A COMPARISON OF THE CONTRIBUTION OF TOTAL FACTOR PRODUCTIVITY TO ECONOMIC GROWTH IN PAKISTAN WITH SELECTED ASIAN COUNTRIES

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Abstract

This paper concentrates on the comparison of the contribution of Total Factor Productivity (TFP) to Economic Growth in Pakistan with selected Asian countries in the presence of human capital. The paper used Growth Accounting Method for this purpose. The results show that TFP is major contributor to economic growth in all selected countries except India and Bangladesh. Physical capital is chief source of economic growth in India and Bangladesh while it is 2nd largest contributor to the growth rate of Gross Domestic Product in remaining countries. Similarly, human capital made considerable contribution to economic growth in India, Bangladesh, Nepal and Indonesia.

Key Words: Total Factor Productivity, Growth Accounting Method, Human Capital, Physical Capital.

Introduction

In 1980s, the theory of economic growth took new direction with the prologue of new growth theories. Since then, the economists round the world are struggling hard to unveil the hidden sources of economic growth; especially the focus of policy makers in developing economies is to expose the non-conventional sources of growth (Khan, 2012)**.** The study of the industrialized economies shows that they have achieved the current status mainly due to human resource development. The significance of human capital can be judged from the fact that, in

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1969 half of American capital stock was human capital (Kendrick, 1976). Moreover, average human capital accounts for 64% of wealth in most of world economies (World Bank, 1995). The human capital accumulation empower the government to effect the productivity directly or indirectly through the technological progress. This is often reflected in Total Factor Productivity (TFP), which is the focus of this paper.

The Asian economies are interesting area of research as diversity can be seen in their economic conditions. Some have achieved sustained economic growth while others are striving hard for desirable growth rate (Asian Productivity Organization, 2002). The productivity differs across countries due to variation in infrastructure, culture and nature of economy (Hall and Jones, 1996). Recent studies have revealed the fact that Total Factor Productivity is an integral part of the reasons for cross-country differences in income levels and prevailing growth rates (Jerzmonowsky, 2006). Easterly and Revine (2001) found that 90% cross-country variation in growth rates is explained by Total Factor Productivity. Among the Asian economies, Total Factor Productivity (TFP) contributes 38.47% to the growth rate of GDP per capita in Pakistan (Khan, 2012). TFP is an important ingredient of Indian economic growth and its value fell from 85% in 1951 to 25 % in the year 1992 (Virmani, 2004)

The focus of the present study is to compare the contribution of Total Factor Productivity (TFP) and human capital to economic growth in Pakistan with selected Asian Countries including India, China, Bangladesh, Indonesia, Iran, Nepal and Srilanka. All the selected countries are neighboring countries or countries of more or less similar nature in the region. The study has used the Growth Accounting Method for this purpose.

Material and Methods

This paper is based on secondary data which was taken from World Development Indicators (World Bank), Maddison (2008), LABORSTA (International Labour Organization), State Bank of Pakistan (2005), Economic Survey of Pakistan (Various issues) and Human Development Reports (United Nations Development Programme). The data covers the period, 1971-2008.

The economic growth literature shows that one of the main problems in growth regressions is the value of residual. The value of this residual remains unknown, which creates gap between the economic growth and factors associated with it and is known as Solow residual or Total Factor Productivity. This paper uses Growth Accounting method for this purpose. (Solow, 1957 and Zvi, 1967)

The basic idea of this paper is based on Khan (2012) which proceeds as below.

$$Y = f(A, K, L, H) \qquad (1)$$

Where

Y = Output, A = level of Technology,

K = Capital, L = Labour

H = Human capital in form of Health

Differentiating equation (I) w. r .t time and dividing by 'Y' we get

$$y = g + s_1 g_K + s_2 g_l + s_3 g_h \qquad (2)$$

Where $y = \dot{Y}/Y$, $s_1 = \frac{E_K K}{Y}$, $s_2 = \frac{E_L L}{Y}$, and $s_3 = \frac{E_H H}{Y}$

By solving equation (2) for Total Factor Productivity (TFP) can be derived as given below. (Khattak and Khan, 2012)

$$g = y - s_1 g_k - s_2 g_l - s_3 g_h \qquad (3)$$

Where 'y' is growth rate of GDP per Capita, 'g_l' shows growth rate of labour and 'g_h' growth rate of human capital (health). S_1, S_2 and S_3 are shares of capital, labour and human capital in output. 'g_k' stands for growth rate of physical capital which has been measured by Gross Fixed Capital (GFC), labour has been measured by total labour force in the economy and health by life expectancy. The optimum capital, labour and human capital share has been used as 0.33, 0.33 and 0.34. This has been used in a number of studies for the developing countries. (Young, 1992) Therefore equation (3) takes the form for final analysis as under

$$TFP = y - 0.33 g_k - 0.33 g_l - 0.34 g_h \qquad (4)$$

The TFP for the selected countries has been computed for the study period as whole (1971-2008) and for four sub periods 1971-1980, 1981-1990, 1991-2000 and 2001-2008.

Results and Discussion

The present study compares the contribution of Total Factor Productivity (TFP) to economic growth in Pakistan with selected Asian countries. The countries have been selected either on the basis of geographic location surrounding Pakistan or on the basis of similar characteristics. The result is not only expected to support the previous studies conducted in the overall region but also highlight some new facts. Some of the studies like Young (1989), Young (1993) and, Kim and Lau (1994) viewed the contribution of capital inputs to economic growth greater than

TFP in empirical studies of Asian economies. The present study is expected to explore not only the contribution of TFP but also Physical Capital, Human Capital and Labour in the selected economies.

Pakistan, a developing Asian country, is rich in human resources. But due to multiple socioeconomic problems, it is not properly utilizing its human resources and with lower Human Development Index, it is among the low ranked countries. The present study found that TFP contributed 46.93% to economic growth of Pakistan during the period 1971-1980. The contribution of human capita in form of health remained 1.64% during the same period. The share of human capital increased marginally in next decade while that of TFP fell to 44.22 percent. The input of physical capital to the growth rate of GDP per capita stayed 44.58%. The fluctuations continued during the period 1991-2000 and the share of TFP increased to 54.28 while that of human capital fell to 1.60. The share of physical capital remained 38.44 during the same period.

The contribution of TFP and human capital remained 47.32 and 0.94 percent in the period 2001-2008 respectively. The physical capital was 42.37% while that of labor 9.37% in the same period. However, TFP contributed 54.20% to the growth rate of GDP per capita of Pakistan during the study period.

India, is one of the most influential country of the region. It has huge population size and labor abundant economy. Its economy is also gigantic with extensive trade boundaries all over the world. Interestingly, following the pattern of developing economies TFP is a major contributor to economic growth in India. It contributed 19.53% to GDP per capita during 1971-80 much lower than Pakistan. However, during the next decade its contribution jumped to 44.02 while that of Pakistan remained sustained. The contribution of TFP to GDP per capita further

increased to 54.31 during the period 1991-2000. These estimates are similar to some of the previous studies.(Asian Productivity Organization, 2004).The TFP declined to 38.20% during 2001-2008. However, overall contribution of TFP to GDP per Capita in India remained 44.16% against the 47.74 % of Pakistan during the whole study period (1971-2008). Physical capital is the second higher contributor to Indian economy after TFP. It contributed 40.90 % to the economic growth of India during 1971-2008. When the calculation is done decade-wise, its contribution shows some fluctuations. However, it remained a significant part of growth process along with TFP. The estimates of the physical capital are in line with the previous studies.(Besudeb and Bari, 2000). The share of human capital (Health) remained very low like Pakistan. It contributed 2.12% to economic growth throughout the study period. The details are shown in Table: I. The analysis of TFP in India as compared to Pakistan shows that there have been many fluctuations in TFP some periods. Changes in R&D expenditures, inflow of FDI and foreign inputs, changes in scale of production, evolution of private sector, and trade openness with the passage of time are believed to be some of the factors which have brought about fluctuations in contribution of TFP to economic growth of India.

China is a statist economy which is directly or indirectly controlled by centralized authority. Being, the most populated country of the world, china has the highest number of workers in the world. It is on the path of industrialization and emerged as a global economic power in recent decades with sustained economic growth rate over the last decade and half. Its boundaries touch the northern Pakistan and both countries have friendly relations. The Chinese economy mainly depends on foreign trade and most of the researchers have struggled to explore the sources of productivity in china. The results of the present study shows that Total factor productivity is still an

important source of the Chinese economic growth. The share of TFP in economic growth remained 52.42% during the study period which is little bit higher than that of Pakistan share in the period. Capital, Labor and human capital are the 2nd, 3rd and 4th largest contributors to economic growth of china respectively. The result of the TFP share in economic growth of china of the present study is similar to Hall and Jones (1996). However it is different from the results of some other studies. (Iwata *et al,* 2002)

During the sub periods, in 1st decade of the study period TFP added a smaller percentage of 23.82 to economic growth in China. Its share increased to 58.74% and 54.06 % in next two decades. The TFP share remained 55.88% during 2000-2001 in Chinese economy. The second major portion of the GDP per capita is covered by physical capital. Initially, 57.09% of the economic growth was attributed to physical capital but gradually its share fell down. It contributed 41.4% to Chinese economy at the end of the study period as shown in the Table: II. This shows that the sources of economic growth in china are more or less similar to the economy of Pakistan. It is evident from the estimates of TFP, Physical capital, Human Capital and Labour in China and Pakistan.

Iran, is another country which touches the boundaries of the study area. With extensive deposits of hydrocarbon, it is an influential country in oil business. TFP is a substantial ingredient of Iranian economic growth. According the results of the present study, TFP added 55.67% to economic growth during the study period. Physical capital remained the second higher contributor and the human capital least contributor to the growth rate of GDP per capita in Iran during 1971-2008. The estimates are in between the range of studies conducted by Asian productivity Organization (2004) and International Monetary Fund (2007). In the sub periods, the contribution of TFP 55.91%, 51.185, 56.78%

and 62.12% during the 1971-80, 1981-90, 1991-2000 and 2001-08 respectively. The capital contribution remained lower than TFP in all the sub periods within the range 33.03% in 2001-2008 to 41.39% in 1971-80.The shows continues fall in Capital contribution. This may be due to some higher shares of labour and human capital across the study period.

Indonesia is a rising Asian economic power. With rapid industrialization, it has attained sustained economic growth. The present study is comparing the contribution of different sources to economic growth of Pakistan with Indonesia. The TFP has been the chief provider to economic growth in Indonesia throughout its history. Its addition to GDP per capita remained 58.87%, 52.27%, 58.93% and 58.91% during 1971-80, 1981-90, 1991-200 and 2000-2008 respectively. As whole, it contributed 57.66% during 1971-2008, which the highest contribution to economic growth in all the selected countries and Pakistan during the study period. The results regarding the share of TFP in Indonesian economic growth are much higher than the estimates of Iwata *et al* (2002). However, addition of its second chief contributor capital stayed lower than Pakistan and other selected countries in most of sub periods as well as in the whole study period. Its share was 36.6% during the period 1971-2008 which is much smaller than the estimation of Bosworth (1995) and Bu (2004).This shows that the addition of TFP and other factors to the Indonesian economy is somewhat different from Pakistan economy.

Bangladesh is another selected country which remained a part of Pakistan called East Pakistan before the beginning of the study period. With agro-based economy, Bangladesh is now moving towards the industrialization. Surprisingly, The TFP share in economic growth of Bangladesh is smallest among the set of selected countries. It has contributed 36.35% to economic

growth during 1971-2008. This share is much lower than the results of Klenow and Andres (1997). However, it is nearer to the study of Besudeb and Bari (2000). The share of Physical capital remained on top in sources of Bangladesh economic growth. During the sub periods, TFP remained in the range of 20.11% - 43.62%. The lowest value was in 1991-2000 while the highest value was 2001-2008. The contribution of human capital also showed great variation. It fluctuated between the minimum and maximum values 1.42 % and 6.08 % during the four sub periods against the lower share of human capital in the economy of Pakistan.

In Sri Lanka, 54.20% of economic growth has been attributed to TFP during the study period. This behaviour of TFP is similar to the other Asian economies. In the four sub periods great variation seemed in the TFP share. Its lowest estimate was 34.39% in 1971-80 which is half of the estimate in the next decade. This was due to some structural transformation in 1980s and 1990s. The sustained GDP growth in 1980s followed economic liberalization, which took the private sector investment to 19% of GDP (IMF, 2007). Physical capital is another significant ingredient of the Sri Lankan economy. Its share stayed at 40.90% in the study period. This share is nearer to the contribution of physical capital to the economic growth of Pakistan. Unfortunately, the study results regarding the share to physical capital are contradiction to other few studies. (Besudeb and Bari, 2000).

Nepal is another Asian economy selected for comparison on the basis of its contribution in Asian forum SAARC. It is an active member of SAARC and its efforts for political and economic activities in SAARC region of Asia are appreciable. The TFP appeared as major contributor to the economy of Nepal with a marginal difference with the contribution of Physical

capital. It added 44.91 % to The GDP Per Capita as compared to the physical Capital share of 43.44%.

Conclusion and Recommendations

It is concluded on the basis of the results that Total Factor productivity is an important determinant of economic growth in the selected countries. It is the chief source of economic growth in all selected economies excluding India and Bangladesh where, physical capital is the major contributor to the same. Moreover, the share of TFP in economic growth of Pakistan is less than china, Iran, Indonesia and Sir Lanka while it is greater than Bangladesh and India. Physical capital appeared as 2nd major contributor along with TFP in almost all countries except India and Bangladesh. Similarly, human capital (Health) showed comparatively a smaller contribution as compared to other factors.

Table I: TFP Comparison of Pakistan with Neighbouring Asian Countries

Period: 1971-1980				
Country	Contribution of TFP to Economic Growth	Contribution to Economic Growth		
		labour	Capital	Human Capital (Health)
Pakistan	46.93	6.78	46.93	1.64
India	19.53	11.03	65.07	4.37
Bangladesh	36.78	4.08	57.72	1.42
China	23.82	15.16	57.09	3.93
Iran	51.91	5.23	41.39	1.47
Indonesia	58.87	3.13	36.55	1.45
Nepal	50.13	8.24	37.13	4.50
Srilanka	34.39	5.38	58.53	1.69

Period: 1981-1990				
Pakistan	44.22	9.55	44.58	1.65
India	44.02	7.10	47.47	1.41
Bangladesh	39.46	8.83	47.98	3.72
China	58.74	6.04	34.47	0.75
Iran	51.18	7.21	39.43	2.18
Indonesia	52.27	6.24	38.05	3.44
Nepal	49.63	5.78	41.81	2.78
Srilanka	69.00	3.80	26.56	0.61
Period:1991-2000				
Pakistan	54.28	5.68	38.44	1.60
India	54.31	6.63	37.78	1.28
Bangladesh	20.11	14.63	59.18	6.08
China	54.06	2.44	42.65	0.85
Iran	56.71	3.98	38.64	0.67
Indonesia	58.93	3.72	35.98	1.37
Nepal	42.99	8.46	44.23	4.31
Srilanka	53.53	3.89	42.22	0.35
Period:2001-2008				
Pakistan	47.32	9.37	42.37	0.94
India	38.20	6.60	53.00	2.20
Bangladesh	43.62	9.45	43.56	3.37
China	55.88	2.98	40.33	0.81
Iran	62.12	4.30	33.03	0.55
Indonesia	58.91	3.45	36.07	1.57
Nepal	37.39	11.28	47.15	4.18
Srilanka	60.22	2.49	36.18	1.08

Source: Author's calculations based on Data taken from World Development Indicators (Various issues), Maddison (2006), State Bank of Pakistan (2005) and Economic Survey of Pakistan (Different Issues). *The figures in calculations have been rounded off, so possibly the totals may not be necessarily equal to 100.

Table II: Comparison of Total Factor Productivity for the Whole Study period (1971-2008)

Country	Contribution of TFP to Economic Growth	Contribution to Economic Growth		
		Capital	Labour	Human Capital
Pakistan	47.74	43.09	7.72	1.45
India	44.16	47.06	6.66	2.12
Bangladesh	36.35	53.08	7.55	3.02
China	52.42	41.40	5.02	1.16
Iran	55.67	38.28	4.94	1.11
Indonesia	57.66	36.60	3.92	1.82
Nepal	44.91	43.44	7.79	3.86
Srilanka	54.20	40.90	3.95	0.94

Source: Author's calculations based on Data taken from World Development Indicators (Various issues), Maddison (2006), State Bank of Pakistan (2005) and Economic Survey of Pakistan (Different Issues). *The figures in calculations have been rounded off, so possibly the totals may not be necessarily equal to 100.

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