

Trade Openness, Investment, and Long-Run Economic Growth

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*– A working paper presented at the '07-'08 Southern Economics Association (SEA) meetings
New Orleans, La. November 18-21, 2007*

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As the freedom to trade internationally impacts the realized productive capacity of a nation in a number of ways – enhancing the potential for specialization according to the law of comparative advantage, reducing the potency of less-than-competitive domestic markets, and increasing access (and reducing the cost of such access) to a wider variety of intermediate inputs for domestic firms (to list just a few of the mechanisms by which trade liberality impacts long-run economic growth), it indirectly influences the level of domestic investment which results. Limits on the freedom to trade internationally ultimately impact the efficiency of domestic markets, encumbering and thereby limiting the level of entrepreneurial activity, investment, and (ultimately) the growth rate of an economy. This study attempts to more completely measure the impact of *trade openness* (the freedom to trade internationally) on long-run economic growth by estimating, and statistically isolating, its indirect impact through domestic investment.

The methodology employed in this study is a 2-stage growth analysis in the style of Gwartney, Holcombe, and Lawson (2006) and Skipton (2007). The first-stage estimates the impact of trade openness on both the *level of* and *change in* private investment (as a share of GDP) during the sample period (1980-2002) with the objective being the creation of pair of residual series which have within them the pattern of private investment differences between states not correlated (or statistically associated with) differences in the freedom to trade internationally. In the second stage, an applied Barro-style long-run economic growth model is run amended to include trade-openness (in the style of Skipton 2004). Instead of the traditional investment indicator (typically gross capital formation), the two residual series from the first stage (proxies for differences in private investment between states) are coupled with government investment (as a share of GDP). What results is a more complete picture of the impact of trade openness on long-run economic growth that includes both its direct and indirect influences.

Section I carefully defines the economic concept of *trade openness*, discusses the openness and growth arguments, and summarizes the literature. Section II outlines the Trade Openness Index (TOI) metric for measuring cross-country differences in relative trade liberality. Section III specifies and runs both the first- & second-stage models – first identifying the impact of trade openness on private investment patterns and then examining both the direct and indirect (through private investment) impact of trade openness on long-run economic growth. Section IV summarizes the interpretations of the empirical analysis, and outlines the findings of this study. Section V provides both context for the study’s findings and a conclusion for the inquiry.

I. Trade Openness, Economic Freedom, Institutions, and Growth

Trade openness – *Relative Trade Liberality*:

The term *trade openness* has been applied to a range of meanings in the literature from *trade intensity* and *exposure to external markets* (terms used to indicate the sum of imports and exports as a share of GDP – hereafter *simple trade share*) to the particular idea adopted in this study, that of *trade policy liberality*. Pritchett (1996) defines trade policy liberality as “that set of policies such that the level and pattern of trade (and prices) are near what they would be under

free trade.”¹ And so, *Trade openness*, in this paper, represents the degree to which unfettered markets are used to coordinate trade across national boundaries and, hence, indicates the extent to which such markets can efficiently allocate scarce resources where they are valued the most.

Trade openness and long-run economic growth:

In a dynamic world, *free-* and *open-markets* may influence long-run economic growth in many different specific ways. One path comes from the expanding the opportunities of firms to realize more fully scale economies and greater efficiency in investment (Krueger, 1978). Increased competition, resulting from reduced barriers for foreign competitors, serves to limit the market power of domestic imperfectly competitive markets, mandates efficiency, and delivers a greater variety of both finished products and intermediate inputs to consumers and industry, respectively (Harris and Cox, 1985; Bhagwati, 1988). A different path for growth through trade liberalization stems from the transfer of ideas and the ability of domestic industries to utilize imported intermediate inputs that benefit from new technologies in the world economy. Repeated and sustained interaction through international trade facilitates the ability of domestic producers to adopt foreign knowledge in their own production (Edwards, 1992). Yet another path for greater economic growth is through international competition in governance. As states remove barriers to and institutional biases from international trade, governments *must* also adjust their portfolio of services (and the taxes used to fund them) or risk capital flight, commerce flight, a loss of competitiveness for its domestic suppliers, and, ultimately, shrinkage in their tax base. Trade openness begets a greater importance for competitive institutions of governance (reflected in greater *economic freedom* generally), resulting in enhanced long-run economic growth (Wacziarg, 2001; Skipton, 2007). There are many different ways that trade openness may impact economic growth.

Many studies (Skipton, 2004; Baldwin, 2002; Rodríguez and Rodrik, 2000; Edwards, 1998; Lee, 1993) have examined whether or not greater trade liberalization is likely to impact long-run economic growth with what could be described as either mixed results or, more accurately, *conditional consensus*.² The degree to which trade impacts long-run economic performance remains a contentious topic, but economic theory indicates that there is reason to believe that relatively open economies will achieve higher income levels and grow more rapidly than those with substantial barriers that retard trade. Policies that limit potential gains from trade simultaneously limit the gains from division of labor, specialization, and the realization of gains from comparative advantage.

Trade openness and Private Investment:

Distilling the summary of how trade openness impacts long-run economic growth above provides a range of mechanisms through which the trade openness may increase the opportunities represented by private domestic investment. By enhancing the efficiency of investments (either through the capacity to more fully employ an investment or by enriching the

¹ Pritchett (1996) also defines *trade openness* as synonymous with *trade intensity*, which varies for reasons unrelated to trade policy (like geographic size and population). *Trade intensity*, described as *trade share* in this paper, is an especially imprecise outcome based measure of both the non-policy characteristics of a state (such as its proximity to demand, size, population, etc) and its explicit counter-openness policies (such as tariffs, quotas, & exchange rate controls).

² The empirical results from studies examining the relationship between openness & economic growth are generally in agreement that greater liberalization leads to greater economic growth; but, this result is conditional as there is debate regarding the limits of some of the approaches to the question. Rodríguez and Rodrik (2000) is a key paper that addresses the range of questions examining the many existing empirical approaches. It is not the end of this paper to show the openness and growth relationship specifically, but rather to look for an additional conduit through which openness may indirectly impact growth and so suggest the measured impact of greater trade liberality is under-estimated in the literature – regardless of measurement approach.

competitiveness of the marketplace) restraints on the potential capacity of an economy are relaxed. By encouraging the transfer of ideas, opportunities for investment are created where they were once not available. By fostering competition in the market for inputs (both in acquiring low-cost – or more appropriate – inputs from a broader market and by allowing for international competition for the most efficient – or most appropriate – form of domestic governance structures) investments are freed to realize their greatest potential.

As trade openness impacts the level of private investment in an economy, it then impacts long-run economic growth indirectly. And so, the full impact of trade openness on long-run economic growth may be consistently underestimated in the existing literature.

II. Measurement of the Freedom to Trade Internationally – the *TOI*

When measuring the extent of counter-openness policy present, there are two basic approaches: the measurement of incidence and measurement of outcome (Baldwin, 1989). Methods that concentrate on incidence examine explicit measures of counter-openness policy or proxies for them; measures that concentrate on outcome infer the extent of counter-openness policy present by looking at macro outcomes hypothesized to be affected by such policy. Methods that concentrate on incidence must select meaningful measures that are indicative of the entire trade policy regime. Methods that concentrate on outcome must select measures functionally related to the incidence of counter-openness policy, carefully model the relationship between the observed variables and the implied counter-openness policies, and control for the multitude of contributing factors in an economy that may create the specific effect.

The Trade Openness Index (*TOI*) (Skipton, 2004; Skipton, Gwartney, and Lawson, 2001) is a composite index of relative trade openness constructed from a set of incidence and outcome measures of trade restrictiveness. Three elements make up the *TOI*: a 3-part tariff measure, an exchange rate control measure, and *actual-versus-expected* trade share differences from an empirical model. The tariff and exchange rate control measures are each incidence-based indicators. The *actual-versus-expected* trade share differences (estimated by a *trade-share-estimation model*) are an outcome-based measure. A fixed effects model is used to estimate *natural* trade share levels (by nation) that would exist in a world economy without policy distortion. By including established determinants of simple trade share (imports and exports as a share of GDP) such as population, geographic size, proximity to demand, and access to coastline, the fixed effect model accounts for the time-invariant, *state dependent* factors³. These state dependent factors are, by definition, policy invariant and so the difference between the *natural* trade share level and actual trade share figures represents a rough proxy for the total extent of counter-openness policy present.

Data from the three elements in the *TOI* are normalized to fit between 0 and 10 using a range of different techniques designed to maintain the integrity of the relative distribution in the actual data. The elements are combined using weights established using principal components

³ The fixed effect, trade share estimation model includes a unique measure of proximity to world concentrations of demand called the *distance adjusted demand scalar (DADS)*. The *DADS* measure is an aggregated approach to the proximity idea developed by Chuck Skipton and James Gwartney (2000) that includes, within its construction, more than 99% of the world's measured GDP. In the standard gravity model of international trade, bilateral trade shares are estimated pair-wise (bi-laterally) with the distance between them and their respective GDP measures introducing a measure of proximity to demand. The *DADS* measure represents a conceptual aggregation of this bilateral approach. For more detailed information on the *DADS* measure, see Skipton (2003).

analysis to form a continuous, annual measure of relative trade openness for the 123 countries in the sample from 1980-2002. By construction the TOI is an index bounded between 0 and 10 where an index of 0 is representative of a relatively *less open* economy and an index of 10 is representative of a *relatively more open* economy. Table 1 shows the 10 *most open* and 10 *least open* economies in 2003 (the latest year for which the index is available). Appendix 1 presents more complete TOI data for the entire 123-country sample sorted alphabetically.⁴

Table 1: Trade Openness Index, 2000-02

10 Most Open Economies	2000-02 EFW	10 Least Open Economies*	2000-02 EFW
Singapore	9.96	Tanzania	6.11
Indonesia	9.20	Albania	6.07
Ireland	9.03	Egypt	5.93
Slovakia	8.93	Central African Republic	5.61
Thailand	8.90	Rwanda	4.87
Luxembourg	8.85	Iran	4.61
Estonia	8.82	Pakistan	4.38
Belgium	8.79	Burundi	4.29
Canada	8.78	Sierra Leone	4.09
Ghana	8.76	Congo, Democratic Republic	3.94

Note*: Myanmar excluded due to inconsistent data.

III. The Empirical Study

The empirical question that is the focus of this study is whether trade openness impacts long-run economic growth both directly (as theory suggests) and indirectly (through increased private investment the result of relative trade liberality). Toward this end a two-stage process is pursued in order to identify, qualify, and quantify such measurable effects using an empirical approach similar to that used by Gwartney, Holcombe, and Lawson (2006) and Skipton (2007).

In the first stage, the TOI is regressed on private investment (as a share of GDP). This analysis both quantifies the degree to which the *level of* and *change in* private investment are each impacted by greater freedom to trade internationally and creates a set of *residual series* which, when introduced into the growth equations of the second stage, represents the cross-country variations in private investment not correlated with trade openness.

In the second stage, both trade openness and the set of residual series from stage one are introduced to a Barro (1991) style long-run economic growth equation. By employing this approach, both related (yet individually relevant) factors are included in the long-run analysis and the direct and indirect impact of openness on long-run economic growth may be examined.

Though similar, the 2-stage empirical question addressed in this study is distinct from the two studies identified above as being similar in methodological approach. Gwartney, Holcombe,

⁴ The complete time-series of the TOI data is available by request from the author.

and Lawson (2006) isolated the impact of economic freedom (a broader measure of institutional quality than the freedom to trade internationally) on long-run economic growth through enhanced private investment (using a very different long-run growth model). Skipton (2007) examined the impact of trade openness on long-run economic growth through greater institutional quality (generally); the strongest impact that was established, though, was limited to select areas of institutional quality related to the protection of private property rights.

The Data:

The TOI data are from Skipton (2004) updated in 2006 to include TOI figures for 2002 and 2003. The data for private and government investment as a share of GDP series are from Gwartney, Holcombe, and Lawson (2006). Data for the standard elements of the Barro growth regressions came from World Bank, Penn World Tables, OECD, and IMF.⁵

The full sample for the growth analysis is made up of 93 economies. The difference between these 93 and the 123 in the full EFW country sample is comprised mostly of states not present in the data for the entire 23-year span. There are a few states that were in existence for the entire period but for which *TOI* data are not available for long-periods in the sample due to data availability issues. There are two states, Belize and Tanzania, with *TOI* data spanning the entire growth regression period that were eliminated from the full-sample run due to inconsistency in other data necessary for the growth analysis.

Trade Openness and Private Investment:

Figure 1 shows the impact of trade openness on both the *level of* and *change in* private investment in an economy. If it takes time for the impact of trade liberalization to then influence the investment behavior in the market, then there is reason to believe there would be a lag between trade liberalization and the private investment levels in the economy. It takes time for policy liberalization to establish a belief in the mind of the owners of private capital resources of policy persistence. It takes time for investments opportunities to be recognized & realized and for older investment decisions to be amended to represent the new dimensions of domestic opportunities. To address this, the data on changes in the level of trade openness is divided into two parts (1980's and 1990's). This allows for different sized coefficients during each time period to demonstrate such a lagged impact. Table 2 (on next page) presents the economies with the largest change in openness during both the 1980s, 1990s, and entire 1980 – 2002 period.

EQ-1 examines the cross-country variability in the *level of* investment related to differences in trade openness. Both the beginning of period *level* indicator and the two period *change* indicators (1980-90 & 1990-2000) each enter the equation with positive and significant coefficients. Greater trade openness (and the change in relative trade liberality) leads to higher general levels of private domestic investment. The adjusted r-squared of this equation is .37.

EQ-2 examines the cross-country differences in the *change in* investment during the period related to differences in trade openness. Here only the period change indicators (for

⁵ GDP and gross capital formation figures were collected from the World Bank, *World Development Index CD-ROM (various editions) and WDI-Online (2006)*; Penn World Table (v. 5.6a); International Monetary Fund, *International Financial Statistics Yearbook* (various editions); OECD, *Economic Outlook* (various issues); Central Intelligence Agency, *World Fact Book* (online – various years), and Central Intelligence Agency, *Handbook of International Economic Statistics* (1998). Enrollment figures are from William Easterly and Mirvat Sewadeh's online *Global Development Network Database* (#4 – Social Indicators and fixed factor time series). Enrollment figures were updated using the World Bank's *World Development Index CD-ROM (various editions) and WDI-Online (2006)*. Relative price of investment goods data were gathered from Barro, R. and J-W. Lee (1994).

Figure 1: Trade Openness and Investment – Stage I

	<i>Dependent Var.</i> Private Investment as a Share of GDP: 1980-2000 – Level – Eq-1	<i>Dependent Var.</i> Change in Private Investment as Share of GDP: 1980 - 2000 – Change – Eq-2
Constant	- 1.99 (0.89)	0.01 (0.06)
TOI 80-83	2.39 (6.96)***	- 0.11 (0.44)
Δ in TOI 80s	1.79 (3.45)***	0.96 (2.57)***
Δ in TOI 90s	1.30 (2.55)***	1.14 (3.12)***
Adj. R ²	.37	.25
Sample size	94	94

*** significant at the 1% level ** significant at the 5% level * significant at the 10% level
(t-statistic is in parenthesis)

openness) enter the equations significant – with greater openness highly correlated to larger increases in private investment. The adjusted r-squared for this equation is .25.

The specifications for EQ-1 & EQ-2 (of Figure 1) are each knowingly mis-specified in an attempt to isolate patterns in the residuals that represent the *cross-country differences in the level of investment existing between states specifically unrelated to relative trade liberality*. The constructed residuals from these two first-stage equations (*Pr-Inv Resids LVL & Pr-Invest Resids CH*) are employed, as described, in the second-stage equations in Figure 3.

Table 2: States with Largest Change in Trade Openness

1980-02 to 1988-90	Change in TOI	1990-92 to 2000-02	Change in TOI	1980-2 to 2000-02	Change in TOI
Ghana	4.5	Bangladesh	4.6	Ghana	8.4
Mexico	4.4	Syria	3.4	Nicaragua	5.6
Nicaragua	3.3	China	3.3	Mexico	5.4
Congo, Dem. R.	2.9	Uganda	3.2	Bangladesh	4.6
Costa Rica	2.5	Ghana	3.0	El Salvador	4.2
Burundi	2.3	Bulgaria	2.6	China	4.0
Mauritius	2.0	Hungary	2.5	Costa Rica	3.8
Madagascar	1.8	Estonia	2.4	Hungary	3.6
Nigeria	1.7	Rwanda	2.3	Syria	3.6
Malawi	1.7	Algeria	2.3	Turkey	3.3
Turkey	1.5	India	2.2	Tanzania	3.1
El Salvador	1.4	Romania	2.2	Nigeria	3.1

Trade Openness and Long-Run Economic Growth:

The greatest impact of trade liberalization on economic growth is in the long run. Though the reduction of counter-openness policy may lead to fairly immediate changes in trade flows (as they are often anticipated) the full impact of liberalization on income is likely to take more time. It takes time for institutional changes to lead to capital inflows and resource decisions to be made to reflect now profitable transactions. It takes time for financial institutions to become convinced of the likelihood of trade policy persistence – facilitating the reorganization of resources necessary for the full-impact of a liberal trade regime to be realized. It takes time for economies, once impeded by the strong arm of exchange regulation, to operate in industries where their true comparative advantage lay and where wealth may be created without inhibition. Finally, it takes time for all resources, whether human or physical, to be reallocated to where they are valued the most, making the largest measurable impact on the growth rate of the economy, the long-run growth rate, possible.

The long-run economic growth analysis in this study employs an applied Barro (1991) methodology – modeled after the approach used by Sachs and Warner (1995) in their landmark trade openness paper. The dependent variable is the average annual compounding growth of PPP GDP per capita for the period (1980-2000). Two measures of human capital formation are used: primary and secondary enrollment rates. Two measures related to physical capital formation are utilized: gross capital formation and a measure for the relative price of investment capital at the start of the sample.⁶ Both a convergence indicator (the log of GDP per capita at the start of the period) and a measure of sound monetary policy (period inflation variability) are each included. Finally, to represent the general level of relative trade openness during the period, the TOI (1980-2002) is included.

EQ-1 of Figure 2 shows the applied Barro long-run growth equation. The convergence measure enters the equation as significant and with the expected negative sign.⁷ While the sign on the coefficient for the primary enrollment rate is not as expected, it is also insignificant.⁸ The coefficient on the secondary enrollment rate is both significant at the 99th percentile and possesses the expected sign. Each of the two human capital measures delivers a proxy for the extent of human capital formation occurring at the beginning of the 22 year period of the sample. The coefficient on inflation variability, which captures the *soundness* of monetary policy (to be stable and predictable), is significant at the 99th percentile and possesses the expected negative sign. Where the annual rate of change in the general level of prices in the economy is volatile (as measured with larger standard deviations) there is slower rate of economic growth. The “relative price of investment goods” measure (PPI80DEV) is both significant at the 99th percentile and possesses the expected positive sign. In economies where the general price level for investment goods at the beginning of the period was higher, slower long-term economic growth followed. The coefficient on gross capital formation is both significant at the 99th percentile and possesses the expected positive sign. Last, the *TOI* enters the growth equation significant at the 95th

⁶ PPI80DEV is the deviation of the log of the price level of investment goods for a nation relative to the sample mean as calculated by Barro and Lee (1994). In a few cases, where data is not available for 1980, observations for 1985 were used.

⁷ The *convergence* of income levels through faster growth rates exhibited by less developed economies (after controlling for the other macro aspects of the economy) is controlled for using the beginning of period log of per capita income measure. Using this technique, a negative and significant coefficient on the measure allows for (and suggests) economies with smaller beginning of period per capita incomes (all else equal) to grow faster than their higher per capita income equivalents (see Edwards, 1992).

⁸ The performance of this particular human capital measure (the primary enrollment rate) may be due to multi-colinearity between it and the secondary enrollment rate figure.

Figure 2: Trade Openness and Long-Run Economic Growth

Dependent Variable: Average Annual Compounding Growth of PPP GDP Per Capita 1980-2000
(t-statistic is in parenthesis)

	Eq-1	Eq-2
Constant	- 1.11 (0.93)	- 0.013 (0.01)
LN GDP Per Cap 1980	- 0.350 (1.95)*	- 0.544 (2.83)***
Enroll P ^a	- 0.013 (1.57)	- 0.010 (1.30)
Enroll S ^b	0.028 (2.92)***	0.028 (3.00)***
Std Dev Infla Rate ^c	- 9.6E-04 (4.85)***	- 9.2E-04 (4.67)***
PPI80DEV ^d	- 1.270 (3.86)***	- 1.300 (3.97)***
Gross Capital Form ^e	0.141 (4.28)***	
Priv Invest % GDP ^f		0.197 (4.62)***
Govt Invest % GDP ^g		0.088 (1.72) *
TOI ^h	0.323 (2.17)**	0.307 (2.01)**
Adjusted R-squared	.59	.61
Sample size	91	91

*** significant at the 1% level

** significant at the 5% level

* significant at the 10% level

a. Enroll P 80: Primary school enrollment rate in 1980

b. Enroll S 80: Secondary school enrollment rate in 1980

c. Standard deviation of change in GDP deflator (inflation) from 1980 to 1999

d. PPI80DEV: Relative price of investment goods in 1980

e. Gross Cap Form: Gross capital formation as a share of GDP1980-1999

f. Priv Invest % of GDP: Private investment as a share of GDP (period average, 1980-2000)

g. Govt Invest % of GDP: Government investment as a share of GDP (period average, 1980-2000)

h. TOI: *Trade Openness Index*, period average 1980-2002

percentile and with the expected positive sign. This suggests that, even from within an established long-run economic growth equation, trade openness matters for long-run economic growth. The adjusted r-squared for the basic model (EQ-1) is 0.62.

It has been shown (Skipton, 2004) that private and public (government) investment as a share of GDP (each entered separately) serves much the same purpose as gross capital formation and allows for a more descriptive analysis of the growth relationship. Not only does separating the two forms of “investment” allow for one make statistical inferences of the relative efficiency

of private versus “public investment,” but government spending as a share of GDP serves to replace (albeit *imperfectly*) real government consumption spending as a share of GDP from the original Barro growth equations (a fairly cumbersome data series that attempted to measure government spending outside of the military and education). This alternate specification of the Barro model is the base specification used in this study.

EQ-2 (of Figure 2) shows the results from the *baseline specification* of the applied Barro growth model employed in this study – the specification employed by Skipton (2004, 2007) outlined in the paragraph above. Note that all the major findings of the traditional applied Barro specification (EQ-1) are replicated in the specification of EQ-2, with a few notable additions. The differential efficiency of private versus public investment on long-run growth is identified in EQ-2. The coefficient on private investment as a share of GDP is twice that estimated for government investment, is the expected positive sign, and possesses a much more significant t-stat (private investment significant at the 99th percentile, government investment at the 90th). Relatively small levels of private capital formation (and net flows) – all else equal – are indicative of an economy limited in its own capacity to grow. Further, the descriptive power of the applied Barro growth model increases from an adjusted r-square of .59 to .61.

The exercise outlined in Figure 2 is presented to show that the replacement of the gross capital formation series with private and public investment as a share of GDP in the applied Barro growth equation is done without any substantive change in its descriptive capacity.

Trade Openness, the Private Investment, and Long-Run Economic Growth:

Figure 3 (EQ-2 & EQ-3) shows the impact on the descriptive capacity of the baseline applied Barro growth equation (EQ-1) resulting from the inclusion of the residuals from the trade openness and *level of private investment* and trade openness and the *change in private investment* regressions of the first stage (Figure 1). Variations in both the *level of* and *change in* private investment across countries not correlated with differences in either the *level of* or *change in* trade openness are imbedded within the residuals of the first-stage analysis.

EQ-2 of Figure 3 introduces the first-stage residuals from the analysis of the impact of trade openness on the *level of* private investment. The residual series enters the equation as significant (at the 99th percentile) and possessing the expected positive sign. As the baseline growth analysis already suggests, greater levels of private investment (even those unrelated to the relative openness of an economy) are likely to result in greater growth rates. Comparing EQ-1 (the baseline) and EQ-2 shows that introducing this imbedded information changes the estimated coefficient on the trade openness indicator measurably (increasing the t-stat dramatically at the same time – driving it deep into the 99th percentile range). Stripped of some of its descriptive capacity, the residual series serves as an imperfect substitute for private investment as a share of GDP, reducing the overall descriptive capacity of the model very modestly from .608 to .600.

EQ-3 of Figure 3 introduces the first-stage residuals from the analysis of the impact of trade openness on the *change in* private investment to the specification of EQ-2 (which already included the residuals from the *level of* private investment first-stage run). The second residual series enters the equation as significant (at the 90th percentile) and with the expected positive sign. Greater growth rates in the level of private investment (even those statistically uncorrelated with trade openness) are correlated with higher growth rates for the economy. Comparing EQ-2 and EQ-3 shows that while introducing this new imbedded information the coefficient on trade

Figure 3: Trade Openness, Private Investment, and Long-Run Economic Growth

Dependent Variable: Average Annual Compounding Growth of PPP GDP Per Capita 1980-2000
(t-statistic is in parenthesis)

	Eq-1	Eq-2	Eq-3
Constant	- 0.013 (0.01)	- 0.241 (0.185)	- 0.558 (0.433)
LN GDP Per Cap 1980	- 0.544 (2.83)***	- 0.533 (2.75)***	- 0.502 (2.63)**
Enroll P ^a	- 0.010 (1.30)	- 0.010 (1.32)	- 0.010 (1.20)
Enroll S ^b	0.028 (3.00)***	0.029 (3.03)***	0.028 (2.96)***
Std Dev Infla Rate ^c	- 9.2E-04 (4.58)***	- 1.0E-03 (5.07)***	- 1.0E-03 (4.90)***
PPI80DEV ^d	- 1.300 (3.97)***	- 1.362 (4.17)***	- 1.194 (3.60)***
Priv Invest % GDP ^e	0.197 (4.62)***		
Govt Invest % GDP ^f	0.088 (1.72)*	0.095 (1.83)*	0.112 (4.93)***
TOI ^g	0.307 (2.01)**	0.739 (4.97)***	0.722 (4.93)***
Pr-Inv Resids LVL ^h		0.189 (4.39)***	0.194 (4.58)***
Pr-Inv Resids CH ⁱ			0.107 (2.00)**
Adjusted R-squared	.608	.600	.614
Sample size	91	91	91

*** significant at the 1% level

** significant at the 5% level

* significant at the 10% level

a. Enroll P 80: Primary school enrollment rate in 1980

b. Enroll S 80: Secondary school enrollment rate in 1980

c. Std deviation of Δ in GDP deflator (inflation), 1980-99

d. PPI80DEV: Relative price of investment goods in 1980

e. Priv Invest % of GDP, 1980-2000

f. Govt Invest % of GDP, 1980-2000

g. Trade Openness Index, 1980-2002

h. Residuals from EQ-1 of Figure 1 (Stage I): TOI and the level of private investment as a % of GDP 1980-2000.

i. Residuals from EQ-2 of Figure 1 (Stage I): TOI and the Δ in private investment as a % of GDP 1980-2000.

openness is left principally unchanged, both the coefficient and t-statistic on the *level of* private investment (not correlated with differences in trade openness) are each reinforced. Further, the overall descriptive power of the model is increased to .614 from .600. The specification of EQ-3 does increase the overall descriptive power of the model (from before the 2-stage analysis is introduced) modestly, from .608 to .614.

While this two-stage analysis does not increase the descriptive power of the model substantively, it does suggest the importance of trade openness on long-run economic growth may be imbedded within other macroeconomic indicators commonly present in long-run growth

equations, such as private investment. By examining (and isolating) the impact of trade openness on both the *level of* and *change in* private investment (within an economy) the direct and indirect influences of trade openness on long-run growth can be more accurately estimated.

IV. Conclusions

This study endeavors to more carefully examine the impact of relative trade liberality, as measured by the *trade openness index – TOI* (Skipton, 2004), on long-run economic growth through its indirect influence on the *level of* and *change in* private investment. The freedom to trade internationally enhances the efficiency of domestic investments by removing restraints on their potential, creates new opportunities through the transfer of technology and ideas, and fosters competition not only for the intermediate products and services used by domestic firms but for the institutions of governance to whom they are subject.

The statistical study employed involves two stages. The first-stage measures the impact of the *level of* and *change in* relative trade liberality on both the *level of* and *change in* private investment. Residuals series are constructed from this first-round analysis to be employed, in the second round, as a proxy for the cross-country variations in private investment not associated with differences in relative trade liberality between states. The second-round analysis utilizes a Barro-style long-run economic growth equation to estimate the impact of trade openness on long-run economic growth. Using the residual series from the first stage (along with a government investment as a share of GDP series to round out the investment figures) the second round analysis captures both the direct and indirect impacts of openness on long-run economic growth – more accurately estimating the importance of trade openness and more definitively outlining the mechanisms by which such impacts are transmitted.

The findings of the statistical study in this paper show that the measured positive relationship (in the literature) between economies whose institutions engender the freedom to trade internationally and long-run economic growth may be understated due to the imbedded impact of trade openness on common macroeconomic elements that are commonly found in growth equations, such as private investment.

If relative trade liberality matters for economic growth, then understanding the complexity of its full impact on the economy may require a series of indirect questions. Recent work examining trade openness and the *market for governance* (Skipton 2007) shows that trade openness necessitates greater liberalization of governance structures which further loosens the restrictions on the behavior of potential entrepreneurs and the opportunities that they bring to domestic economies. Taken together, the findings of these two studies suggest that the impacts of trade openness on the potential capacity of an economy are significantly underestimated in the literature. The results of this study are intended to contribute to the dialogue regarding this particular question.

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Appendix 1: The TOI from 1980-82 to 2000-02

Economy	1980-82 Rating	1985-87 Rating	1990-92 Rating	1995-97 Rating	2000-02 Rating	1980-2002 Rating (rank)	Full-period Δ in TOI
Albania	.	.	.	5.8	6.1	**	**
Algeria	4.9	3.6	4.0	4.4	6.3	4.41 (90)	1.4
Argentina	4.4	2.9	5.0	6.3	6.3	4.88 (83)	1.9
Australia	6.7	7.0	6.8	7.2	7.4	7.01 (35)	0.7
Austria	7.5	7.6	7.5	7.7	8.2	7.69 (13)	0.7
Bahamas	5.1	5.4	4.8	5.2	.	**	**
Bahrain	8.7	8.3	8.3	7.7	7.5	8.06 (10)	-1.3
Bangladesh	1.6	1.5	1.6	3.8	6.1	2.86 (95)	4.6
Barbados	6.5	6.1	5.8	6.4	6.2	6.22 (55)	-0.3
Belgium	8.2	8.5	8.4	8.4	8.8	8.47 (3)	0.6
Belize *	4.9	4.5	5.6	6.0	6.8	5.52 (74)	1.9
Benin	5.4	5.5	.	.	6.4	**	1.0
Bolivia	5.4	6.2	7.1	7.4	7.1	6.69 (42)	1.7
Botswana	7.6	7.7	7.6	7.3	7.5	7.55 (17)	-0.1
Brazil	3.9	2.9	5.4	6.3	6.8	5.01 (80)	2.9
Bulgaria	.	4.9	5.5	7.5	8.1	.	**
Burundi	1.7	3.2	3.9	2.4	4.3	3.10 (94)	2.6
Cameroon	6.1	6.4	5.9	5.8	6.5	6.15 (57)	0.4
Canada	7.7	7.9	7.7	8.2	8.8	8.05 (11)	1.1
Central African Rep.	6.0	5.8	5.3	6.2	5.6	5.82 (66)	-0.4
Chad	.	.	6.5	7.2	6.9	**	**
Chile	6.6	6.4	7.8	7.6	7.8	7.18 (30)	1.2
China	4.3	5.9	5.0	7.7	8.3	6.11 (59)	4.0
Colombia	4.7	5.2	5.6	6.6	6.9	5.72 (70)	2.3
Congo Dem. Rep.	3.4	6.7	6.0	7.4	3.9	5.74 (68)	0.5
Congo Rep. of	8.2	7.0	7.0	8.4	8.3	7.74 (12)	0.1
Costa Rica	3.7	4.6	6.7	7.2	7.5	5.99 (62)	3.8
Cote d'Ivoire	6.5	6.6	6.0	7.0	7.0	6.60 (44)	0.4
Croatia	.	.	.	6.6	7.3	**	**
Cyprus	6.9	6.8	6.5	6.8	6.9	6.77 (39)	0.1
Czech Rep.	.	.	.	8.5	8.7	**	**
Denmark	7.0	7.1	7.0	7.0	7.3	7.04 (33)	0.3
Dominican Rep.	3.5	5.3	4.4	6.4	6.6	5.22 (78)	3.1
Ecuador	4.9	3.9	6.3	6.6	7.3	5.67 (71)	2.4
Egypt	5.9	3.3	4.9	6.1	5.9	5.21 (77)	0.1
El Salvador	2.8	3.4	5.1	6.6	7.0	4.95 (82)	4.2
Estonia	.	.	6.4	8.5	8.8	**	**
Fiji	6.0	6.1	7.2	7.3	7.5	6.83 (39)	1.4
Finland	7.3	7.2	6.8	7.4	7.5	7.23 (28)	0.2
France	7.2	7.2	7.3	7.4	7.6	7.34 (25)	0.4
Gabon	6.7	7.2	6.9	7.1	6.8	6.96 (36)	0.1
Germany	7.3	7.4	7.5	7.6	8.1	7.57 (16)	0.8
Ghana	0.4	2.8	5.7	7.2	8.8	4.78 (86)	8.4
Greece	6.2	5.8	6.6	6.8	7.1	6.48 (48)	0.9
Guatemala	4.2	2.5	5.9	6.5	6.7	5.02 (79)	2.5

Appendix 1: The TOI from 1980-82 to 2000-02 *continued*

Economy	1980-82 Rating	1985-87 Rating	1990-92 Rating	1995-97 Rating	2000-02 Rating	1980-2002 Rating (rank)	Full-period Δ in TOI
Guinea Bissau	.	4.3	.	.	7.2	**	**
Guyana	6.1	5.3	.	.	8.5	**	**
Haiti	4.1	2.9	2.6	.	6.5	**	**
Honduras	5.2	.	6.9	7.7	7.6	**	**
Hong Kong	7.7	8.1	8.5	8.5	8.4	8.28 (5)	0.7
Hungary	4.8	5.3	5.9	7.4	8.4	6.34 (51)	3.6
Iceland	5.9	6.2	6.8	7.0	6.9	6.57 (45)	0.9
India	4.1	3.7	4.5	5.6	6.7	4.80 (85)	2.6
Indonesia	7.9	7.5	8.0	8.2	9.2	8.10 (9)	1.3
Iran	2.5	1.6	4.1	4.2	4.6	3.40 (93)	2.2
Ireland	7.6	7.7	7.8	8.5	9.0	8.15 (6)	1.5
Israel	7.1	7.3	7.2	7.1	7.5	7.23 (27)	0.5
Italy	7.5	7.4	7.1	7.5	7.6	7.40 (22)	0.2
Jamaica	4.9	6.3	6.0	6.8	7.0	6.16 (56)	2.2
Japan	7.1	6.8	6.5	6.4	6.5	6.64 (43)	-0.6
Jordan	7.7	7.0	7.6	7.8	7.2	7.47 (20)	-0.5
Kenya	6.1	6.1	6.2	7.1	7.0	6.51 (46)	0.9
Korea, South	7.1	7.2	7.4	7.6	8.1	7.49 (19)	1.0
Kuwait	.	7.7	8.0	7.6	7.4	**	**
Latvia	.	.	.	7.8	7.5	**	**
Lithuania	.	.	.	8.0	7.7	**	**
Luxembourg	8.0	8.5	8.2	8.2	8.8	8.36 (4)	0.8
Madagascar	3.0	4.3	5.2	6.1	6.1	4.99 (81)	3.1
Malawi	4.1	5.0	6.2	6.5	6.6	5.73 (69)	2.5
Malaysia	8.7	8.8	8.9	8.9	8.6	8.82 (2)	-0.1
Mali	6.0	6.7	6.7	7.1	7.6	6.79 (40)	1.6
Malta	6.2	6.5	7.0	7.4	7.2	6.88 (38)	1.0
Mauritius	4.4	6.3	6.5	6.8	6.8	6.22 (54)	2.4
Mexico	2.6	5.4	7.3	8.3	8.0	6.46 (49)	5.4
Morocco	5.6	6.3	6.1	6.7	6.5	6.24 (53)	0.9
Myanmar †	1.4	0.4	0.0	0.0	.	**	**
Namibia	.	7.9	7.9	7.6	7.8	**	**
Nepal	5.6	5.2	5.0	6.1	6.4	5.60 (72)	0.8
Netherlands	8.1	8.2	8.0	8.1	8.3	8.14 (7)	0.3
New Zealand	7.1	6.8	6.8	7.0	7.5	7.01 (34)	0.4
Nicaragua	2.6	2.4	6.4	7.6	8.2	5.57 (73)	5.6
Niger	6.5	6.0	5.3	5.8	6.8	5.99 (63)	0.3
Nigeria	4.0	4.2	6.0	5.4	7.2	5.31 (75)	3.1
Norway	7.5	7.6	7.3	7.1	6.9	7.29 (26)	-0.5
Oman	.	7.8	7.8	7.6	7.7	**	**
Pakistan	3.9	4.9	4.8	5.2	4.4	4.68 (87)	0.5
Panama	7.5	6.8	6.6	7.1	6.8	6.93 (37)	-0.6
Papua New Guinea	.	7.9	7.6	7.5	.	**	**
Paraguay	4.4	4.1	6.2	7.3	7.1	5.77 (67)	2.7
Peru	3.9	2.8	4.8	6.5	6.7	4.85 (84)	2.8

Appendix 1: The TOI from 1980-82 to 2000-02 *continued*

Economy	1980-82 Rating	1985-87 Rating	1990-92 Rating	1995-97 Rating	2000-02 Rating	1980-2002 Rating (rank)	Full-period Δ in TOI
Philippines	6.1	6.3	7.0	8.4	8.7	7.34 (24)	2.6
Poland	.	3.9	6.4	6.9	7.4	**	**
Portugal	7.2	7.4	7.2	7.4	7.5	7.36 (23)	0.4
Romania	.	.	5.1	7.1	7.3	**	**
Russia	.	.	.	7.9	8.6	**	**
Rwanda	1.7	.	2.6	4.3	4.9	**	**
Senegal	6.2	6.0	5.5	6.3	6.7	6.11 (60)	0.4
Sierra Leone	2.7	2.4	3.9	5.1	4.1	3.58 (92)	1.4
Singapore	9.9	9.9	9.9	9.9	10.0	9.92 (1)	0.0
Slovakia	.	.	.	8.3	8.9	**	**
Slovenia	.	.	.	7.3	7.3	**	**
South Africa	7.5	6.8	6.9	7.0	7.7	7.10 (32)	0.2
Spain	6.8	6.9	6.9	7.5	7.8	7.18 (29)	1.0
Sri Lanka	6.1	5.3	5.5	7.2	7.7	6.30 (52)	1.6
Sweden	7.2	7.7	7.3	7.7	7.9	7.60 (15)	0.7
Switzerland	7.3	7.5	7.4	7.1	7.8	7.41 (21)	0.5
Syria	3.6	3.0	3.8	5.0	7.2	4.32 (91)	3.6
Taiwan	8.2	8.2	8.1	8.1	8.0	8.12 (8)	-0.2
Tanzania *	3.0	3.0	4.5	6.7	6.1	4.61 (88)	3.1
Thailand	6.6	6.8	7.8	8.3	8.9	7.65 (14)	2.3
Togo	6.4	6.9	6.1	.	7.1	**	**
Trinidad and Tobago	4.1	4.0	4.6	6.7	6.5	5.12 (78)	2.4
Tunisia	5.8	5.6	6.7	7.0	7.2	6.50 (47)	1.4
Turkey	4.4	6.2	6.0	7.4	7.7	6.38 (50)	3.3
Uganda	3.8	3.5	3.5	6.0	6.7	4.51 (89)	2.8
Ukraine	8.5	**	**
United Arab Emirates	8.2	8.0	8.3	.	.	**	**
United Kingdom	7.5	7.7	7.3	7.6	7.6	7.53 (18)	0.1
United States	7.2	7.0	7.1	7.3	7.2	7.15 (31)	0.0
Uruguay	5.3	6.0	6.1	6.5	6.4	6.09 (61)	1.1
Venezuela	6.7	4.9	6.5	5.5	6.9	5.91 (65)	0.2
Zambia	5.5	5.5	5.8	7.4	7.1	6.13 (58)	1.6
Zimbabwe	4.3	4.7	6.3	7.8	6.2	5.95 (64)	2.0

** There is insufficient *TOI* data for these economies to have a full 1980-2002 period rating.

* Insufficient macro growth data exist for these two economies to be run in the growth equation in Figure 2.

† Inconsistent (and problematic) *other* macro data prevent Myanmar from use in the growth equations in Figures 1 & 2.