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Openness and Growth in South Asia

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ABSTRACT

The determinants of economic growth have long been a subject for economists, historians and sociologists. Traditionally, economic growth has been attributed to physical factors of production like labor and capital but, in the past few decades, there has been a search going on for the part of growth that remains unexplained when the physical factors of production are accounted for. At least two third of economic growth cannot be attributed to the physical factors of production. Several other factors contributing to economic growth have been highlighted in the recent past. Such factors include human capital, increasing returns to scale and openness. Openness of the economy is thought to be an important part of the equation of growth and there are a large number of studies and estimation using a large number of cross-sectional datasets. Time series models have been applied to single country analysis in South Asia. However, in the present paper, focusing on the three largest economies of South Asia, the authors apply, along with several other models, a panel data model to a panel dataset of India, Pakistan and Bangladesh for the period of 1980 to 2008. The results confirm that openness played an important part in the economic growth of South Asia during the period 1980-2008.

KEYWORDS: South Asia, Pakistan, Bangladesh, India, Economic Growth, Openness, Panel Data Models

Introduction

Economists have throughout been trying to define and explain economic growth and its determinants. Perhaps the best and most exhaustive detailed overview of growth theories can be found in (McCombie & Thirlwall, 1994) from where the authors extracted that the literature of economic growth and development can be

classified with reference to four points of views: The linear stage growth models, International dependence revolution, structural changes and the neo-classical free market counter revolution. In the 1950's and 1960's, economists like (Rostow, 1960) believed that a country must pass through certain stages of economic growth to reach the status of the present developed countries. These theories emphasized how critical saving, investment and foreign capital inflow were for a nation to proceed along the historical economic growth path. According to (McCombie & Thirlwall, 1994) this theory was replaced by the theories which related growth and development with structural changes and then by the international dependence theories that show the restrictions in the way of a smooth path of development. The neo-classical economists like Solow (1957)**,** Hicks (1980)**,** Wheeler (1980) discussed the role of free markets, open economics and privatization in economic growth and development.

All the above mentioned theories thought of growth as dependent on physical factors of production i.e. labor and capital. But researchers like Denison (1962) showed that only about one third of the total growth of the American economy can be explained by such physical factors of production. This meant that there was something else that was responsible for the large proportion of unexplained growth of countries like USA, Japan and later Korea, Singapore etc. From the 1980s and the beginning of 1990s, the so called New Growth Theory started emerging. Several articles, for example, (Grossman & Helpman, 1990), (Lucas, 1988), Romer (1986; 1990) emphasize the role of openness in trade and other factors that may have been responsible for the rapid growth of the Newly Industrialzed Countries fo the World. This theory has been tested for the East Asian Economies by Sengupta (1991; 1993). In the same decade, according to World Bank, the average tarriff rate went down considerabley and the volume of import and export increases significantly. Many economies opened themselves to the world and the map of the world is a new one as compared to the pre-1990 time period. There is no doubt that the world has switched form 'import substitution' to more outward looking approach in recent years and South Asia has been hesitant to do so but is now moving in this direction. The question of the effect of economic policy in relation to being 'outward' or 'inward' on the economics growth of the world has been discussed in several papers using large cross country datasets. But such studies in a panel data focusing on South Asia are rare.

Althoug South Asian Economics did not grow at the pace of the South East Asian Nations but what ever growth took place can not be attributed only to the phyisical factors of production. The empirical relevence fo openness to growth must be investigated for South Asia. For other regions, such studies investigate the matter in a corss section of countries or in a time series for a single country. It is importan here to use the modern panel data techniques to provide the evidence of the relevence of openness to growth using a panel data set. The present paper test the relevence of one of the factors in the New Growth Theory i.e. Openness for the

three largest SAARC countries; Pakistan, India and Bangladesh. By using appropriate models suitable for panel data, the authors try to confirm this relevence by using proxies for openness in South Asia.

South Asian nations, particularly the three largest ones (Pakistan, India and Bangladesh) have a long common history and deep historic relations. This region is a home to one fifth of the world population with a nominal GDP of 1.8 trillion US dollars (2009) although it is one of the poorest regions of the world. It is the least integrated region in the world; trade between South Asian countries is only 2% of the region's combined GDP, compared to 20% in East Asia according to The Economist of December 11, 2008. Human development is another issue where the soldiers outnumber the doctors. This is one of the regions that started switching towards openness later than other regions of the world. The region suffers from conflicts, corruption, volatile exchange rates, poverty and heavy fiscal deficits. However the growth in the past two decades is impressive given the abovementioned problems. This may be due to opening up the economies to the world and economic reforms in the 1990's.

Table 1 provides the basic indicators of our sample countries over selected years from the sample period. The table shows a remarkable increase in the physical factors of production as a percentage of GDP. The GDP per capita has increased significantly in all the countries of the sample. The growth rates also increases remarkably with the exception of Pakistan in 2008. The Gross capital formation and the labor force participation rates have increases over the passage of time. Most noticeably, both the exports and imports as a percentage of GDP have been improving which may indicates the extent of openness of the economies. Life expectancy at birth and the number of telephone lines are given as an indication of human development although the picture is very bleak in this regard.

Table 1: Economic and Social Indicators in South Asia's Selected Countries

Indicator	India			Pakistan			Bangladesh		
	1988	**1998**	**2008**	**1988**	**1998**	**2008**	**1988**	**1998**	**2008**
GDP per capita (constant 2000 US$)	296	419	713	446	520	648	245	313	462
GDP growth (annual %)	9.6	6.2	5.1	7.6	2.6	1.6	2.2	5.2	6.2
Gross capital formation (% of GDP)	23.6	22.6	34.9	18.0	17.7	22.1	16.3	21.6	24.2
Labor participation rate (% of population ages 15+)	60.2	59.0	57.8	50.6	50.6	53.6	74.6	71.6	70.6
Exports of goods and services (% of GDP)	6.1	11.2	23.5	13.6	16.5	12.9	5.6	13.3	20.3
Imports of goods and services (% of GDP)	7.5	12.8	29.0	21.7	17.5	14.1	12.7	18.3	28.8
Life expectancy at birth (years)	58	60	64	60	63	67	53	60	66
Telephone lines (per 100 people)	0.62	2.02	2.66	0.51	2.20	3.32	0.17	0.30	0.84

Source: World Bank, World Development Indicators

Given the above discussion, we first proceed to provide a brief review of the relevant literature and then use a simple random effect panel data model to highlight the importance of openness in South Asia.

Review of Literature

One of the famous growth models, the Harrod-Domar growth model remained a popular approach to explain growth in the economy for a significantly long period of time. This approach emphasized that the growth in labor force and capital stock are the main determinants in the equation of growth but could not explain the part of economic growth that could not be accounted for by labor and capital. Solow (1956) provided an alternative approach by assuming that labor and capital can be substituted for each other in the production process and hence permitted a continuous set of capital-output ratios. Such so called neo-classical models assumed diminishing marginal productivities and constant returns of scale which give rise to the stationary state found in various growth models. Cobb-Douglas production function was widely used in which the growth of National Income was assumed to be dependent on the growths of capital stock and labor force. But after the research by authors like Denson (1981), it became evident that the physical factors of production can only explain a certain proportion of the variation in production and these studies tried to explain the determinants of the 'residual' growth. This residual was called change in total factor productivity and was explained in several ways. Denison (1962) attributed it to the quality of labor and the effect of investment in human capital; Romer (1986), Lucas (1988) and Kwon (1986) emphasized the role of increasing returns to scale in output due to learning-by-doing.Grossman & Helpman (1990), Romer (1990), Kruger (1978) and Tyler (1981) specified and tested the relation between exports (proxy for openness) and economics growth for different countries. The story of exports and economic growth originally concentrated on the correlation between exports (openness) and economic growth. (Emery, 1967), (Maizeles, 1968), (Kravis, 1970)

The work by Balassa was based on a limited sample followed by large sample studies like Heller & Porter (1978). This was improved by studies, like Tyler (1981) and Feder (1982), which used aggregate production function that included exports as one of the explanatory variables. Hicks (1980) regresses the growth rate of GDP on several variables including imports. The impact of export growth on output was analyzed also by Kruger (1978).

Lucas (1988) considered three models; one emphasizing physical capital accumulation and technological change, the other considering human capital accumulation through schooling and the last one including human capital accumulation through learning-by-doing. This study used the World Bank data.

Sengupta (1991; 1993) showed the spill-over effect of growth of the export sector by using Cobb-Douglas type of production function.

Ballassa (1978) investigated the relationship between export and economic growth for eleven developing countries as a group. Here GNP and Labor were expressed as the ratio of absolute change between initial and terminal change divided by initial year values. Exports, Purchase power of exports, Incremental output export ratio, Average current account balance, Average difference between gross fixed capital formation and current account balance experienced as proportion of initial year GNP were included in the explanatory variables. It was evident that the explanatory power of the regression equation increased when exports were included as an independent variable.

The results were not affected substantially when the dollar value of exports was replaced by purchasing power of exports or by the incremental export GNP ratio. Balassa (1978) also estimated that a 1% increase in the rate of growth of exports tends to raise the rate of growth of GNP by 0.06 of 1%.

Tyler (1981) analyzed the imperial relationship between economic growth and export expansion using the data of 55 middle income developing countries for the period of 1960 to 1977. He used the Cobb-Douglas production function and differentiated the function with respect to time and estimated it in terms of growth rates. It was found that both capital formation and exports play an important role in increasing GNP growth rate. It was also shown that a good fit is obtained by regressing GDP growth on capital stock and labor force but the explanatory power of the model improves when we include exports. When exports of only manufacturing sector are included the value of R-square further increases, which may be due to the element of increasing returns to scale in manufacturing caused by human capital or research and development taking place in the manufacturing sector.

Wolf, H. (1993) regresses nine different measures openness on estimates that he calculates of ten-year averages of total factor productivity from 1960-90 for 93 developed and developing countries. Controlling for initial per capita GDP in 1965 and the average number of years of education in 1965, he finds that six of the nine measures of openness are statistically significant in the expected direction.

Dollar, D. & Kaary, A.(2004) provide regression analysis that focuses on within-country changes in growth rates and changes in the volume of trade where volume of trade is used as a proxy to openness. Using instrumental-variable regressions, they find a strong and significant positive relationship between the effect of changes in trade and changes in growth.

Data and Methodology

Our sample includes Pakistan, India and Bangladesh which are the three largest nations of South Asia. The sample contains a panel of the three countries for the period 1980 to 2008. We used several proxies for openness and Human Capital but present only the relevant estimations. The data set is derived from the World Development Indicators provided by the World Bank. The World Bank provides this data for the period of 1960 to 2009 for all countries. This data is freely available on the web for download and is also available in the shape of a CD-ROM. As the World Bank claims, this is the primary World Bank collection of development indicators, compiled from officially-recognized international sources. It presents the most current and accurate global development data available, and includes national, regional and global estimates according to the World Bank

Following the footsteps of **Sengupta** 1991, 1993, we use the Cobb Douglas production function to estimate GDP as a function of Labor force, capital stock, openness and human capital. Here

$$Y_{it} = A_0 L_{it}^{\alpha} K_{it}^{\beta} O_{it}^{\gamma} H_{it}^{\delta} u_{it}$$

Where Y=GDP, L = Labor, K=Stock of Capital, O = Openness, H = Human capital and u_{it} is equal to $e_i + u_t$.

We used various proxies for Openness and Human Capital but retained the volume of trade for openness and Life Expectancy at birth as a proxy to Human Capital as the Human Development Index is not available for period of time before 1995. These proxies have been used in various studies although a large number of studies use exports or imports separately as a proxy to openness. Other proxies for human capital accumulation may include expenditure of education and primary school enrollment ration that have been extensively used in studies related to human capital accumulation but, unfortunately, the data on these variables is not available for our sample countries for the period 1980 to 2008 and there exist lot of missing values. For the capital stock we use gross capital formation as a proxy which is a normal practice in research dealing with capital stock.

Differentiating with respect to time, we can express growth of GDP as a linear function of growths of labor force, growth of capital stock, growth in Openness and Human Capital Accumulation.

We first estimate this using Ordinary Least Square in a pooled fashion and then use the random effect panel data model to have more accurate estimates. The panel model must be used as the pooled estimation ignores the panel structure. In a panel, the estimated equation may be written as

$$\ln Y_{it} = A + \alpha \ln L_{it} + \beta \ln K_{it} + \gamma \ln O_{it} + \delta \ln H_{it} + e_{it}$$

We use random effect model by first testing for the appropriateness of random effect using the Breush-Pagan Test. This estimation is, in fact, a feasible generalized least squares (FGLS) estimation. Panel data were used that permit a rich model specification and have more advantages since they allow us to look into

economic effects that cannot be distinguished with the use of time series or cross-section data used separately. First of all Panel data provide an increased number of observations that generate additional degrees of freedom. Secondly panel data substantially circumvents the problem of omitted variables as it incorporates information relating to both cross-section and time-series variables. Panel data also controls for heterogeneity. More importantly, some of the statistical inference problems arising from probable correlations between some of the explanatory variable are also dealt with that enables us to deal with problems like autocorrelation, heteroscedasticity and multicolinearity.

In the random effects model, the individual-specific effect is a random variable that is uncorrelated with the explanatory variables. Random effects model provides efficient estimates and should be used instead of fixed effects model if the assumptions underlying it are believed to be satisfied. We check this by applying a Breusch-Pagan test for panel data random effects relevance.

Results

The estimation results are shown in the following table. The first two models are estimated in Cobb-Douglas form using ordinary least square. As expected, the coefficients of labor force and capital stock are positive and significant in all the models which conform to earlier studies. There magnitude and significance does not change across models. The variable on openness, where volume of trade defined as the sum of exports and imports in constant US dollars of 2000, is always significant and has a positive sign. This indicates the importance of openness in the process of growth for the three sample countries during the period of the sample. When we include life expectancy at birth as a proxy for human capital accumulation in the model 2, the other coefficients are not much affected but the sign of the coefficient on life expectancy is found to be negative which has no meaning as it is not significant.

The third model is a random effects model used for the purposes mentioned earlier in the methodology. The coefficients do not change much but we are more sure about the efficiency and accuracy of the results as the abilities of the random effects panel data model are far beyong simple regression in terms of efficiency and accuracy. In the random effects model, the individual-specific effect is a random variable that is uncorrelated with the explanatory variables. Random effects model provides efficient estimates and should be used instead of fixed effects model if the assumptions underlying it are believed to be satisfied. We also check this by applying a Breusch-Pagan test for panel data random effects relevance. The Test shows that random effects model is appropriate for estimation on this dataset.

Table 2: Estimations of Growth in GDP in South Asia			
Dependent variable: Natural log of GDP	**Cobb-Douglas form OLS**		**Random Effect Model**
	Model 1	**Model 2**	
Labor Force	0.21 ***	0.13 **	0.13 **
Gross Captal Formation	0.59 ***	0.68 ***	0.68 ***
Openness (Volume of Trade)	0.12 **	0.12 *	0.12 **
Human Captal Accumulation (Life Expectancy)		- 0.600	- 0.59
Constant	4.61 ***	6.60 ***	6.58
R-Square	0.98	0.98	0.93 (within), 0.97(between)
Wald Chi-square			6183 ***
Breuasch-Pagan Chi-square			31.23 ***

Note: All variables are in natural log form, constant US dollars

, **, * : significant at 10%,5% and 1% respectively*

Although the notion of human capital was not proved here but this can be justified as life expectancy at birth is not a perfectly good proxy to human capital accumulation and has been used because of unavailability of other data that included expenditure on education, school enrollment ratios and human development index.

However, the relevance of openness in the process of growth is evident from these results as about 12 percent of economic growth in Pakistan, Bangladesh and India during 1980 and 2008 can be attributed to openness which was a feature in these countries during this time period as they started opening up to the world in terms of increased volume of trade and less restrictions on international trade.

Conclusion and Future Recommendations

In the limited scope of this paper, we have tested the relevance of openness along with the physical factors of production in the process of GDP growth. Using a panel data random effect model, we conclude that growth process in Pakistan, Bangladesh and India cannot be explained only by physical factors of production. We must incorporate other possible determinants of growth including openness. It is evident that increase in openness is an important factor in the development of South Asian Nations and future policies should be framed in such a way that gives life to the concept of openness. This conforms to other studies on samples of East

Asian Economies and those on South Asia that used a simple cross section or time series data separately.

The future direction of research may focus on adding other possible determinants of growth and better proxies for human capital. Some studies use unit root tests and co-integration techniques on individual country time series samples or cross country datasets but there is a need and possibility to use the co-integration techniques devised for panel data, the process of estimation of which has been incorporated in the latest statistical software like STATA 11.

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