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Growth Effects of Economic Globalization: A cross country analysis

Sovna Mohanty*

Abstract

Globalization is capable of sustaining pro-poor economic growth. The central dilemma lies in whether globalization has promoted economic growth and as a result affected the income distribution within countries and between countries and whether the collective evidence holds true for the Indian scenario as well. This study looks into the impact of the several sub dimensions of economic globalization (trade, finance and information flows) on economic growth at the cross country level. We have taken 110 countries over a period of 1991-2013. The countries have been divided into four categories depending on their income levels (High, Upper Middle, Lower Middle and Low). We have analyzed the link between globalization and economic growth through total factor productivity using fixed effect panel data estimation techniques. The results support globalization and imply that a certain level of economic development is imperative for economic globalization to be effective for bringing about economic growth. Openness to trade, fdi , ICT terms of trade improvements, and financial sector development are all associated with higher TFP growth and as a result sustainable economic growth.

1. Introduction

Growth disparity across economies in the world has been a serious challenge to economists worldwide. A study of the sources of growth in economies which differ in their levels of development can lead to drawing important policy conclusions for growth prospects and poverty reduction.

The determinants of economic growth in the literature are divided into factor accumulation and total factor productivity (Miller & Upadhyay, 2000).Basic inputs of production directly contribute to economic growth and other factors change the efficiency of basic inputs and indirectly contribute to economic growth. These factors determine the TFP. There is a wide consensus that cross-country differences in income primarily arise due to the differences in TFP (Klenow and Rodriguez-Clare, 1997; Hall and Jones, 1992). Solow (1957) argued that cross-country differences in TFP can generate important differences in cross-country differences in income per capita. Mankiw, Romer and Weil (1992) found that 78% of the world income variance can be explained due to differences in human capital and saving rates across countries whereas Klenow and Rodriguez-Clare (1997) and Hall and Jones (1999) found that productivity differences are the dominant source of the large world dispersion of output per worker accounting for 60% of the variance (Cordoga and Ripoll, 2008). Thus, it is crucial to understand what causes some countries to have higher levels of productivity than others.

As opposed to endogenous growth theories, neo-classical growth models support the prediction that international trade affects economic growth. Grossman and Helpman (1991) identify the channels of openness –international transmission of ideas; international flow of goods and services and international movements of capital. Larger amount of trade helps in improving the productivity by bringing in more efficient technology for production which increases the total factor productivity and improves economic growth. International trade through various transmission mechanisms

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(technological progress, R&D) leads to increase in knowledge transfer, size of market and thus improvement in economic growth. FDI increases the stock of knowledge by labour training and skill acquisition.

There are several studies which have investigated the determinants of Total Factor Productivity at the global level (Miller & Upadhyay, 2000; Edwards, 1998; Borzenstein et al, 1998; Harrison, 1996; Zhao).

Miller & Upadhyay (2000), Edwards (1998), Harrison (1996) and Wu (2004) have highlighted the role of trade openness and human capital in improving the economic growth through total factor productivity in cross country studies using panel data techniques.

Harrison (1996) and Edwards (1998) have studied whether more open economies are associated with faster TFP growth using various measures of trade openness in a cross –country framework. The evidence is in support of faster productivity growth in open economies. Harrison finds that greater openness is associated with higher economic growth when openness is statistically significant. He has finds bidirectional causality between openness and economic growth.

Wu (2004) has extended the conventional approach on studying the relationship between TFP and trade openness. He has studied the impact of openness on technological progress and efficiency to isolate the influences of TFP. Openness has a positive and significant effect on both technological progress and efficiency. Miller & Upadhyay (2000) and Rath & Parida (2014) study the impact of human capital and openness on TFP in a cross-country framework. Miller & Upadhyay (2000) find that trade, measured as exports in GDP, is positively associated with TFP growth. For high levels of per capita income, trade has a positive significant impact, although its effects are negative for low per capita incomes. This means that for low-income countries a certain level of human capital is necessary to enjoy the benefits of trade. Rath and Parida (2014) find that in the long-run Granger causality running from trade openness and human capital to TFP. Similarly, in the short-run, there exists a bi-directional Granger causality between trade openness and total factor productivity and between total factor productivity and human capital.

Several studies have offered evidence on how FDI affects TFP and hence economic growth.

Alfaro et al (2009) and Mello (1999) examined the effect of FDI on growth and capital accumulation. Alfaro et al (2009) find that factor accumulation whether physical or human is not the main channel through which countries benefit from FDI. Countries with well-developed financial markets gain significantly from FDI via TFP improvements. Mello (1999) studies the impact of FDI on capital accumulation and output and TFP growth in a sample of both OECD and non-OECD economies. The results suggest that FDI boosts long run growth via technological up gradation and knowledge spill

over. Knowledge transfers are expected to augment growth through labour training and skill acquisition. Kose and Terrones (2009) and Baltabaev (2014) have also found that FDI leads to increase in productivity. Kose et al (2009)find that capital account openness has a robust positive effect on TFP growth and FDI and portfolio equity liabilities boost TFP growth while external debt is actually negatively correlated with TFP growth. They find strong evidence that financial openness, measured by capital account openness, is associated with higher medium-term TFP growth. The level of financial integration, measured by the stock of external liabilities to GDP, is not correlated with TFP growth. FDI and equity inflows contribute to TFP growth while debt inflows have the opposite effect. Borzenstein (1998) studies the effect of FDI and human capital on economic growth in a cross country regression framework and gives very crucial results. The impact of FDI on economic growth is dependent on the level of human capital available in the host economy. There is a strong positive interaction between FDI and the level of educational attainment.

Several studies have highlighted the role of variables such as health, education, knowledge, structural changeetc in TFP.

Alvi and Ahmed (2014) study the impact of health and education on TFP for a sample of developed and developing countries. Both of the indicators have significant and positive impact on TFP. There are several studies which have highlighted the role of knowledge in improving the productivity of the economy. Mastromarco and Ghosh (2009) have studied channels of technology diffusion, import of research and development, import of machinery, etc to see the effect on TFP of developing countries. The results show that positive effects of FDI, imported research and development depend crucially on the level of education. Borzenstein et al, (1998) emphasizes on FDI being an important channel for transfer of technology. Imports of high technology products, adoption of foreign technology are various means facilitated by multinational corporations. They find that a threshold level of human capital is necessary to ensure a higher productivity of FDI.

Based on the above literature review, the following are the focus of the study-

a) *Measurement of TFP:* Firstly, there are various methodologies existing to measure TFP growth (parametric and non-parametric). We have employed the growth accounting method which is a parametric approach and is based on strong theoretical assumptions as opposed to Frontier analysis.
b) *Determinants of TFP:* Secondly, the determinants of TFP are an issue which has limited amount of empirical studies. The existing studies can be divided into two strands – influence of human capital on TFP (Benhabib and Spiegel 1994; 2005) and studies such as Miller and Upadhayay (2000) have explained the affect of trade openness and human capital on developed and developing countries. We have tried to look for a rich set of explanatory variables from a purely empirical perspective

c) *Policies conducive to improve TFP growth and hence economic growth.* Thirdly, we have tried to conduct a few policy simulations to explain TFP growth and GDP growth and those important for India.

The rest of the paper is organized as follows. Section 2 presents the methodology to estimate total factor productivity, and section 3 discusses the data and variables. Estimated results are given in section 4. Section 5 discusses policy implications for India and Section 6 concludes the study.

2. Methodology

The methodology of the anlaysis can be divided into two steps . In the first part , we have estimated the total factor productivity using a cobb douglas production function . In the second part , the determinants of TFP have been estimated by paying special attention to economic globalization indicators.

2.1 Estimation of Total Factor Productivity (TFP)

For the estimation of TFP, we follow Miller and Upadhyay (2000).TFP is estimated using the Cobb-Douglas production function without human capital.

The functional form is expressed as follows:

$Y = AK^{\alpha}L^{\beta}$; where$0<\alpha<1$, $0<\beta<1$ (1)

Where Y equals real GDP and K equals the physical capital and L equals the number of workers (labour force in the working age group 15-64).

Here, α is the capital cost share and β is the share of production costs paid to labour.

These production functions display increasing, constant, or decreasing returns to scale as (α + β) are greater than, equal to, or less than one, respectively.

We follow the perpetual inventory method to calculate the capital stock as follows:

$$K_t = I_t + (1-\delta)K_{t-1} \quad (2)$$

Where δ is the rate at which capital depreciates and I_t is the gross fixed capital formation.

The depreciation rates used in the sample were 4% for high income countries, 3.5% for middle income countries and 2.5% in low income countries following a study by Arslanalpet. al. (2011).

Dividing equations (1) by the labour force (L) expresses output, the physical capital stock, and the human capital stock on a per worker basis.

$$y = Ak^{\alpha}L^{\alpha+\beta-1} \quad (3)$$

Where *y* equals real GDP per worker and *k* equals the per worker stock of physical capital.

Rewriting equation (3) in natural logarithmic form,

$$lny_{it} = lnA_{it} + \alpha lnk_{it} + (\alpha + \beta \quad 1)lnL_{it} \quad (4)$$

This equation identifies and allows us to measures the three sources of growth: changes in the amount of capital, changes in the amount of labour and changes in total factor productivity.

Since it has been assumed in Mankiw et al (1992) that

$$lnA(0)=a+\varepsilon \quad (5)$$

Where 'a' is a constant and ε is a country specific shock which reflects not just the technology but resource endowments, climate, institutions, etc which differs across countries.

Thus, we can rewrite equation (4) as follows:

$$lnA_{it} = lny_{it} \quad \alpha lnk_{it} \quad (\alpha + \beta \quad 1)lnL_{it} + a \quad (6)$$

TFP can be calculated as follows

$$lnA_{it} = lny_{it} \quad \alpha lnk_{it} \quad (\alpha + \beta \quad 1)lnL_{it} + a \quad (7)$$

TFP is the change in output that cannot be explained by changes in inputs. Thus total factor productivity is computed as a residual that is the amount of output growth that remains after we have accounted for the determinants of economic growth that we can measure. TFP captures anything that changes the relation between measured input and measured output.

$$ln\frac{Y}{L} = lnA + \alpha ln\frac{K}{L} + (\alpha + \beta \quad 1)lnL$$

$$lnY \quad lnL = lnA + \alpha lnK \quad \alpha lnL + (\alpha + \beta \quad 1)lnL$$

$$lnY \quad lnL = lnA + \alpha lnK \quad \alpha lnL + \alpha lnL + \beta lnL \quad \ln L$$

$$lnY = lnA + \alpha lnK + \beta lnL \quad (8)$$

Differentiating with respect to time,

$$\frac{1}{Y}\frac{\partial Y}{\partial t} = \frac{1}{A}\frac{\partial A}{\partial t} + \frac{\alpha}{K}\frac{\partial K}{\partial t} + \frac{\beta}{L}\frac{\partial L}{\partial t}$$

$$\frac{Y}{Y} = \frac{A}{A} + \alpha \frac{K}{K} + \beta \frac{L}{L} \quad (9)$$

This can be written as,

$$G_Y = G_A + \alpha G_K + \beta G_L \quad (10)$$

Where, G_Y, G_K, G_L, G_A are the growth rates of output, capital, labour and TFP respectively.

2.2 Determinants of TFP

The econometric model for estimation of the determinants of TFP is specified as follows:

$$lnTFP_{it} = a_1 + a_2 \ln(exports\ to\ gdp)_{it} + a_3 \ln(import\ to\ gdp)_{it} + a_4 lnFDI_{it} + a_5 lnINTERNET_{it} + a_6 lnKNOWLEDGE_{it} + a_7 lnEDUCATION_{it} + a_8 lnHEALTH_{it} + a_9 lnAgriculturalEmployment_{it} + a_{10} lnIndustrialEmployment_{it} + \varepsilon_{it} \quad (11)$$

Where *fdi* is foreign direct investment as a percentage of *gdp*, *internet* is the number of internet users, *knowledge* is measured by the patent applications, *and education* by the expenditure on education, *health* is measured by health expenditure.

The predicted signs of the coefficients are as following : $a_1 > 0$, $a_2 > 0$, $a_3 > 0$, $a_4 > 0$, $a_5 > 0$, $a_6 > 0$, $a_7 > 0$, $a_8 > 0$, $a_9 < 0$, $a_{10} > 0$.

2.3 Technique of Estimation

We have chosen a sample of 113 countries which comprise of high income, upper middle income and low income countries over the time period 1993-2012. We have used static panel data, estimator for finding the effect of the determinants of TFP. Diagnostic tests such as Lagrangian Multiplier (LM) and Hausman tests are used to choose between the panel data models. A high value of LM favors FE model or RE model over pooled OLS. Further the statistical significance of Hausman specification test suggests that estimation by using FE is preferable to RE model.

3. Data and Variables

Output per Worker: output per worker is dependent variable in Cobb- Douglas production function. To get output per worker GDP it is divided by labour force.

Capital per Worker: Following Miller and Upadhyay (2000), we follow a perpetual inventory method to calculate the capital stock. We take the gross fixed capital formation at constant prices and the capital stock for the base period is calculated as follows:

$$K_0 = \frac{GFK_0}{\delta + g_{GFK}}$$

Where K_0 is the capital stock , GFK_0 is the gross fixed capital formation(GFCF), δ is the rate of depreciation and g_{GFK} is the average growth in GFCF. Then to calculate the capital stock for the remaining years, we used the following equation: $K_t = I_t + (1-\delta)K_{t-1}$.

Labour: Labour is the number of workers in the working age group of 15-64.

Trade openness: Grossman and Helpman (1991) and Barro, Sala-i-Martin (1995), and Edwards (1998) among others, have argued that countries that are more open have a greater ability to benefit from technology diffusion and its boosting effect on productivity growth. Dollar and Kraay (2004) also find evidence that greater openness to trade can generate economies of scale and productivity gains.

FDI: According to the theoretical literature, FDI stimulates economic growth by improving technology and productivity (Borensztein et al., 1998). Host economies are expected to benefit from the positive externalities fuelled by FDI. Those include knowledge spillovers generated by technology transfers, introduction of new processes and managerial skills, and know-how diffusion to the domestic market. However, Alfaro et al. (2009) suggests that the overall impact of FDI on productivity is somewhat mixed.3 The majority of these studies find that the impact of FDI on productivity and growth depend on other factors, such as the level of human capital (Borensztein et al., 1998) and the development of the domestic financial market (Alfaro et al., 2003)

Health: Health has both direct and indirect influences on TFP. Health has a direct effect on the income and wealth of individuals and indirectly through increasing the labour productivity, savings, etc .Burden of diseases are a major challenge to economic growth and well educated and healthier population are in a better position to learn and absorb more knowledge. Alvi et al (2014) find that the indicator of health has a positive and significant impact on TFP. This has been measured using health expenditure as a percentage of GDP.

ICT: Human capital, research and development along with ICT tend to increase the absorptive capacity of an economy. It is an important variable for long term economic growth.

Sectoral Composition of Output: Structural transformation is a key factor in developed countries. A number of empirical studies have found that a transition of economic activity from agriculture to non-agricultural sectors would lead to stronger productivity growth, as it implies a shift from lower- to higher-productivity sectors (Jaumotte (2007) and Mc Millan (2011). The measures to study structural change are agricultural employment and industrial employment as a percentage of GDP.

Knowledge: Knowledge has a direct effect on TFP. Change in knowledge can't be measured is the result of various factors such as investment in research and development, education, etc. Multinational Corporations serve as a major channel for importing knowledge and help spur growth domestically. Mastromarco et al (2009) and Borzenstein et al (1998) emphasize the role of knowledge in absorbing more efficient techniques of production. Patent applications have been used as a measure for knowledge.

Education: A well educated population helps the economy in its ability to acquire and utilize relevant knowledge. Human capital in the form of level of education has an important effect on TFP because of its role as a determinant of an economy's capacity to carry out technological capacity (Romer, 1990). We have measured education using the expenditure on education as a percentage of GDP variables.

4. Results and Discussion

The production function estimates are given in tables 1 and 2. The results show that the output elasticity of GDP with respect to capital stock is highest in the high income and upper middle income economies and is lowest in the low income economies. The coefficient of lnL is 0.072 for the overall category of countries and indicates that the production function exhibits increasing returns to scale. The coefficient of lnk has a value of 0.724 which explains the elasticity of output with respect physical capital stock. These two coefficients generate the elasticity of output with respect to labour of 0.348. The output elasticity with respect to labour and physical capital sums up to a value of 1.072.Low income economies on the other hand have the highest output elasticity with respect to labour. The results suggest that the economic growth is mainly driven by labour supply growth in low income economies but in the advanced economies growth of physical capital plays the central role.

To look at a greater depth into the drivers of economic growth tables 3 and 4 and Figure 1 decompose GDP growth rates into factor accumulation and TFP growth for different income groups using the standard growth accounting decomposition method as given below.

$$AAGR_Y = AAGR_K * \alpha + AAGR_L * \beta + AAGR_{TFP,} \quad (12)$$

Where, AAGR=Average annual growth rate

The growth decomposition in table 3 shows that GDP has grown at an average of 4.66% per year from 1993-2012.Of this 2.79% is attributable to capital stock followed by 1.79% of TFP. Table 3 shows that low income economies have a higher rate of growth than high income economies and upper middle economies which is interesting because it is in line with the convergence theory that suggests that over time poor nations may grow faster to catch up with the rich nations. The figure shows that higher amount of TFP in low income economies than in high income economies and upper middle economies. TFP contributes to 50% of economic growth in low income economies.

The countries ranked according to their TFP are presented in Table B given in the appendix. Developed countries are high in rank while countries that are ranked low belong to the low income category. New Zealand has the highest productivity and Ukraine has the lowest, whereas India also ranks quite low (97).

Table 1:Production Function Estimates

Dependent Variable: Log(GDP per capita)				
	Overall	High Income	Upper Middle	Low
Log(Per Capita Capital)	0.724***(27.4)	0.788***(21.24)	0.71***(33.6)	0.55***(17.58)
Log(Labour)	0.072***(2.64)	0.264***(4.47)	0.116***(3.03)	0.029(1.01)
Constant	0.655*(1.74)	-2.541***(-3.23)	0.217(.43)	2.29***(5.36)
R-Squared	0.63	0.78	0.68	0.31
No. of Obs.	2484	903	676	916

Source: Estimated by using equation (4)

Table 2: Returns To Scale

	Overall	High Income	Upper Middle	Low
α(Capital Share)	0.724	0.788	0.705	0.552
α+β-1	0.072	0.264	0.116	0.029
β(Labour Share)	0.348	0.476	0.411	0.477
α+β (Returns to Scale)	1.072	1.264	1.116	1.029

Source: Estimated by using equation (4)

TABLE 3 :Decomposition (In average annual percent)

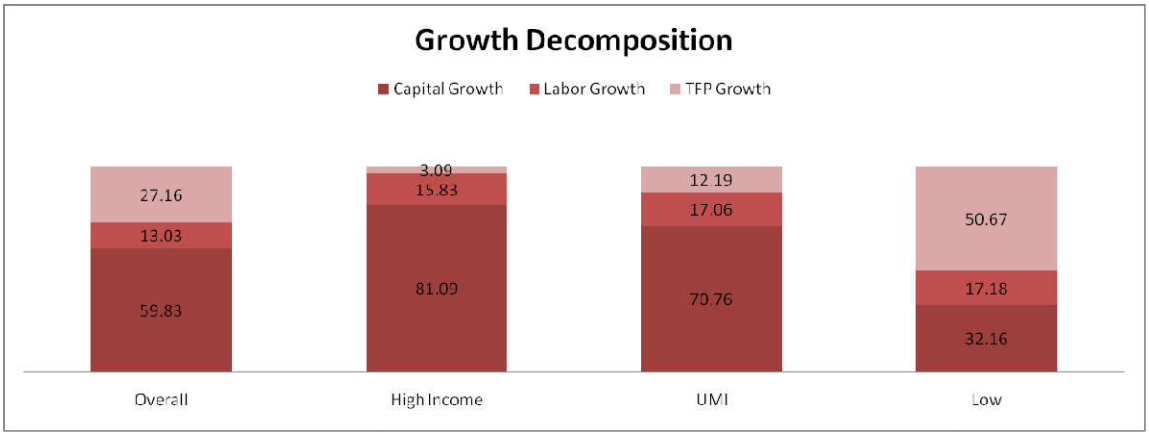
	Output Growth	Capital Growth	Labour Growth	TFP Growth
Overall	4.66	2.79	0.61	1.27
High Income	3.31	2.68	0.53	0.11
UMI	4.32	3.06	0.74	0.53
Low	6.8	2.19	1.17	3.45

Source: Estimation from equation 12

TABLE 4 :Decomposition (Contribution in percent)			
	Contribution of Capital	Contribution of Labour	Contribution of TFP
Overall	59.83	13.03	27.16
High Income	81.09	15.83	3.09
UMI	70.76	17.06	12.19
Low	32.16	17.18	50.67

Source: Estimation from equation 12

Figure 1: Growth Decomposition for Different Income Country Groups



Source: Estimated using equation 12

The TFP regressions by income category are given in Table 5 .The results show that the variables on Export to GDP, Imports to GDP, FDI , and ICT which are used as a proxy of economic globalization have a positive and significant impact on economic growth. This matches the predicted sign of the variables as well. Miller & Upadhyay (2000) find that trade, measured as exports in GDP, is positively associated with TFP growth. For high levels of per capita income, trade has a positive significant impact, although its effects are negative for low per capita incomes. This means that for low-income countries a certain level of human capital is necessary to enjoy the benefits of trade. However, our results have shown that trade openness and internet have had a positive impact in case of low income economies also. The evidence is supported by Harrison (1996) and Edwards (1998) who find faster productivity growth is associated with open economies. International trade through various transmission mechanisms (technological progress, R&D) leads to increase in knowledge transfer, size of market and thus improvement in economic growth.

FDI has shown a negative effect on TFP in case of low income economies. This evidence supports Borzenstein et al (1998) who find that impact of FDI on economic growth is dependent on the level of human capital available in the host economy. FDI brings in technology diffusion and a certain level of education is required to absorb it. Since low income economies still have a high level of illiteracy prevailing, FDI has a negative and significant effect on TFP.

Table 5: Total Factor Productivity Regressions By Income Category							
Model No	1.1	1.2	1.3	1.4	2.1	2.2	2.3
Dependent Variable : Log (Total Factor Productivity)							
	Full Model				Benchmark Model		
	Overall	High Income	Upper Middle	Low	High Income	Upper Middle	Low
Export-GDP	0.06*(1.76)	0.145**(2.09)	-0.089(-1.42)	0.082(.66)	0.14**(2.1)	-0.052(-.87)	0.139*(1.73)
Import-GDP	0.114** (2.33)	0.072*(1.89)	0.093*(1.86)	0.28*** (2.77)	0.08 (1.05)	0.115** (2.02)	0.180** (2.49)
Internet	0.015*(1.9)	0.018(1.03)	0.025*(1.82)	0.03***(3.04)	0.021(1.8)*	0.012*(1.74)	0.005(.68)
FDI	0.007** (2.15)	0.005*(1.88)	0.027**(2.27)	-0.020** (-2.42)	0.005*(1.9)	0.019**(2.47)	-0.007(-.67)
Agricultural Employment	-0.004(-.13)	-0.026(-.59)	-0.046(-1.13)	-0.07(-1.1)		-0.027(-1.03)	
Industry Employment	0.363*** (4.5)	0.495***(6.75)	0.061(.42)	0.052(.42)	0.488***(7.01)	0.036(.51)	
Health Expenditure	-0.024(-.31)	-0.137*(-1.91)	-0.13(-1.31)	0.11(.75)	-0.128*(-1.7)		0.15(.91)
Expenditure on Education	0.058(1.48)	0.066(1.41)	-0.086**(-2.16)	0.374***(4.1)	0.06(1.21)	-0.070** (-2.07)	0.134(1.29)
Patent	0.002 (.49)	0.003 (.68)	0.015*(1.93)	-0.002(-.10)	0.002(.32)		-0.018(-.96)
Constant	-1.24*** (-3.14)	-1.048*** (-3.06)	-0.222(-.39)	-1.8***(2.79)	-1.06*** (-3.070)	-0.149(-.51)	-1.31***(-2.9)
R-Squared	0.36	0.33	0.34	0.75	0.33	0.26	0.45
No. of Obs.	491	292	123	76	292	172	134

Note: Figures in parentheses indicate t –values based on robust standard errors. ***/**/* indicate significance at 1%, 5%, 10% respectively.

Source: Estimated using equation (11)

Of the control variables we can see that industrial employment and patents have a positive contribution towards TFP. Health and education have mostly insignificant impact on TFP. This may be due to less number of observations in these variables. However education has proved to have a significant and positive on TFP in the case of low income countries. Industrial employment is supporting productivity. Any successful economy is characterised by its structural transformation. This evidence is supported by Mc Millan and Rodrik (2011) who find that structural change i.e. labour moving from low productivity activities to high productivity activities contributes to overall productivity growth.[2]

5. Policy Implications for India

There has been a considerable step up in the economic growth rate of India after adopting the broad based economic reforms. It is important to see whether the growth in India has been caused by factor accumulation or TFP to derive policy lessons for sustained long term economic growth.

Figure 2 shows the growth decomposition for India. The decomposition has been subdivided into four year periods. There has been a dip in economic growth in the periods 1997-00 and 2000-2004 and TFP has been the lowest in those two periods as compared to the periods shown in the figure. The figure clearly shows that economic growth has been higher in the periods where TFP has also been higher.

Figure 3 shows the countries which belong to different income country groups. Countries such as New Zealand, China and Korea belong to high income and upper middle income countries whereas countries like Kenya, Pakistan belong to the low income country groups. As can be seen in the figure, countries characterised by high income have a higher level of TFP, whereas Kenya and Pakistan, etc have a low amount of TFP. India belongs to the lower middle income group and the contribution of TFP is 18%, which is higher than Kenya and Pakistan but much lower than New Zealand. In India capital and TFP contribution are the higher followed by labour contribution to economic growth. This is the case in Korea and China as well. However the countries belonging to the low income group such as Bangladesh, Pakistan and Kenya have a higher contribution of labour in economic growth.

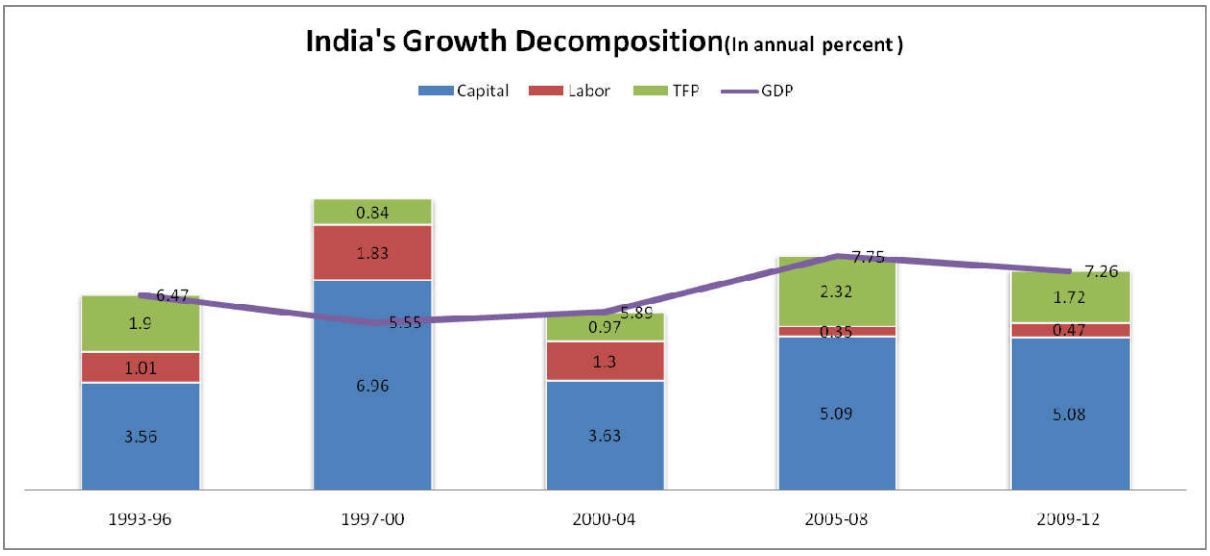
[2] In case of the benchmark model, we tried looking at the models which gave us best results for the different income categories. In case of high income economies, when we dropped the agricultural employment variables the results have been significant for most of the variables, though the explanatory powers have remained the same. In case of the upper middle income categories, dropping the health expenditure and patents variable gives better results. This is mostly due to poor data availability in both these variables. In case of low income category, on dropping both the employment variables the results have improved slightly in terms of significance of globalization variables and the explanatory powers.

Various policy simulations can be carried to show that the productivity in India could be higher if we adopt growth strategies that exist in high income and upper middle income country groups. These simulations can help us in drawing important policy lessons to help India improve its productivity and thus the economic growth.

Figure 4(a), (b), (c) show the policy simulations that have been carried out. Figure 4(a) shows the actual and predicted TFP growth rates of India. Predicted growth is based on estimation result of high income and upper middle income countries as has been given in table 5 above. Figure 4(b) shows the actual and predicted TFP growth rates if we assume the export,import, ICT and FDI variables of India to have values which are similar to the high income and upper middle income countries .Figure 4(c) shows the actual and predicted growth rates of India . Predicted growth again here is based on the estimation result of high income and upper middle income countries.

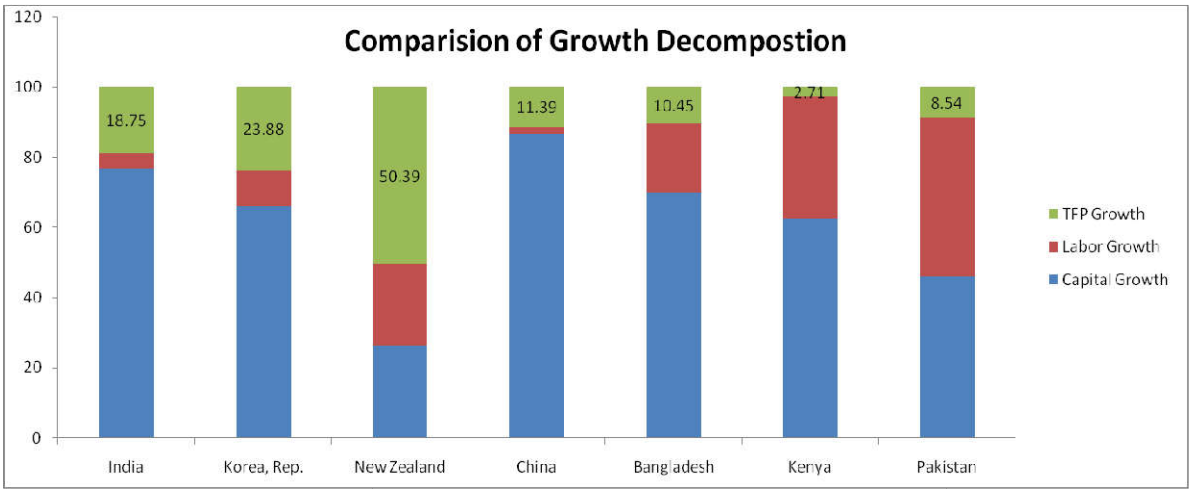
In figure 4(a) and figure 4(b) the predicted values of India have shown to be higher than actual TFP growth rate. When we anlysed the GDP per cgrowth rate , we can see that after the year 2002 the actual values and the predicted values have been similar or even higher.

Figure 2 : India's Growth Decomposition



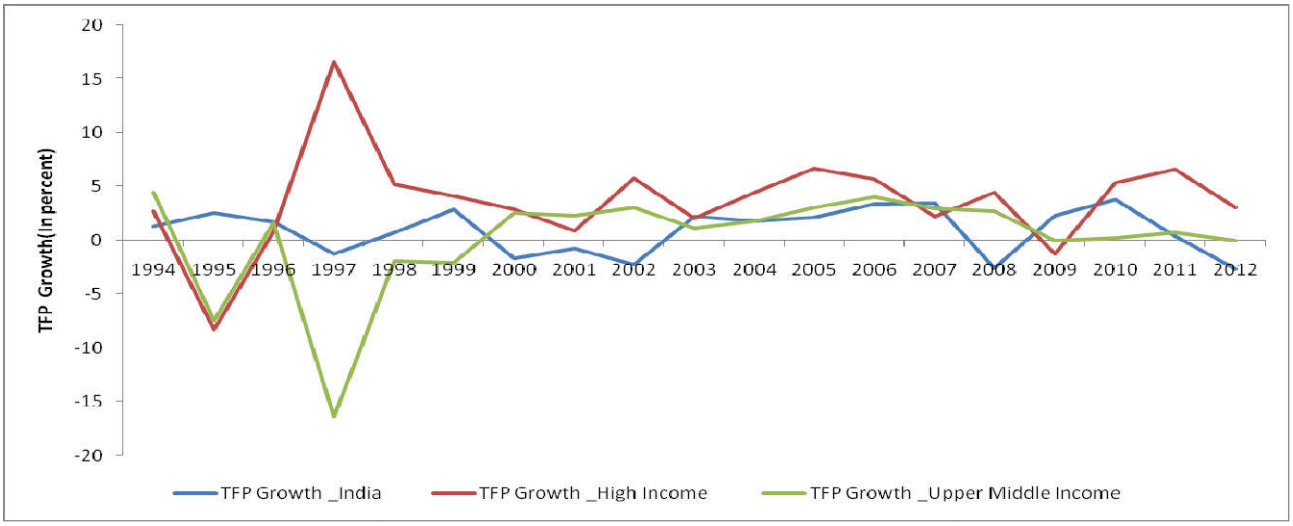
Source: Own Calculation

Figure 3: Comparison of Growth Decomposition



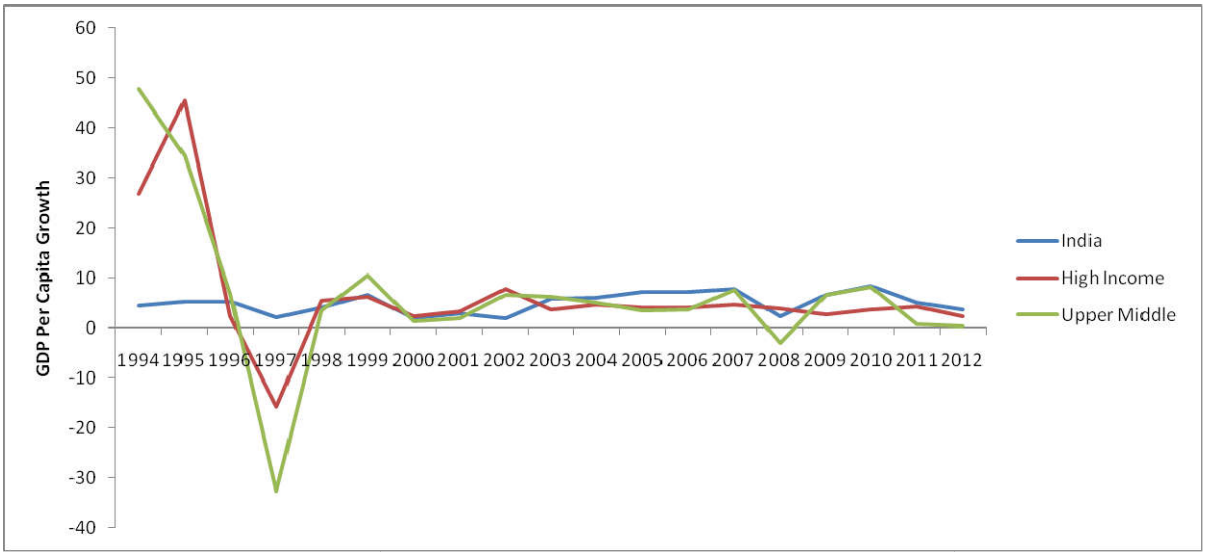
Source: Own Calculations

Figure 4 (a): Policy simulation for India on TFP Growth



Source: Own Calculations

Figure 4 (b): Policy simulation for India on Economic Growth



Source: Own Calculations

6. Conclusion

This paper has explored the relationship between globalization variables and TFP by using static panel data approach for the period 1993-2012 based on the data for 113 economies. From the estimated results we can infer the following: First, that faster productivity growth is associated with international trade and ICT. However for FDI to absorb in low income economies, education level needs to be higher. Second, Industrial employment is very crucial for improving productivity. Third, for the case of India, we can look into the growth strategies of high income and upper middle income economies, to improve the productivity of India and put it in a sustainable growth trajectory.

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APPENDIX

Table A: Sample Of Countries

High Income	Upper Middle Income	Low Income
Australia	Albania	Armenia
Austria	Algeria	Bangladesh
Bahamas, The	Argentina	Benin
Belgium	Azerbaijan	Bolivia
Brunei Darussalam	Belarus	Burkina Faso
Canada	Belize	Cambodia
Chile	Botswana	Cameroon
Croatia	Brazil	Congo, Dem. Rep.
Cyprus	Bulgaria	Congo, Rep.
Czech Republic	China	Egypt, Arab Rep.
Denmark	Costa Rica	El Salvador
Equatorial Guinea	Cuba	Eritrea
Estonia	Dominican Republic	Gambia, The
Finland	Ecuador	Guatemala
France	Gabon	Honduras
Germany	Hungary	India
Greece	Jordan	Indonesia
Hong Kong SAR, China	Kazakhstan	Kenya
Iceland	Lebanon	Kyrgyz Republic
Ireland	Macedonia, FYR	Lesotho
Israel	Malaysia	Madagascar
Italy	Mauritius	Mauritania
Japan	Mexico	Moldova
Korea, Rep.	Namibia	Morocco
Latvia	Panama	Mozambique
Lithuania	Peru	Pakistan
Luxembourg	Romania	Paraguay
Macao SAR, China	South Africa	Philippines
Malta	Thailand	Senegal
Netherlands	Turkey	Sierra Leone
New Zealand	Venezuela, RB	Swaziland
Norway		Tanzania
Poland		Togo
Russian Federation		Uganda
Singapore		Ukraine
Slovak Republic		Uzbekistan
Slovenia		Vietnam
Spain		West Bank and Gaza
Sweden		
Switzerland		
Trinidad and Tobago		
United Kingdom		
United States		
Uruguay		

Table B: Rank Of Countries According to TFP

Country	Income Group	Rank-TFP	Country	Income Group	Rank-TFP	Country	Income Group	Rank-TFP
New Zealand	HI	1	Lithuania	HI	41	Morocco	LMI	81
Belize	UMI	2	France	HI	42	Paraguay	LMI	82
Luxembourg	HI	3	Estonia	HI	43	Cameroon	LMI	83
Equatorial Guinea	HI	4	El Salvador	LMI	44	Mozambique	LI	84
Iceland	HI	5	Italy	HI	45	Sierra Leone	LI	85
Macao	HI	6	Argentina	UMI	46	Macedonia	UMI	86
Ireland	HI	7	Turkey	UMI	47	Philippines	LMI	87
Brunei Darussalam	HI	8	Uruguay	HI	48	Burkina Faso	LI	88
Norway	HI	9	Mauritius	UMI	49	Senegal	LMI	89
Uganda	LI	10	South Africa	UMI	50	Kenya	LI	90
Bahamas, The	HI	11	Germany	HI	51	Eritrea	LI	91
Malta	HI	12	Botswana	UMI	52	Belarus	UMI	92
Denmark	HI	13	Spain	HI	53	China	UMI	93
Singapore	HI	14	Venezuela,	UMI	54	Pakistan	LMI	94
Israel	HI	15	Slovak Republic	HI	55	Indonesia	LMI	95
Panama	UMI	16	Czech Republic	HI	56	Benin	LI	96
Chile	HI	17	Hungary	UMI	57	India	LMI	97
United Kingdom	HI	18	Gabon	UMI	58	Togo	LI	98
Namibia	UMI	19	Guatemala	LMI	59	Uzbekistan	LMI	99
Canada	HI	20	Lebanon	UMI	60	Vietnam	LMI	100
Australia	HI	21	Jordan	UMI	61	Gambia, The	LI	101
Finland	HI	22	Peru	UMI	62	Madagascar	LI	102
Hong Kong SAR, China	HI	23	Korea, Rep.	HI	63	Kazakhstan	UMI	103
Netherlands	HI	24	Mexico	UMI	64	Bangladesh	LI	104
Belgium	HI	25	Bulgaria	UMI	65	Thailand	UMI	105
Sweden	HI	26	Cuba	UMI	66	Congo, Dem. Rep.	LI	106
Croatia	HI	27	Romania	UMI	67	Lesotho	LMI	107
Slovenia	HI	28	West Bank and Gaza	LMI	68	Russian Federation	HI	108
United States	HI	29	Albania	UMI	69	Tanzania	LI	109
Dominican Republic	UMI	30	Malaysia	UMI	70	Armenia	LMI	110
Poland	HI	31	Ecuador	UMI	71	Kyrgyz Republic	LMI	111
Switzerland	HI	32	Bolivia	LMI	72	Moldova	LMI	112
Austria	HI	33	Cambodia	LI	73	Ukraine	LMI	113
Costa Rica	UMI	34	Congo, Rep.	LMI	74			
Cyprus	HI	35	Japan	HI	75			
Latvia	HI	36	Egypt,	LMI	76			
Swaziland	LMI	37	Brazil	UMI	77			
Trinidad and Tobago	HI	38	Algeria	UMI	78			
Azerbaijan	UMI	39	Honduras	LMI	79			
Greece	HI	40	Mauritania	LMI	80			

Note: The abbreviations used for HI, UMI, LMI and LI are high income, upper middle income and lower middle income and low income groups

Table C: Descriptive Statistics					
Variable	Obs.	Mean	Std. Dev.	Min	Max
Log(Total Factor Productivity)	2261	-0.27	1.03	-9.27	7.86
Export-GDP	2214	-1.04	0.64	-2.93	0.86
Import-GDP	2214	-0.95	0.58	-3.35	1.08
Internet	2098	1.42	2.64	-9.3	4.57
FDI	2081	0.59	1.85	-12.71	4.45
Agricultural Employment	1549	2.26	1.25	-2.31	4.49
Industry Employment	1538	3.13	0.33	0.96	3.79
Health Expenditure	1981	1.81	0.39	0.37	2.84
Expenditure on Education	906	2.63	0.34	1.17	3.5
Patent	1560	6.34	2.43	0	12.53

Table D: Measurement and Data Sources of the Variables		
Variable	Measure	Source
Output	GDP (constant 2005 US$)	World Development Indicators(WDI)
Capital Stock	Gross Fixed Capital Formation (constant 2005 US$)	WDI
Labour	number of workers in the working age group of 15-64	WDI
Trade (Exports as a ratio of GDP ; Imports as a ratio of GDP)	Exports of goods and services (constant 2005 US$)	WDI
	Imports of goods and services (constant 2005 US$)	WDI
FDI	Foreign direct investment, net inflows (% of GDP)	WDI
ICT	Internet Users(per 100 people)	WDI
Health	Health expenditure, total (% of GDP)	WDI
Knowledge	Patent applications, residents	WDI
Human Capital	Expenditure on Education	WDI
Structural Change	Employment in agriculture (% of total employment)	WDI
	Employment in industry (% of total employment)	WDI