Openness and Growth: An Empirical Investigation on a Panel of Countries over the Period 1999-2009

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Abstract: The paper investigates the link between indicators of economic openness and real growth of output. It is based on the theoretical expectation that openness should affect total factor productivity mainly through technological spillovers and market discipline. This is indeed observable in the data for 213 countries spanning 10 years for flows of goods and services, whereas the effects of financial liberalization are more ambiguous. A clear policy recommendation stems from these results: countries should target their efforts at current account liberalization, but proceed with extra care when liberalizing the financial account of the Trade Balance.

I. Introduction

The link between economic growth and openness has been one of the many topics in economics people love to disagree about[1]. Due to its obvious political salience[2], economic discourse has often fallen prey to non-economic considerations and the debate about the merits of openness has been significantly distorted. This volatility of opinion has also manifested itself in frequent changes of the trade regime throughout the 20th century. The beginning of the century was marked by a very liberal trade regime, only to be suspended in the wake of the Great Depression. Later attempts to stabilize and liberalize international exchange after the Second World War have had mixed success. The formation of the WTO marked a new regime of multilateral agreements, based on rounds of talks about the liberalization of the goods, services and capitals flows.

However, those efforts have lately come to a grinding halt. Looking at these developments, authors point out that not only the trade regimes have undergone a significant transformation but so has the effect on openness on growth. If at all present, it may very well be a recent phenomenon[3]. The point of contention in deciding the rules of the trade regime has always been the efficiency gains and the redistributive effects of the new rules. The argument goes (in opposition to classical Hekscher-Ohlin models) that developed countries have much to gain, and developing – much to lose. This sentiment has also been echoed in academic discourse[4].

Although it is obvious that international trade and specialization is a dynamic process, reaching new equilibria as it proceeds, we need to ask the question if openness has a clear positive effect on growth, especially in the context of economies at different levels of development. The question has been oft-debated in the literature and this paper conducts an additional empirical test on that. What is less researched is if openness can follows a trajectory of decreasing marginal benefits, eventually reaching zero or even negative values, which is also tested emprically. Finally, the paper tries to disentangle the question of endogeneity regarding trade and economic development.

The structure is as follows: Section 2 provides a brief overview of the existing empirical literature on the topic. Section 3 presents and develops a simple theoretical model on how openness can benefit Total Factor Productivity, and therefore growth. Section 4 presents the data and elaborates on the definitions. Section 5 looks into empirically observable effects of different indicators of openness on GDP growth, and Section 6 probes whether developing economies' experience differs. Section 7 mounts an attempt to investigate causality and Section 8 provides short policy advice. Section 9 presents a summary and conclusion.

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[1] Yanikkaya, 2003
[2] Read, 2001
[3] Vamvakidis, 2002
[4] Ocampo and Taylor, 1998; Dowrick and Golley, 2004

II.   Existing Research on the Link between Openness and Growth

In the empirical literature, the issue of growth and its determinants has received large and unwavering attention throughout the last decades. Openness, most often defined as trade liberalization, has been extensively scrutinized and a plethora of differing interpretations have emerged. This section will shortly review some of the most cited papers in this respect.

A lot of empirical work has focused on the explicit connection between the trade regime, and its growth-promoting effects using regression modeling. There has been significant critique on econometric grounds but such research has formed the mainstream of thinking about growth and openness, postulating a positive and statistically significant link between the two[5]. In a seminal research, Dollar[6] used two indices to measure the distortion and variability of exchange rates away from their free-trade regimes. On entering them into growth regressions he found a positive link between this indicator of openness on the one hand, and economic growth on the other.

Following the many critiques of model misspecification, Sachs and Warner[7] constructed an index of openness, which classified a country as not open if any of the following criteria are true: average tariffs above 40%, nontariff barriers of cover more than 40% of imports, socialist regime, state monopoly of exports or a black market premium of above 20%. When the dummy is inserted into growth regressions of different specifications, results show a positive effect of openness on growth[8].

An alternative strand of research focuses on the critique of misspecification by testing the effect of a wide variety of openness indices on growth. For example, Edwards[9] regressed nine alternative measures of how open the economy is on its total factor productivity growth and found that five out of the nine indicators reached statistical significance and all had the expected signs. Persuasive as these results may sound, an influential paper by Rodriguez and Rodrik[10] showed that by changing the regression specifications and by substitution of data, coefficients become statistically less significant, or lose significance altogether. These authors argued that measurement error and data peculiarities account for the greatest part of the empirical consensus on growth[11]. In short, they asserted that the profession has read too much into inconclusive results.

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[5] Baldwin, 2003
[6] Dollar, 1992
[7] Sachs and Warner, 1995
[8] Ibid.
[9] Edwards, 1998
[10] Rodriguez and Rodrik, 2001
[11] Ibid.

Another line of the openness argument focuses on the differential effects on growth. Dowrick and Golley[12] find that less developed economies enjoy little of the benefits of openness, which and may even experience detrimental effects, whereas richer economies accrue large share of the positive effect. On the other hand, other research finds that developing countries also reap significant benefits[13].

When we turn our attention to financial aspects of liberalization, it seems that effects here are much less clear. Research[14] has pointed out the fact that experiences among countries widely differ and that least developed countries stand nothing to gain from the process. Indeed, some authors[15] even argue that financial account liberalization policy leads to positive short-term effects at the expense of long-term slowdown in growth. Such ideas pave the way for research in the topic of bidirectional effects of financial openness. It might very well be the case that financial liberalization affects the economy differently after certain thresholds are reached – mostly in terms of size and sophistication of the financial sector.

Based on the existing empirical literature, this paper will follow a theoretical model of TFP growth through innovation and examine the effects of openness on productivity growth. A special focus will be the effects on developing countries and possible diminishing returns.

III.   Theoretical model

As a natural continuation of the debate about openness and growth comes the plethora of literature dealing with the subject empirically. However, for a large part of the research span, it was theoretically ambiguous as to why economic openness should stimulate growth at all. Eventually, an agreement emerged that the increase of growth brought about by openness should come from the significant technological spillovers that accompany the process of opening up[16]. As economies open their markets to the rest of the world, they get exposed to foreign knowledge and technology, which can be introduced into the home economy.

To aid to intuitive understanding, I will also present a straightforward mathematical model[17]. Take a production function in which output depends on labor, capital and technology (or total factor productivity TFP). It takes the form:

$$Y = A(L, K) \tag{1}$$

Where usual notation applies: Y is GDP, A – technology, L – labor and K- capital. If α, β are the respective factor shares, then the Solow decomposition yields:

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[12] Dowrick and Golley, 2004
[13] Weinhold and Rauch, 1997
[14] Klein, 2003
[15] Fratzscher and Bussiere, 2004
[16] Grossman and Helpman, 1990
[17] Following Edwards, 1997

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \alpha \frac{\Delta L}{L} + \beta \frac{\Delta K}{K} \qquad (2)$$

On its account, TFP can grow either endogenously, or exogenously – i.e. innovation can take place either domestically or internationally. Therefore, TFP changes as follows:

$$\frac{\Delta A}{A} = \delta + \theta \left(\frac{W - A}{A}\right) \qquad (3)$$

Firstly, TFP grows through domestic innovation at the rate δ, and then it also grows through international innovation – thus closing the gap between the domestic stock of knowledge A and the world stock of knowledge W at a speed θ. If the given country is at the technological frontier, then W=A, and TFP will grow only through domestic innovation. In short, the innovation leaders will have nobody to copy from and will have to develop new knowledge on their own. On the other hand, if there is a gap between the world knowledge stock and the given country's stock (i.e. (W-A)/A $\neq$ 0), then a country can copy technology from the rest of the world, and thus increase its TFP. The rate of closing the gap is determined by the parameter θ. The more open the economy is, the larger the value of θ, and the more rapid the growth is.

If there is an empirical base for this model, we expect to see a range of clear-cut results. Firstly, there would be a positive correlation between measures of openness and the growth of GDP. Then, those measures of openness would be able to predict growth at statistically significant levels. Finally, if growth in TFP does actually happen with a lag, then lagged values of the openness indicators should be able to predict growth, controlling for other relevant variables.

IV.   Data description and methodology

The paper looks into the overall effects of openness on growth. Basically, we can distinguish two types of indicators. Firstly, there are de facto indicators of exchange – those show how many transactions do, in fact, happen between a given economy and the rest of the world. The other type of indicators is the so-called policy indicators which show how the policy regime treats international transactions. This author considers the first ones to be more relevant in this case. An economy cannot grow because of something that could possibly happen; it grows because of something that has actually happened. For completeness, however, the research includes both types.

The de facto indicators of openness used are the level of exports as percentage of GDP, the level of imports as percentage of GDP and the net financial inflows, again as percentage of GDP. These variables are selected in such a way so as to capture both real and financial aspects of the international transactions. In addition to that, a policy indicator – namely the

average weighted tariff – is included. It is difficult to vouchsafe the quality of data, especially given the large panel, and those indicators are by construction imperfect measures. However, these do capture the largest part of international transactions and provide a good overview of the variability of the regimes across countries. Data are taken from the World Bank's World Development Indicators and the Global Development Finance.

The economy can grow for factors outside the beneficial effects of openness. Those are the classical accumulation of labor and capital, as well as the beneficial effects of domestic increase of the knowledge stock. The paper uses data for the labor force from the World Bank and measures the accumulation of human capital as spending on education as percentage of GDP. The issue with capital stock was much more difficult. Data up to 2009 was nowhere readily available so the author had to calculate it. Stepping on a seminal paper on the ratio of capital stock to GDP in 1990[18], estimates of the capital stock in 1990 were deduced. Using data for gross fixed capital formation since, and assuming an average rate of depreciation of 5% across countries, estimates for the capital stock were obtained.

As time progresses, the initially assumed level of capital in 1990 is becoming less and less important, and by 1999 (the first year in the panel) enough data points of investment balance the estimate. The rate of depreciation, on the other hand, follows standard conventions, even though in the literate it can be found at anywhere between 4% and 8%. The later estimations are robust to such small variations. The more serious problem here is that the rate of depreciation is clearly not equal across countries. However, depreciation rates of less than 3% and more than 10% would be truly exceptional, and therefore a 5% could serve as an imperfect but plausible approximation which in turn will not lead to significant deviations from the true value.

As two additional control variables, the sample includes GDP lagged by 5 years which will serve to gauge a possible effect of beta convergence in the less developed countries and a binary dummy which measures whether a given country is a developing one, or a developed one. Here, the standard World Bank classification is used – if in 2009, the country has a GDP per capita of 11 905 USD or less, it is classified as a developing country; if more – as a developed. All these variables are taken for a sample of all 213 countries for which the World Bank collects data at three different time points – 1999, 2004, and 2009, with missing observations being excluded[19]. Those observations are then grouped into a balanced panel and used for subsequent estimation.

Referring to the theoretical model developed, we expect GDP growth to depend on the availability of physical capital, labor, human capital, and some indicator of openness, thus yielding the following regression:

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[18] Nehru and Dhareshwar, 1993

[19] There does not seem to be a pattern in missing values. Therefore, I assume that these are, in fact, random.

$$y = \beta_0 + \beta_1 \log K + \beta_2 \log L + \beta_3 H + \beta_4 Open + \varepsilon \qquad (4)$$

The theoretical expectation stemming from equations (2) and (3) is for the coefficients β_i (i=1 to 4) to be positive and statistically significant at a conventional level. However, this model overlooks that each country has its specific characteristics – its unique institutional setting, traditions, geographic location and economic relations. Therefore, it would be preferable to use a model with a specific error term for each country, which is supposed to capture those peculiarities, thus reaching:

$$y = \beta_0 + \beta_1 \log K + \beta_2 \log L + \beta_3 H + \beta_4 Open + \vartheta + \varepsilon \qquad (5)$$

Here, ϑ stands for a country specific error term. Such a model can best be accommodated within the framework of a panel regression with random effects. Due to the peculiarities of the fixed effects for the periods being studied, it is meaningful for the regression to include time dummies as well. This specification, however, measures only the linear effects of openness. To put it another way, the variable can be uni-directional. To see if there is a possibility of openness becoming suddenly detrimental after a certain threshold, then a specification which allows the change of signs of the openness variables is needed.

A proposition is to include the square of the indicator together with the indicator itself in the model, thus reaching:

$$y = \beta_0 + \beta_1 \log K + \beta_2 \log L + \beta_3 H + \beta_4 Open + \beta_5 Open^2 + \vartheta + \varepsilon \qquad (6)$$

A significant β_5 will indicate that the link between growth and openness does do proceed in a linear fashion. Other coefficients are still expected to be positive and significant.

V. Estimation and results

This section uses the available data to rigorously test for a link between indicators of economic openness and performance. Firstly, a visual inspection will probe into the sample to see if empirical data conforms to theoretical expectation. GDP growth is graphed against the logs of labor and capital and the levels of human capital, exports, imports and net FDI in Figure 1.
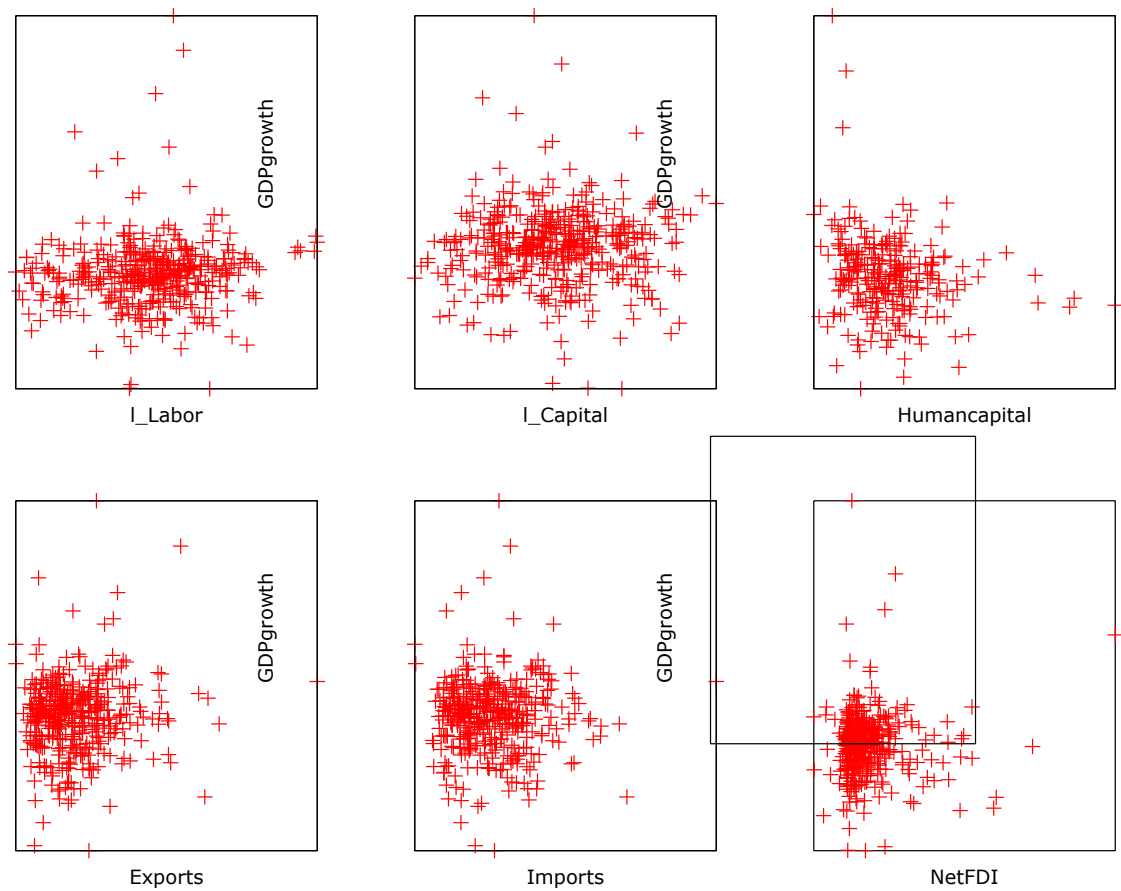
Figure 1: Scatterplots of growth factors against real GDP growth

Visually, a positive relationship between all the indicators and GDP growth is readily discernible, and it is particularly visible in the case of exports and human capital. To formalize this relationship between openness and growth equation (5) is estimated, using alternative specifications of openness as follows: Model I uses Exports, Model II uses Imports, Model III uses Tariff, and Model IV uses Net FDI. Results are presented in Table 1 (coefficient and exact level of significance below):

Table 1: Regression results for the effect of openness on economic performance

	Model I	Model II	Model III	Model IV
Constant	7.72552	8.48598	12.4313	8.08690
	0.0035 ***	0.0049 ***	0.0001 ***	0.0013 ***
Log Labor	0.858971	0.618639	0.888423	0.654359
	0.0007 ***	0.0098 ***	0.0006 ***	0.0022 ***
Log Capital	-0.716639	-0.561575	-0.871908	-0.574468
	1.58e-05 ***	0.0004 ***	1.38e-05 ***	9.87e-05 ***
Human capital	-0.314030	-0.361309	-0.107197	-0.247603
	0.0298 **	0.0128 **	0.4858	0.0647 *
Export	0.0375100			
	0.0012 ***			
Import		0.0154048		
		0.2334		

Tariff			-0.0155539	
			0.7105	
Net FDI				0.0820986
				0.0481 **
Observations, N	296	296	187	308
R^2	0.33189	0.31047	0.39703	0.30869
Adjusted R^2	0.322708	0.300994	0.383774	0.299565

Exact level of significance: *** = at or below 1%, ** = 5%, * = 10%

Of the four indicators of openness examined, Exports and Net FDI reach statistical significance at conventional levels − Exports below 1%, and Net FDI at 5%. This finding goes very much in line with the simple model in equation (3). It is through exports and the pressure to compete internationally that firms feel the incentive to improve their productivity through knowledge advancement. Further, positive Net FDI is indicative of financial inflows which seem to bring knowledge to the host economy along with money (the monetary effect is gauged through the gross fixed capital formation).

On the other hand, Imports fail to reach statistical significance, hinting at the fact that mere importing does little to stimulate domestic producers to strive for improvement. Thus imports do not stimulate Total Factor Productivity and although may add to consumer welfare, they do not meaningfully influence economic growth. Tariffs also fail to reach statistical significance. Although the coefficient is with the expected negative sign, the results are far from any conventional levels. This underlines the fact that policy variables, although invaluable in stimulating behavior, are merely mark posts. The regime itself adds little to economic growth. What matters are the actual actions of economic agents engaging in cross-border transactions.

Finally, the control variables merit a comment. By and large they have achieved the theoretically predicted significance levels. However, the signs of the capital stock and the human capital in some specifications may puzzle the reader at first. They are surprisingly negative, even though theory postulates they should take a positive sign. The unexpected sign is due to the convergence effect. Large past values of log GDP would indicate that a given economy is rather developed and therefore closer to its steady state. This might lead to a slowdown in growth, especially when compared to less developed economies. It turns out that the current values of the capital stock are highly, almost perfectly correlated with the log of GDP five years ago. The correlation stands at $r = 0.974$ with a statistical significance $p < 0.0005$. Entering the log of GDP lagged five periods into the model:

$$y = \beta_0 + \beta_1 \log K + \beta_2 \log L + \beta_3 H + \beta_4 Open + \beta_5 \log Y\_5 + \vartheta + \varepsilon \qquad (7)$$

On estimating equation (7), it turns out that the lagged GDP is significant and negative in all four Models, whereas the capital stock becomes insignificant. So, the unexpected negative signs of the coefficients in Model I through IV (equation (5)) are merely the manifestation of an alternative beta convergence specification. Another, and more interesting, question is

whether the connection between openness and growth proceeds in a linear fashion. To investigate this equation (6) is estimated using the different indicators of openness as follows: Model V uses Exports, Model VI uses Imports, Model VII uses Tariff, and Model VIII uses Net FDI.

Table 2: Regression results for bi-directional effect of openness on economic performance

	Model V	Model VI	Model VII	Model VIII
Constant	7.27209	7.45852	11.5869	7.71521
	0.0097 ***	0.0418 **	0.0010 ***	0.0023 ***
Log Labor	0.881332	0.643368	0.808390	0.640062
	0.0007 ***	0.0092 ***	0.0045 ***	0.0028 ***
Log Capital	-0.722567	-0.552238	-0.800356	-0.552279
	1.50e-05 ***	0.0006 ***	0.0004 ***	0.0002 ***
Human capital	-0.316074	-0.360531	-0.119172	-0.245755
	0.0293 **	0.0137 **	0.4431	0.0668 *
Export	0.0496010			
	0.0689 *			
Export squared	-9.66508e-05			
	0.6254			
Import		0.0320238		
		0.3651		
Import squared		-0.000124565		
		0.6147		
Tariff			0.0398719	
			0.6641	
Tariff squared			-0.00144975	
			0.4907	
Net FDI				0.129577
				0.0458 **
Net FDI squared				-0.00255737
				0.3394
Observations, N	296	296	187	308
R^2	0.33224	0.31103	0.39917	0.31081
Adjusted R^2	0.320724	0.29915	0.382574	0.299396

Exact level of significance: *** = at or below 1%, ** = 5%, * = 10%

Re-estimating the models with an added squared term in search of bi-directional effects yields no significant change in results. Exports and Net FDI remain statistically significant regardless of the inclusion of their squared terms. Imports and Tariff remain likewise insignificant. The squared terms all have the expected negative sign. However, neither of them managed to reach statistical significance. This hints that de facto openness and its positive effects on total factor productivity are not subject to diminishing marginal returns. On the contrary – based on the current data it seems that the relationship is linear and stable across most countries.

The models themselves seem remarkably robust to changes in specificiations, functional forms and inclusion of new variables. Models V through VIII also display a tendency to capture a convergence effect through the capital stock variable due to the very high

collinearity with the GDP lag. Apart from that the conclusions from Models I through IV are unambiguously confirmed. This does not yet provide for a homogenous experience across the sample. Such a possibility will be investigated in the next section.

VI.   Peculiarities of small economies and developing countries

The literature has often found that the effects of openness on growth can differ dramatically in different sets of countries. Conventional wisdom and academic discourse both point in the direction that small open economies can be especially vulnerable[20] to overdependence on external demand and international capital inflows. Little do we have to think before the East Asian crisis comes to mind as a good case in point.

The first difficulty with this line of reasoning comes with the definition of a small economy[21]. Formally, a small economy should be responsible for a very tiny fraction of world output. In fact, it should produce less than 1%. By this token, 195 of the countries under scrutiny fall in the category. Maybe 0.5% would be a better threshold. Still 181 of the 213 are classified as small. This comes to illustrate the fact that the sample data is, in fact, dominated by small economies, and only a handful of large ones. The technique of Weighted Least Squares (WLS) was intentionally not used, so that a small economy would have the same weight as a large one in the regressions estimation. And since they predominate in the sample, results obtained are easily generalizable to this group.

A more important and interesting analytical distinction is between developing and developed countries. Developing countries are usually associated with less than perfect governance, more limited human capital endowments and an institutional setting which is less receptive of innovation. Therefore, it can be that they benefit much less from openness in comparison to more developed countries[22]. To check this, the paper uses the World Bank definition of developing and developed countries. Thirty-seven of the sample countries are classified as developed, and the rest as developing. To see if there is any difference in effect, a dummy is entered into equation (5), thus obtaining the following regression:

$$y = \beta_0 + \beta_1 \log K + \beta_2 \log L + \beta_3 H + \beta_4 Open + \beta_5 Dev + \vartheta + \varepsilon \qquad (8)$$

In all the specifications of Model I to IV the dummy Dev failed to reach statistical significance. This points out the fact that developing countries react in no different way from developed ones when it comes to the interrelation between international openness and output growth. Of course, equation (6) also needs to be tested to probe for possible bi-directional effects when it comes to developing and developed countries, thus:

$$y = \beta_0 + \beta_1 \log K + \beta_2 \log L + \beta_3 H + \beta_4 Open + \beta_5 Open^2 + \beta_6 Dev + \vartheta + \varepsilon \qquad (9)$$

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[20] Read, 2001
[21] Bernal, 2001; World Bank, 2010
[22] Ocampo and Taylor, 1998

Again, the Development dummy fails to reach significance at any conventional level when entered into Models V to VIII, pointing that developing countries do not experience openness in a markedly different way. An alternative test to this would be to run Models I to VIII restricting the sample to either only developing or only developed countries. Neither of the two approaches yields differences in the sign or significance of any of the coefficients. Results seem very robust to alternative specifications and in line with recent empirical literature[23]. However, the regression results do not conclusively prove the direction of causality between openness and economic growth. It might very well be the case that openness is in fact endogenous in the regression. Intuitively, this would mean that fastest growing countries are more prone to liberalize the flows of goods and capital. The next section will look further into this possibility.

VII. Causality issues

The very simple model developed in equation (2) and (3) already presupposes a causal relationship between openness and growth. As soon as the economy opens its markets to the rest of the world, external knowledge starts pouring in, thus enhancing total factor productivity and, therefore, growth. However, it might be the case that countries with higher levels of GDP growth choose to pursue more liberal policies. In this case, contemporaneous growth and openness will be related in a statistically significant way, implying causality where in reality none exists. Therefore the estimated models, as they stand, can yield no valid inference before a robust causal link is established. When probing into the causality issue, the paper will take a very conservative standpoint looking for the temporal association between variables, their link, and finally the possibility of intervening variables which obscure the relationship. Firstly, we need to note that the positive effect on TFP is not limited to the current year only. Lagged values of openness should also influence the knowledge stock as not all the beneficial effects of openness are fully internalized in the period of one year.

Although Model I through IV have looked at the relationship from a comparative cross country static perspective, the dynamic effects of knowledge can also be used to probe into causality. The intuition behind this is that enterprises need some time before they can adopt and utilize the full amount of knowledge they receive through international transactions. Therefore, lagged indicators of openness should also influence growth. A short visual inspection of the relationship between lagged indicators and growth shows that this seems to be indeed the case (Figure 2):
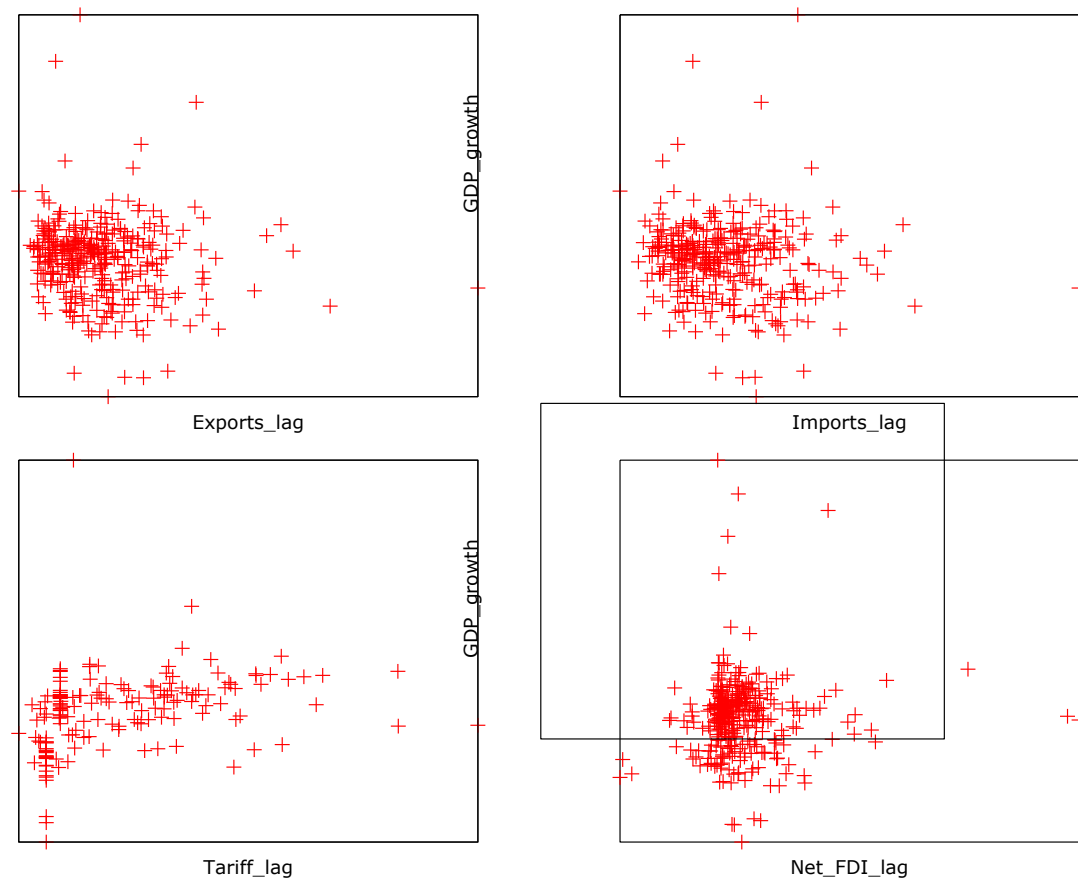
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[23] Lee et al., 2004

Figure 2: Scatterplots of lagged indicators of openness against real GDP growth

The connection is particularly pronounced in the case of exports and net financial investment, but somewhat ambiguous with tariffs and imports. This finding very much mirrors the results of the previous section.

However, another concern remains – high collinearity of both contemporaneous growth and lagged openness may obscure the relationship. Getting back to the idea or reverse causality, it might be the case that highly developed countries in the previous period grow faster in the current period, and liberalization was merely a corollary to the whole process. What needs to be seen, therefore, is the pure effect of lagged openness indicators. In order to entangle this, a model can be specified:

$$y = \beta_0 + \beta_1 \log Y\_5 + \beta_4 Open + \beta_5 Open\_5 + \vartheta + \varepsilon \qquad (10)$$

The data at hand is used, with the lagged value of both GDP and the openness indicator coming from the previous cross-section of the panel. This means that the new dataset under scrutiny is a panel of 213 observations over two periods. Even after removing the missing observations, the test retains a comfortable number of more than 300 cases to work with.

The technique of choice is still a panel regression with random effects which can best account for country specificities. Time dummies were also included, particularly in view of the effects of the global economic crisis 2008-2009. However, they did not reach statistical significance in any of the specifications. The results are as presented in Table 3.

Table 3: Regression results for lagged effects of openness on economic performance

	Model IX	Model X	Model XI	Model XII
Constant	9.29043	13.5140	-6.94270	7.36330
	0.0039 ***	0.0006 ***	0.1876	0.0619 *
Log GDP lag	-0.257921	-0.385473	0.243099	-0.201542
	0.0518 *	0.0103 **	0.2335	0.2191
Export	0.133209			
	2.11e-06 ***			
Export lag	-0.156464			
	1.84e-07 ***			
Import		0.0320861		
		0.2962		
Import lag		-0.0768040		
		0.0159 **		
Tariff			0.0868316	
			0.2190	
Tariff lag			0.264642	
			0.0025 ***	
Net FDI				0.0457234
				0.4425
Net FDI lag				0.00324548
				0.7701
Observations, N	310	310	138	334
R^2	0.1066676	0.0464	0.16305	0.0108
Adjusted R^2	0.097909399	0.037048	0.144317	0.001802

Exact level of significance: *** = at or below 1%, ** = 5%, * = 10%

The results in this specification largely mirror the ones obtained in Model I through VIII, with the levels of Exports reaching statistical significance and Tariffs and Imports failing to do so. The one exception is the ambiguous result of Net FDI. However, an inspection of the lagged values gives some interesting insights. Not only current period exports reach significance but also lagged ones do. This indicates that effective participation in the world economy brings benefits to total factor productivity over a period of time and its beneficial effects are readily discernible. An explanation for this is that world competition forces companies to continuously innovate – both through closing the gap with the world knowledge and standards and through domestic innovation.

On the other hand, imports and tariffs are insignificant in the current period but their lagged values can predict growth. It seems that imports eventually lead to an increase in exports – the correlation between lagged Imports and Exports in current period stands at $r = 0.7$, with $p < 0.0005$. This effect might very well be due to a possible deterioration in the Balance of Payments and exchange rate effects which lead to an increase in export. Another

interpretation of the significance might be long-term beneficial effects of imports through change in the patterns of specialization in the domestic economy.

Lagged Tariffs become very statistically significant in the new specification (Model XI). Its current period lack of importance might be due to overarching importance of actual transaction that take place. However, over a longer period of time high average weighted tariff signals a specific type of regime and lets actors adjust to it, thus affecting growth. Net FDI here fail to reach significance, neither in current, nor in previous periods thus pointing at the ambiguous influence of FDI on long-term productivity growth.

The results presented in this section point out that a causal link between openness and growth seems very plausible indeed. Firstly, a temporal order between openness and growth can be established – lagged values of exports, imports and tariffs significantly predict growth. Second, a clear link between openness and growth was amply established in Model I through VIII. Finally, possible intervening variables were considered by including lagged GDP into the regression IX to XII. Although such test are imperfect by construction, both theoretical modeling and empirical data point to a stable and robust link between international transactions and output increase in a given economy.

VIII. Policy implications

Looking at the results reveals the unambiguous effect of openness on growth, especially in view of some of the indicators. Exports, both in level and lag, can significantly predict GDP growth. Furthermore, they most closely conform to the theoretical predictions and seem to effect growth by exerting an influence on total factor productivity. Exports are a de facto indicator of openness and, not incidentally, have the strongest and most robust influence in the specified growth regressions. It follows that countries are well advised to ensure that the trade regime is liberal, and that firms, in fact, do compete in the external markets. This can be achieved through numerous mechanisms like financial and technical support for exporting firms, preferential tax and interest rates, and appropriate bilateral and multilateral trade agreements. However, it should be kept in mind that exports spur growth because of the incentives that firms are given to enhance their knowledge stock and utilize external knowledge. Therefore, support should be careful not to distort the stimuli to increase TFP, and instead create an unwanted reliance on state help. A possible approach here would be to limit economic policy both in the extent of help (limited financing) and definitely in time (limited period).

Moving on to other indicators of growth, imports and tariffs seem not to exert any significant influence in the current period. This obviously does not come to say that imports should be banned or any other radical policy taken. They have their merit in terms of increasing consumer utility and in case of booming exports can be easily financed through export revenue. Further, allowing imports should discipline domestic producers who have to compete with international firms and over a longer run can have an effect on growth. This

might very well be another explanation for the statistically significant coefficient of lagged imports in the growth regressions. The negative sign obtained here may signal a restructuring in competing industries and changing patterns of specialization. Therefore, a policy of trade openness seems warranted by the uncovered empirical relationships. An important point to make is the statistically significant coefficient on lagged tariffs. This variable is essentially a policy variable and the importance of its lagged value indicates the long-run effects of a given trade regime. In the specifications it is statistically significant and with a positive sign, whereas its square is negative in sign, while insignificant. This points to the ambiguous effects of the average tariff on growth.

Finally, Net FDI's influence was also found to be affect growth in a very unclear manner, echoing other research on this issue. While positive in level in the current period, it loses significance as soon as a lagged variable is entered into the equation. It might very well be the case that Net FDI stimulates a short-run boom but in the long run it does not add much to total productivity growth. Across the sample studied no sign of bi-directionality could be detected, which means that, within the bounds of the data, openness affects linearly and possibly indefinitely a country's growth. Such a conclusion is consistent with endogenous growth theory, whereby knowledge does not suffer from diminishing marginal returns.

In short, countries should follow a policy of Current Account liberalization as much as possible but proceed with great care when dealing with Financial Account ones. Those results seem to hold for both developing and developed countries, and those two groups do not display different experiences in terms of the effect of openness on growth in the regressions specified. If anything, policy should focus on promoting trade and specialization across all types of economies.

IX.   Conclusion

This paper has looked into the oft-contended topic of the relationship between growth and economic openness. The research presented here draws on a large sample of countries with recent data and explicit focus on the last ten years. This is done intentionally to capture the new realities of openness and global economic restructuring. The choice of indicators to enter in the growth regressions is rather conservative. By controlling for labor and capital, they measure the effect of an openness variable on total factor productivity. As indicators of openness, the paper used exports, imports, average weighted tariff and amount of foreign investment. In the current period exports and investment easily reach statistical significance whereas imports and tariff do not. In terms of the lagged values all variables but investment reach statistical significance.

Results are quite robust to alternative specifications and seem largely applicable for both developing and developed economies. They clearly point at the fact that a liberal trade regime promotes increases in TFP, and therefore economic growth, whereas investment has a much more ambiguous effect. The policy recommendation stemming for that is full liberalization of

the Current Account and close monitoring of the Financial Account. In conclusion, these results largely confirm the idea that increasing international specialization and exchange is beneficial for growth, acting through the channel of increases of the knowledge stock of economies. On the other hand, increased capital mobility cannot as of yet be shown to provide for any of that. Governments, therefore, will be well advised to approach liberalization in a case-by-case fashion to ensure optimal growth for their countries.

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