclusions talk about the impact of trade liberalization defined in a broader sense: the dismantling of ISI and switch to outward orientation.

[9] Wacziarg and Welch (2003) attempt to separate the effect of trade reform from the impact of other complementary policies embedded in structural adjustment reforms by estimating their results after removing from the sample those countries that implemented trade liberalization together with a comprehensive privatization program. There are three main caveats in their approach as some of the pure reformers: (i) did undertake privatization few years before or after the trade liberalization episode, thus also significantly affecting growth rates after trade liberalization (Kenya); (ii) implemented significant privatization though considerable state involvement in the economy remains (India and Morocco); or (iii) implemented other non-privatization reforms (e.g. deregulation, sectoral reforms, fiscal adjustment, etc) that could equally alter potential growth by stabilizing an economy or fostering the development of market institutions (e.g. Bolivia, Ghana, Kenya). Taking these caveats into consideration, their sample of pure trade reformers would be reduced to only 3 countries.

to the dependent variable. As was the case with saving in human capital we expect other control variables such as life expectancy to show a positive trend through time and hence, aim to capture their impact by including either year dummies or a time trend[10]. To further limit the effect of other possibly omitted variables that could gradually change over time, our estimations only consider the twelve years before and nine after the reforms[11].

Fifth, we consider several variables that affect growth around its stead-state rate (ω variables in Equation 6). We include inflation growth, terms of trade, and fiscal balance following Bosworth and Collins (2003), to which we add other significant determinants of GDP growth: occurrence of a natural disaster; deviation of the real exchange rate from its long term equilibrium level; current account balance (reflecting the effect of capital inflows); and growth of world demand (see Appendix 2). The effect of the latter variable on growth is approximated through the inclusion of year dummies. Although some of these variables are expected to be cyclical, there are still significant long term trends which imply that they may have considerably different averages before and after trade liberalization. In Section 4, we verify that indeed most of these variables are more recessionary in the period after relative to the period before trade liberalization. This means that the impact of trade reforms on growth is more positive than the coefficient of the trade liberalization dummy portrays when estimating equation (5).

Sixth, we perform sample modifications to reduce other sources of volatility in our dependent variable. Thus, we remove countries with characteristics that exacerbate such volatility: those with considerable oil dependence (fuel exports accounting for more than 50% of merchandise exports) and a small size of its population (below 1 million people) [12]. Economic performance in such countries is

[10] Wacziarg and Welch (2003) also include a time trend and year dummies in their analysis.

[11] Limiting the period before trade liberalization to 12 years prior to reform possibly leaves out some years of high growth under the ISI model (e.g. Brazil, Argentina) and one could argue that this could bias our estimates in favor of the post-liberalization period. On the other hand, note in the following paragraph that we also opt to eliminate from our sample the recessionary period prior to reform [-4,-1] and one could argue that this could bias our estimates against the post-liberalization years.

[12] Appendix 5 presents a classification of developing countries according to several characteristics, including those used to define our sample of countries.

excessively dependent on the evolution of oil prices and external shocks, respectively[13]. To avoid variation due to changes in the sample throughout time we include only countries with GDP data for all years in the [-12,9] period. We also exclude countries that have gone through serious conflicts as a large literature documents their pernicious impact on economic growth.[14] The determination of this sample is in line with the methodology applied in Jinjarak et al (forthcoming)[15].

Finally, we delete the years of economic crisis that surrounded trade reforms, as we observe later that in average our sample countries experience a period of economic downturn four years before reform and a rebound in the following year. Such exclusion is particularly needed for the countries that experienced hyperinflation.

Our sample selection technique also permits a more accurate application of within country estimation of the impact of trade liberalization on other economic indicators, such as investment, exports, share of manufacturing exports, industry value added, and exports concentration. These indicators will allow us to obtain a comprehensive picture of the impact of trade liberalization on economic performance.

The regressions on GDP growth are estimated using the entire sample of 39 countries and also for subgroups of countries grouped by world region, income per capita, and size of the population. We consider non reversed trade liberalization episodes between the years 1970 to 2004 and for each country we analyze economic performance 12 years before to 9 years after trade reforms, excluding the crisis years [–4,1].

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[13] A valid critique to our methodology in this regard is that several other countries that remain in our sample are highly dependent on a handful of non-oil commodities and thus could be highly volatile. Yet, we cannot exclude such countries due to sample size considerations and expect that the inclusion of terms of trade would control for volatility in commodity prices.

[14] Collier and Hoeffler (1998). We define conflict countries as those that experienced war (internal or external) according to Gleditsch et al. (2002)

[15] The obvious caveat of concentrating on this sample is its reduced size. Whereas SW and WW use more than 100 countries in their analysis we are left with only 39.

# 4. DATA

## 4.1. Data Sources

As shown in Appendix 4, the World Bank's World Development Indicators (World Bank, 2005) is the source for most variables in our analysis. The main dependent variable, GDP per capita growth (GDPPCG), is the annual real change in gross domestic product (in local currency) minus annual population growth, both indicators extracted from World Bank (2005). Other dependent variables are also obtained from this source are gross capital formation as a share of GDP (IGDP), the share of exports of goods and services in total GDP (XGDP), the share of manufacturing exports in total merchandise exports (MANX), and industrial valued added as a share of GDP (IND). UNCTAD's Handbook of Statistics (UNCTAD, 2006) is our source for our measure of exports concentration (which is based on the Herfindahl-Hirschman Index). Among our independent variables, World Bank (2005) is the source of total population and our estimate of GNI per capita relative to the one of the United States. It is also the source of our measure of terms of trade, current account balance, fiscal balance, and inflation. Our list of natural disasters comes from the OFDA/CRED Emergency database (EM-DAT, 2006) and we use estimates of real exchange rate misalignments (RXRDEV) from Elbadawi and Soto (forthcoming). In addition to regression variables, we use other statistics to compare the general economic status and evolution of countries in and out of the sample, and before and after trade liberalization. These statistics are all listed and described in Appendix 4.

## 4.2. Data Description

Developing countries included in our sample did not differ considerably or systematically from those left out during the period under consideration (1970-2004). According to the average values presented in Appendix 6, countries in the sample had higher output growth, but lower income per capita and lower level of industrialization. The general macroeconomic outlook is slightly better for in-sample countries having lower inflation, debt to GDP share, current account deficits, and fiscal deficits. On the

other hand, countries in the sample were also slightly less open to trade in terms of their share of exports and imports to GDP, but had similarly restrictive trade barriers than other developing countries. In-sample countries also had lower concentration of exports and a larger share of manufacture to merchandise exports. Appendix 7 presents average statistics for these variables in out-of-sample countries grouped according to the factor behind their exclusion (i.e. conflict, transition, population, and oil dependence).

The list of trade liberalization episodes in our paper fairly differs from the one used in WW (see Appendix 3). Out of the 39 countries included in the sample, there are 25 countries (67%) in which our identified liberalization year coincides with the one in WW. Out of the 14 countries of disagreement, there are no countries in which the divergence is less than three years. In six cases we identify a year of liberalization that precedes the one identified in WW, since our list includes the initiation of the liberalization process whereas WW use a following year in which SW criteria is first met. In the other 8 of our identified reforms (Central African Republic, India, Jordan, Malaysia, Malawi, South Korea, Senegal, and Thailand), WW did not recognize a year of reform as these countries have either permanently met or unmet the SW criteria throughout the period 1970-2004[16].

## 5. EMPIRICAL FINDINGS

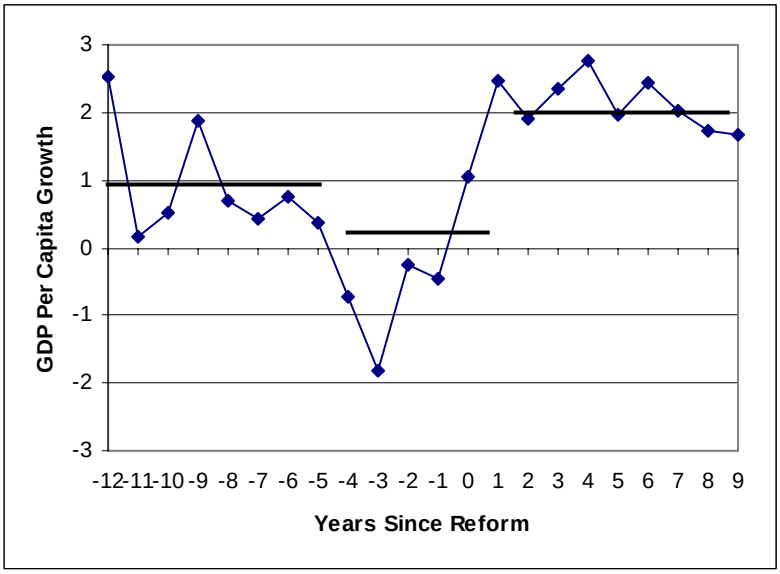
### 5.1. Basic Statistics

Figure 1 shows the evolution of the average growth of GDP per capita 12 years before and 9 years after the identified reforms for our sample of countries. There are three markedly different periods of growth: a first one that corresponds to the years of stable growth (years [-12, -5]) under an ISI regime; a second period (years [-4,1]) of economic crisis prior to trade liberalization and a rebound right after the reforms; and the years of stable growth that follow the reforms (years [2,9]). Thus, in comparing economic performance before and after trade liberalization, we delete the period of crisis that surrounds

[16] In the case of Chile we do not consider the liberalization started in the 1970s (as SW and WW do), since it was significantly reversed in the early 1980s.

reforms, since not doing this lowers our estimates of pre-reform performance. One can argue that that the performance of the ISI period should be judged considering both its years of stable growth and those of economic crisis that come as a result of the distortions it created. However, we prefer to apply a most stringent test on the benefits of reform and present much of our analysis removing the years of turmoil in which the ISI model derailed[17].

**Figure 1: GDP Per Capita Growth Before and After Reforms**




Liberalization in our sample countries was followed in average by growth increase of more than 1 percent vis-à-vis the period of stable growth under ISI[18]. Actually if we do not remove crisis years from our comparison the increase in GDP per capita growth is from 0.38 in years [-12, -1] to 2.03 percent in years [0,9]; or an increase of 1.6 percent. Appendix 8 confirms that there is an acceleration in all country subgroups classified according to geographic region, population size and income per capita. Appendix 10 in turn shows that growth increased in the large majority of our sample countries (31 out of 39, or 80 percent of them).

[17] Since our sample includes those countries for which we have GDP growth data for all years within the [-12,9] period, Figure 1 and other tables in this section are not distorted by a time-varying country sample.

[18] Year -12 is preceded by two years of growth below 1 percent and Year 9 is followed by an average growth around 2 percent.

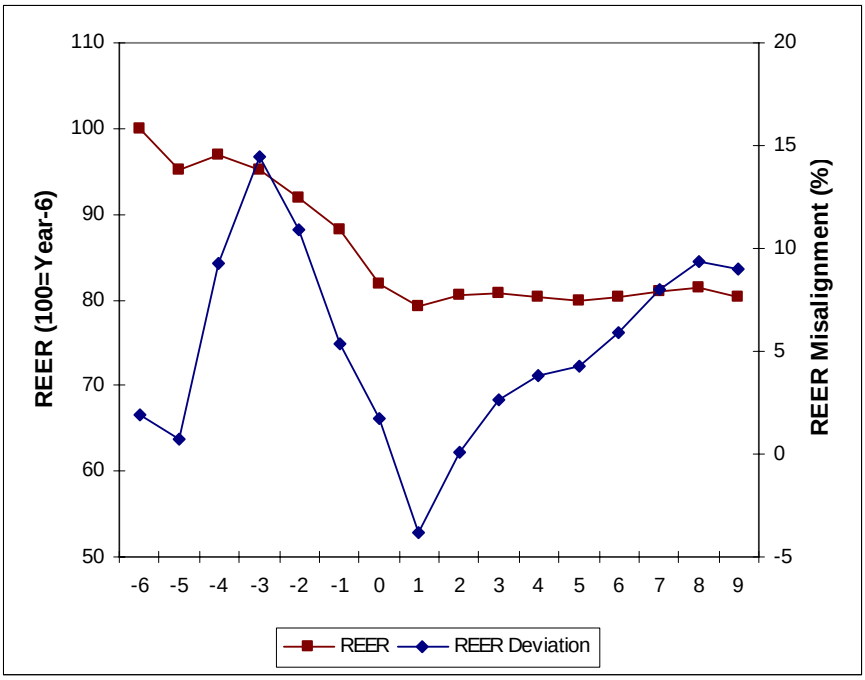
**Table 1: Economic Indicators Before and After Trade Liberalization in Sample Countries: 1975-2004**

| | Before [-12,-5] | After [2,9] |
|---|---|---|
| *General Indicators* | | |
| Gross National Income Per Capita (US$, Atlas Method) | 981.37 | 1624.45 |
| Inflation (% annual) | 29.39 | 25.91 |
| Fiscal Balance (% of GDP) | -4.43 | -1.86 |
| Growth in External Debt (% Annual) | 10.42 | -1.54 |
| Current Account Balance (% of GDP) | -5.69 | -3.39 |
| Real Effective Exchange Rate (2000=100) | 152.84 | 102.35 |
| Terms of Trade (2000=100) | 115.45 | 103.05 |
| Imports of Goods and Services (% of GDP) | 29.42 | 35.01 |
| *Regression Variables* | | |
| Growth in GDP per Capita (% Annual) | 0.92 | 2.11 |
| Investment (% of GDP) | 20.41 | 21.22 |
| Exports of Goods and Services (% of GDP) | 23.88 | 29.53 |
| Industrial Value Added (% of GDP) | 27.54 | 26.67 |
| Exports Concentration (Herfindahl-Hirschmann Index) | 0.36 | 0.31 |
| Manufacturing Exports (% of Merchandise Exports) | 26.16 | 41.60 |

Source: World Development Indicators (2006)

Table 1 and Appendix 9 in turn give a more comprehensive picture of the economic evolution before and after trade liberalization. Average growth in GDP per capita increases from 0.92 to 2.11 between the periods [-12,-5] to [2,9]. This acceleration is most impressive if we consider that macroeconomic variables were clearly more expansionary in the years before trade liberalization. State dirigisme prior to reform translated into high growth in the external debt and unsustainably high levels of current account deficits. The period after reform in turn is characterized by reduction in the levels of debt to GDP and considerably lower current account deficits. Furthermore, terms of trade were higher before trade liberalization than afterwards. Table 1 shows that trade liberalization was also followed by considerable increases in investment, exports share of GDP, share of manufacturing exports, with only a minor reduction in industry value added and even a reduction in exports concentration. This is later confirmed through fixed effects estimates.

**Figure 2: REER Before and After Reforms**




An interesting development complementary to trade liberalization is the evolution of the real exchange rate in the years around economic reform. Theoretically it is clear that a reduction in imports barriers needs to be accompanied by a real exchange rate devaluation to maintain external equilibrium. Trade reforms increase the demand for imports and therefore the demand and price of foreign exchange. Thus, the real exchange rate should fall after trade liberalization to avoid misalignment. Figure 2, shows that in average in our sample the real exchange rate depreciated in the years preceding reform. The real exchange rate falls by about 25 percent in the 6 years prior to trade liberalization[19], and in the years after trade reforms there is only a mild, temporary appreciation. However, an index of real exchange rate misalignment presented in Elbadawi and Soto (forthcoming) shows that the real exchange rate first falls slightly below its equilibrium value, but that afterwards it increases to 10 percent above equilibrium.

[19] In fact, as shown in Table 1, the actual fall in the real exchange rate from period [-12,-5] to [2,9] is of about one third.

### 5.2. Fixed Effects Results

The within groups estimations under all specifications show a positive and statistically significant association between trade liberalization and GDP growth. The first column in table 2 includes the entire period from 12 years before to 9 years after the reform under the basic specification of equation (5). The apparent impact of trade opening is an increase in income per capita growth of 1.7 percent, a considerable acceleration with high statistical significance. As expected, this impact is lower when the years of crisis [-4,1] are excluded but it is still above 1 percent p.a. and statistically significant at 1%.

**Table 2: Trade Liberalization and GDP Per Capita Growth**

| | Basic Equation Using Entire Period [-12,9] | Excluding [-4,1] | | | Excluding [-4,4] | Excluding [-5,5] |
|---|---|---|---|---|---|---|
| | | Basic Equation | With Time Trend | With Year Dummies | | |
| | Independent Variable: GDP Per Capita Growth | | | | | |
| postlib | 1.686 | 1.23 | 2.096 | 3.571 | 1.049 | 0.993 |
| | (6.10)** | (4.16)** | (3.49)** | (3.66)** | (2.91)** | (2.47)* |
| trend | | | -0.105 | | | |
| | | | (1.65) | | | |
| Constant | 0.356 | 0.926 | 0.584 | 0.737 | 0.926 | 0.993 |
| | (1.92) | (4.32)** | (1.96) | (0.27) | (4.16)** | (4.11)** |
| Observations | 856 | 661 | 661 | 661 | 505 | 427 |
| Number of countries | 39 | 39 | 39 | 39 | 39 | 39 |
| R-squared | 0.04 | 0.03 | 0.03 | 0.11 | 0.02 | 0.02 |

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

We noted earlier though that the coefficient of POSTLIB in the basic specification of equation (5) will underestimate the impact of trade liberalization, if the expansionary macroeconomic policies and economic context in the pre-liberalization years are taken into account. Equation (5) is reestimated adding a time trend and year dummies. These variables should capture the impact of the negative trend in the macroeconomic and external context. The third column of Table 2 shows that the time trend has a negative coefficient, although it is not statistically significant. Inserting a time trend has the effect of increasing the coefficient to above 2 percent while using year dummies raises it to almost 4 percent.

Because in most sample countries there was a recessionary period prior to trade liberalization one could argue that the acceleration after reforms is actually the result of a rebound effect. In fact, Figure 1 shows that there is a spike in average growth in years 1 through 4 after reforms. Yet, the last two columns in Table 2 show that there was a significant increase in growth after reforms even when we do not include 4 and 5 years before and after the reforms. There is indeed a slight reduction in the coefficient of POSTLIB, but still above 1 percent and with statistical significance above 5 percent.[20]

We take one step further to capture other factors that may have affected growth before and after trade liberalization and in Table 3 present the results of fixed effects estimations with multivariate specifications including growth determinants that are omitted under the standard specification of equation (5)[21].The first column shows the estimates under the basic specification. In the second column we introduce one lag of the dependent variable (l.gdppcg)[22], population size (ll.lpop) and the gap with respect to U.S. income (gdptous). The specification in the third column adds interaction terms to take into account the possibility that the magnitude of the acceleration after trade liberalization depends on population size (postpops) or the average growth rate in the pre-reform period (postini). The next three columns introduce variables that are relatively exogenous to GDP growth (i.e., real exchange rate deviation (rxrdev)[23], natural disasters (disast), and terms of trade (ltot)). In the next two columns we add variables that are rather endogenous to growth (i.e. current account balance (cur), inflation growth (infg), and fiscal balance (fbal). The last column introduces an instrument for investment (ll.igdp).

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[20] The reduction in statistical significance could partly be the result of the lower number of observations we have after removing several years after reform. Ideally, we could have compensated the loss in observations by including more years after reform and thus compare growth between periods [-12,-5] and [5,12]. However, this would imply a significant reduction in the number of countries in our sample, since about one fourth of them do not have growth data for the period [10,12].

[21] Notice than in this estimation we reintroduce the period [-4,1] to increase the number of observations given that that there is missing data for some of the independent variables. Since the deletion of period [-4,1] caused a reduction of 0.5 percent in the coefficient of POSTLIB, we can assume that this reduction similarly applies to our estimates in Table 3.

[22] Although potential endogeneity may result from the inclusion of the lagged dependent variable, this dynamic specification can be estimated through fixed effects because the time dimension of our panel exceeds 15 observations.

[23] Here we use the real exchange rate misalignment estimates created by Elbadawi and Soto (2006). Although GDP growth does have an impact on the real exchange rate, the estimates of misalignment by Elbadawi and Soto properly control for this effect.

Although this is a rather simplistic specification of the relationships between the independent variables and growth, most of the resulting estimates have statistical significance; the signs of the coefficients are as expected a priori; and their magnitudes are reasonable. The sign and statistical significance of β implies that there is conditional income convergence and the magnitude of this coefficient is in line with conventional estimates in the growth convergence literature. Output growth is increased by improvements in terms of trade and inflation reduction, while it is lowered when a disaster occurs or when the real exchange rate is over-appreciated. This latter negative relation between a real exchange rate above equilibrium and economic growth is highly significant and consistent across all specifications[24]. In agreement with several other empirical studies (e.g. Aron and Meullbauer, 2001; Bosworth and Collins, 2003), we observe a positive relation between the fiscal balance and GDP growth. And also as expected, the sign and significance of the coefficient of postpops implies that the acceleration after trade liberalization is higher in smaller countries.

Most importantly, the inclusion of all these variables has a robust impact on the coefficient of trade liberalization. Since most of these variables were more favorable in the years prior to trade reforms, including them through a multivariate specification results in a considerable increase in the coefficient and t-statistic of POSTLIB dummy with respect to the basic specification. Under all specifications trade liberalization is now associated with an increase in output growth of between 1.73 and 2.59 percent per year. These estimates are slightly higher than our approximations in Table 2, when we only use a time trend to capture omitted variables, and have also higher statistical significance as measured by t-

[24] This empirical finding supports several studies including IEG (2006) that point out at the importance of maintaining a competitive real exchange rate during trade liberalization.

statistics[25]. Furthermore, as seen in appendix 12, the increase in the coefficient of POSTLIB is robust to the introduction of lags of several independent variables[26].

**Table 3: Trade Liberalization and GDP Per Capita Growth Controlling for Other Growth Factors**[1]

| | Independent Variable: GDP Per Capita Growth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| postlib | 1.686 | 2.327 | 2.392 | 1.996 | 1.737 | 2.116 | 2.592 | 2.504 |
| | (6.10)** | (4.05)** | (3.98)** | (3.21)** | (2.55)* | (2.92)** | (3.54)** | (3.43)** |
| l.gdppcg | | 0.141 | 0.138 | 0.117 | 0.167 | 0.244 | 0.222 | 0.225 |
| | | (4.00)** | (3.90)** | (3.05)** | (3.90)** | (5.32)** | (4.84)** | (4.93)** |
| ll.lpop | | -16.206 | -17.326 | -18.37 | -16.658 | -18.345 | -16.518 | -16.302 |
| | | (3.85)** | (4.05)** | (3.81)** | (3.24)** | (3.47)** | (3.13)** | (3.10)** |
| gdptous | | -4.091 | -4.188 | -4.708 | -4.025 | -4.707 | -4.895 | -4.592 |
| | | (5.43)** | (5.31)** | (5.36)** | (4.21)** | (4.70)** | (4.74)** | (4.42)** |
| postpops | | | -0.003 | -0.004 | -0.005 | -0.005 | -0.006 | -0.006 |
| | | | (1.74) | (2.34)* | (2.56)* | (2.75)** | (3.08)** | (3.10)** |
| postini | | | 0.049 | 0.037 | 0.074 | -0.04 | -0.022 | -0.012 |
| | | | (0.40) | (0.29) | (0.50) | (0.25) | (0.14) | (0.08) |
| rxrdev | | | | -0.016 | -0.017 | -0.02 | -0.021 | -0.023 |
| | | | | (2.88)** | (2.94)** | (3.17)** | (3.33)** | (3.54)** |
| disast | | | | -0.939 | -0.947 | -0.482 | -0.487 | -0.522 |
| | | | | (2.22)* | (2.12)* | (0.97) | (1.00) | (1.07) |
| ltot | | | | | 1.017 | 0.959 | 2.257 | 2.099 |
| | | | | | (0.87) | (0.67) | (1.56) | (1.45) |
| infg | | | | | -0.452 | -0.649 | -0.632 | -0.651 |
| | | | | | (2.39)* | (3.07)** | (3.02)** | (3.11)** |
| fbal | | | | | | 0.182 | 0.173 | 0.179 |
| | | | | | | (3.42)** | (3.29)** | (3.43)** |
| cur | | | | | | | -0.211 | -0.211 |
| | | | | | | | (3.84)** | (3.83)** |
| ll.igdp | | | | | | | | -0.075 |
| | | | | | | | | (1.62) |
| Constant | 0.356 | 251.254 | 269.08 | 284.199 | 257.072 | 292.922 | 250.054 | 254.725 |
| | (1.92) | (3.77)** | (3.97)** | (3.71)** | (3.10)** | (3.28)** | (2.89)** | (2.87)** |
| Observations | 856 | 764 | 764 | 665 | 549 | 454 | 450 | 449 |
| Number of countries | 39 | 39 | 39 | 37 | 34 | 30 | 30 | 30 |
| R-squared | 0.04 | 0.19 | 0.19 | 0.21 | 0.24 | 0.33 | 0.35 | 0.35 |

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

[1]Year dummies are included (except in the first regression) though their coefficients are not shown in this table

[25] Unfortunately we cannot make a direct comparison between our results and those in WW because the latter are calculated for subperiods that do not coincide with our periods of estimation. Appendix 11 however presents estimates using our methodology and WW identification of reform episodes. There is indeed some divergence between the estimates in Table 2 and Appendix 11; a difference ranging between 0.06 and 1 percent.

[26] In appendix 12 we introduce lags of time-varying independent variables that were statistically significant in Table 3. Since the introduction of lags brings a reduction in the number of observations, the coefficients of several variables lose statistical significance.

It is still frequently claimed that any potential benefits of trade liberalization on overall growth come at the cost of an increased economic vulnerability to external shocks as a result of deindustrialization and concentration of exports in a few products. Table 4 shows that such claims are not supported by cross-country evidence. Trade reforms have been followed by only a very small decrease in industry valued added (on average of less than 1 percent of GDP) and in fact reforms were followed in average by a considerable decrease of 0.06 points in the Herfindahl-Hirschman Index of exports concentration. The move towards trade liberalization has been followed also by an industrialization of exports: an increase of 18 percentage points in the share of manufacturing exports in total merchandise exports[27].

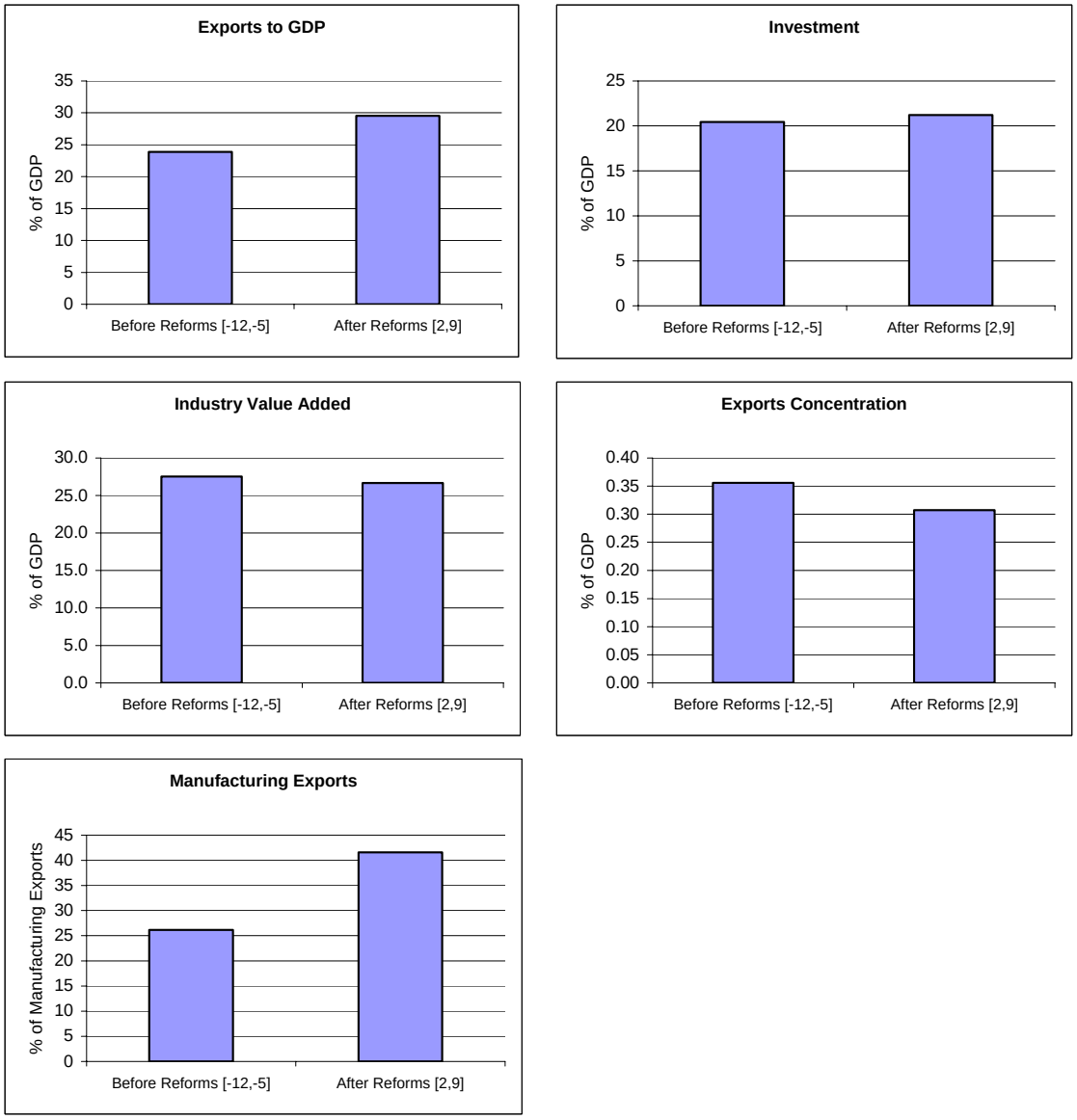
**Table 4: Impact of Trade Liberalization on Other Economic Variables in the Periods [-12,-5] and [2,9]**

| Dependent Variable: | Exports to GDP | Investment to GDP | Industry Value Added | Exports Concentration | Share of Manuf. Exports |
|---|---|---|---|---|---|
| postlib | 5.472 | 0.768 | -0.839 | -0.06 | 17.867 |
| | (11.44)** | (2.27)* | (2.68)** | (6.20)** | (18.96)** |
| Constant | 23.972 | 20.443 | 27.522 | 0.364 | 24.872 |
| | (70.81)** | (85.45)** | (124.35)** | (46.97)** | (36.82)** |
| Observations | 623 | 623 | 607 | 370 | 543 |
| Number of countries | 39 | 39 | 38 | 38 | 39 |
| R-squared | 0.18 | 0.01 | 0.01 | 0.1 | 0.42 |

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

[27] We do not present any results about the impact of trade liberalization on social indicators given the lack of such data for the period prior to the reforms.

**Figure 3: Economic Indicators Before and After Trade Reforms**

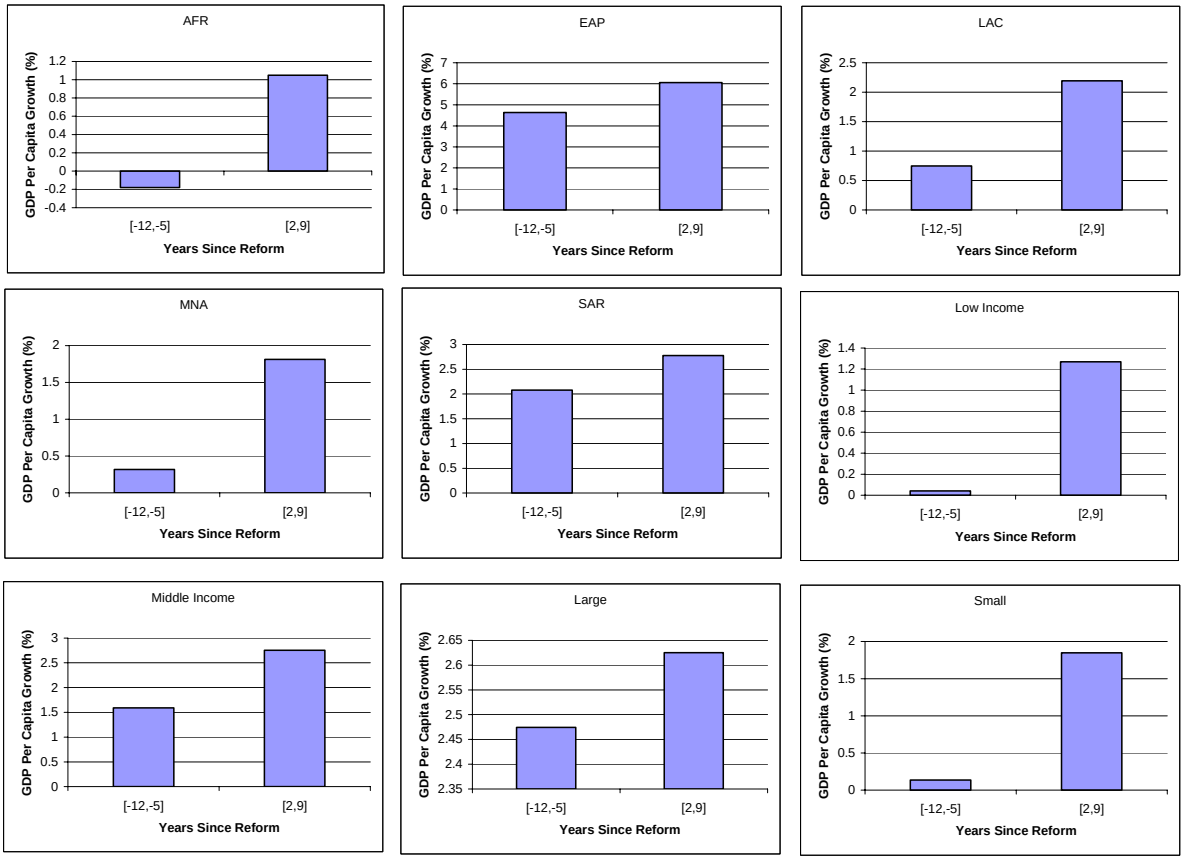



### 5.3. Sources of Heterogeneity

As was shown in Appendix 10, there is large heterogeneity by country in the evolution of GDP per capita growth before and after trade liberalization. Appendix 13 investigates the sources of such variation by estimating equation (5) for different country subgroups. We find that some of this heterogeneity is explained by country characteristics that are expected to influence the effect of liberalization. For instance, the growth increase following trade reforms is more significant in small developing countries which because of their reduced internal market, are expected to suffer more from

the economic isolation imposed by ISI policies. Interestingly, low income countries experience a similar increase in growth following trade liberalization as middle income countries. Since there is a positive relation between the quality of institutions and income per capita, this implies that supply response from trade opening was not limited by weak institutions. Furthermore, countering frequent criticisms, the evidence in this Appendix shows that countries in Sub-Saharan Africa have indeed benefited significantly from an outward orientation of economic policies[28] [29]. Finally, we divide the sample according to pace of the trade reforms, either fast or gradual, based on a classification established at Jinjarak et al (forthcoming), and we observe that gradual reformers obtain more robust benefits than fast liberalizers.

**Figure 4: Evolution of GDP Per Capita Growth by Country Subgroups**




[28] These patterns are robust to the inclusion of a time trend.

[29] We cannot make strong inferences about MNA and SAR due to the small number of countries in our sample.

## 6. FINDINGS AND CONCLUSIONS

By appropriately using within-country estimation, which circumvents the need to measure trade openness, this paper finds that trade liberalization has been followed by a significant increase in GDP per capita growth for a sample of developing countries that are not in transition from socialism, do not have conflicts, and do not depend on a single natural resource. The estimated average increase in growth varies between 1.2 and 2.6 percent according to which specification we use to take into account the evolution of other growth determinants and is statistically significant under all specifications. Since our methodology controls for many other factors that could have prompted growth variation after trade liberalization, the evidence suggest that it was the move towards an outward oriented regime (i.e. trade liberalization as defined in Baldwin (2003)) that fostered output per capita growth in our sample countries. For other factors to have caused this acceleration, they would have to be systematically correlated to POSTLIB. Thus far, our results are robust to the inclusion of previously omitted variables.

This increase in output per capita growth has been most significant in small countries, and contrary to common claims, it has been substantial irrespective of income per capita level and considerably important in Sub-Saharan African countries. Despite the claims of skeptics, growth has increased substantially after the dismantling of the ISI regime in Latin American countries. Also disproving usual criticisms, trade liberalization has not significantly changed the level of industrialization of an economy, and has actually been followed by lower export concentration and a higher share of manufacturing exports. Interestingly, our multivariate fixed effects estimates suggest that the overvaluation of the real exchange rate was an important factor limiting the supply response to trade reform.

In the midst of international negotiations for trade liberalization at the multilateral, bilateral, and regional levels, it is necessary to put into perspective cross-country evidence about the potential impact of trade openness on economic development[30]. If the dismantling of the ISI model has indeed increased GDP per capita growth by around 2 percentage points as our evidence suggests, then its most

[30] Note though that the evidence in this paper mainly reflects the impact of unilateral trade liberalization and that more benefits to developing countries are expected from reciprocal liberalization schemes.

enthusiastic proponents should recognize that trade reform by itself cannot generate the per capita growth levels of the so-called East Asian Miracle Economies of near 6 percent per year.

However, the economic acceleration that has followed trade liberalization shows that reforms did not bring doomsday for liberalizing countries and that the evidence actually suggests that trade reforms did make a very important contribution to sustained economic development across developing countries. This seems to be where the evidence of the trade liberalization and growth literature is finally leaving us to stand.

**REFERENCES**

Aron, Janine. and Muellbauer, John. 2001. "Interest Rate Effects on Output: Evidence from a GDP forecasting Model for South Africa" Paper prepared for the 2nd Annual Research Conference , IMF, 29-30 November, 2001.

Balassa, Bela. 1978. "Exports and Economic Growth: Further Evidence." Journal of Development Economics E, 5, 181-189.

Baldwin, Robert. 2003. Openness and Growth: What's the Empirical Relationship? Robert E. Baldwin. NBER Working Paper No. 9578

Barro, Robert J, 1991. "Economic Growth in a Cross Section of Countries," The Quarterly Journal of Economics, MIT Press, vol. 106(2), pages 407-43, May

Barro, Robert J & Sala-i-Martin, Xavier, 1992. "Convergence," Journal of Political Economy, University of Chicago Press, vol. 100(2), pages 223-51, April.

Ben-David, Dan. 1993. "Equalizing Exchange: Trade Liberalization and Income Convergence," Quarterly Journal of Economics, 108(3).

Berg, Andrew and Krueger, Anne O., "Trade, Growth, and Poverty: A Selective Survey" (February 2003). IMF Working Paper No. 03/30

Bolaky, Bineswaree, and Freund, Caroline. 2004. "Trade, Regulations, and Growth." Policy Research Working Paper No. WPS3255. Washington, D.C.: The World Bank.

Bosworth, Barry and Collins, Susan, 2003 "The Empirics of Growth: An Update" Brookings Papers of Economic Activity (September 2003). Washington, DC.

Calderon, Cesar; Loayza, Norman; and Schmidt-Hebbel, Klaus. 2004. "Openness, Vulnerability, and Growth." World Bank Research Paper, First Draft.

Chang, Roberto; Kaltani, Linda; and Loayza, Norman. 2005. ''Openness can be good for Growth: The Role of Policy Complementarities.'' World Bank Policy Research Working Paper # 3763.

Cline, William. 2004. "Trade Policy and Global Poverty." International Institute of Economics, Washington, DC

Collier, Paul and Anke Hoeffler, 1998. 'On economic causes of civil war', Oxford Economic Papers, Vol. 50 (4), pp. 563–573, 1998.

Dollar, David. 1992. "Outward-oriented Developing Countries Really Do Grow More Rapidly: Evidence from 95 LDC's, 1976-85." In Economic Development and Cultural Change 40(April): 523–544.

Dollar, David. and Kraay, Art. 2004. "Trade, Growth, and Poverty." Economic Journal 114(493): F22-49.

Durlauf, Steven N; Johnson, Paul; and Temple, Johnathan R. W., 2004. "Growth Econometrics," Vassar College Department of Economics Working Paper Series 61, Vassar College Department of Economics.

Edwards, Sebastian. 1998. "Openness, Productivity and Growth: What Do We Really Know?" Economic Journal 108(447): 383–98.

Elbadawi, Ibrahim, and Soto, Raimundo . forthcoming. "Theory and Empirics of Real Exchange Rates in Sub-Saharan Africa and Other Developing Countries". mimeo

EM-DAT (2006): The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

Frankel, Jeffrey Alexander, and Romer, David. 1999. "Does Trade Cause Growth?" American Economic Review 89(3): 379–99.

Feenstra Robert., 2004, Advanced International Trade, Theory and Evidence, Princeton Univ. Press, ISBN 0-691-11410-2

Gleditsch, Nils Petter; Wallensteen, Peter; Eriksson, Mikael; Sollenberg, Margareta; and Strand, Havard, 2002. 'Armed Conflict 1946–2001: A New Dataset', Journal of Peace Research 39(5): 615–637.

Greenaway, David; Morgan, Wyn; and Wright, Peter. 1998. "Trade liberalisation and growth in developing countries." Journal of Development Economics 67: 229-244.

Harrison, Ann. 1996. "Openness and Growth: A Time Series, Cross-Country Analysis for Developing Countries". Journal of Development Economics. No. 48: 419-447.

Hiscox, Michael, and Kastner, Scott. 2002. "A General Measure of Trade Policy Orientations: Gravity-Model-Based Estimates for 82 Nations, 1960-1992.". Draft available at: http://www.people.fas.harvard.edu/~hiscox/HiscoxKastner.pdf

Independent Evaluation Group, 2006. Assessing World Bank Support for Trade, 1987-2004: An IEG Evaluation. Washington, DC: The World Bank

Krueger, Alan, and Lindahl, Mikael, 2001. "Education for Growth: Why And For Whom?" Journal of Economic Literature, Vol. XXXIX (December 2001) pp. 1101–1136

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

Jinjarak, Yothin; Salinas, Gonzalo; and Tsikata, Ivonne. forthcoming. " Trade Adjustment Lending: Is the Glass Half-Full or Half-Empty?" mimeo.

Mankiw, N Gregory, Romer, David; and Weil, David N, 1992. "A Contribution to the Empirics of Economic Growth," The Quarterly Journal of Economics, MIT Press, vol. 107(2), pages 407-37, May

Muellbauer, John. and Nunziata, Luca. 2001. "Credit, the Stock Market and Oil: forecasting US GDP." CEPR discussion paper no. 2906, August.

Nash, John and Thomas, Vinod. "Reform of trade policy: recent evidence from theory and practice." The World Bank Research Observer, vol. 6, no. 2 (July 1991), pp. 219-240

Papageorgiou, Demetris; Michaely, Michael; and Choksi, Armeane, eds., 1991, Liberalizing Foreign Trade (Oxford: Basil Blackwell).

Pritchett, Lant, 1996, "Where Has All the Education Gone?". World Bank Policy Research Working Paper No. 1581.

Rodrik, Dani. 2000. "Comments on "Trade, Growth, and Poverty," by D. Dollar and A. Kraay (October 2000)." Electronic version available at: <http://ksghome.harvard.edu/~drodrik/papers.html>.

Rodriguez, Francisco, and Rodrik, Dani. 2000. "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence." In Ben Bernanke and Kenneth S. Rogoff (eds.) NBER Macroeconomic Annual. Cambridge, MA: MIT Press.

Rodrik, Dani; Subramanian, Arvind; and Trebbi, Francesco, 2002. "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development," CEPR Discussion Papers 3643, C.E.P.R. Discussion Papers

Sachs, Jeffrey D., and Warner, Andrew. 1995. "Economic Convergence and Economic Policies." In William Brainard and George Perry (eds.) Brooking Papers on Economic Activity 1: 108–118.

Salinas, Gonzalo. Forthcoming. "Measuring the Effectiveness of Trade Liberalization." mimeo.

Santos-Paulino, Amelia U. and Thirlwall, A. P. 2004. "Trade Liberalisation and Economic Performance in Developing Countries – Introduction" . Economic Journal, Vol. 114, pp. F1-F3, February.

UNCTAD (United Nations Conference for Trade and Development). 2006. Handbook of Statistics On-line. Available at: < http://stats.unctad.org/handbook/>

Wacziarg, Romain T. 1998. "Measuring the Dynamic Gains from Trade." World Bank Policy Research Working Paper No. 2001

Wacziarg, Romain, and Karen Horn Welch. 2003. "Trade Liberalization and Growth: New Evidence." NBER Working Paper No. 10152.

Warner, Andrew. 2003. "Once More into the Breach: Economic Integration." Center for Global Development. Working Paper No. 34, 2003. Harvard Univeristy.

World Bank. 1987. "World development report 1987 : barriers to adjustment and growth in the world economy; industrialization and foreign trade; world development indicators." Washington, D.C.: The World Bank.

_____ .2005. "World Development Indicators." World Bank World Development Indicators Series. Washington, D.C.

_____ .2006. "Assessing World Bank Support for Trade 1987-2004: An IEG Evaluation." World Bank Independent Evaluation Group. Washington, D.C.

## Appendix 1: Assessments of the Impact of Trade Policy Openness on Growth

| Study | Openess Indicators Used | Methodology | Control Variables | Conclusion of Study |
|---|---|---|---|---|
| WDR (1987) | WDR (1987) | Comparison of average rates of real GDP growth, among four categories of openness, based on subjective classification. | None | Countries with outward oriented policies grow faster than those with inward oriented regimes. |
| Papageorgiou, Michaely, and Choksi (1991) | Papageorgiou, Michaely, and Choksi (1991) | Comparison of average rates of real GDP growth, before and after trade liberalization among groups of liberalizers classiffied according to strength and sustainability of reforms. | None | If anything, trade reform-especially strong and fast reform-is associated with higher growth from the beginning. |
| Dollar (1991) | Dollar (1991) | Cross country regression | Investment rate | Outward orientation is positively related to per capita GDP growth. |
| Barro (1991) | Barro (1991) | Cross country regression with standard errors based on White's (1980) heteroskedasticity-consistent covariance matrix. Additional estimations weight obervations by the levels of GDP and population. | Initial income, educational attainment, investment rate, government consumption, population size, price of investment goods, fertility rate, mortality rate, regional dummy, socialist system dummy, and political instability. | Distortions of investment price goods are adverse for growth |
| Sachs and Warner (1995) | Sachs and Warner Index (1995) | Replicate Barro regression on cross country growth. Barro (1991) | Initial income, educational attainment, investment rate, government consumption, population density, price of investment goods, and political instability. | Open economies grow, on average, by 2.45 percentage points higher than closed economies, with a highly statistically significant effect |
| Harrison (1996) | Papageorgiou, et al (1991) Thomas et al (1990), Black market premium, Trade share of GDP, Bhalla and Lau (1992), Dollar (1991), and bias against agriculture from industrial sector protection and overvaluation of the exchange rate (Schiff and Valdes, 1992) | OLS cross-country estimation and panel fixed effects. | Capital stock, years of primary and secondary education, population, labor force, arable land, and technological change. | Although the correlation across different types of openness is not always strong, there is generally a positive association between growth and different measures of openness. |
| Wacziarg (1998) | Wacziarg (1998) | The model consists of a growth equation, an equation determining the nature of trade policy, and a series of channel equations describing the effects of trade policy on several growth determining variables. The parameters of the structural model are estimated jointly using three-stage least squares. | Initial Income, black market premium, FDI, macro policy quality, human capital, regional and country group dummies, population size, population density, ethnolinguistic fractionalization, terms of trade, democratic government, postwar dummy, island dummy | Trade openness has a strong positive impact on economic growth |
| Edwards (1998) | Sachs and Warner Index (1995); WDR (1987); Leamer (1998); Average Black Market premium; Average Import Tariffs; Coverage of Non Tariff Barriers; Heritage Foundation Index; Total revenue on trade taxes over total trade; Holger Wolf´s index | Cross country estimation through weighted least squares using GDP per capita in 1985 PPP dollars as weight, and also through instrumental weighted least squares. Openness is approximated through nine different variables. | Initial income per capita and human capital, property rights, political and macroeconomic stability. | More open countries have indeed experienced faster productivity growth and these results are robust to the use of openness indicator, estimation technique, time period and functional form. The only indicators whose coefficients do not reach conventional significance levels are Leamer's Index and Holger Wolf's Index. |

**Appendix 1 (cont): Assessments of the Impact of Trade Policy Openness on Growth**

| Study | Openess Indicators Used | Methodology | Control Variables | Conclusion of Study |
|---|---|---|---|---|
| Greenaway et al (1998) | Episode identification in Dean et al (1993), Sachs and Warner (1995), and World Bank (1993) | Use a very large data base and a panel framework together with a range of measures of liberalization and a more rigurous exploration of the dynamics of trade reform than hitherto. Panel estimation through dynamic GMM estimator (Arellando and Bond, 1991) | Initial income, educational attainment, investment rate, terms of trade, and population size. | Report a surprisingly consistent set of results both qualitatively and quantitatively. These suggest that liberalization and openness do impact favorably on the growth of GDP per capita. In the case of liberalization, the impact may not necesarily be straightforward and as theory suggests, the response is in all probability lagged. Morover, it is also relatively modest. That is not surprising since liberalizations vary in their depth and intensity and rarely ever amount to an intermediate shift to free trade. |
| Dollar and Kraay (2001) | Dollar and Kraay (2001) | Cross country using OLS and instrumenting for dependent variables through lagged variables. | Growth in previous decade, FDI to GDP, Investment rate, Contract intensive money, government consumption, inflation, revolutions | Changes in trade volumes have a strong positive relationship to changes in growth rates |
| Wacziarg and Welch (2003) | Wacziarg and Welch (2003) based on Sachs and Warner (1995) | Replication of Sachs and Warner (1995) cross country exercise for a longer time period. Seemingly Unrelated Regressions (SUR) and Fixed Effects regression based on liberalization dates. | Initial income, educational attainment, investment rate, government consumption, population density, price of investment goods, and political instability. | The replication of SW for the 1990s leads to an openness coefficient that is statistically indistinguishable from zero. SUR estimates of openness coefficient are between 1.2 and 1.4 and statistically different from zero for 1970-98, but again indistiguishable from zero for the 1990s. The fixed effects estimation however leads to openness coefficients that are significant for the period 1950-1998 and actually higher for 1990-98. |
| Bosworth and Collins (2003) | Sachs and Warner (1995) | Regression analysis (OLS) of the change in growth rates between two long time subperiods (1960-80 and 1980-2000) | Initial income per capita, human capital, (proxied by life expectancy in the initial year), changes in terms of trade, institutional quality, geography (number of frost days and tropical area), change in inflation, budget balance. | Their coefficient since the 1980s on the Sachs and Warner variable indicates a statistically significant increase of 0.82 percentage point in per capita growth for open versus closed economies. In the 1960-70 period this coefficient was insignificant. |
| Bolaky and Freund (2004) | The logs of a) current total trade relative to current GDP in local currency and b) a PPP-adjusted measure of trade to GDP | Cross-section OLS and IV using Frankel and Romer (1999) trade fitted values as an instrument for trade using a) levels b) decadal growth regressions. | Index of business and labor regulations, rule of law index, market size (natural log of population), landlock dummy, distance from the equator, legal origin | Both the levels and decadal growth regressions provide evidence that long-run growth is not helped, and may even be hampered, by trade in highly regulated economies. |
| Calderon, Loayza, and Schmidt-Hebbel (2004) | Ratio of exports plus imports to GDP | GMM for dynamic models of panel data | Average rate of secondary school enrollment, average ratio of private credit to GDP, average inflation rate to account for monetary discipline, and average ratio of government consumption to GDP, and foreign shocks variables. | The findings point toward non-monotonic effects of openness, in the sense that the growth effects of trade and inancial openness increase with the level of development, tapering off for high levels of income. |
| Chang, Kaltani, and Loayza (2005) | Dollar and Kraay (2001) | Panel data growth regression using GMM procedure to control for endogeneity and unobserved country-specific factors. | Educational investment, financial depth, macroeconomic price stability, public infrastructure, governance, labor-market flexibility, ease of firm entry, and ease of firm exit. | The growth effects of openness are positive and economically significant if certain complementary reforms are undertaken. |

**Appendix 2: Variables in Growth Equations**

| **Variables** | **How we account for them** |
|---|---|
| | |
| *Convergence Term* | |
| Income Per Capita | Included GDPTOUS in Multivariate Regression. |
| *Solow Model Variables* | |
| Human Capital | Time trend captured through trend term or year dummies. |
| Physical Capital | Included ll.igdp in one specification but not directly taken into account in most specifications. Assumed as an outcome of trade liberalization. |
| *Controls for Steady-State Growth Rate* | |
| Geography | Dropped in fixed effects transformation since it is constant through time. |
| Institutional Quality | Component related to Income per Capita captured through GDPTOUS. Any time trend captured through year dummies or time trend. Exclusion of transition countries from our sample. |
| Life Expectancy | Component related to Income per Capita captured through GDPTOUS. Any time trend captured through year dummies or time trend. |
| Population Size | Included in instrumental form through ll.lpop (logarithm, two-year lagged) |
| *Variables Affecting Growth, not the Steady-State Rate* | |
| Real Exchange Rate Misalignment | RXRDEV |
| Terms of Trade | LTOT |
| Natural Disaster | DISAST |
| World Demand Growth | Year Dummies |
| Fiscal Balance | FBAL |
| Current Account | CUR |
| Inflation Reduction | INFG |

## Appendix 3: Episodes List

| Country | Year | TAE | WW | Country | Year | TAE | WW |
|---|---|---|---|---|---|---|---|
| Argentina | 1991 | X | X | Malawi | 1994 | X | |
| Bangladesh | 1992 | X | | Malaysia | 1988 | X | |
| Bangladesh | 1995 | | X | Mali | 1988 | X | X |
| Benin | 1990 | X | X | Mauritania | 1995 | X | X |
| Bolivia | 1985 | X | X | Mexico | 1986 | X | X |
| Brazil | 1991 | X | X | Morocco | 1984 | X | X |
| Cameroon | 1993 | X | X | Nepal | 1991 | X | X |
| Central African Republic | 1994 | X | | Niger | 1994 | X | X |
| Chile | 1986 | X | | Pakistan | 1991 | X | |
| Costa Rica | 1986 | X | X | Pakistan | 2001 | | X |
| Cote d'Ivoire | 1994 | X | X | Panama | 1991 | X | |
| Dominican Republic | 1992 | X | X | Panama | 1996 | | X |
| Ecuador | 1991 | X | X | Paraguay | 1989 | X | X |
| Ghana | 1985 | X | X | Philippines | 1988 | X | X |
| Honduras | 1991 | X | X | Senegal | 1994 | X | |
| India | 1991 | X | | South Africa | 1991 | X | X |
| Jamaica | 1985 | X | X | Thailand | 1986 | X | |
| Jordan | 1994 | X | | Tunisia | 1989 | X | X |
| Kenya | 1993 | X | X | Turkey | 1982 | X | |
| Korea, Rep. | 1982 | X | | Turkey | 1989 | | X |
| Madagascar | 1992 | X | | Uruguay | 1990 | X | X |
| Madagascar | 1996 | | X | Zambia | 1993 | X | X |

TAE: Trade Assistance Evaluation (Jinjarak et al, forthcoming). SW: Sachs and Warner (1995). WW: Wacziarg and Welch (2003)

**Appendix 4: Variables' Codes and Sources**

| CODE | Variable | Source |
|---|---|---|
| cur | Current account balance (% of GDP) | World Development Indicators (2006) |
| debt | External debt (% of GNI) | World Development Indicators (2006) |
| disast | Dummy for occurrence of a major natural disaster (1 if disaster incurred financial costs higher than 0.5% of GDP or affected more than 5% of the population, 0 otherwise) | OFDA/CRED Emergencies database |
| fbal | Overall budget balance, including grants (% of GDP) | World Development Indicators (2006) |
| gdppcg | GDP growth per capita (annual %) | World Development Indicators (2006) |
| gdptous | Ratio of Country-to-US GNI per Capita at time=-1 (Logarithm) | World Development Indicators (2006) |
| gnipcat | Gross National Income Per Capita (Atlas Method) | World Development Indicators (2006) |
| igdp | Gross Capital Formation (% of GDP) | World Development Indicators (2006) |
| ind | Industry, value added (% of GDP) | World Development Indicators (2006) |
| inf | Inflation, consumer prices (annual %) | World Development Indicators (2006) |
| infg | Annual Change in the Inflation Rate (%) | World Development Indicators (2006) |
| l.gdppcg | 1 yr. lagged gdppcg (%) | World Development Indicators (2006) |
| ll.igdp | igdp two year lagged | World Development Indicators (2006) |
| ll.lpop | Population Size two-year lagged (logarithm) | World Development Indicators (2006) |
| ltot | Logarithm of the Terms of Trade (TOT=100 in 2000) | World Development Indicators (2006) |
| manx | Manufactures exports (% of merchandise exports) | World Development Indicators (2006) |
| mgdp | Imports of goods and services (% of GDP) | World Development Indicators (2006) |
| ntb | Frequency of Non-Tariff Barriers (% of Tariff Lines) | UNCTAD |
| postini | Interaction of Postlib and average gdppcg in [-12,-5] | World Development Indicators (2006) |
| postlib | Post-liberalization Dummy | Authors' estimates |
| postpops | Interaction of Postlib and Population Size | World Development Indicators (2006) |
| rxr | Real Effective Exchange Rate (2000=100) | World Development Indicators (2006) |
| rxrdev | Real Exchange Rate (REER) misalignment (% of equilibrium REER) | Elbadawi and Soto (forthcoming) |
| tar | Unweighted Average Tariff (%, Ad-Valorem) | Trade Assistance Evaluation (IEG, 2006) |
| tot | Annual Change in Terms of Trade (2000=100) | World Development Indicators (2006) |
| wdemg | World Demand Growth, calcultated excluding country under consideration (% annual) | World Development Indicators (2006) |
| xcon | Exports Concentration (Herfindahl-Hirschmann Index) | UNCTAD Handbook of Statistics (Online) |
| xgdp | Exports of goods and services (% of GDP) | World Development Indicators (2006) |

## Appendix 5: Classification of Developing Countries

| name | Main Characteristics | | | | | | Reasons for Exclusion from Sample | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In-Sample | Region | Income Per Capita | Population Size | Geography | Hyperinflation | Main Exports | Conflict | Population Less than 1 million | Transition | Insufficient Data |
| **IN-SAMPLE** | | | | | | | | | | | |
| Argentina | X | LAC | Middle Income | Large | Other | X | Other | Non-Conflict | | | |
| Bangladesh | X | SAR | Low Income | Large | Other | | Manuf | Non-Conflict | | | |
| Benin | X | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | |
| Bolivia | X | LAC | Middle Income | Small | Landlocked | X | Fuel | Non-Conflict | | | |
| Brazil | X | LAC | Middle Income | Large | Other | X | Manuf | Non-Conflict | | | |
| Cameroon | X | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | |
| Central African Republic | X | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | |
| Chile | X | LAC | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| Costa Rica | X | LAC | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| Cote d'Ivoire | X | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | |
| Dominican Republic | X | LAC | Middle Income | Small | Island | | Other | Non-Conflict | | | |
| Ecuador | X | LAC | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| Ghana | X | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | |
| Honduras | X | LAC | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| India | X | SAR | Low Income | Large | Other | | Manuf | Non-Conflict | | | |
| Jamaica | X | LAC | Middle Income | Small | Island | | Manuf | Non-Conflict | | | |
| Jordan | X | MNA | Middle Income | Small | Other | | Manuf | Non-Conflict | | | |
| Kenya | X | AFR | Low Income | Large | Other | | Other | Non-Conflict | | | |
| Korea, Rep. | X | EAP | Middle Income | Large | Other | | Manuf | Non-Conflict | | | |
| Madagascar | X | AFR | Low Income | Small | Island | | Other | Non-Conflict | | | |
| Malawi | X | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | |
| Malaysia | X | EAP | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| Mali | X | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | |
| Mauritania | X | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | |
| Mexico | X | LAC | Middle Income | Large | Other | | Man | Non-Conflict | | | |
| Morocco | X | AFR | Middle Income | Large | Other | | Manuf | Non-Conflict | | | |
| Nepal | X | SAR | Low Income | Small | Landlocked | | Manuf | Non-Conflict | | | |
| Niger | X | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | |
| Pakistan | X | SAR | Low Income | Large | Other | | Manuf | Non-Conflict | | | |
| Panama | X | LAC | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| Paraguay | X | LAC | Middle Income | Small | Landlocked | | Other | Non-Conflict | | | |
| Philippines | X | EAP | Middle Income | Large | Island | | Other | Non-Conflict | | | |
| Senegal | X | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | |
| South Africa | X | AFR | Middle Income | Large | Other | | Other | Non-Conflict | | | |
| Thailand | X | EAP | Middle Income | Large | Other | | Other | Non-Conflict | | | |
| Tunisia | X | MNA | Middle Income | Small | Other | | Manuf | Non-Conflict | | | |
| Turkey | X | ECA | Middle Income | Large | Other | | Manuf | Non-Conflict | | | |
| Uruguay | X | LAC | Middle Income | Small | Other | | Other | Non-Conflict | | | |
| Zambia | X | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | |
| **OUT-OF-SAMPLE** | | | | | | | | | | | |
| Afghanistan | | SAR | No data | Large | Landlocked | | Other | Conflict | | | |
| Albania | | ECA | Middle Income | Small | Other | | Other | Non-Conflict | | X | |
| Algeria | | MNA | Middle Income | Large | Other | | Fuel | Conflict | | | |
| American Samoa | | EAP | No data | Small | Island | | Other | Non-Conflict | | | X |
| Angola | | AFR | Low Income | Small | Other | X | Fuel | Conflict | | | |
| Armenia | | ECA | Middle Income | Small | Landlocked | X | Other | Non-Conflict | | X | |
| Azerbaijan | | ECA | Low Income | Small | Landlocked | X | Other | Conflict | | X | |
| Belarus | | ECA | Middle Income | Small | Landlocked | X | Other | Non-Conflict | | X | |
| Belize | | LAC | Middle Income | Small | Other | | Other | Non-Conflict | X | | |
| Bhutan | | EAP | Low Income | Small | Landlocked | | Other | Non-Conflict | X | | |
| Bosnia and Herzegovina | | ECA | Middle Income | Small | Other | | Other | Conflict | | X | |
| Botswana | | AFR | Middle Income | Small | Landlocked | | Other | Non-Conflict | X | | |
| Bulgaria | | ECA | Middle Income | Small | Other | X | Other | Non-Conflict | | X | |
| Burkina Faso | | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | X |
| Burundi | | AFR | Low Income | Small | Landlocked | | Other | Conflict | | | |
| Cambodia | | EAP | Low Income | Small | Other | | Other | Conflict | | | |
| Cape Verde | | AFR | Middle Income | Small | Other | | Other | Non-Conflict | X | | |
| Chad | | AFR | Low Income | Small | Landlocked | | Other | Conflict | | | |
| China | | EAP | Middle Income | Large | Other | | Other | Non-Conflict | | X | |
| Colombia | | LAC | Middle Income | Large | Other | | Other | Conflict | | | |
| Comoros | | AFR | Low Income | Small | Island | | Other | Non-Conflict | X | | |
| Congo, Dem. Rep. | | AFR | Low Income | Large | Other | X | Other | Conflict | | | |
| Congo, Rep. | | AFR | Low Income | Small | Other | | Fuel | Conflict | | | |
| Croatia | | ECA | Middle Income | Small | Other | X | Other | Non-Conflict | | X | |
| Cuba | | LAC | No data | Small | Island | | Other | Non-Conflict | | | X |
| Czech Republic | | ECA | Middle Income | Small | Landlocked | | Other | Non-Conflict | | X | |
| Djibouti | | MNA | Middle Income | Small | Other | | Other | Non-Conflict | X | | |
| Dominica | | LAC | Middle Income | Small | Other | | Manuf | Non-Conflict | X | | |
| Egypt, Arab Rep. | | MNA | Middle Income | Large | Other | | Fuel | Non-Conflict | | | |
| El Salvador | | LAC | Middle Income | Small | Other | | Other | Conflict | | | |
| Equatorial Guinea | | AFR | No data | Small | Other | | Other | Non-Conflict | X | | |
| Eritrea | | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | X |
| Estonia | | ECA | Middle Income | Small | Other | | Other | Non-Conflict | | X | |
| Ethiopia | | AFR | Low Income | Large | Landlocked | | Other | Conflict | | | |
| Fiji | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Gabon | | AFR | Middle Income | Small | Other | | Fuel | Non-Conflict | X | | |

**Appendix 5: Classification of Developing Countries (continued)**

| name | Main Characteristics | | | | | | Reasons for Exclusion from Sample | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In-Sample | Region | Income Per Capita | Population Size | Geography | Hyperinflation | Main Exports | Conflict | Population Less than 1 million | Transition | Insufficient Data |
| Gambia, The | | AFR | Low Income | Small | Other | | Other | Non-Conflict | X | | |
| Georgia | | ECA | Low Income | Small | Other | | Other | Conflict | | X | |
| Grenada | | LAC | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Guatemala | | LAC | Middle Income | Small | Other | | Other | Conflict | | | |
| Guinea | | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | X |
| Guinea-Bissau | | AFR | Low Income | Small | Other | | Other | Non-Conflict | X | | |
| Guyana | | AFR | Middle Income | Small | Other | | Other | Non-Conflict | X | | |
| Haiti | | LAC | Low Income | Small | Island | | Manuf | Non-Conflict | | | X |
| Hungary | | ECA | Middle Income | Small | Landlocked | | Manuf | Non-Conflict | | X | |
| Indonesia | | EAP | Middle Income | Large | Island | | Fuel | Non-Conflict | | | |
| Iran, Islamic Rep. | | MNA | Middle Income | Large | Other | | Other | Conflict | | | |
| Iraq | | MNA | No data | Small | Other | | Other | Conflict | | | |
| Kazakhstan | | ECA | Middle Income | Small | Landlocked | X | Other | Non-Conflict | | X | |
| Kiribati | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Korea, Dem. Rep. | | EAP | No data | Large | Other | | Other | Non-Conflict | | | X |
| Kyrgyz Republic | | ECA | Low Income | Small | Landlocked | | Other | Non-Conflict | | X | |
| Lao PDR | | EAP | Low Income | Small | Landlocked | | Other | Non-Conflict | | | X |
| Latvia | | ECA | Middle Income | Small | Other | | Other | Non-Conflict | | X | |
| Lebanon | | MNA | Middle Income | Small | Other | | Other | Conflict | | | |
| Lesotho | | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | |
| Liberia | | AFR | Low Income | Small | Other | | Other | Conflict | | | |
| Libya | | MNA | No data | Small | Other | | Fuel | Non-Conflict | | | |
| Lithuania | | ECA | Middle Income | Small | Other | | Other | Non-Conflict | | X | |
| Macedonia, FYR | | ECA | Middle Income | Small | Other | | Other | Non-Conflict | | X | |
| Maldives | | SAR | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Marshall Islands | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Mauritius | | AFR | Middle Income | Small | Island | | Manuf | Non-Conflict | | | X |
| Mayotte | | AFR | No data | Small | Island | | Other | Non-Conflict | | | X |
| Micronesia, Fed. Sts. | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Moldova | | ECA | Low Income | Small | Landlocked | | Other | Non-Conflict | | X | |
| Mongolia | | EAP | Low Income | Small | Landlocked | | Other | Non-Conflict | | | X |
| Mozambique | | AFR | Low Income | Small | Other | | Other | Conflict | | | |
| Myanmar | | EAP | No data | Large | Other | | Other | Conflict | | | |
| N. Mariana Islands | | EAP | No data | Small | Island | | Other | Non-Conflict | | | X |
| Namibia | | AFR | Middle Income | Small | Other | | Other | Non-Conflict | | | X |
| Nicaragua | | LAC | Low Income | Small | Other | X | Other | Conflict | | | |
| Nigeria | | AFR | Low Income | Large | Other | | Other | Conflict | | | |
| Oman | | MNA | Middle Income | Small | Other | | Manuf | Non-Conflict | | | X |
| Palau | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Papua New Guinea | | EAP | Low Income | Small | Island | | Other | Non-Conflict | | | X |
| Peru | | LAC | Middle Income | Large | Other | X | Other | Conflict | | | |
| Poland | | ECA | Middle Income | Large | Other | | Manuf | Non-Conflict | | X | |
| Romania | | ECA | Middle Income | Large | Other | | Other | Conflict | | X | |
| Russian Federation | | ECA | Middle Income | Large | Other | | Other | Non-Conflict | | X | |
| Rwanda | | AFR | Low Income | Small | Landlocked | | Other | Conflict | | | |
| Samoa | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Sao Tome and Principe | | AFR | Low Income | Small | Island | | Other | Non-Conflict | X | | |
| Saudi Arabia | | MNA | Middle Income | Small | Other | | Fuel | Non-Conflict | | | |
| Serbia and Montenegro | | ECA | Middle Income | Small | Other | | Manuf | Non-Conflict | | X | |
| Seychelles | | AFR | Low Income | Small | Island | | Fuel | Non-Conflict | X | | |
| Sierra Leone | | AFR | Low Income | Small | Other | | Other | Conflict | | | |
| Slovak Republic | | ECA | Middle Income | Small | Landlocked | | Other | Non-Conflict | | X | |
| Solomon Islands | | EAP | Low Income | Small | Island | | Other | Non-Conflict | X | | |
| Somalia | | AFR | Low Income | Small | Other | | Other | Conflict | | | |
| Sri Lanka | | SAR | Middle Income | Small | Island | | Other | Conflict | | | |
| St. Kitts and Nevis | | LAC | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| St. Lucia | | LAC | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| St. Vincent and the Grenadines | | LAC | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Sudan | | AFR | Low Income | Large | Other | | Other | Conflict | | | |
| Suriname | | LAC | Middle Income | Small | Other | | Other | Non-Conflict | X | | |
| Swaziland | | AFR | Middle Income | Small | Landlocked | | Other | Non-Conflict | X | | |
| Syrian Arab Republic | | MNA | Middle Income | Small | Other | | Fuel | Non-Conflict | | | |
| Tajikistan | | ECA | Low Income | Small | Landlocked | | Other | Conflict | | X | |
| Tanzania | | AFR | Low Income | Large | Other | | Other | Non-Conflict | | | X |
| Timor-Leste | | EAP | Low Income | Small | Island | | Manuf | Non-Conflict | X | | |
| Togo | | AFR | Low Income | Small | Other | | Other | Non-Conflict | | | X |
| Tonga | | EAP | Middle Income | Small | Other | | Fuel | Non-Conflict | X | | |
| Trinidad and Tobago | | LAC | Middle Income | Small | Island | | Fuel | Non-Conflict | | | |
| Turkmenistan | | ECA | Middle Income | Small | Other | | Other | Non-Conflict | | X | |
| Uganda | | AFR | Low Income | Small | Landlocked | | Other | Conflict | | | |
| Ukraine | | ECA | Middle Income | Large | Other | X | Other | Non-Conflict | | X | |
| Uzbekistan | | ECA | Low Income | Large | Other | | Other | Non-Conflict | | X | |
| Vanuatu | | EAP | Middle Income | Small | Island | | Other | Non-Conflict | X | | |
| Venezuela, RB | | LAC | Middle Income | Large | Other | | Fuel | Non-Conflict | | | |
| Vietnam | | EAP | Low Income | Large | Other | | Other | Non-Conflict | | X | |
| West Bank and Gaza | | MNA | Middle Income | Small | Landlocked | | Other | Non-Conflict | | | X |
| Yemen, Rep. | | MNA | Low Income | Small | Other | | Manuf | Conflict | | | |
| Zimbabwe | | AFR | Low Income | Small | Landlocked | | Other | Non-Conflict | | | X |

**Appendix 6: Main Economic and Social Indicators In and Out of Sample**

| Variable | Obs | Mean | Std. Dev. | 95% Confidence Interval Min | 95% Confidence Interval Max |
|---|---|---|---|---|---|
| ***Out-of-Sample*** | | | | | |
| *General Indicators* | | | | | |
| Gross National Income Per Capita (US$) | 2239 | 1683.95 | 2066.98 | 80.91 | 18062.53 |
| Inflation (% annual) | 1910 | 75.52 | 702.66 | -13.06 | 23773.13 |
| Fiscal Balance (% of GDP) | 1249 | -3.63 | 6.57 | -64.49 | 20.63 |
| Growth in External Debt (% Annual) | 1934 | 81.36 | 105.64 | 0.00 | 1209.30 |
| Current Account Balance (% of GDP) | 1936 | -5.36 | 11.30 | -132.80 | 53.23 |
| Growth in Real Exchange Rate (% Annual) | 1755 | 1.74 | 29.35 | -100.00 | 859.82 |
| Growth in Terms of Trade (% Annual) | 1750 | 0.86 | 15.40 | -60.72 | 135.37 |
| Imports of Goods and Services (% of GDP) | 2484 | 44.04 | 23.11 | 1.05 | 173.00 |
| Unweighted Average Tariffs (%) | 950 | 16.66 | 9.60 | 0.00 | 61.00 |
| Frequency of Non-Tariff (% of tariff lines) | 179 | 31.97 | 34.68 | 0.12 | 100.00 |
| *Regression Variables* | | | | | |
| Growth in GDP per Capita (% Annual) | 2706 | 1.38 | 8.13 | -53.68 | 103.32 |
| Investment (% of GDP) | 2500 | 23.55 | 10.44 | -17.38 | 113.58 |
| Exports of Goods and Services (% of GDP) | 2485 | 34.45 | 20.24 | 0.42 | 128.00 |
| Industrial Value Added (% of GDP) | 2405 | 29.86 | 14.23 | 0.00 | 88.92 |
| Exports Concentration (Herfindahl-Hirschmann Index) | 901 | 0.41 | 0.24 | 0.05 | 1.00 |
| Manufacturing Exports (% of Merchandise Exports) | 1550 | 27.40 | 27.50 | 0.00 | 100.00 |
| ***In-Sample*** | | | | | |
| *General Indicators* | | | | | |
| Gross National Income Per Capita (US$) | 1250 | 1409.81 | 1637.57 | 115.70 | 13979.41 |
| Inflation (% annual) | 1155 | 44.72 | 389.67 | -9.62 | 11749.64 |
| Fiscal Balance (% of GDP) | 911 | -3.47 | 4.55 | -30.72 | 5.53 |
| Growth in External Debt (% Annual) | 1164 | 68.32 | 47.45 | 2.14 | 415.87 |
| Current Account Balance (% of GDP) | 1165 | -4.06 | 5.60 | -36.86 | 15.92 |
| Growth in Real Exchange Rate (% Annual) | 983 | -1.28 | 11.70 | -70.21 | 122.79 |
| Growth in Terms of Trade (% Annual) | 1242 | -0.24 | 11.71 | -64.35 | 73.96 |
| Imports of Goods and Services (% of GDP) | 1442 | 34.19 | 20.90 | 2.98 | 139.00 |
| Unweighted Average Tariffs (%) | 673 | 21.52 | 15.13 | 5.10 | 107.00 |
| Frequency of Non-Tariff (% of tariff lines) | 197 | 29.84 | 31.09 | 0.10 | 100.00 |
| *Regression Variables* | | | | | |
| Growth in GDP per Capita (% Annual) | 1452 | 1.52 | 4.68 | -19.96 | 27.87 |
| Investment (% of GDP) | 1446 | 21.09 | 7.39 | 3.15 | 66.38 |
| Exports of Goods and Services (% of GDP) | 1442 | 26.92 | 16.69 | 2.90 | 124.00 |
| Industrial Value Added (% of GDP) | 1411 | 27.04 | 8.96 | 6.25 | 59.84 |
| Exports Concentration (Herfindahl-Hirschmann Index) | 713 | 0.32 | 0.17 | 0.08 | 0.85 |
| Manufacturing Exports (% of Merchandise Exports) | 1189 | 33.23 | 26.99 | 0.16 | 98.80 |

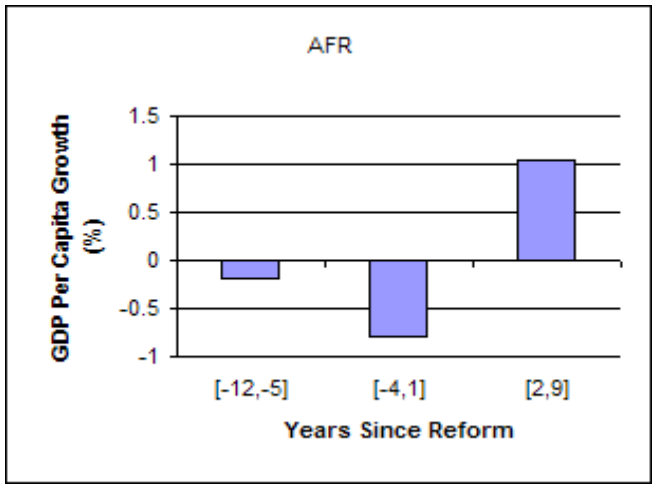
Source: World Development Indicators (2006) and UNCTAD's Handbook of Statistics

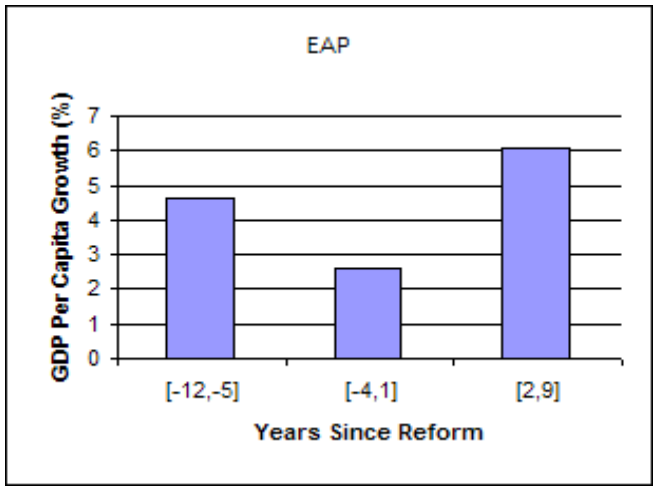
**Appendix 7: Main economic indicators by country subgroup**

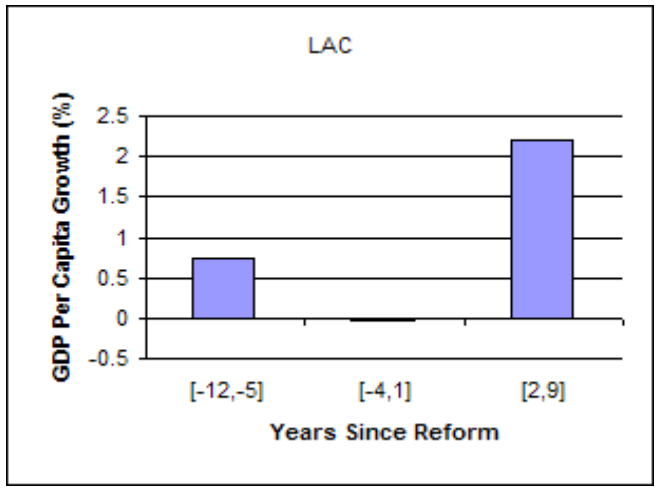
| Variable | In-Sample | Conflict | Transition | Hyperinflation | Population <1million | Fuel Exports |
|---|---|---|---|---|---|---|
| **Number of Countries** | **39** | **33** | **125** | **14** | **31** | **139** |
| *General Indicators* | | | | | | |
| Gross National Income Per Capita (US$) | 1409.81 | 765.54 | 1930.97 | 1668.33 | 1872.16 | 1495.56 |
| Inflation (% annual) | 44.72 | 197.23 | 107.11 | 644.78 | 9.40 | 69.73 |
| Fiscal Balance (% of GDP) | -3.47 | -3.50 | -1.97 | -3.99 | -2.51 | -3.20 |
| Growth in External Debt (% Annual) | 68.32 | 102.17 | 48.66 | 109.02 | 95.79 | 81.54 |
| Current Account Balance (% of GDP) | -4.06 | -5.67 | -4.10 | -7.25 | -7.86 | -4.90 |
| Growth in Real Exchange Rate (% Annual) | -1.28 | 4.09 | 3.79 | 8.83 | 0.07 | 0.78 |
| Growth in Terms of Trade (% Annual) | -0.24 | 2.53 | 1.01 | 1.07 | -0.10 | 0.88 |
| Imports of Goods and Services (% of GDP) | 34.19 | 29.19 | 47.74 | 33.80 | 67.01 | 42.95 |
| *Regression Variables* | | | | | | |
| Growth in GDP per Capita (% Annual) | 1.52 | 0.46 | 2.63 | 0.40 | 1.68 | 1.44 |
| Investment Growth (% Annual) | 21.09 | 4.37 | 2.36 | 5.14 | 0.96 | 2.30 |
| Exports of Goods and Services (% of GDP) | 26.92 | 22.07 | 41.12 | 28.32 | 47.87 | 32.88 |
| Industrial Value Added (% of GDP) | 27.04 | 27.59 | 35.07 | 33.99 | 23.13 | 27.10 |
| Exports Concentration (Herfindahl-Hirschmann Index) | 0.32 | 0.42 | 0.17 | 0.23 | 0.56 | 0.34 |
| Manufacturing Exports (% of Merchandise Exports) | 33.23 | 20.16 | 61.71 | 32.99 | 23.78 | 38.97 |

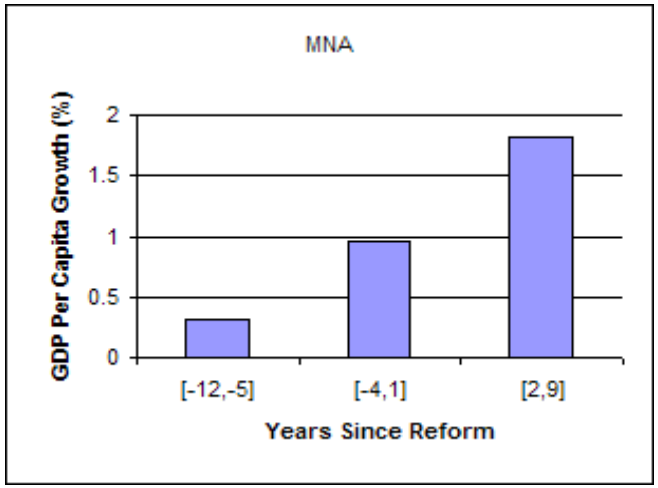
Source: World Development Indicators (2006) and UNCTAD's Handbook of Statistics

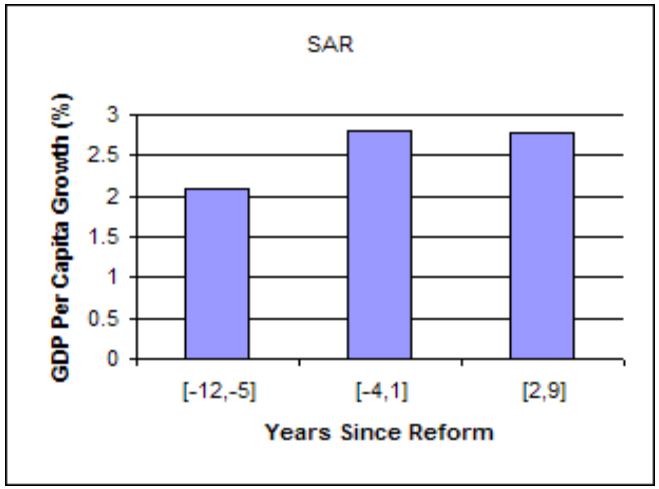
## Appendix 8: GDP Per Capita Growth by Country Subgroups



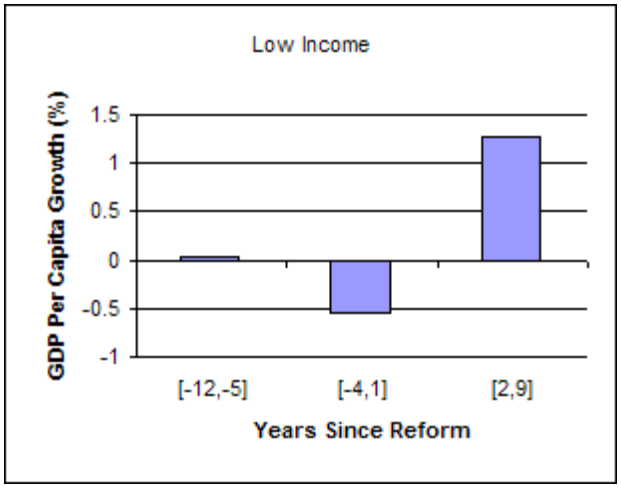



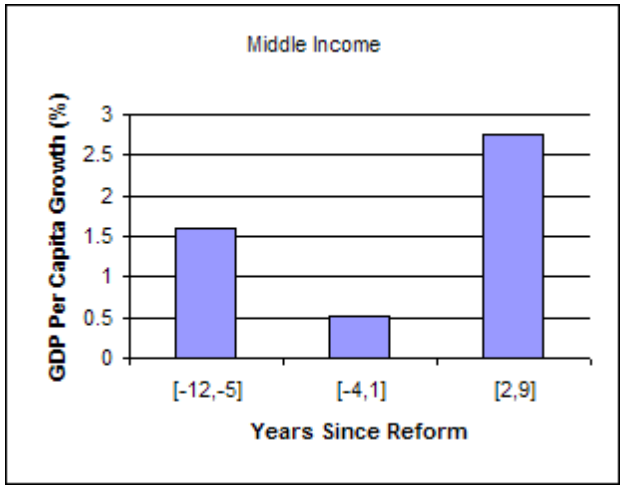



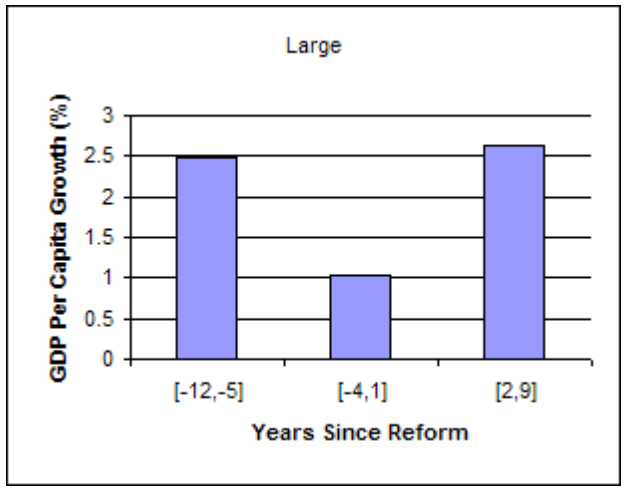



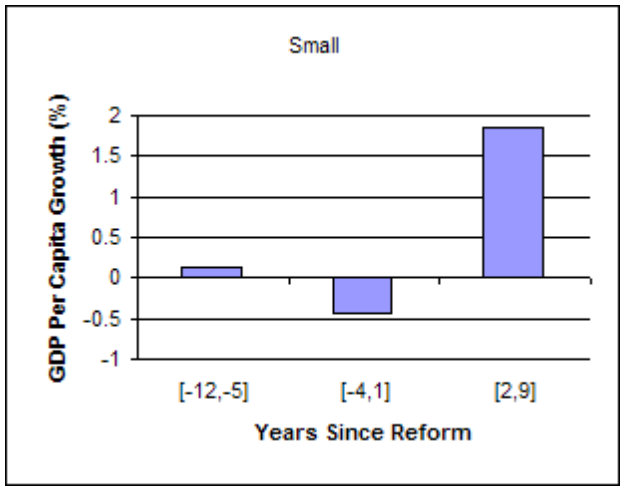



**Appendix 8 (continued)**
**GDP Per Capita Growth by Country Subgroups**



## Appendix 9: Main Economic and Social Indicators Before and After Trade Liberalization

| Variable | Obs | Mean | Std. Dev. | 95% Confidence Interval Min | 95% Confidence Interval Max |
|---|---|---|---|---|---|
| ***Pre Liberalization (Years [-12,-5])*** | | | | | |
| *General Indicators* | | | | | |
| Gross National Income Per Capita (US$) | 289 | 981.37 | 784.89 | 131.84 | 3649.39 |
| Inflation (% annual) | 249 | 29.39 | 71.83 | -6.87 | 672.18 |
| Fiscal Balance (% of GDP) | 245 | -4.43 | 4.35 | -21.63 | 5.41 |
| Growth in External Debt (% Annual) | 269 | 10.42 | 21.30 | -40.21 | 137.58 |
| Current Account Balance (% of GDP) | 279 | -5.69 | 5.02 | -29.75 | 9.32 |
| Real Effective Exchange Rate (2000=100) | 220 | 152.84 | 63.36 | 47.56 | 794.76 |
| Terms of Trade (2000=100) | 271 | 115.45 | 36.30 | 54.04 | 313.39 |
| Imports of Goods and Services (% of GDP) | 311 | 29.42 | 16.06 | 4.76 | 91.50 |
| Unweighted Average Tariffs (%) | 93 | 34.35 | 22.43 | 6.00 | 102.00 |
| Frequency of Non-Tariff (% of tariff lines) | 30 | 55.02 | 28.94 | 6.60 | 96.10 |
| *Regression Variables* | | | | | |
| Growth in GDP per Capita (% Annual) | 312 | 0.92 | 4.87 | -19.94 | 14.26 |
| Investment (% of GDP) | 312 | 20.41 | 6.46 | 3.15 | 38.26 |
| Exports of Goods and Services (% of GDP) | 311 | 23.88 | 14.74 | 3.28 | 98.20 |
| Industrial Value Added (% of GDP) | 303 | 27.54 | 9.76 | 9.86 | 49.42 |
| Exports Concentration (Herfindahl-Hirschmann Index) | 115 | 0.36 | 0.15 | 0.11 | 0.75 |
| Manufacturing Exports (% of Merchandise Exports) | 255 | 26.16 | 21.24 | 0.78 | 87.40 |
| ***Post Liberalization (Years [2,9])*** | | | | | |
| *General Indicators* | | | | | |
| Gross National Income Per Capita (US$) | 312 | 1624.45 | 1715.67 | 156.75 | 8173.16 |
| Inflation (% annual) | 310 | 25.91 | 160.40 | -6.24 | 2075.89 |
| Fiscal Balance (% of GDP) | 222 | -1.86 | 3.49 | -20.13 | 4.72 |
| Growth in External Debt (% Annual) | 300 | -1.54 | 14.17 | -37.83 | 78.43 |
| Current Account Balance (% of GDP) | 281 | -3.39 | 3.77 | -17.62 | 9.68 |
| Real Effective Exchange Rate (2000=100) | 307 | 102.35 | 19.41 | 59.78 | 184.26 |
| Terms of Trade (2000=100) | 273 | 103.05 | 14.08 | 70.60 | 190.43 |
| Imports of Goods and Services (% of GDP) | 312 | 35.01 | 17.90 | 9.10 | 98.10 |
| Unweighted Average Tariffs (%) | 269 | 16.76 | 8.32 | 5.40 | 51.00 |
| Frequency of Non-Tariff (% of tariff lines) | 67 | 23.52 | 33.47 | 0.10 | 100.00 |
| *Regression Variables* | | | | | |
| Growth in GDP per Capita (% Annual) | 312 | 2.11 | 3.35 | -7.99 | 11.63 |
| Investment (% of GDP) | 312 | 21.22 | 6.99 | 4.30 | 43.64 |
| Exports of Goods and Services (% of GDP) | 312 | 29.53 | 16.86 | 6.91 | 101.00 |
| Industrial Value Added (% of GDP) | 304 | 26.67 | 7.51 | 9.22 | 44.57 |
| Exports Concentration (Herfindahl-Hirschmann Index) | 255 | 0.31 | 0.17 | 0.08 | 0.85 |
| Manufacturing Exports (% of Merchandise Exports) | 288 | 41.60 | 27.98 | 0.53 | 98.80 |

Source: World Development Indicators (2006) and UNCTAD's Handbook of Statistics

**Appendix 10: Change in GDP per capita growth from years [-12,-5] to [2,9]**

| Country | Period |
|---|---|
| Jamaica | 7.53 |
| Dominican Republic | 4.53 |
| Chile | 4.23 |
| Madagascar | 4.15 |
| Ghana | 3.84 |
| Thailand | 3.72 |
| Niger | 3.51 |
| Zambia | 3.35 |
| Uruguay | 3.24 |
| India | 2.69 |
| Bangladesh | 2.60 |
| Argentina | 2.50 |
| Mauritania | 2.24 |
| Korea, Rep. | 2.07 |
| Cote d'Ivoire | 1.91 |
| Nepal | 1.28 |
| Malaysia | 1.16 |
| Panama | 1.16 |
| Honduras | 1.06 |
| Mali | 1.01 |
| Tunisia | 0.90 |
| Brazil | 0.78 |
| Costa Rica | 0.73 |
| Senegal | 0.71 |
| Central African Republic | 0.59 |
| Benin | 0.59 |
| South Africa | 0.58 |
| Jordan | 0.49 |
| Malawi | 0.19 |
| Ecuador | 0.18 |
| Bolivia | 0.05 |
| Kenya | -0.86 |
| Turkey | -1.09 |
| Philippines | -1.86 |
| Cameroon | -2.13 |
| Morocco | -2.81 |
| Pakistan | -2.91 |
| Mexico | -3.35 |
| Paraguay | -4.00 |

**Appendix 11: Impact of Trade Liberalization on GDP Per Capita Growth (Using Wacziarg and Welch Liberalization Years)**

| | Basic Equation Using Entire Period [-12,9] | Excluding [-4,1] | | |
|---|---|---|---|---|
| | | Basic Equation | With Time Trend | With Year Dummies |
| | Independent Variable: GDP Per Capita Growth | | | |
| postlib | 1.457 | 1.134 | 2.625 | 2.894 |
| | (4.69)** | (3.16)** | (3.25)** | (2.36)* |
| trend | | | -0.173 | |
| | | | (2.06)* | |
| Constant | -0.007 | 0.435 | -0.124 | 0.112 |
| | (0.03) | (1.74) | (0.34) | (0.03) |
| Observations | 671 | 485 | 485 | 485 |
| Number of countries | 31 | 31 | 31 | 31 |
| R-squared | 0.03 | 0.02 | 0.03 | 0.15 |

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

**Appendix 12: Impact of Trade Liberalization on GDP Per Capita Growth**

| | Using Year Dummies | | |
|---|---|---|---|
| | Independent Variable: GDP Per Capita Growth | | |
| postlib | 2.768 | 2.051 | 1.58 |
| | (4.29)** | (3.22)** | (2.36)* |
| gdptous | -2.102 | (1.575) | (1.412) |
| | (2.66)** | (1.98)* | (1.68) |
| postpops | -0.003 | -0.004 | -0.003 |
| | (1.73) | (2.03)* | (1.76) |
| postini | -0.116 | -0.081 | -0.025 |
| | (0.85) | (0.59) | (0.17) |
| rxrdev | -0.015 | -0.002 | 0.007 |
| | (2.69)** | (0.26) | (0.74) |
| disast | -1.011 | -0.694 | -0.546 |
| | (2.32)* | (1.63) | (1.24) |
| infg | -0.386 | -0.576 | -0.579 |
| | (2.06)* | (2.82)** | (2.72)** |
| l.rxrdev | | -0.017 | 0.7 |
| | | (2.20)* | (1.59) |
| l.disast | | 0.654 | -0.448 |
| | | (1.52) | (2.08)* |
| l.infg | | -0.391 | -0.03 |
| | | (1.95) | (2.61)** |
| ll.rxrdev | | | 0.012 |
| | | | (1.46) |
| ll.disast | | | 0.177 |
| | | | (0.4) |
| ll.infg | | | -0.17 |
| | | | (0.81) |
| Constant | -4.406 | -7.515 | -7.69 |
| | -1.85 | (2.37)* | (3.07)** |
| Observations | 625 | 565 | 516 |
| Number of countries | 37 | 37 | 36 |
| R-squared | 0.17 | 0.20 | 0.20 |

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

**Appendix 13: Impact of Trade Liberalization on GDP Per Capita Growth by Country Group (Deleting [-4,1])**

| | Region | | | | | Income Per Capita | | Population Size | | Reform Pace | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sub-Saharan Africa | East Asia and Pacific | Latin America and the Caribbean | Middle East and North Africa | South Asia | Low Income | Middle Income | Small | Large | Fast | Gradual |
| | Dependent Variable: GDP Per Capita Growth | | | | | | | | | | |
| | | | | | | | | | | | |
| postlib | 1.121 | 1.423 | 1.446 | 1.497 | 0.697 | 1.229 | 1.164 | 1.713 | 0.151 | 0.691 | 1.591 |
| | (2.13)* | (2.55)* | (2.57)* | (1.09) | (1.03) | (2.63)** | (2.96)** | (4.39)** | (0.34) | (1.50) | (3.84)** |
| Constant | -0.326 | 4.638 | 0.748 | 0.316 | 2.079 | 0.041 | 1.591 | 0.136 | 2.474 | 1.045 | 0.6 |
| | (0.87) | (11.75)** | (1.88) | (0.33) | (4.35)** | (0.12) | (5.73)** | (0.49) | (7.85)** | (3.21)** | (2.05)* |
| Observations | 240 | 64 | 208 | 32 | 64 | 272 | 352 | 416 | 208 | 272 | 336 |
| Number of countries | 15 | 4 | 13 | 2 | 4 | 17 | 22 | 26 | 13 | 17 | 21 |
| R-squared | 0.02 | 0.1 | 0.03 | 0.04 | 0.02 | 0.03 | 0.03 | 0.05 | 0 | 0.01 | 0.04 |

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%