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Trade Liberalization Index and Economic Growth in Developing Countries: Does Stage of Development Matter?

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Abstract

This paper analyses the widely used Sachs and Warner (1995) index of trade liberalization for 193 countries extending the period up to 2009 identifying 134 countries as open, 23 countries as closed, and 36 countries with ambiguous status, and then investigates the impacts of trade liberalization on economic growth using a dynamic growth model for a disaggregated levels of income. For this purpose, this study uses the biggest panel data set in this literature covering the period of 1985-2009. The results show that the impact of trade liberalization on economic growth differs based on the income levels of the developing countries. As indicated by the estimated results, the lower-middle-income countries, on average, benefit up to 3.45 percent points more compared to other developing countries from the trade liberalization. This finding makes a strong case for a clear departure from the 'Washington Consensus' approach and claims that trade liberalization with the same priority to all developing countries does not ensure economic growth. Also, the findings strongly suggest considering the stage of economic development of the developing countries while recommending their trade policy reforms.

Keywords: *Trade liberalization index, Trade reform, Economic reform, Economic development.*

JEL Classification: *F14, P26, N10, O40.*

Introduction

Despite having some drawbacks as criticised by Rodrik (1998), the Sachs-Warner index (SWI hereafter) of trade liberalization, as developed in the Sachs and Warner (1995) and updated by Wacziarg and Welch (2008), is the only index that captures the most policy variables into a single indicator to suit the

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liberalization and reform context. But this index needs a thorough update to cover most of the developing countries. Trade liberalization has become an important phenomenon, as part of globalization, in 134 countries in the world.[2] In this background, from a brief survey of literature on trade liberalization and economic growth, two major points emerge; first, SWI is not available for many developing countries. Second, in the literature, we did not find the disaggregation of developing countries based on their economic status to analyse the impact of trade liberalization.

This paper aims to contribute to the literature in two ways. First, it analyses and updates the SWI of trade liberalization for 193 countries extending the period up to 2009, the maximum possible time period to cover with the existing data and information, identifying 134 countries as open, 23 countries as closed and 36 countries with ambiguous status with the consistent approach of Sachs and Warner (1995); Wacziarg and Welch (2008). Based on the available data and information, this study updates and extends the index and then it employs empirical analysis using the biggest database in the unbalanced panel setting. Second, the stage of economic development is included as an additional variable in the growth regressions to know whether the impact of trade liberalization differs across the stage of economic development of countries.

In the previous studies, all developing countries embarking on liberalization reforms have been treated as a homogenous group without paying attention to differences relating to the stage of development, however, Wacziarg and Welch (2008) indicate that the impact of liberalization may differ from country to country. We contribute to the literature testing this doubt econometrically to reach the same conclusion with the biggest possible dataset and wider coverage. For this, we employ a much-advanced technique, the Hausman and Taylor estimation method as developed in Hausman and Taylor (1981).

Most of the literature in the field adopt the 'Washington Consensus' view recommending 'Trade Liberalization' as a comprehensive policy for all developing countries. Against this background, the critics of the Washington Consensus have argued that the ability of a given country to gain from global economic integration depends on the stage of economic development, which determines its ability to face trade competition and gains from emerging opportunities through structural adaptation (Broad, 2004). On this debate, our analysis stands at the latter's side concerning whether the impact of trade liberalization on economic growth is different across the ranges of developing countries–which are in a different stage of economic development.

[2] I investigated the openness criteria for total of 193 countries and found 134 countries are open, 23 countries are identified as closed, and the position of other 36 countries is unclear due to lack of information. For detail to access the dataset: Sachs & Warner (1995); Wacziarg & Welch (2008); GF Database (2011).

The estimation results show that the updated SWI is robust as the estimation figures are consistent with Sachs and Warner (1995) and others in the literature, and the impact of trade liberalization on economic growth differs depending on a country's stage of economic development at the time of liberalization. For example, if a country is liberalized when its economic status was lower-middle-income, on average, this country benefits up to 3.45 percent points more compared to other developing countries that were either low income or upper-middle income at the time when they became open.[3]

The structure of this paper is as follows. The next section presents a brief literature survey focusing on trade liberalization and economic growth. Section 3 updates the Sachs-Warner index of trade liberalization and discusses the key points that emerged from the index updates. Section 4 presents the empirical analysis, and the final section concludes.

Trade Liberalization and Economic Growth: A Brief Literature Survey

The role of trade liberalization on economic growth is a widely discussed topic in development economics. Since the early 1990s, liberalization has been one of the important phenomena of the policy agendas in developing countries. In the literature, the impact of trade liberalization on economic growth has been examined using three broad sets of indicators. We find some studies using tariff rate equivalents, for example as in Paudel and Burke (2015) and Mandal and Marjit (2013), as a measure of trade liberalization-which would be probably the best indicator to study the trade liberalization episode, but these data are not available for many developing countries, and also not for a longer period. Therefore, researchers use either Sachs–Warner (1995) binary index–which has been updated by Wacziarg and Welch (2008) covering the period up to 1999, or trade orientation or openness to explain the trade regime shifts for long term analysis. Trade openness, the ratio of trade to gross domestic product (GDP) measures only the trade orientation, simply, this ratio can be high in the closed economy country too, it does not capture the trade policy regime, and it is not as comprehensive as SWI. However, this has widely been used in the literature, for example Fenira (2015) and Yusuf, Malarvizhi et al. (2013). Moreover, it has some conceptual measurement problems as the trade is measured in net value while GDP is measured in a value added concept.

Broadly, it is found for and against views on the role of trade liberalization on economic growth. For example, the studies (Rivera-Batiz & Romer, 1991; Devereux & Lapham, 1994; Sachs & Warner, 1995; Krueger, 1997) differ from some studies (Rodrik, 1998; Rodriguez & Rodrik, 2000; Redding, 2002) in terms of the contribution of trade liberalization on economic growth. Easterly (2001) suggests that the reform has not always been successful in some countries

[3]The countries' income classification is based on the World Bank classification.

context, referring to the reform is useful but not always. This mixed feeling is found in both country-specific time series and cross country growth estimations. In addition, there are differences in the measures used to proxy the trade liberalization as explained above.

Following this background, SWI is a composite index constructed covering five broad policy variables, which make the index more reliable to judge whether a country's economy is open or closed. Because of this fact, an important sub-set of this literature focuses on SWI to cover the longer period. Even SWI has some weakness as indicated by Rodriguez and Rodrik (2000), there is no alternative comprehensive index that better capture the overall policy shift episode of an economy as SWI does.

Some studies suggest that the impact of trade policies may be different from country to country. For example, Rodriguez and Rodrik (2000) suggest that trade policies may have different impacts in small and big countries, low income and high-income countries. Wacziarg and Welch (2008) also mention that the impact of trade liberalization may be different from country to country. Yet, the literature is unable to answer econometrically whether the impact of liberalization differs among the different income group countries. Therefore, this paper aims to contribute to the literature answering this query.

The Sachs-Warner Criteria: An Update

Sachs and Warner (1995) developed the index for 118 countries. Later, Wacziarg and Welch (2008) updated for 141 countries covering the period till 1999 following the same criteria used in Sachs and Warner (1995). In the empirical analysis, this index defines a country as open if it satisfies all these five criteria. First, average tariff rates are less than 40 percent; second, non-tariff barriers are less than 40 percent; third, a black market exchange rate premium is less than 20 percent; the fourth, country does not have a state's monopoly in major exports; and fifth, the country does not have the socialist economic system. This index turns to be a binary variable (takes the value of zero if the economy is closed or earlier period than to be open, and one after the economy graduates to 'Open' satisfying all five criteria).

There are some criticisms of this index. The critics say that some of the variables, particularly black market premium and state's economic system, are not the direct measure of trade policy regimes rather these are related to a country's macroeconomic stability issues. In addition, the heterogeneity issue of trade policies in different countries is also a matter of debate. Specifically, the issues like of China, and recently of Vietnam, are often debatable as these countries are more liberal in economic policies under the single political party leadership system. Further, Edwards (1998); Rodriguez and Rodrik (2000); Greenaway et al. (2002); and Kneller et al. (2008) have criticised this index

based on a methodological approach that uses the cross-sectional estimations. Despite these criticisms, SWI is the only indicator that captures the most policy variables into a single indicator, which can consistently be applied to the wider ranges of countries' liberalization and reform episodes.

Therefore, this paper attempts to analyse the liberalization status of 193 countries based on the SWI covering the period up to 2009 following the same and consistent approach of Wacziarg and Welch (2008)–which updates the indicator for 141 countries until the period 1999.[4] In the below, we explain how we update the five criteria of the Sachs-Warner index (Appendix-I for details):

a. Tariffs:- we collect the average tariff data from World Bank (2021), then calculate the average for the period from 1999 to 2009. To maintain consistency with other countries (those captured in the previous studies) data, this paper looked at the individual country's tariff data carefully. It is found that only Bermuda exceeds this criterion of 40 percent, with about 60 percent average tariff rates. Bermuda is the only closed country due to failure to pass the tariffs criteria.

b. Non-tariff Barriers:- Non-tariff barrier data for the wider group of countries are not available for this period. In addition to our struggle to get these data, this difficulty is highlighted in Kee, Nicita et al. (2009). Therefore, to measure this criterion, this paper follows the membership criteria of the World Trade Organization (WTO) that paves the way to proxy for non-tariff barrier data for the period after 1999, WTO made a condition of zero non-tariff barriers to its potential member countries and provided a grace period of five years to reduce the non-tariff barrier to zero to the member countries of the General Agreement on Tariffs and Trade (GATT). This refers to the state that if a country was a member of GATT before joining the WTO (in 1995), it was required to meet the membership conditions within 2000. These conditions imposed by WTO to its existing and new member countries make us able to detect whether a country stands within the boundary of Sachs Warner criteria of non-tariff barrier.

Here, the position of 36 countries is not clear, and it is not detected the openness condition of these countries due to lack of these data and sufficient information (Appendix-I) for detailed country data). These countries' openness situation is ambiguous, but most likely these countries have higher non-tariff barriers. For this reason, we assume that if these had zero non-tariff barriers, would become WTO members as this is the fundamental condition for WTO members. Also, it is noted that most of the developing countries reduced the tariffs but shifted to the non-tariff barrier.

c. Black Market Premium:- For the data of those countries not listed in Wacziarg & Welch (2008), this paper used Edwards, Boyce et al. (2001) and the

4. I gratefully thank to Romain Wacziarg for his kindness to provide me his data of updated Sachs-Warner index of trade liberalization.

data from GFD at a base (2011). Based on this criterion, it is found that the black market premium exists only in a few countries, mainly in Afghanistan, Congo Democratic Republic, China, Myanmar, and Zimbabwe. But, only China and Zimbabwe have crossed the limit of 20 percent, and thus remain closed (Sachs & Warner (1995); Wacziarg & Welch (2008); GF Database (2011).

d. State's Monopoly in Major Exports:- The monopoly in the major export market was not the crucial determinant in the group. Most African countries had this nature of exporting practice in the past. In our selected period, only Turks and Caicos Islands, Belarus, Senegal, Congo Republic, Papua New Guinea, Turkmenistan, Central African Republic, Congo Democratic Republic, and Togo have the exporting board.

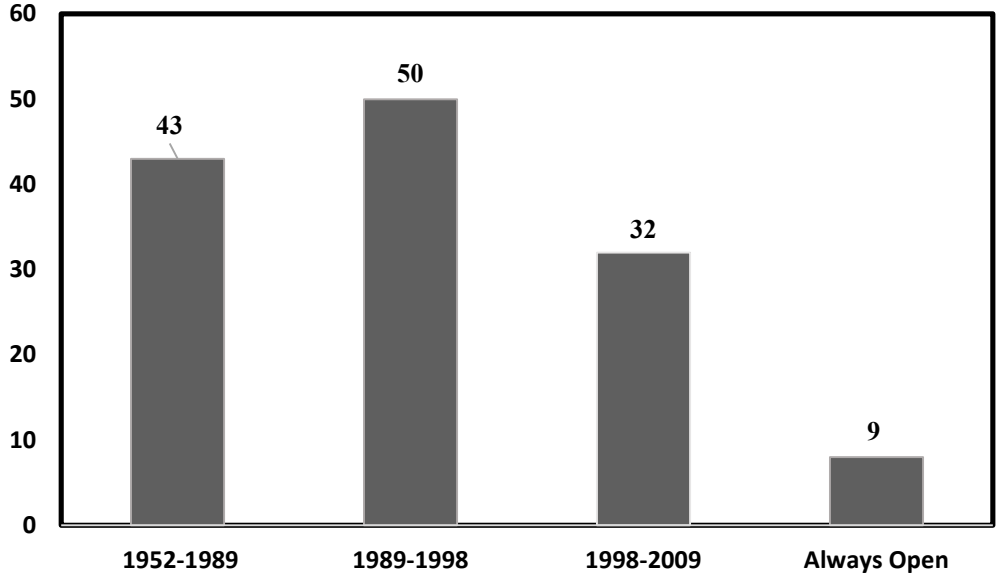
e. Socialist Economic System:- Theoretical ground of SWI is that the countries' economic system guides the trade policies. In this criterion, find much change over the recent decades is found. Bahrain, Oman, Qatar, Saudi Arabia, United Arab Emirates, Cuba, Fiji, Lebanon, Senegal, Vietnam, Bhutan, China, Congo Republic, and Myanmar have either the socialist structure of the economy or unfavourable situation for business due to political movements, transition phase or autocratic regimes. In this criterion, not only the socialist nature of the governing system but also any political system that controls the market disturbing the smooth flow of market forces should be considered.

To be in brief, the openness criteria for a total of 193 countries is investegated and found only 134 countries are open, and 23 countries remain closed formally until the end of 2009. The situation of the other 36 countries is ambiguous due to the lack of information and data on the non-tariff barrier.

Historically, a total of eight countries are always open, other 43 countries became open by the end of 1989. The data show that most of the countries that were open at an earlier time are high-income countries. Out of 8 countries, which were always open, 6 are high-income countries and 2 are upper middle income and lower-middle-income countries. Out of 43 countries that were opened during 1952-1989, a total of 22 were high-income countries, the other 7 were upper-middle-income countries, and only 6 were low-income countries.

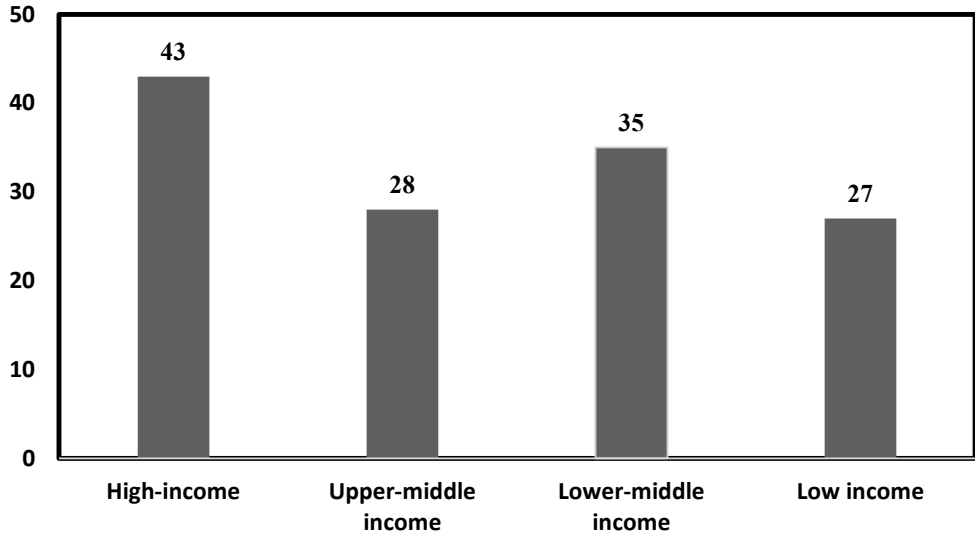
The substantial wave of trade liberalization occurred in developing countries during 1989-1998 when other 50 countries became open-out of which 13 were low-income countries, the other 15 were lower-middle-income countries, and the other 15 were upper-middle-income countries. Since 1998, a total of 32 countries gained the 'open' status, out of which eight were low income, 11 were lower middle income and five were upper-middle-income countries. These facts show that most of the developing countries were latecomers in the liberalization reform process (Figure 1 and 2).

Figure 1: Period-wise Division of Number of Open Countries



Source: As in section 3.

Figure 2: Stage of a Development-wise Division of the Number of Open Countries



Source: World Bank (2021).

Methodology

A growth model in a dynamic panel framework using the updated SWI applying instrument variable approach based Hausman and Taylor (HT estimator) developed in Hausman and Taylor (1981) as a preferred method of estimation

is estimated. The motivating factor of using the HT estimator is its suitability in the growth model with the mixture of time-variant and time-invariant variables, as is the case of this study. For example, this paper has time-invariant variables like initial income, initial education and landlockedness; and the rest variables are dummy and time-variant. Also, this estimator combines the strength of the fixed effect (FE) estimator and gives more credible results from the estimations addressing the endogeneity issue, by setting the instrument as the difference between the regressor and the mean of the regressor, i.e., $X_{1,it} - \overline{X_{1,it}}$ (Hausman & Taylor, 1981; Breusch et al., 1989; Verbeek 2008). For this paper, this method is helpful to handle the potential endogeneity issues on some of the variables, such as capital to GDP ratio and trade to GDP ratio.

The initial level of income, the initial level of education, and landlockedness are three major time-invariant variables in which situation the HT estimator gives more consistent and efficient results (Cameron & Trivedi, 2009). The empirical tests are conducted only for developing countries disaggregating them into low-income countries, lower-middle-income countries and upper-middle-income countries as defined by the World Bank so that we can identify the impact of trade liberalization across the ranges of developing countries.

Model, Variables, and Data

The first step adopted in the estimation procudures is to start estimating a simple bivariate model as in equation (1) to know the exact impact of trade liberalization in economic growth, following Wacziarg and Welch (2008) using fixed effect.

$$\boldsymbol{lnY_{i,t} - lnY_{i,t-1} = \propto_i + \beta LIB_{i,t} + \varepsilon_{i,t} \dots\dots\dots\dots\dots (1)}$$

Where, y_{it} is per capita income in country *i* at time *t, ln* refers to the natural log, and $\propto$ is a constant. To calculate the growth rate of per capita income, the log of per capita income with its lag, which is the first-order lag of the growth is used. LIB refers to the SWI, a binary variable based on the updated Sachs-Warner index of trade liberalization (LIB) as updated in Section 3. This variable has a value of '1' for each year once the date of liberalization is identified and '0' for earlier years. If the country remains closed, this variable takes '0' for the entire period.

Then, the next step is to estimate the augmented growth model as in equation (2) using fixed effect and HT estimation, and the results the HT estimation are reported as the preferred method. For this, to check the results in different prospects, two different base models are estimated. The first model appears exactly as in equation (2), and the second appears without TRADE / GDP to remove the doubt whether the link between LIB and TRADE / GDP dominates the results.

$$y_{i,t} = \beta_1 y_{i,t-1} + \beta_2 lnY_{i,85} + \beta_3 lnSCH_{i,85} + \beta_4 LIB_{i,t} + \beta_5 (\frac{CAP}{GDP})_{i,t} + \beta_6 LLOCK + \beta_7 lnPOP_{i,t} + \beta_8 (TRADE/GDP)_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, the definition is as: $y_{i,t} = lnY_{i,t} - lnY_{i,t-1}$, which is the growth rate of per capita income, as a dependent variable. Among the explanatory variables, $y_{i,t-1}$ is a lag of the growth of per capita income to capture the dynamic impacts in the model. $Y_{i,85}$ is real per capita GDP at 1985 to capture the convergence effect. $SCH_{i,85}$ is the level of secondary school enrolment as of 1985, *(CAP / GDP)* is the ratio of gross capital formation to GDP to proxy the capital in the country, *LLOCK* is a dummy to capture the landlockedness impact on economic growth, and *POP* is the population to capture the size of the economy. In addition, TRADE / GDP is the ratio of trade to GDP in percent terms.

It is well noted that including lags may create a correlation bias between the error term and the lagged dependent variable. Further, *CAP / GDP* and TRADE / GDP may have some endogeneity issues. Therefore, the preferred method of estimation is HT estimation, which allows us to estimate the time-invariant variables and handles the doubt of endogeneity issues. Then, the equation including dummies for low income and lower-middle-income countries as in equation (3) is estimated:

$$y_{it} = \beta_1 y_{i,t-1} + \beta_2 lnY_{i,85} + \beta_3 lnSCH_{i,85} + \beta_4 LIB_{i,t} + \beta_5 (\frac{CAP}{GDP})_{i,t} + \beta_6 LLOCK + \beta_7 lnPOP_{i,t} + \beta_8 (TRADE\ /\ GDP)_{i,t} + \beta_9 D1 + \beta_{10} D2 + \beta_{11} D1xLIB + \beta_{12} D2xLIB + \beta_{13} LLOCKxLIB + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where, D1 is a binary dummy for low-income countries and D2 is also a binary dummy for lower-middle-income countries. The income level was identified for each developing country at the time when they were open first, this helps to find out whether the countries have progressed much after liberalization. Both dummies have interacted with the index of trade liberalization so that it becomes easy to identify the impact of trade liberalization in these three types of developing countries, i.e., low-income countries, lower-middle-income countries and upper-middle-income countries. LLOCK x LIB is an interaction term of landlocked developing countries that are liberalized. This term will suggest whether landlocked liberalized countries are differently benefited compared to the closed landlocked developing countries. The study expects the sign of $\beta_2, \beta_6, \beta_7, \beta_9$ and β_{10} to be negative, and rest positive. The positive and statistically significant coefficients of the interaction terms (β_{11} and β_{12}) would indicate that

these countries are in a more advantageous position due to trade liberalization compared to upper-middle-income countries.

The data sources used to update the Sachs-Warner index of liberalization *(LIB)* are discussed in Section 3. For the rest of the variables, the major data source of this study is the world development indicator – World Bank (2021) and various issues of world development report published by World Bank (World Bank Various years). In the first phase, this study uses the unbalanced panel dataset for 193 countries. Here, it is noted, and most likely, those 36 countries with the ambiguous status of openness are closed. Then, in the robustness check, the data for 157 countries removing those 36 countries are used to check the sensitivity of the estimated results.

Results

The estimated results of the growth model for the period of 1985-2009 are reported in Table 1. The results in column 1 (Base model 1) refer to the base specification of the model with SWI as in equation 2. Column 2 (Base model 2) presents the result without the TRADE / GDP. In these specifications, all the variables have the expected sign. Overall, several findings come through the estimations' results in Table 2. The post estimation tests reported at the bottom of the tables shows the appropriateness of the HT estimation method.

First, the result of $y_{i,t-1}$ is as expected, indicating that there is a long-run dynamic impact on the growth of the variables in the model. Second, the results indicate that the countries with a low level of initial income grow faster. This result is consistent with the literature of growth convergence with the expected negative sign, for example, Mankiw, Romer et al. (1992). As expected, the sign of the initial level of education is positive, opposite to that of initial income, i.e., a country with a high level of initial education grows faster. These results of initial income and schooling are consistent with the literature, such as Greenaway, Morgan et al. (2002).

Third, the results for the index of LIB show that on average a liberalized country's per capita income increases by 2.62 percent points holding other variables in the model constant, indicating that liberalization has a substantial impact on economic growth.[5] However, the immediate impact of liberalization on per capita income growth for developing countries is 2.137 percent points. These results also are consistent with Sachs & Warner (1995) and Greenaway et al. (2002) in the literature. Fourth, a country being landlocked (LLOCK) has a statistically significant negative impact on economic growth. Finally, the ratio of capital to GDP (CAP/GDP) and the ratio of trade to GDP (TRADE / GDP)

[5]As our model is dynamic panel, the actual coefficient of trade liberalization for the long run is calculated as 2.137/(1-0.185) = 2.62. The coefficient of Index of liberalization 2.137 is the short run impact.

have a positive and statistically significant impact on economic growth at the 1 percent level of significance.

To identify whether the impact of trade liberalization is different across the ranges of developing countries, i.e., different income levels of these countries at the time of liberalization, column 3 (with interaction) provides the benchmark estimations for the model as in equation 3. The coefficients of D1 and D2, which are just the intercepts, show that low income and lower-middle-income countries grow slower compared to upper-middle-income countries on average. Here, the coefficients of trade liberalization, D1xLIB and D2xLIB are of much interest. The results of D1xLIB shows that there is a positive but not statistically significant impact of trade liberalization in low-income countries. The coefficient of D2xLIB shows the impact of liberalization for lower-middle-income countries. This impact is, on average 2.6 percent points higher in lower-middle-income countries while the other variables in the model are held constant.[6] No proof is detected to suggest that the landlocked developing countries with liberalization are better off by liberalization on this occasion.

The coefficients for low-income countries and lower-middle-income countries are different and their level of statistical significance is different. In this situation, we cannot say whether low-income countries and lower-middle-income countries are also different in terms of the impact of liberalization on economic growth. To follow the correct procedures, the significance of their coefficients, and F-test detected that these two groups of countries are not significantly different from each other, but they are different from the upper-middle-income countries.[7] This finding is against the general perception that all countries benefit from trade liberalization.

This could be because the lower-middle-income countries were more distorted compared to upper-middle-income countries before they started the trade liberalization. For example, these countries had higher tariff rates, black market premiums, and trade restrictions imposing the quota system, licencing and so on. These distortions cause poor economic growth encouraging rent-seeking behaviour, lowering the governance quality and institutions, and sometimes resulting in the 'Dutch Disease' effect in the case of the resource-rich country. When such distortions were removed by making the countries open, lower-middle-income countries, consistent with what Edwards (1992) states, quickly picked up their growth-enhancing their trade and investment as indicated by the estimation results.

Another reason for the upper-middle-income countries not to benefit much from the liberalization could be linked to the middle-income trap from which

[6]As the estimated model is dynamic, the coefficient of D2xLIB is calculated as [(LIB+D2xLIB)/(1-$y_{i,t-1}$)] = (0.799+1.322)/ (1-0.185) = 2.60.

[7]The Ho: $\beta_{11} = \beta_{12}$ cannot be rejected base on the F-test estimation.

mostly upper-middle-income countries suffer and need to find a new source of growth rather than based on the liberalization and reform as discussed in Agénor et al. (2012). Also, the reason can be linked with the level of trade reform and trade protection changes with the quality of the governance as the income level of a country changes.

In the case of low-income countries, even the distortions are removed, they lack the institutional quality to take benefits from the liberalization and reform. This is consistent with Edwards (1992) that states the distortion slows economic growth but point to note is that openness without proper institutions and capacity to adopt the technology does not work to enhance economic growth in a country. Just focusing as opined by Washington Consensus may not be that equally beneficial for all types of developing countries for their better economic performance. Therefore, while recommending the reform policy, the stage of a country's economic development should be considered seriously.

Table 1: Economic Growth: 1985-2009

Dependent Variable: Growth of Per Capita GDP			
	(1)	(2)	(3)
Variables	**(Base Model - 1)**	**(Base Model - 2)**	**(With Interaction)**
$y_{i, t-1}$	0.185***	0.184***	0.184***
	(0.021)	(0.021)	(0.021)
Per capita GDP in 1985	-5.293***	-6.867**	-3.093***
	(1.699)	(3.137)	(0.863)
School in 1985	1.736**	2.427*	1.286***
	(0.678)	(1.316)	(0.451)
Index of Trade Liberalisation (LIB)	2.137***	2.289***	0.799
	(0.315)	(0.325)	(0.705)
Cap / GDP	0.109***	0.116***	0.105***
	(0.017)	(0.017)	(0.017)
Landlockedness (LLOCK)	-4.854***	-6.066*	-2.515**
	(1.832)	(3.150)	(1.073)
Population-log	-0.634	-0.854	0.084
	(0.446)	(0.606)	(0.261)
Trade / GDP	0.009*	-	0.005

	(0.005)	-	(0.004)
LLOCKxLIB	-	-	1.228
	-	-	(0.747)
D1-Dummy low income	-	-	-4.054**
	-	-	(1.586)
D1xLIB	-	-	0.842
	-	-	(0.887)
D2-Dummy lower-middle income	-	-	-2.551***
	-	-	(0.944)
D2xLIB	-	-	1.322*
	-	-	(0.800)
Number of observations	2,331	2,336	2,331
Number of countries	166	166	166
F-Statistics	31.22	34.27	21.37
Sargan-Hansen Statistics	3.39	8.97	8.96
Sargan-Hansen P-Value	0.34	0.18	0.18

Notes: Standard errors are in parentheses, ***, **, and * indicate 1%, 5%, and 10% level of statistically significance, respectively.

To check the robustness of the estimation, all equations reducing the period to 1995-2009 are estimated. Therefore, the number of observations has decreased in this estimation as can be seen in Table 2. The results in column (1) for the variable of main interest, such as the index of trade liberalization remains statistically highly significant with a correct sign, and the magnitude also remains almost similar. For this period as well, the initial income and schooling are significant and both of these variables have the correct sign. These results for initial income and schooling are consistent with Paudel (2014) for the same period. The disadvantage for being landlocked is statistically significant on this occasion too but has lost its level of significance. This result is sensible as most of the landlocked developing countries became open in this period, and the negative impact on growth might have been covered to some extent by their openness policies. The variables CAP / GDP and TRADE / GDP have maintained statistical significance. However, results, in this case, are not such strong as indicated by the Sargan-Hansen P-value is 0.06 with a significance level of 10 percent.

Column 2 in Table 2 presents the estimated results for the model removing TRADE / GDP from the equation. On this occasion, the results for the main variable of interest in this paper are not different from the results from Column 1.

Column 3 in Table 2 presents the estimated results for the model with the interaction terms of dummies with the index of trade liberalization. The results of D1xLIB shows that there is a positive impact of trade liberalization in low-income countries but this is not statistically significant again. This impact for lower-middle-income countries (D2xLIB) is again higher and statistically significant consistently as in the case of the period 1985-2009. The results show if a lower-middle-income country is liberalized in the recent decades, its growth is on average 3.45 percent higher than that of low income and upper-middle-income countries. Moreover, the results for this period of 1995-2009 suggest that the liberalized landlocked developing countries are better off compared to non-liberalized landlocked countries in the recent decades. However, overall these landlocked countries, even after liberalisation, suffer from slow growth by about three percentage points[8] compared to other non-landlocked developing countries.

The number of observations is about 2300 for the initial sample period 1985-2009. The number of observations drops to about 1800 while the sample period is reduced to 1995-2009. Further, the number of countries in the initial sample drops to 166 from 193 and to 135 in the later sample due to a lack of data for initial income and initial level of education for 1985 and 1995.

Table 2: Economic Growth: 1995 - 2009

Dependent Variable: Growth of Per Capita GDP			
	(1)	(2)	(3)
Variables	**(Base Model -1)**	**(Base Model -2)**	**(With Interaction)**
$y_{i, t-1}$	0.231***	0.235***	0.227***
	(0.023)	(0.024	(0.024)
Per capita GDP in 1995	-4.307**	-4.146**	-2.468**
	(1.778)	(2.051)	(1.209)
School in 1995	1.482**	1.558**	1.405**
	(0.739)	(0.769)	(0.602)
Index of trade liberalisation (LIB)	1.414***	1.476***	-0.398
	(0.493)	(0.501)	(0.990)

[8]This net impact of liberalization on landlocked countries is calculated as [(LIB+LLOCK+ LLOCKxLIB)/(1-$y_{i,t-1}$)] = (-0.398-3.974+1.838) / (1-0.227) = - 3.278.

Cap / GDP	0.088***	0.095***	0.087***
	(0.021)	(0.021)	(0.020)
Landlockedness (LLOCK)	-4.482*	-4.320*	-3.974**
	(2.434)	(4.629)	(1.885)
Population-log	-0.212	-0.298	0.261
	(0.546)	(0.596)	(0.388)
Trade / GDP	0.014**		0.009
	(0.006)		(0.006)
LLOCKxLIB	-	-	1.838*
	-	-	(1.099)
D1-Dummy low income	-	-	-1.904
	-	-	(2.634)
D1xLIB	-	-	1.737
	-	-	(1.287)
D2-Dummy lower-middle income	-	-	-1.881
	-	-	(1.683)
D2xLIB	-	-	1.986*
	-	-	(0.820)
Number of observations	1790	1794	1790
Number of countries	135	135	135
F-Statistics	52.91	59.19	36.56
Sargan-Hansen Statistics	2.417	1.01	2.563
Sargan-Hansen P-Value	0.49	0.61	0.48

Notes: Standard errors are in parentheses, ***, **, and * indicate 1%, 5%, and 10% level of statistical significance, respectively.

Also, estimation test is conducted removing the landlockedness dummy and its interaction term in the model; the results for the main variable of interest remain the same. Further to be assure on the robustness of the results, an empirical test is conducted removing those 36 countries with the ambiguous status of SWI, the results for the main variables of interest remain consistent.

Conclusion

This paper contributes to the literature on trade liberalization and economic growth mainly in two ways. First, it analyses and updates the SWI of trade liberalization for 193 countries extending the period up to 2009 identifying 134 countries as open, 23 countries as closed and 36 countries with ambiguous status with the consistent approach of Sachs and Warner (1995), and Wacziarg and Welch (2008). Second, the stage of economic development is included as an additional variable in the growth regressions so that the differential impact of trade liberalization on different income groups of developing countries is identified. Unlike in the previous studies, all developing countries embarking on liberalization and reforms have been treated as a heterogeneous group based on their stage of development.

This paper revisits the evidence on a dynamic growth model to estimate the impact of trade liberalization on economic growth in the short-run and long run. It is crucial to know that both of these effects because the liberalization itself is a process to impact the economic growth, which is normally judged in the long run. The estimated results show that, overall, liberalization has a positive impact on the growth of per capita income. Also, the results consistent with the literature indicate that the newly updated SWI is correct and reliable. The estimated results show that even a landlocked developing country that has liberalized in the recent decades has been benefited from the liberalization, however, they are in a disadvantageous position due to the constraints imposed by landlockedness.

The estimation results suggest that the impact of trade liberalization on economic growth differs from the stage of economic development of a country. Thus, the stage of a country's economic development is crucial to ensure a better impact of trade liberalization on economic growth. The finding shows that if a lower-middle-income country becomes open, on average, it benefits up to 3.45 percent points more compared to other developing countries that were low or upper-middle income at the time when they became open. This suggests that not all income group countries benefit equally from trade liberalization.

Developing countries' trade and investment capacity, distortion level, and stage of their economic development determine the level of benefit from the trade liberalization, mere trade liberalization may not fulfil the aim of fostering economic growth in the developing countries. Therefore, parallel to the blanket policy recommendation of 'Washington Consensus', while making the policy recommendation in different income group developing countries, policymakers should note well this differential impact of trade liberalization on growth. Also, the liberalized landlocked countries have significantly benefited in the recent decades compared to closed landlocked countries, however, their growth is slower by about 0.6 percent points on average compared to non-landlocked developing countries due to the constraints from the landlockedness.

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