Growth effects of a comprehensive measure of globalization with country-specific time series data

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Growth effects of a comprehensive measure of globalization with country-specific time series data

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Many studies have estimated the growth effects of globalization where globalization was measured with a few economic variables, ignoring its social and political dimensions. Recently, Dreher (2006) has developed a comprehensive measure of globalization with several variables from the economic, political and social sectors. He showed, with the panel data methods, that globalization has positive growth effect implying that countries with higher globalization grow faster. We argue that 5-year average growth rates, used in many panel data studies, are inadequate proxies for the unobservable Steady State Growth Rate (SSGR). Using the Dreher indices, we extend the Solow (1956) model to derive country-specific estimates of SSGRs for Singapore, Malaysia, Thailand, India and the Philippines. Our results show that countries with higher levels of globalization have higher SSGRs but the growth effects on SSGRs are smaller than in many studies.

I. Introduction

A large number of papers have estimated the effects of globalization on the long-run growth of output. This long-run growth rate is conceptually the same as the Steady State Growth Rate (SSGR) of the theoretical models. At first, growth equations with large cross-section dimensions were estimated. Subsequently, with improved software packages and availability of data for longer periods, panel data methods with higher time series dimensions, became popular\textsuperscript{1}. In both types of studies globalization was partially measured with one or two economic variables, ignoring its social and political dimensions.

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\textsuperscript{1}Panel data methods are broadly of two kinds, namely those that ignore the stationarity properties of the variables (because they frequently use 5-year averages in the panels) and those that use methods for nonstationary variables. Classical methods of estimation, e.g. the generalized least squares, seemingly unrelated regressions and generalized method of moments are popular in the former. The Pedroni (1999, 2004) method is popular in the latter. While many studies on the effects of globalization have used the former type, there are relatively few studies with the Pedroni method. More recently Mark and Sul (2003) and Breitung (2006) have developed alternatives to the Pedroni method. Some widely used software packages, in both approaches, are EViews, STATA, RATS, TSP and GAUSS.
This was so mainly because these proxy variables are often highly trended and it is difficult to estimate
their individual growth effects due to high multicollinearity. Economic variables frequently used to
proxy globalization are the trade ratio, direct foreign investment, capital flows, tariff rates, trade restric-
tions, monopolization of exports, black market premiums, country-specific globalization dummies, etc. Generally, these measures of globalization are referred to as the openness of the economy. Subsequently, a few comprehensive measures of globalization were developed with the weighted average or principal component methods. One such example is the well-known Sachs and Warner (1995) binary index of openness based on some of the aforesaid economic variables. When variables from the political and social sectors are used to proxy globalization, it is difficult to disentangle their individual growth effects because measures of political freedom, for example, include a variety of political as well as social indicators. The well-
known Freedom House discrete index of political freedom is based on a few such variables. These variables are often used, along with a few other crucial economic variables, as the conditioning variables in the growth equations. In practice, it is hard to maintain a distinction between 'openness', measured primarily with economic variables, and 'globalization' measured more comprehensively with variables from the economic, political and social sectors. In this article, we shall use these two terms as well as 'outward-oriented policies' as synonymous because economic variables play a dominant role in any measure of globalization.

In spite of a large number of studies there is no unanimity on the growth effects of globalization irrespective of how it is measured. There seem to be two main issues in this controversy. Firstly, what is an appropriate or satisfactory measure of globalization, because it has economic, political and social dimensions. Secondly, and more generally, what should be an appropriate specification of the output equation to capture the effects of globalization (or some other variables) on the long-run rate of growth of output or the SSGR. The latter is a relatively neglected issue and also important for estimating the permanent growth effects of other variables like education, public expenditure on infrastructure, investment ratio, aid, foreign direct investment, financial reforms learning by doing, etc. Commenting on the then state of literature Rodriguez and Rodrik (2001) argued that measures of openness (by implication globalization) in studies that find 'openness improves growth' are flawed and their econometrics is weak. Similarly, Easterly et al. (2004) observed that 'This literature has the usual limitations of choosing a specification without clear guidance from theory, which often means there are more plausible specifications than there are data points in the sample.'

In a recent contribution to this journal, Dreher (2006) has developed perhaps the most comprehensive measures of globalization which has the potential to reduce the controversy on the measurement issue. His measure uses the principal components method to combine several variables from the economic, political and social sectors. Dreher's economic dimension is weighted by 35%, political dimension by 28% and social by 37%. The Dreher globalization index for 123 countries, updated annually, can be downloaded from his homepage. He has also shown, with conventional techniques and panels of 5-year averages that the growth affects of his measures of globalization are significant, implying that countries with higher globalization grow faster. However, Dreher's panel data estimates have the same weaknesses of the earlier works because annual or even 5-year average growth rates are poor proxies for SSGRs. Further, we also take a methodological view that country-specific time series studies, instead of panel data studies, are more useful for growth policies. With country-specific studies it is possible to estimate country specific SSGRs and therefore the permanent growth effects of globalization or any other variable. Conceptually SSGR is similar to the noninflationary unemployment rate or the natural rate of unemployment. Both are unobservable and need to be derived from the estimates of dynamic equations with observable variables. In practice, their estimates are derived by imposing equilibrium or the steady state conditions on the estimated nonsteady state equations.

The purpose of this article is to illustrate the advantages of our methodology and not to under-
estimate the significance of panel data or cross section studies. In fact, both the country specific time series

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2 Another important issue is whether or not globalization alleviates poverty; see, for example, Dollar and Kraay (2004) and Dreher (2006).
3 Although these observations were made by Easterly et al. (2004) in the context of the aid–growth relationships, they are equally applicable to other specifications.
4 These indices can be downloaded from http://globalization.kof.ethz.ch/
5 For some methodological views on the relative merits of country-specific time series estimates of growth models, see Greiner et al. (2004). More recently Luintel et al. (2008) also observed that country-specific time series studies are more useful.
and panel data methods should be seen as complementary and the power and relevance of panel data estimates can be improved with our specifications and methodology. The outline of this article is as follows. Section II briefly reviews some key studies on the growth effects of globalization. Section III discusses our methodological concerns on the specification and estimation. Estimates with our specifications and country-specific time series data are in Section IV. To illustrate the merits of our approach we have selected Singapore, Malaysia, Thailand, Korea, India and the Philippines. These countries are selected partly because of their rapid growth rates and globalization process. Section V concludes.

II. Globalization and Growth

Most economists agree that international trade and globalization are important factors in building an economic system. Throughout recent history, policymakers have attempted to produce efficient trade policies that can boost economic growth. However, there is no consensus among economists regarding the effect of openness in trade on economic growth. As stated in the previous section, some of them believe that economic policies oriented towards openness are beneficial for many countries but others reject this hypothesis.

According to Baldwin (2003), there are several reasons for this disagreement. The first and the most important reason is the difference in the way economists define and treat the question that is being investigated. Some researchers are concerned about the impact of outward-oriented policies on economic growth. Others are looking at the causal relationship between the increase in trade and the increase in growth. On the other hand, the interpretation and definition of openness differ among authors. Another reason for the disagreement among economists regarding the effect of openness in trade on economic growth is reflected by the nature of the data and the econometric approach that researchers use to test their models. In addition to the concerns noted in the previous section, Pritchett (1996) also brought to the forefront doubts that researchers were adequately measuring openness. Pritchett (1996) examined the correlations between a number of measures of openness to see if they were capturing some common aspect of trade policy or openness. He found that the examination of the link between various empirical indicators are pair-wise uncorrelated. This finding raises obvious questions about their reliability in capturing some common aspect of trade policy and the interpretation of the empirical evidence on economic performance. Hence, and in an important way, his findings cast a doubt on the interpretation of the empirical evidence on openness and economic growth.

In what follows, a survey of different views regarding openness and growth will be presented. The survey will pursue a historical pattern from 1992. An extended survey is also provided in Table A1 in the Appendix.

A vast number of research manuscripts have recognized a positive relationship between openness and growth. In this framework, Dollar (1992) found out that outward-oriented economies as well as high exports and the sustainability of imported goods and machinery accelerate growth. 7 Barro and Sala-i-Martin (1995), Sachs and Warner (1995), Edwards (1998), Greenaway et al. (1998) and Vamvakidis (1998) show, with cross-country regressions, that trade protection reduces growth rates. Ben-David (1993) and Sachs and Warner (1995) show that only open economies experience unconditional convergence. Quinn (1997) proposed an openness indicator based upon a coding of the domestic and international laws of 64 nations, most of whose legislation is available from 1950 to 1994. The results suggest that capital account deregulation may contribute to economic growth and investment and initial level of income should be also added as the determinants of long-run economic growth. Frankel and Romer (1999) provide instrumental variables estimates and confirm a significant and robust positive impact of trade on growth, using cross-country geographic indicators. Brunner (2003) extended Frankel and Romer’s (1999) cross-sectional approach to panel estimation and found a significant positive impact of trade on income.

On the contrary, Rodriguez and Rodrik (2000) challenge the robustness of the openness–growth correlations found by Dollar (1992), Ben-David (1993), Sachs and Warner (1995) and Edwards (1998). They argue that some of these studies do not control for other important growth indicators and that important drawbacks are their usage of the openness measures. Nevertheless, Warner (2002) refutes the argument of Rodriguez and Rodrik (2000). His results re-establish the positive

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7 Recently, Subasat (2003) demonstrates that the index developed by Dollar (1992) has fundamental flaws and therefore has no relevance to the debate on trade orientation and should be abandoned.

At the same time, Vamvakidis (2002) and Clemens and Williamson (2004) examine longer-period historical data. They find that the existing correlation between openness and growth becomes significant only in recent decades. Rodrik (1998) argued that trade and financial openness by itself are implausible to lead to economic growth, and may occasionally even backfire, in the absence of a wide range of complementary institutional and governance reforms. Here, it is worth noting that even such outstanding defenders of globalization like Blinder (2006), Summers (2006) or Krugman (2007) have acknowledged that globalization has also some adverse effects and increases inequality and insecurity.

Finally, it is important to highlight that Baldwin and Sbergami (2000) and Edison et al. (2004) demonstrated that enriching the specification between globalization and growth by allowing for nonlineairities helps explain why different studies that ignore the nonlinear character of the relationship find mixed results. Specifically, Baldwin and Sbergami (2000) provide a formal dynamic model with imperfect competition that gives rise to a U-shaped relationship between ad valorem tariffs and growth while there is a bell-shaped relationship between specific tariffs and growth. They conclude that allowing for nonlinearity does have a big empirical impact. Greiner et al. (2004) discuss in some detail how such nonlinear models can be estimated, but within the framework of the endogenous growth models. Therefore, we also consider the nonlinear nature of the relationship between growth and globalization in our empirical specifications although we conjecture that the results also depend on how openness or globalization is measured and what kind of growth model is selected.

III. Methodological and Specification Issues

Dreher (2006) is an important contribution and should satisfy the critiques of the way globalization is measured. Further refinements are perhaps possible, but the Dreher methodology would serve as a useful framework. Therefore, in what follows we assume that the Dreher index of globalization is satisfactory and attention is given two other issues of which the more important one is about the specification of the estimated growth equations in both the panel data and time series studies.

On the importance of the specification issues it is worth recalling from Section I the observation made by Easterly et al. (2004). Dreher and many similar panel data studies have often used 5-year average growth rates of per capita output to measure the unobservable SSGRs. However, a time span of 5 years is too short for an economy to attain its steady state growth when perturbed. This is so because simulations with the closed form solutions show that an economy takes several periods to converge anywhere close to its steady state. This transition period may be more than 30 years even for small perturbations; see Sato (1963) and Rao (2006). For example, when Easterly et al. (2004) have used 8-year average growth rates of output, instead of the popular 5-year growth rates, to check the robustness of the results in Burnside and Dollar (2000) on the effects of aid on growth, the coefficient of aid and the conditionality variables became insignificant. They have also experimented with various lengths for panels – ranging from annual growth rates to the average growth rate for the entire sample period of 1970 to 1993 of Burnside and Dollar – and found that this did not alter their findings. This is an indication that even average growth rate of over two decades is

Dreher (2006) is not the first to construct a comprehensive measure of globalization. Kearney, and Andersen and Herbertsson (2005) have also developed such indices. The Kearney measure combines indicators of trade, finance, political engagement, information technology and personal contact to form a comprehensive measure of globalization for 62 countries. This index starts from 2000 and used by Foreign Policy magazine to determine the annual rankings of countries on the basis of the Kearney index. The Andersen and Herbertsson index is developed for 23 Herbertsson index is developed for 23 Organization for Economic Cooperation and Development (OECD) countries for the period 1979 to 2000. Nine economic variables are used to develop their globalization index with the factor loading technique. Like the Kearney index, the Andersen and Herbertsson index is used to rank the countries on the basis of their globalization index. This work has also a good critique of the Kearney index. A weakness of the Kearny index is that the weighting scheme is somewhat arbitrary in which they are not adjusted for the size of the country on the basis of its population. In contrast to these two studies, the Dreher index combines many economic, political and social indicators with the widely available technique of the principal components method in software packages like EViews and TSP, etc. Furthermore, it is not possible to use the Kearney and Andersen and Herbertsson indices in time series regressions whereas the Dreher index is most suitable for this purpose.
not a good proxy for the SSGR. More explicitly, this limitation is recognized by Demirgüç-Kunt and Levine (2008), in their work on finance and growth, by noting that ‘To the extent that five years does not adequately proxy for long-run growth, the panel methods may be less precise in assessing the finance growth relationship than methods based on lower frequency data’. This limitation of measuring the unobservable SSGRs did not so far receive much attention of the experts of growth economics and econometrics.9 Dreher’s panel data growth equations, based on the conventional methods, also have this specification bias.

In light of such limitations, what can be estimated at best, with annual data or even with short panels, seems to be the production function. The production function can be modified to capture the permanent growth effects of variables like globalization through their effects on the Total Factor Productivity (TFP). Edwards (1998) and Dollar and Kraay (2004) suggest a similar procedure, but our method is somewhat different because this extension depends on the selected growth model. In this article we select the Solow (1956) growth model for a few reasons. Firstly, the Solow exogenous growth model, with constant returns, is easy to extend and estimate compared to a variety of endogenous growth models which need more complicated nonlinear dynamic specifications. Greiner et al. (2004) have estimated such endogenous growth models with country-specific time series data to determine the permanent growth effects of R&D expenditure. Secondly, there is no convincing evidence that endogenous growth models, with increasing returns, empirically perform better than the Solow model; see Jones (1995), Kohcerlakota and Kei-Mu Yi (1996), Solow (2000) and Parente (2001). Solow (2000) observed that ‘The second wave of runaway interest in growth theory – the endogenous growth literature sparked by Romer and Lucas in the 1980s, following the neoclassical wave of the 1950s and 1960s – appears to be dwindling to a modest flow of normal science. This is not a bad thing. Nevertheless, a wider variety of growth models is now available for trying out; and some of the main empirical uncertainties have been specified, and perhaps narrowed down even if not settled’. Our extended Solow model may be called the Solow model with an endogenous framework. The well-known extension to the Solow model by Mankiw et al. (1992, MRW, hereafter) is based on a similar approach. However, our extension differs somewhat but its underlying spirit is similar. While our model directly estimates the effects of variables on the SSGR, the MRW, method is more suitable for estimating the level effects.

Let the Cobb–Douglas production function with the constant returns and Hicks-neutral technical progress be

$$y_t = A_t K_t^\alpha, \quad 0 < \alpha < 1$$ (1)

where $y_t$ = per worker output, $A_t$ = stock of technology and $K_t$ = capital per worker. It is well known that SSGR in the Solow model equals the rate of growth of $A_t$. It is common in the Solow model to assume that the evolution of technology is given by

$$A_t = A_0 e^{gT}$$ (2)

where $A_0$ is the initial stock of knowledge. Therefore, the steady state growth of output per worker (SSGR) equals $g$. It is also plausible to assume for our purpose that

$$A_t = f(T, GLO_t) \quad f_T \text{ and } f_{GLO} > 0$$ (3)

where $GLO$ is a measure of globalization. For example, Edwards (1998), Dollar and Kraay (2004) and Winters (2004) take the view that a more convincing and robust evidence between openness or globalization and growth should be derived from their effects on productivity.10 The effect of GLO on TFP can be captured with a few alternative empirical specifications for (3).

Simple linear and nonlinear specifications of the extended production function of Equation 1 are as follows:

$$y_t = A_0e^{(g + \phi GLO_t)T} K_t^\alpha$$ (4)

$$y_t = A_0e^{(g + \frac{\phi GLO_t}{1+\phi T})T} K_t^\alpha$$ (5)
A third alternative is to introduce GLO as a shift variable into the production function implying that

$$A_t = A_0 e^{gT} GLO_t^g$$  \hspace{2cm} (6)

and

$$y_t = (A_0 e^{gT} GLO_t^g)^{k_t^a}$$  \hspace{2cm} (7)

These formulations can also be used, in a similar way, to test for the growth effects of other variables. It is also possible to introduce conditionality variables into our specifications. However, this may not be necessary when a comprehensive measure of globalization (e.g. Dreher’s) is used. These alternative specifications imply that the corresponding SSGRs are

$$\Delta \ln y^* = g_1 + g_2 GLO$$  \hspace{2cm} (4')

$$\Delta \ln y^* = g_4 - g_5 GLO^{-1}$$  \hspace{2cm} (5')

$$\Delta \ln y^* = g + \beta \Delta \ln GLO$$  \hspace{2cm} (7')

These specifications are well suited to test, for example, Dreher’s findings that countries with higher globalization grow faster because the SSGR (denoted as $\Delta y^*$ above) depends on GLO.

**IV. Empirical Results**

**Singapore and Malaysia**

The specifications in (4), (5) and (7) are estimated with the London School of Economics (LSE) and Hendry’s general to specific method (GETS). First, some advantages of GETS are that the parameters of both the long-run equilibrium relationship and the variables that capture the dynamic adjustments, i.e. the Autoregressive Distributed Log (ARDL) terms, can be estimated in one step. Second, any endogenous variable bias can be minimized by estimating with the instrumental variables method. Finally, it is relatively simple to impose the nonlinear constraints on the variables and parameters; see Rao et al. (2009) for the advantages of GETS which are not easy with alternative methods like the Johansen, Phillips and Perron and Bounds Test methods. We shall use the Ericsson and McKinnon (2002) test as the cointegration test. All the variables are tested for their stationarity properties and found to be $I(1)$ in levels and $I(0)$ in their first differences. For illustration the GETS specification of Equation 4 with the ARDLs and in its most general form is as follows:

$$\Delta \ln y_t = -\lambda [\ln y_{t-1} - \ln A_0 + (g_1 + g_2 GLO_{t-1}) T + \alpha \ln k_{t-1}]$$

$$+ \sum_{i=0}^{n_1} \gamma_{1i} \Delta \ln k_{t-i} + \sum_{i=0}^{n_2} \gamma_{2i} \Delta GLO_{t-i}$$

$$+ \sum_{i=0}^{n_3} \gamma_{3i} \Delta \ln y_{t-i}$$  \hspace{2cm} (8)

We have included in (8) current period changes of the variables because some of them may have short-run dynamic and transitory effects on the growth rate, and the endogenous variable bias is minimized due to the instrumental variable estimation method; see below. In general it is to be expected that current period investment, i.e. $\Delta k_t$, would have significant growth effects especially in the developing countries. Using the variable deletion tests, this long specification can be reduced into a parsimonious equation. It may be noted that the expression in the square brackets is the lagged error correction term (ECM).

Similar specifications for Equations 5 and 7 can be obtained by replacing the ECM in (8) with the appropriate terms and these are as follows:

$$\Delta \ln y_t = -\lambda [\ln y_{t-1} - \ln A_0 + (g_3 - g_4 GLO_{t-1}) T + \alpha \ln k_{t-1}]$$

$$+ \sum_{i=0}^{n_4} \gamma_{1i} \Delta \ln k_{t-i} + \sum_{i=0}^{n_5} \gamma_{2i} \Delta GLO_{t-i}$$

$$+ \sum_{i=0}^{n_6} \gamma_{3i} \Delta \ln y_{t-i}$$  \hspace{2cm} (9)

$$\Delta \ln y_t = -\lambda [\ln y_{t-1} - \ln A_0 + g T + \beta \ln GLO_{t-1}$$

$$+ \alpha \ln k_{t-1}]$$

$$+ \sum_{i=0}^{n_7} \gamma_{1i} \Delta \ln k_{t-i} + \sum_{i=0}^{n_8} \gamma_{2i} \Delta \ln GLO_{t-i}$$

$$+ \sum_{i=0}^{n_9} \gamma_{3i} \Delta \ln y_{t-i}$$  \hspace{2cm} (10)

We have estimated these GETS equations with the methods stated above for Singapore, Malaysia,

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11 Rodriguez and Rodrik (2000) and Winters (2004) have argued in favour of additional conditionality variables because globalization is often measured partially with a few economic variables. Let this conditionality variable be $Z$. The extended specification based on Equation 4 will be

$$y_t = A_0 e^{(g_1 + g_2 GLO_t + g_3 GLO_t Z_t)} k_t^a$$
Globalization

Table 1. Singapore and Malaysia NL2SLS-IV estimates (1974–2004)

<table>
<thead>
<tr>
<th></th>
<th>I (SGP)</th>
<th>II (SGP)</th>
<th>III (MAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>6.0376 (3.23)*</td>
<td>6.1544 (5.45)*</td>
<td>6.2805 (14.98)*</td>
</tr>
<tr>
<td>λ</td>
<td>–0.4665 (–4.18)*</td>
<td>–0.4726 (–5.81)*</td>
<td>–0.5837 (–6.43)*</td>
</tr>
<tr>
<td>g1</td>
<td>–0.0029 (0.08)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>g2</td>
<td>0.3259E–3 (8.25)*</td>
<td>0.3009E–3 (6.88)*</td>
<td>0.2409E–3 (7.23)*</td>
</tr>
<tr>
<td>α</td>
<td>0.3519 (1.93)**</td>
<td>0.3399 (3.43)*</td>
<td>0.2926 (6.96)*</td>
</tr>
<tr>
<td>Δln kT</td>
<td>0.9864 (2.61)*</td>
<td>0.9999 (3.07)*</td>
<td>1.0542 (5.91)*</td>
</tr>
<tr>
<td>Δln kT–1</td>
<td>–0.6572 (–3.58)*</td>
<td>–0.6494 (–6.14)*</td>
<td>0.9649 (3.98)*</td>
</tr>
<tr>
<td>Δln gT–1</td>
<td>–0.4679 (2.80)*</td>
<td>0.4671 (3.01)*</td>
<td>–</td>
</tr>
<tr>
<td>1971–2004 Mean SSGR</td>
<td>2.1276%</td>
<td>2.1276%</td>
<td>1.318%</td>
</tr>
<tr>
<td>R²</td>
<td>0.30602</td>
<td>0.33975</td>
<td>0.61679</td>
</tr>
<tr>
<td>Sargan’s χ²</td>
<td>1.0756 [0.783]</td>
<td>1.1316 [0.889]</td>
<td>5.8359 [0.323]</td>
</tr>
<tr>
<td>SEE</td>
<td>0.02839</td>
<td>0.02769</td>
<td>0.02408</td>
</tr>
<tr>
<td>χ² (sc)</td>
<td>0.74991 [0.387]</td>
<td>0.59447 [0.441]</td>
<td>1.0768 [0.299]</td>
</tr>
<tr>
<td>χ² (n)</td>
<td>1.3542 [0.058]</td>
<td>1.4374 [0.487]</td>
<td>0.31429 [0.855]</td>
</tr>
</tbody>
</table>

Notes: Absolute t-ratios (White-adjusted) are in the parentheses p-values are in the square brackets for the χ² tests. SEE: Sum of Squared Errors.
* and ** denote significance at the 5 and 10% levels, respectively.

Thailand, India and the Philippines for the period 1974 to 2004. Two-stage nonlinear least squares instrumental variables method (2S NL1-IV) is used for estimation and lagged values of the variables are used as the instrumental variables. The Sargan χ² test is used to validate the choice of instrumental variables. However, of the three alternative specifications, Equation 8 with linear effects of GLO performed far better. This may be due to the use of Dreher’s comprehensive measure of GLO. Elsewhere when globalization is measured with only trade ratio, the nonlinear specification (9) performed better; see Rao and Singh (2007). Compared to the trade ratio or similar variables, the potential growth effects of a broad-based measure of GLO are likely to continue for longer periods. Therefore, a nonlinear specification where these effects taper off over one or two decades may be an inappropriate specification when globalization is measured comprehensively.

Estimates of the parsimonious equations of (8) for these five countries are given in Tables 1 and 2. First, we shall discuss the estimates for Singapore and Malaysia because these are very similar. Furthermore, this also helps to understand if the SSGR of Singapore is higher than in Malaysia because the average value of GLO in the former is significantly more. Equations I and II in Table I are for Singapore. Although Equation I is well determined and its residuals have no serial correlation and normally distributed, estimates of g1 and g2 which are crucial parameters for determining TFP due to autonomous factors and GLO, respectively, are insignificant. This may be, as one of the referees has suggested, due to the high collinearity between trend (T) and T×GLO. However, when this equation is re-estimated in (II) with the constraint that g1 = 0, g2 became significant.12 This implies that improvements in TFP and SSGR in Singapore are mostly due to its rapid globalization policies. This is not surprising because the Dreher globalization index is comprehensive and includes many growth enhancing variables from the economic, social and political sectors. Therefore, it is to be expected that g1 will be small and insignificant for other countries also.

The Dreher index for Singapore is the highest in our sample. The mean value of GLO for Singapore is 70.7 compared to a lower mean of 54.7 for Malaysia and the minimum of 30.2 for India. It is noteworthy

12 Following a suggestion of a referee, we have also used the Johansen Maximum Likelihood (JML) method to estimate for Singapore (for which our results are more robust) the cointegrating equations between ln y, ln k and T×GLO. Although there is a single cointegrating equation with a restricted trend, all the estimated coefficients are insignificant. Furthermore, the coefficient of T×GLO was negative and the coefficient of trend was implausibly high at 0.09. This may be, as this referee pointed out, due to the near perfect correlation of 0.99 between trend and T×GLO. Next, we tested for cointegration with trend and no T×GLO and then with T×GLO and no trend. In both cases there was a well-defined single cointegrating equation and all the estimated coefficients were significant. When only trend is retained in a restricted form, its coefficient is 0.03 and the share of profits is somewhat higher at 0.489. When only T×GLO is retained, with no trend, the share of profits increased to 0.674 and the coefficient of T×GLO was 0.243E–3. These estimates are qualitatively similar to those in Table 1 but not close enough. Since results with JML are not very impressive for Singapore, we did not proceed further with JML. For the merits of GETS over some alternative methods of cointegration techniques, see Rao (2007) and Rao et al. (2009), keeping in mind that this controversy is a methodological issue.
that the estimates of the share of profits ($/C_{11}$) in Equations I and II are close to their stylized value of one-third in the growth accounting exercises. All other coefficients are significant.

Estimates for Malaysia are similar to Singapore in that while all other coefficients are significant, both $g_1$ and $g_2$ were insignificant. This estimate is not shown to conserve space. Estimates for Malaysia with the constraint that $g_1 = 0$ are in Equation III and these are similar to (II) for Singapore, but with a smaller value of $g_2$. The share of profits ($/C_{11}$) for Malaysia is marginally lower than Singapore, but not significantly different from the stylized value of one-third.

Compared to the estimates for the other countries, which will be reported shortly, estimates for these two neighbouring countries are well determined and robust. Further, the Sargan $\chi^2$ is insignificant at the 5% level and validates our choice of instrumental variable. The test statistic for cointegration, namely, the $t$-ratios of the adjustment coefficients ($/C_{21}$) in (II) and (III) are more than the Ericsson–McKinnon critical value at the 5% level and reject the null of no cointegration.13 Therefore, we shall use these results in the first instance to examine the differences in the contribution of GLO to SSGRs of Singapore and Malaysia. Some estimates of the relevant average values for different sample periods for the five countries are given in Table 3. As stated earlier the average GLO for Singapore and Malaysia during 1970–2004 are respectively 70.7 and 54.7. The mean estimated value of SSGR for Singapore is 2.1% compared to 1.3% for Malaysia. Therefore, our results support the view that countries with higher globalization levels permanently grow faster. Within Singapore itself the level of globalization is different at the beginning and end of the sample period. During 1971–1975 the mean values of GLO and SSGR are, respectively, 58.9 and 1.8%. During 2000–2004 the corresponding values are 83.0 and 2.5%. Thus, a 34% increase in globalization seems to have increased Singapore’s SSGR by 35%. For Malaysia the corresponding increases are about 53% each. In comparison, the actual average rate of growth of per worker output in both countries has declined between these two periods implying that 5-year average growth rates of many panel data studies are not good for proxying the long run and steady state rates of growth.14 Singapore being an advanced country, its actual rate of growth of output is now close to its SSGR, but Malaysia seems to be growing at slightly above its SSGR.

Table 2. Thailand, India and Philippines NL2SLS-IV estimates (1974–2004)

<table>
<thead>
<tr>
<th></th>
<th>I (THA)</th>
<th>II (IND)</th>
<th>III PHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.0986 (6.43)*</td>
<td>-2.9679 (15.95)*</td>
<td>3.1018 (3.73)*</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>-0.4915 (5.47)*</td>
<td>-1.2255 (6.24)*</td>
<td>-0.3326 (2.05)*</td>
</tr>
<tr>
<td>$g_2$</td>
<td>0.2604E-3 (3.76)*</td>
<td>0.3344E-3 (9.75)*</td>
<td>0.6486E-4 (1.72)**</td>
</tr>
<tr>
<td>$/C_{11}$</td>
<td>0.4662 (6.59)</td>
<td>0.4333 (10.61)*</td>
<td>0.6386 (9.11)*</td>
</tr>
<tr>
<td>$\Delta ln k_t$</td>
<td>1.5275 (6.72)*</td>
<td>2.2355 (3.01)*</td>
<td>1.9442 (3.05)*</td>
</tr>
<tr>
<td>$\Delta ln k_{t-1}$</td>
<td>-</td>
<td>2.4320 (2.68)*</td>
<td>1.4325 (2.28)*</td>
</tr>
<tr>
<td>$\Delta GLO_t$</td>
<td>0.0102 (1.91)**</td>
<td>0.0223 (2.68)*</td>
<td>-</td>
</tr>
<tr>
<td>FCDUM</td>
<td>-0.1050 (6.97)*</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DUM 79</td>
<td>-</td>
<td>-0.0960 (4.38)*</td>
<td>-</td>
</tr>
<tr>
<td>FCPHI</td>
<td>-</td>
<td>-</td>
<td>-0.0288 (4.17)*</td>
</tr>
<tr>
<td>1971–2004 Mean SSGR</td>
<td>0.9722%</td>
<td>1.1395% a</td>
<td>0.2442%</td>
</tr>
<tr>
<td>$/C_{22}$</td>
<td>0.63253</td>
<td>0.51691</td>
<td>0.71899</td>
</tr>
<tr>
<td>Sargan’s $\chi^2$</td>
<td>2.0869 [0.720]</td>
<td>3.4275 [0.489]</td>
<td>0.014140 [0.993]</td>
</tr>
<tr>
<td>SEE</td>
<td>0.0255</td>
<td>0.0204</td>
<td>0.0196</td>
</tr>
<tr>
<td>$\chi^2(5c)$</td>
<td>0.50124 [0.479]</td>
<td>0.52140 [0.470]</td>
<td>0.81749 [0.366]</td>
</tr>
<tr>
<td>$\chi^2(n)$</td>
<td>2.3199 [0.314]</td>
<td>0.25414 [0.881]</td>
<td>0.33634 [0.845]</td>
</tr>
</tbody>
</table>

Notes: Absolute $t$-ratios (White-adjusted) are in the parentheses. $p$-values are in the square brackets for the $\chi^2$ tests. For the critical values of the Ericsson–McKinnon test, see footnote 12. SEE: Sum of Squared Errors.

aSSGR for India is estimated for the period 1970 to 2003.

* and ** denote significance at the 5 and 10% levels, respectively.

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13 The computed 5 and 10% critical (absolute and sample size adjusted) values are 4.1063 and 3.7012, respectively. The cointegration test statistic is the absolute value of the $t$-ratio of the adjustment coefficient $\lambda$. The null is that there is no cointegration.

14 The average rates of growth of output per worker for Singapore are 5.6% (1971–1974) and 2.5% (2000–2004). The corresponding rates for Malaysia are 6.6 and 2%, respectively.
**Other Asian countries**

In comparison to the estimates for Singapore and Malaysia, estimates for Thailand, India and the Philippines showed that the point estimates of the share of profits ($\alpha$) are higher ranging from 0.48 for Thailand to 0.64 for the Philippines. However, the Wald test showed that these are not significantly more than one-third at the 5% but not at the 10% level. The estimates for these three countries which have lower levels of globalization are given in Table 2.

**Thailand.** In the initial estimates (not reported to conserve space), without constraining that $g_1 = 0$, the estimate of $g_1$ was 0.009 and significant only at the 15% level. Therefore, this equation is re-estimated with the constraint that $g_1 = 0$ and the results are in Equation IV of Table 2. All the other coefficients are significant and the residuals are free from serial correlation and nonnormality. The Sargan $\chi^2$ is insignificant at 5% level and validates our choice of instrumental variable. The Ericsson–McKinnon test rejects the null of no cointegration. However, the point estimate of profit share is high at 0.47 but not significantly different from the stylized value of one-third. It was also necessary to include a dummy variable (DUM79) to capture the negative effects of the emergency imposed by the then Prime Minister Indira Gandhi and the severe effects of drought. These factors seem to have decreased output growth by 9% in 1979. The estimated share of profits is 0.43 but not significantly different from the stylized value of one-third. India’s globalization index is the lowest in our sample with an average of 34.2 and its average SSGR is 1.1%. However, policies for globalization started from the late 1990s. By the end of the sample period 2000 to 2004 the average level of globalization and SSGR have increased to 47.35 and 1.6%, respectively.

**The Philippines.** In the estimates for the Philippines $g_1$ is also found to be insignificant and the estimates with the constraint that $g_1 = 0$ are in Equation VI of Table 2. All the coefficients are significant and the residuals show no serial correlation and nonnormality. The Sargan $\chi^2$ is insignificant at 5% level and validates the choice of instrumental variable. It is somewhat disappointing to note that the Ericsson–McKinnon test could not reject the null of no cointegration. The share of profits is high at 0.64 but not significantly different from one-third at

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15 Estimates for India are for the period 1974 to 2003.
16 It may be argued that there is no need for the cointegration tests in the GETS because all the variables are $I(0)$ in the specification. Therefore, the classical methods of estimation are valid and there is no need to estimate GETS specifications with the time series methods; see Rao et al. (2009). However, since these are methodological views, Ericsson and McKinnon (2002) have developed cointegration tests to make GETS consistent with the cointegration approach.
the 5%, but not at the 10% level. Further, it was necessary to take into account not only the negative growth effects of the East Asian financial crisis in 1997–1998 but also the negative effects of political instability during 1984–1985 and 1991–1992. The dummy variable (FCPHI), therefore, is unity during these three periods and zero in all other periods. Their combined effect is a decline in the rate of growth of per worker income of about 3%.

Globalization in the Philippines was low with an average value of 37.65 and consequently its average SSGR is less than 1% at 0.2%. Towards the end of the sample period in 2000–2004 their average values are respectively 53.58 and 0.35%. Thus, the SSGR of this country is the lowest of all and its Dreher globalization index and our estimates may need further attention.

Some comparisons. Panel data studies are often criticized because they generally assume that the effects of growth enhancing variables are the same irrespective of considerable differences in the structure of countries in the sample. For example, they imply that R&D expenditure will have equal growth effects in the USA and Kiribati because its coefficient is the same for both countries. In spite of these limitations, panel data methods are justified on the grounds that many growth enhancing variables do not show much variance in country specific time series data. Thus, there seems to be a trade off between the objectives of panel data studies and country specific studies. To get some perspective on the differences in the growth effects of globalization we have tabulated in Table 3 the average values of GLO and SSGRs for two sub-periods for the five countries in our sample.

It can be seen from Table 3 that in general higher levels of globalization lead to higher SSGR both within a country and across the countries. In the entire sample period Singapore's SSGR at 2.14% is higher than India's SSGR of 1.1% because globalization in Singapore has been twice that of India. However, increases in globalization seem to have different effects which may be due the differences in the structure of these economies. A 10 points increase in the index of globalization has the highest effect on SSGR of 0.36% in India compared to only 0.07% in the Philippines. Further, in all the countries in our study the permanent effects of globalization on the rate of growth of per worker output, i.e. SSGR is smaller in comparison to the estimates in the panel data studies with 5-year panels. In Dreher (2006, Column 5 of Table 4), with his comprehensive measure of globalization a one point increase in globalization leads to 7% increase in the rate of growth of per capita output. Our highest estimate for this effect is 3% for India with an average of 2.37% for all the five countries. While some of these differences may be due to the differences in the datasets and estimation methods, we conjecture that the higher growth effects of globalization in Dreher and similar panel data studies are mainly due the specification errors of the output equation and a lack of any theoretical justification of the underlying growth model. Vague references to some endogenous growth model is perhaps inappropriate to justify the specification of the output equation.

V. Summary and Conclusions

In this article, firstly, we have used a comprehensive measure of globalization of Dreher and extended the Solow growth model to derive the estimates of SSGRs for five Asian countries with different levels of globalization. Our empirical results, with the country-specific time series data, showed that countries with higher globalization policies have also higher SSGRs. In this process, we have argued that what can be at best estimated with annual data or even with short panels is a production function not a growth equation. If this is accepted it will increase the degrees of freedom and efficiency in the panel data estimation methods by increasing their time series dimension.

Secondly, our results indicate that the permanent growth effects of globalization do not seem to be uniform across all the countries. Therefore, the assumption in the panel data methods that these effects are uniform across all the countries needs attention. We found that globalization had the highest effect in India and the lowest in the Philippines. While India’s SSGR can be permanently increased by 0.36% points if its globalization index can be increased by 10 points, the corresponding increase for the Philippines is only 0.07% points.

Thirdly, because of specification errors in the panel data estimates they are likely to overestimate the permanent growth effects of globalization and similar growth enhancing variables, considerably. Our results showed that the permanent growth effects of

\[17\] It is possible to estimate separate slope coefficients for each or a group of countries by introducing slope dummy variables. However, this is possible if the sample size is very large which in fact is not true in the empirical growth models. We are not aware of any empirical work that has introduced slope dummy variables although intercept dummies are common.
improving globalization by one point is at best only three percentage points increase compared to the 7% estimate of Dreher.

Finally, although our sample consists of only five countries, for the purpose of estimating the growth effects of globalization, these countries can be classified into three groups, namely, countries where the growth effects of globalization are highest, and close, as in Singapore and India, modest as in Malaysia and Thailand and lowest as in the Philippines. This may be useful for those working with the panel data methodology.

Nevertheless, there are some limitations in our findings. Firstly, our sample size is small and we have used data only for about 35 years. Estimates for more countries and longer time spans may reveal both the advantages and limitations of our methodology. Secondly, we did not estimate the effects of globalization using Dreher’s alternative measures. Similarly, it would be useful to estimate the cointegrating equations with some alternative methods. In spite of these limitations, we hope that this article and our methodology will encourage others to improve methods of estimating the growth effects of globalization and other variables.

Acknowledgements
The authors are grateful to two referees of this journal and their many valuable suggestions.

References


Baldwin, R. E. and Sbergami, F. (2000) Non-linearity in


Appendix

**Data**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Y$ is the real Gross Domestic Product (GDP) at constant 1990 prices (in millions and national currency).</td>
<td>Data are from the UN National accounts database.</td>
</tr>
<tr>
<td>$L$ is labour force or population in the working age group (15–64), whichever is available.</td>
<td>Data obtained from the World Development Indicator CD-ROM 2002 and new WDI online. URL: <a href="http://www.worldbank.org/data/onlinedatabases/onlinedatabases.html">http://www.worldbank.org/data/onlinedatabases/onlinedatabases.html</a></td>
</tr>
<tr>
<td>$K$ is real capital stock estimated with the perpetual inventory method with the assumption that the depreciation rate is 4%. The initial capital stock is assumed to be 1.5 times the real GDP in 1969 (in million national currency).</td>
<td>Investment data includes total investment on fixed capital from the national accounts. Data are from the UN National accounts database.</td>
</tr>
<tr>
<td>GLO</td>
<td>Own estimates</td>
</tr>
<tr>
<td>DUMFC</td>
<td>Own estimates</td>
</tr>
<tr>
<td>FCPHI</td>
<td>Own estimates</td>
</tr>
</tbody>
</table>

DUMFC is a dummy variable to capture the effects of the East Asian financial crisis during 1997–1998. It is one in 1997 and 1998 and zero in all other periods. DUM79 is one in 1979 and zero in all other periods to capture the adverse economic effects of emergency rule in India. FCPHI is a dummy variable which is one in 1997, 1998 (East Asian Financial Crisis), 1984–1985 (end of Marco’s regime) and 1991–1992 (political uncertainty due to power struggles and three leadership changes). This dummy captures the effects of Asian Financial crisis and political instability in the Philippines.
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Contribution</th>
<th>Method*</th>
<th>Key variable(s)</th>
<th>$C^a$</th>
<th>$S^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dollar (1992)</td>
<td>The author analyses the relationship between outward orientation and economic growth. His finding is that outward orientation is conducive to economic growth.</td>
<td>CS</td>
<td>Produced an index of outward orientation. He adjusted national price levels with factor endowments, and used the difference between actual and predicted price levels as a measure of real exchange rate distortion.</td>
<td>95</td>
<td>+</td>
</tr>
<tr>
<td>Levine and Renelt (1992)</td>
<td>Employing Extreme Bound Analysis (EBA) proposed by Leamer (1988) the authors consider a relationship between growth and a variable of interest to be robust if it remains statistically significant and maintains a sign predicted by theory even after the conditioning set of variables in the regression has been changed. Among their findings, they conclude that a positive robust relationship exists between average share of capital formation in the GDP and the average share of trade in the GDP. Similarly, they confirm the existence of a positive robust relationship between average growth rates and the share of capital formation in the GDP. Finally, they point out that an overwhelming majority of economic and political indicators, such as fiscal-expenditure, monetary-policy and political stability indicators are indeed not robustly correlated with growth or the capital formation share of the GDP.</td>
<td>CS</td>
<td>They used a variety of variables related to Trade (see Levine and Renelt, 1992, data appendix) for their exact definition.</td>
<td>119</td>
<td>±</td>
</tr>
<tr>
<td>Easterly et al. (1993)</td>
<td>Find out evidences that terms of trade explain growth variation in the 1970s and 1980s. While the investment rate changes little over time for most countries in the world, the growth rate is highly volatile. Then, if investment rates do not change much across decades whereas growth rates do, it is plausible to think that the investment could not be an important determinant of growth.</td>
<td>CS</td>
<td>The black-market exchange rate premium and the ratio of imports and exports to GDP, both of which they find to be negatively related to growth, although the coefficient on trade share is insignificant.</td>
<td>160</td>
<td>–</td>
</tr>
<tr>
<td>Alesina et al. (1994)</td>
<td>They found that capital controls had positive but insignificant effects on economic growth within OECD countries. They employed annual data so that the implications of the article are for a short term.</td>
<td>CS</td>
<td>Share</td>
<td>20</td>
<td>–</td>
</tr>
<tr>
<td>Grilli and Milesi-Ferreti (1995)</td>
<td>They study the effect of capital controls on GDP growth and inflation. The results show level of capital controls do contribute to inflation.</td>
<td>CS</td>
<td>Share</td>
<td>61</td>
<td>–</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Reference</td>
<td>Description</td>
<td>Citation</td>
<td></td>
<td></td>
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<td>-----------------------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sachs and Warner</td>
<td>(1995)</td>
<td>They constructed their own openness indicator and found positive relationship between the latter and economic growth.</td>
<td>CS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinn</td>
<td>(1997)</td>
<td>Shows that capital account liberalization have a positive effects on growth. He used a nuanced 4-point scale and concluded that those countries that open their capital accounts more quickly grow faster.</td>
<td>CS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rodrik</td>
<td>(1998)</td>
<td>Using a binary indicator of capital account openness (Share) for a sample of roughly 100 developing and developed countries, the author argued that there was no association between (the level of) capital account openness and growth. He shows that the significance attributed to capital account openness in a cross-country growth regression disappears with the inclusion of an indicator of government reputation, a variable whose coefficient is significant in the growth regression.</td>
<td>CS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenaway et al.</td>
<td>(1998)</td>
<td>Find evidence of a positive relationship between liberalization/openness and growth, although the impact of trade reforms appear to follow a J-curve pattern.</td>
<td>PD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edwards</td>
<td>(1998)</td>
<td>Runs regressions of TFP growth on nine alternative indicators of openness for 93 countries. He concludes that there is a significantly positive relationship between openness and productivity growth. Moreover, they argue that no particular measure of openness may be considered as ideal and absolute.</td>
<td>PD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Sachs–Warner dummy is a variable that classifies an economy as closed if it is closed according to any one of the following five criteria: (i) its average tariff rate exceeded 40%, (ii) its nontariff barriers covered more than 40% of imports, (iii) it had a socialist economic system (iv) it had a state monopoly of major exports or (v) its black-market premium exceeded 20% during either the decade of the 1970s or the decade of the 1980s.

The author used the following nine measures of trade restrictions and trade shares: (1) a ratio of taxes on imports and exports to total trade, (2) subjective index of trade distortions proposed by the Heritage Foundation (3) Index of openness based on residuals from regressions explaining trade flows conceived by Leamer (1988), (4) Wolf (1993) regression-based index of import distortions (5) average levels of import tariffs calculated by UNCTAD⁴, (6) average coverage of nontariff trade barriers calculated by UNCTAD, (7) World Bank classification of trade strategies, (8) Warner–Sachs trade policy index and (9) average black-market premium on a nation’s foreign exchange rate.
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Contribution</th>
<th>Method*</th>
<th>Key variable(s)</th>
<th>C^a</th>
<th>S^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harrison and Hanson (1999)</td>
<td>Suggest that many approaches to measuring 'openness' are significantly flawed. As an illustration, they showed that work by Sachs and Warner (1995) measure of openness is not robust and therefore fails to establish a robust link between more open trade policies and SSGR.</td>
<td>CS</td>
<td>They estimate a cross-country growth regression which corresponds exactly to the specification presented by Sachs and Warner, except that they decompose Sach and Warner's openness measure into its five separate components. The dependent variable is the average annual growth in real GDP per capita for the period 1970 to 1989.</td>
<td>72</td>
<td>–</td>
</tr>
<tr>
<td>Klein and Olivei (1999)</td>
<td>The authors show a statistically significant and economically relevant effect of open capital accounts on financial depth and economic growth in a cross section of countries over the period 1986 to 1995.</td>
<td>CS</td>
<td>They used Share indicator, which in their case represents the proportion of years between 1986 and 1995 in which the country had unrestricted capital mobility.</td>
<td>93</td>
<td>+</td>
</tr>
<tr>
<td>Rodriguez and Rodrik (2000)</td>
<td>They conclude that this link has not been convincingly demonstrated, and they remain 'skeptical that there is a strong negative relationship in the data between trade barriers and economic growth, at least for levels of trade restrictions observed in practice'.</td>
<td>CS, PD</td>
<td>A wide range of measure according to variety of authors</td>
<td>Var</td>
<td>–</td>
</tr>
<tr>
<td>Edwards (2001)</td>
<td>Did point out the possibility that capital account openness may be beneficial only when once a certain level of development is reached. To some extent, this provides a support to the view that there is an optimal sequencing for capital account liberalization.</td>
<td>CS</td>
<td>Uses in separate regressions, either the level of Share indicator or its change.</td>
<td>62</td>
<td>+</td>
</tr>
<tr>
<td>Arteta et al. (2001)</td>
<td>They found a positive relationship between capital account liberalization and growth. However, this association varies with time relying on how the capital account liberalization is measured and how it is estimated. They argue about the need to eliminate major macroeconomic imbalances before opening the capital account.</td>
<td>CS, PD</td>
<td>They use in a standard cross-country growth regression, Share and the product of this indicator and the logarithm of GDP per capita. They find that the effect of capital account openness on growth declines with the level of income and, as mentioned above, scant evidence of an effect for richer countries.</td>
<td>61</td>
<td>±</td>
</tr>
<tr>
<td>O’Donel (2001)</td>
<td>O’Donell finds increased financial integration to be associated with lower output volatility for OECD countries but with higher output volatility in non-OECD countries.</td>
<td>CS, PD</td>
<td>Share (not significant) Capital flows (significant)</td>
<td>93</td>
<td>±</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Findings</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Bekaert et al. (2002)</td>
<td>They find capital account openness to reduce output and consumption volatility, though not significantly. Their results, however, show capital account openness to increase output and consumption volatility in emerging market countries.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edison et al. (2002)</td>
<td>The paper finds that although international financial integration is associated with high levels of GDP per capita and strong institutions, the data do not lend much support to the view that international financial integration spurs economic growth.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dollar and Kraay (2003)</td>
<td>They argue that the simple cross-country linear instrumental variables regressions, either in levels or in decadal differences, cannot provide definitive answers about questions as complex as the interacting roles of institutions and trade for growth. In case they consider the institutions as exogenous variables, find a significant partial association between trade and growth which survives the inclusion of a variety of proxies for institutional quality. However, if institutions are considered to be endogenous, then the model is too weakly identified to be able to sharply estimate any of the parameters of interest.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klein (2003)</td>
<td>The estimates presented here show statistically significant and economically meaningful growth benefits from an open capital account for middle-income countries, but not for poor or rich countries.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stiglitzs (2003)</td>
<td>Countries that have managed the globalization process well have shown that globalization can be a powerful force for economic growth.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klein (2003)</td>
<td>They use Share indicator and KQuinn which reflects the average value of Quinn's indicator of capital account openness in 1973, 1982 and 1988. They indicate that the correlation between these two variables is 0.73 for the 51 countries for which both variables are available.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Conceptual paper

(continued)
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Contribution</th>
<th>Method</th>
<th>Key variable(s)</th>
<th>( C^a )</th>
<th>( S^b )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clemens and Williamson (2004)</td>
<td>Demonstrate a positive relationship between tariffs and growth prior to World War II. The relationship reverses during the post-War period. They argue that high tariffs need not necessarily impede growth and the benefits of openness are neither inherent nor irreversible, but rather depend upon the state of the world.</td>
<td>CS</td>
<td>Average tariff rates</td>
<td>35</td>
<td>±</td>
</tr>
<tr>
<td>Chanda (2005)</td>
<td>Capital controls have an important impact of economic growth. The author argues that the negative or positive impact depends on the degree of heterogeneity of the country under consideration. For countries with high degrees of heterogeneity, capital controls lead to greater inefficiencies and lower economic growth. On contrary, for countries which did not face such heterogeneity, capital controls enhance economic growth.</td>
<td>CS</td>
<td>Share</td>
<td>57</td>
<td>±</td>
</tr>
<tr>
<td>Minier (2005)</td>
<td>The question addressed in this article is whether countries with lower barriers to international trade have higher growth rates, controlling for other country characteristics. The author finds that tariff barriers are positively correlated with growth in countries with a comparative disadvantage in primary goods, and negatively correlated in countries with a comparative advantage in primary goods.</td>
<td>CS</td>
<td>Average tariffs as the measure of trade barriers</td>
<td>74</td>
<td>±</td>
</tr>
<tr>
<td>Dreher (2006)</td>
<td>The author empirically examines the effects of several dimensions of globalization on economic growth using cross section time series analysis. The results show that globalization promotes growth.</td>
<td>PD</td>
<td>The author formulated a comprehensive measure of globalization process. The proposed globalization index includes three sub indices; Economic, Social and Political (for details see Dreher, 2006).</td>
<td>123</td>
<td>+</td>
</tr>
</tbody>
</table>

Notes: CS = Cross Section; PD = Panel Data.

\( a \) Indicates the largest number of countries considered in the study.

\( b \) The impact of trade variables on growth indicator. + indicates positive impact; − exerts negative and ± designates mixed results.

\( c \) 'Share' is the proportion of years in which countries had open capital accounts. This indicator is drawn from information in the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) published by the International Monetary Fund. For instance, if the AREAER judged capital markets open for 10 years out of a 20-year period, then this indicator would be 0.5. A larger value of it represents a higher proportion of years with an unrestricted capital account.

\( d \) Same data as used by Barro and Lee (1994).

\( e \) Variable number of countries.