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Total Factor Productivity and Economic Growth in Pakistan: A Five Decade Overview

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ABSTRACT

This paper traces Pakistan's TFP and GDP growth from 1972 to 2019. The analysis shows that Pakistan's TFP and economic growth have declined over time. The sectoral—agriculture, industry, and services—trends are also not different. The TFP and GDP growth rates of the total economy and the three sectors were the highest in the 1980s. In general, Pakistan's economic growth has been driven by factor accumulation, except for in the 1980s and the 2010s. The analysis further shows that whenever attempts were made to deregulate and liberalize the economy, it resulted in higher TFP growth and consequently in higher GDP growth. Similarly, macroeconomic and political stability also seems to be important factors in higher TFP and GDP growth. The comparison with other countries shows that Pakistan's TFP growth performance has been reasonable, especially compared with India. However, the experience of other countries shows that to achieve GDP growth above 8 percent, Pakistan needs to enhance its productivity growth to 3 percent or above.

Keywords: Total Factor Productivity, GDP Growth, Agriculture, Industry, Services

1. PREAMBLE

"Productivity isn't everything, but in the long run it is almost everything"
(Paul Krugman)

The evolution of total factor productivity (TFP) is a key determinant of the long-run output growth. There is substantial evidence available that shows that the countries that managed to boost their TFP grew at a much higher rate and for a sustained period. The Second Industrial Revolution resulted in unprecedented improvements in technology, altering human life in significant ways, and resulting in income increases that lasted well into the 20th century, as explained by Gordon (2016). For a much more recent period, Yalçınkaya et al. (2017) show that in G7, G12, and G20 countries, TFP growth has a greater impact on GDP per capita growth than fixed capital formation and employed labour. According to Warren Buffet, TFP is the 'secret sauce' in the US economic success story over the last 150 years (Lambert, 2016). On the other hand, those countries that managed to grow impressively without the significant contribution from the TFP growth, could not sustain their growth. Economic growth that is based on the expansion of inputs rather than on an increase in output per unit of input is inevitably subject to diminishing returns. Impressive economic growth in the Soviet Union in the 1950s and 1960s, for example, was based entirely on savings. Therefore, unless the economies do not learn to produce more and better output more efficiently, they will suffer the law of diminishing returns (Krugman, 1994).

Box 1: What is TFP?

- In the growth accounting framework, total factor productivity (TFP), also known as multifactor productivity, tells us how productively the economy uses the factors of production to produce output.
- TFP is that part of the GDP growth that cannot be attributed to factor inputs.
- It reflects a shift in the production function arising from technological progress (Barro, 1999).
- TFP may also increase economic growth by allocating inputs more appropriately and efficiently, resulting in production getting very close to the optimum combination of inputs and outputs (Balk, 2001).
- A country may produce at the production possibility frontier but improvements in technology push the frontier out and enable more output to be produced for given factors of production. The concept of TFP growth essentially incorporates technical change and improvements in economic efficiency in the use of factor inputs.
- TFP may also contribute to higher economic growth through the effect that economies of scales have on changing the scale of operations (Jorgenson & Griliches, 1967).
- According to Bosworth and Collins (2008), the TFP not only measures technical efficiency but can also be attributed to several sociopolitical and economic factors, such as government policy, institutions, market structure, or weather shocks that determine the efficiency of factor use.

Acknowledgement: Thanks are due to Dr. Nadeem Ul Haque, Vice-Chancellor, PIDE for motivation and encouragement to undertake this analysis, and for providing comments on different versions of the paper. The errors of omission and commission are of course mine.

In this paper, we present an account of Pakistan's output and TFP growth rates for the total economy as well for three main sectors, viz. agriculture, industry, and services sectors. The paper is organised as follows. In Section 2, trends and analysis of the GDP growth rate, TFP growth rate, and investment-GDP ratio are presented for the total economy. The analysis shows that GDP growth rate, TFP growth rate, and investment-GDP ratio have been on the decline over the last 47 years. In Section 3 a comparison of Pakistan's GDP and TFP growth trends with India and other selected countries is given. The comparison shows that for sustained growth in output, higher TFP growth is imperative. The sectoral output and TFP growth, and investment trends are discussed in Section 4. The sectoral story is no different from that of the total economy. The discussion is summarised in Section 5.

Box 2: TFP Estimation - Methodology

Total factor productivity (TFP) can be estimated using the neoclassical production function:

$$Y = F(A, K, L) \quad \ldots \quad (1)$$

In equation 1, Y is real output, K is capital stock, L is the employed labour force, and A is the residual term, which is TFP.

We can write equation 1in the growth form as:

$$g^Y = \alpha g^L + (1 - \alpha) + g^{TFP} \quad \ldots \quad (2)$$

g^Y denotes the growth rate of output, g^L denotes the growth rate of labour, g^{TFP} denotes the growth rate of TFP, α is the share of labour in output, and (1-α) is the share of capital in output. According to equation 2, the output growth rate is a weighted average of growth in the employed labour force, capital stock, and technological progress, given by the growth of TFP, and the weights are factors shares of labour and capital.

Assuming that output and inputs can be observed, the TFP can be calculated using the following equation:

$$g^{TFP} = g^Y - \alpha g^L - (1 - \alpha) \quad \ldots \quad (3)$$

The TFP can be estimated using either regression techniques or the growth accounting framework. For our analysis, the growth accounting framework is used, assuming that the output in the economy can be approximated by constant returns to scale Cobb-Douglas production function.

Following, Romer (1990), we also add a human capital variable in the model. Our model, thus, becomes:

$$Y = AK^{\alpha} (LH)^{(1-\alpha)} \quad \ldots \quad (4)$$

In the above equation, all the variables are the same as in equation 1, except for LH, which is the human capital-augmented employed labour force. This variable captures increases in labour productivity as a result of educational attainment and is calculated by using the mean years of schooling. We assume that an additional year of education raises the level of productivity by 7 percent, following López-Cálix et al. (2012).

Writing equation 4 in the growth form, it becomes:

$$\Delta \ln (Y) = \alpha [\Delta \ln (K)] + (1 - \alpha)[\Delta \ln(LH)] + \Delta \ln(A) \quad \ldots \quad (5)$$

Using equation 5, TFP growth is estimated as:

$$\Delta \ln(A) = \Delta \ln (Y) - \alpha [\Delta \ln (K)] - (1 - \alpha)[\Delta \ln(LH)] + \quad \ldots \quad (6)$$

Different studies assume different factor shares. For our analysis, following the Asian Productivity Organisation (APO) data, the share of capital is assumed to be 0.52 and that of labour 0.48.

Box 3: Data Notes

- The data used in the analysis is in 2005-06 constant prices. Since data for the entire period of analysis (1972-2019) is not available at one base, the data at older bases (1959-60, 1980-81, and 1990-00) is converted to 2005-06 constant prices using the splicing method. For certain years values are missing, especially for the employed labour force, which are interpolated.
- The capital stock series is estimated using data on the gross fixed capital formation (GFCF) in constant prices and capital stock depreciation rate (δ). The data on the depreciation rate is obtained from Penn World Tables (PWT 9.1). One of the most widely used methods to estimate capital stock is the perpetual inventory method (PIM).

The net capital stock at the beginning of period t can be written as a function of net capital stock at the beginning of period $t-1$, K_{t-1}, investment in the previous period I_{t-1}, and consumption of fixed capital stock, D_{t-1}. Hence, we have:

$$K_t = K_{t-1} + I_{t-1} + D_{t-1}$$

Assuming that capital stock depreciates at the rate δ, we can write capital stock as:

$$K_t = (1-\delta)K_{t-1} + I_{t-1}$$

Iteration of this equation backwards up to the initial period leads to the following equation:

$$K_t = \sum_{i=0}^{\infty}(1-\delta)^i I_{t-(i+1)} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

PIM requires an estimate of initial capital stock in order to arrive at a series of capital stock for subsequent years. One way is to guess the initial value and then estimate capital stock for later years, using data on GFCF. However, it is highly arbitrary. Another method reported in the literature to obtain the initial capital stock is to use the following equation:

$$K_{t-1} \approx \frac{I_t}{g_I+\delta} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where $K_{t-1}$is initial capital stock, in period $t-1$, I_t is GFCF in period t, g_I is the growth rate of GFCF for the entire period for which the capital stock period is to be estimated, and δ is capital stock depreciation rate. The rationale behind using the above equation to estimate initial capital stock is that capital stock and investment grow at roughly the same rate and growth rate of investment can be used to approximate initial capital stock. Following Berlemann and Weselhöft (ibid.), we regress GFCF on time to derive initial investment for the period t, using data from t_2 to T. Specifically, the following equation is used to estimate initial investment, using the OLS method:

$$lnGFCF_t = \alpha + \beta \cdot Time + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Next, using the estimated parameters, α and β from Equation 3, we calculate the fitted value of the investment for period t:

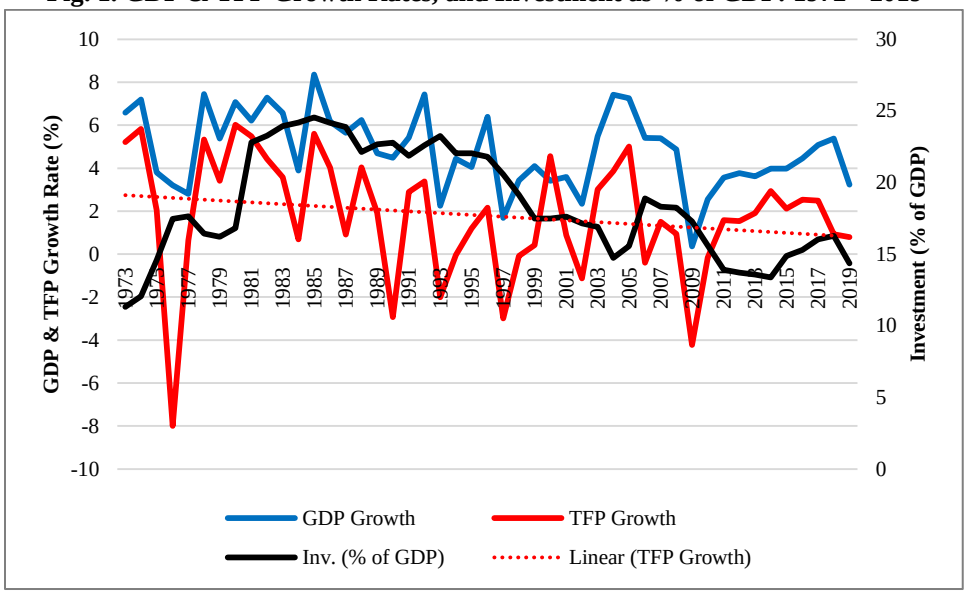
$$ln\widehat{GFCF}_{t1}\alpha + \beta \cdot Time_1 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

This gives us a series of investment, ranging from $t$to T, using the exponential function. We use the first value of the fitted investment for t to calculate initial capital stock, using Equation 2. Instead of calculating the growth rate of investment, g_I, calculated from the data, we use β as a measure of trend investment growth. Capital stock for subsequent years is then calculated using Equation 1 above.

2. EVERY FIGURE TELLS A STORY—DECLINING TRENDS IN TFP, GDP, AND INVESTMENT

Figure 1 tells the story of Pakistan's declining output and TFP growth rates since 1972. The fact that Pakistan's growth experience has been erratic and that the long-term growth rate is on a downward spiral is now well established. The analysis herein reaffirms these facts. Figure 1 clearly shows declining trends in the GDP growth rate, the TFP growth rate, and in investment as a per cent of GDP. According to our estimates, the TFP has grown, on average, at 1.62 percent per annum, which is reasonable when compared internationally. However, the figure clearly shows the volatility in GDP and TFP growth rates – brief spurts followed by slumps. It also shows that GDP and TFP growth rates, and investment as a share of GDP have followed the same path. In other words, whenever the TFP growth has increased, there has also been an uptick in the GDP growth rate, and vice versa. Though it does not establish causality, the literature and experiences of other countries show that TFP growth leads to GDP growth. In Pakistan's case as well, there is an indication of a strong relationship between the TFP and GDP growth rates. This implies that TFP growth has led to GDP growth in Pakistan.

Fig. 1. GDP & TFP Growth Rates, and Investment as % of GDP: 1972 - 2019



Source: Author's estimations.

The downward trend of Pakistan's GDP and TFP growth rates since the 70s illustrates the structural weaknesses that have plagued its economy. The inconsistent economic performance is indeed a puzzle despite various reform efforts undertaken, with support from international agencies and institutions. It highlights little or no impact of these reforms on improving structural weaknesses and economic efficiency. Table 1 shows the growth rates of GDP and TFP in the overall period (1972-2019) and different decades as well. Pakistan's economic growth during the last 47 years (1972–2019), with an average economic growth rate of 4.81 percent is anaemic.

Table 1

Sources of Growth in Pakistan's Economy:1972-2019

	Annual Average Growth (%)				Investment
Period	GDP	Capital	Labour	TFP	(% of GDP)
1972-2019	4.81	4.11	2.21	1.62	18.32
1972-1980	5.06	1.80	5.04	1.71	15.00
1981-1990	6.00	6.25	-0.06	2.77	23.43
1991-2000	4.01	4.49	2.81	0.33	20.82
2001-2010	5.06	3.32	4.21	1.31	17.03
2011-2019	4.28	2.82	1.55	2.07	14.60

Source: Author's estimations.

As Table 1 indicates, GDP, TFP, and capital grew at the highest rates during the 1980s. The growth rate of employed labour was negative during that period. Hallmarks of this period were halting the nationalisation regimes of the 1970s and the revival of private industrial investment (Anjum & Sgro, 2017). It is argued that although there were not many reforms in the 1980s, the industrial policy framework emphasised the role of the private sector and greater import liberalisation of industrial raw materials (Mahmood et al., 2008). However, it is also argued that the impressive economic performance of the 1980s was not due to sound economic policy or institutional reforms it rather came on the back of the large public sector investments made in the 1970s, such as Tarbela Dam, and fertiliser and cement factories (Husain, 2010). Table 1 also shows that TFP was the highest in the period (the 1980s) when the investment-GDP ratio was also the highest at 23.43 percent. The role of investment is important because innovations, R&D, and new technology are embodied in the new investment, which helps the TFP grow and thereby boosting economic growth.

In the 1990s, also sometimes remembered as Pakistan's "lost decade", the economy took a turn for the worse: the TFP grew at a mere 0.33 percent and the GDP growth rate, unsurprisingly, declined to 4.01 percent. There are many explanations, such as soaring external and public debts, for the lacklustre performance of Pakistan's economy during the 1990s. Although in the 1990s significant liberalisation reforms were introduced, the policy environment was unstable in terms of rules, taxes, and import tariffs. Particularly, the policy environment was dominated by the arbitrary use of statutory regulatory orders (SROs), which affected the level playing field.

López-Cálix et al. (2012) argue that the decline in TFP growth in the 1990s – a period of trade liberalisation and other economic reforms – was not caused by trade liberalisation, but by what they see as poorly sequenced economic reforms together with macroeconomic instability and the failure of policymakers to implement and sustain reforms. They note that financial sector reforms in the 1990s were implemented before substantial reforms on the fiscal side. As a result, during the 1990s government finances were under stress due to higher borrowing costs emanating from financial liberalisation. They conclude that, unless Pakistan's record in structural reforms improves, TFP will not improve and that "reform is fragmented and littered with a myriad of policy reversals."

According to Hussain (2010), the 1990s marred by poor macroeconomic management and political instability. Due to these reasons, the policies of economic liberalisation, deregulation, and privatisation could not affect growth positively. Although many liberalising steps were taken such as removal of non-tariff barriers but due to political uncertainty and frequent changes of governments, it did not translate into higher economic growth.

In fact, the poor performance of the economy in the 1990s is often attributed to macroeconomic imbalances carried over from the 1980s. During the 1980s, defence spending increased by 9 percent per annum that resulted in the soaring debt burden in the 1990s. Coupled with high defence expenditures, low development spending, which rose by 3 percent per annum, also contributed to slow growth in this "lost decade".

The TFP growth rate improved during the 2000s to 1.31 percent and so did the GDP growth rate, which was 5.06 percent. The improvement in the growth rate in the 2000s can be attributed to improvements in stabilisation policies and most importantly to structural reforms. There were improvements in trade openness and financial depth. It is argued in the literature that the growth in the 2000s took place due to better macroeconomic fundamentals, structural reforms, institutions, governance, and private sector dynamism (Muslehuddin, 2007). Certain structural reforms, i.e. financial sector restructuring, privatisation, liberalisation, and deregulation of the economy and bank reforms leading towards market-led economy were undertaken. The privatisation process was pursued; the focus was on banking, telecommunication, oil and gas, and the energy sector. The relaxation of sanctions post-September 2001, which were imposed in the wake of nuclear detonations in 1998, also helped improve the economic conditions in the 2000s. Pakistan also received significant funding from the US for supporting the *War on Terror*. Overall, a favourable external environment led to improvements in the TFP and GDP growth rates.

In the 2010s, the GDP growth declined to 4.28 percent from 5.06 percent in the 2000s. What is surprising though is the impressive growth rate, by Pakistan's standards, of TFP. It grew at 2.07 percent during this period, which is higher than TFP growth rates in all the decades except for the 1980s. In the 2010s, the TFP growth rate accounted for almost half of the GDP growth during the decade. It may reflect:

- the growing contribution of the services sector in Pakistan's economy, which requires less investment as compared to the industrial sector.
- an increase in capacity utilisation, especially in the latter half of the decade, which was lying idle due to the energy crisis in the first part of the 2010s.

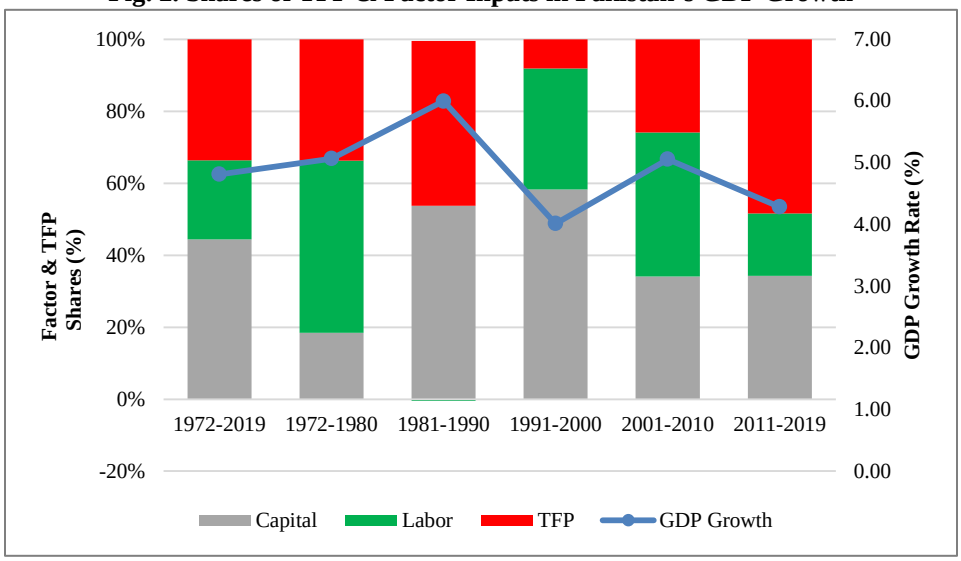
According to the literature on Pakistan's growth experience (see, for example, Favaro & Koehler-Gieb, 2010; Husain, 2010; World Bank, 2010; López-Cálix et al., 2012), high productivity growth periods coincide with periods of deregulation, especially in finance and insurance. The same could be the reason for high TFP growth in the 2010s despite low investment-GDP ratio and modest GDP growth. A combination of high TFP-low GDP growth is rather uncharacteristic. For example, due to the recurrent precarious macroeconomic situation, Pakistan has had to seek the IMF's help in 2008 (2008-2011), 2013 (2013-2016), and more recently in 2019 (2019-2022). Other than that, Pakistan had to deal with floods of varying degrees in 2010, 2011, and 2012. However, since the decade is ongoing, it is hard to comment anything definitively. One reason for a better

TFP growth could be that in the 2000s quite a few reforms were undertaken to liberalise the financial sector of Pakistan. The increase in TFP growth during the 2010s may have been a result of liberalisation undertaken in the preceding decade. For example, tariffs were rationalised in 2005-06. Similarly, the financial sector was liberalised considerably during the 2000s, which perhaps bore fruits in the 2010s, which is evident from impressive TFP performance during the decade.

2.1. Input and TFP Shares in GDP Growth

Figure 2 below shows the relative contributions of TFP and factor inputs to GDP growth rates for the overall period of 1972 to 2019, and also decade-wise. As the figure indicates, Pakistan's growth has mostly been input-driven rather than productivity-driven. For the entire period (1972-2019), the factor inputs contributed almost 67 percent to GDP growth whereas the rest 33 percent was contributed by the TFP. Except for the 70s, when capital contributed less than 20 percent to GDP growth, the contribution of capital accumulation has been impressive. Labour's contribution has ranged from -0.45 percent in the 1980s to 47.79 percent in the 1970s.

Fig. 2. Shares of TFP & Factor Inputs in Pakistan's GDP Growth



Source: Author's estimations.

The negative contribution of human capital-augmented labour to output growth is also observed by others, including Amjad and Awais (2015) and López-Cálix et al. (2012). While it is difficult to explain the negative contribution of this variable, it may be due to low levels of average years of schooling, i.e. human capital in the economy. Although the employed labour force has grown over the years, the growth in the human capital has been modest, which has grown at 1.06 percent from 1972 to 2019.

As presented in Table 2, Pakistan's input-driven growth rate is also documented by various other studies. The studies cited in Table 2 report the TFP growth rate ranging from 1.08 percent (Saleem et al., 2019) to 2.2 percent (Pasha et al., 2002). The

contribution of TFP to GDP growth rate ranges from 22.59 percent (Saleem et al., 2019) to 40 percent (Pasha et al., 2002). A word of caution is warranted, though, when comparing the results of different studies. There is a vast literature on growth accounting that points out that TFP estimates are highly sensitive to the time-period of analysis, data used, base-period, factor shares, and the methodology employed (see, for example, Sirinivasan, 2005 and Hulten, 2000). The above caveat notwithstanding, the analysis of sources of growth in the economy's main sectors (agriculture, industry, and services) further corroborates the input-driven nature of Pakistan's growth.

Table 2

Total Factor Productivity in Pakistan: Cross- Study Comparison

Study	Period	GDP Growth (%)	TFP Growth (%)	TFP Contribution (%)	Factor Input Contribution (%)
Saleem et al. (2019)	1976-2016	4.78	1.08	22.59	77.41
Amjad & Awais (2015)	1980-2015	4.80	1.70	35.42	64.58
López-Cálix et al. (2012)	1980-2010	5.00	1.40	28.00	72.00
Chaudhry (2009)	1985-2005	4.10	1.10	26.83	73.17
Sabir & Ahmed (2003)	1972-2002	5.10	1.80	35.29	64.71
Pasha et al. (2002)	1973-1998	5.50	2.20	40.00	60.00
Author's estimations	1972-2019	4.81	1.62	33.68	66.32

3. INTERNATIONAL COMPARISON

Pakistan's TFP growth rate, compared internationally, is not dismal, especially, when compared with India's TFP growth. As can be seen from Table 3, India's TFP growth rate in the 1971-2017 period is 1.37 percent, which is lower than that of Pakistan, which is 1.62 percent during roughly the same period. However, India's TFP growth was higher than Pakistan's TFP growth during 2001-10 – the period during which India grew at 7.17 percent. Pakistan's lacklustre TFP growth performance, however, becomes clearer if compared with other high-performing countries, especially China and Taiwan. During the current decade, though, surprisingly, Pakistan's TFP growth is quite impressive at 2.07 percent compared to India's 1.31 percent. It is the period during which India's GDP has grown at 6.50 percent whereas Pakistan's GDP growth rate is 4.28 percent.

Table 3

GDP and TFP Growth Rates (%): Cross-Country Comparison

	1971-2017		1971-1980		1981-1990		1991-2000		2001-2010		2011-2017	
Country	GDP	TFP	GDP	TFP	GDP	TFP	GDP	TFP	GDP	TFP	GDP	TFP
Pakistan*	4.81	1.62	5.06	1.71	6.00	2.77	4.01	0.33	5.06	1.31	4.28	2.07
India	5.40	1.37	2.96	-0.30	5.40	1.75	5.32	1.69	7.17	2.40	6.50	1.31
China	8.50	2.87	6.03	0.27	8.87	3.36	9.92	4.55	10.02	3.54	7.30	2.54
South Korea	6.59	1.94	8.46	2.66	9.32	2.97	6.72	2.10	4.45	1.03	2.89	0.54
Taiwan	6.41	2.36	9.94	3.19	7.89	3.23	6.49	2.21	4.08	1.65	2.46	1.14

Source: For Pakistan, the estimates are based on our calculations. For other countries, the estimates are based on the Asian Productivity Organisation (APO) dataset.

Note: For Pakistan, the period is 1972-2019.

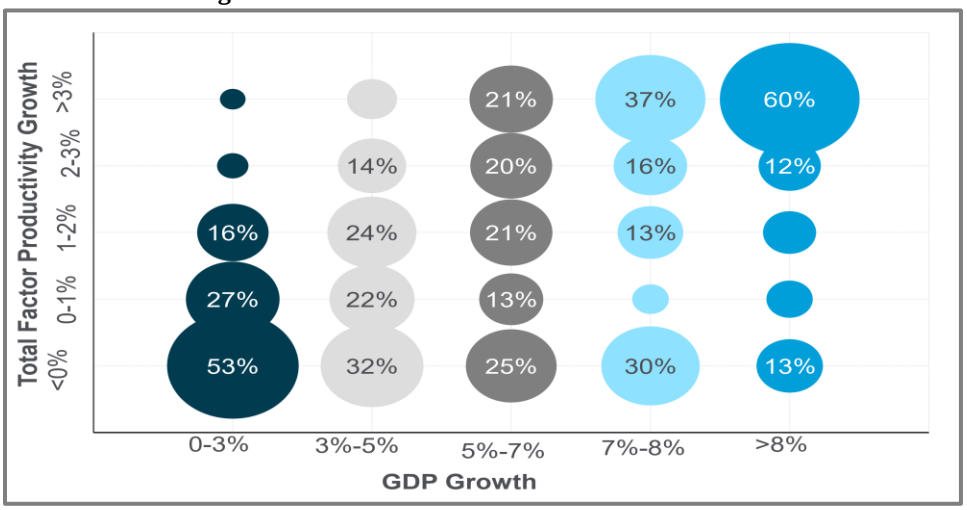
The table shows that all the countries, except for India, which have had higher economic growth rates than Pakistan, their TFP growth rates were also higher. And in the periods when their TFP growth rates were low, their GDP growth rates were also low. For example, China's TFP growth rate is 2.87 percent during the 1971-2017 period, its output growth rate was also high at 8.50 percent. When China's TFP growth rate was low during the 1971-80 period, its GDP growth rate was also low. When China's economy registered growth rates close to 10 percent (the 1990s and the 2000s), its TFP growth rates were also admirably high. The same is the case with South Korea and Taiwan.

One reason for low TFP growth in the Indian economy could be that the TFP growth in its manufacturing and agriculture sectors has been low, pulling down the overall TFP growth. Economic growth in India picked up in the 1990s, which was due to, among other things, the remarkable performance of its services sector. The TFP growth in India's services sector has been impressive, averaging 3.9 percent during 1993-2004 (Bosworth and Collins, 2008).

Therefore, international evidence suggests that to achieve and sustain high growth rates, improvement in productivity is crucial. It is especially important for developing countries like Pakistan that are far away from the productivity frontier. For the case of developed countries, such as Japan or the US, the productivity slowdown or stagnation does not matter much because they are already at or near the productivity frontier. Their higher standards of living have been achieved by technological progress.

The importance of TFP growth for high GDP growth is highlighted by Citi GPS (2018) report. The report shows that a 3 percent growth in TFP is a good threshold to explain high GDP growth economies. As shown in Figure 3, in 60 percent of the economies that experienced GDP growth of more than 8 percent, TFP growth was more than 3 percent. Conversely, TFP growth higher than 3 percent ensured that in at least 50 percent of the cases, the GDP growth for that year exceeded 8 percent.

Fig. 3. TFP Growth and GDP Growth Correlation



Source: TED, Citi Research [Citi GPS (2008)]

Note: Bubble size represents the %age of instances at different levels of GDP growth. For example, if GDP growth is higher than 8 percent, then in 60 percent of cases TFP growth is greater than 3 percent.

If TFP growth was between 2-3 percent, then in 66 percent of the sample points, GDP growth was between 3-7 percent. Sustained average TFP growth of more than 3 percent was achieved only by China in 1980-2010. Some other countries have sporadically achieved such sustained growth in TFP, such as Japan (the 1960s), Germany (the 1950s), Brazil (the 1950s and the 1970s), and Turkey (the 1950s and the 1960s). Sustaining TFP growth above 3 percent over a longer period, however, is a difficult task.

4. DIGGING DEEPER—SECTORAL OUTPUT AND TFP GROWTH

Agriculture

During 1972-2019, the agriculture sector contributed around 27 percent to the GDP and absorbed almost 50 percent of the employed labour force. Over the years, agriculture's share in Pakistan's economy has contracted. During the 2011-19 period, though, agriculture's share in the economy has come down to almost 20 percent and the employed labour share has reduced to 43 percent. Despite its declining share in output and employment, it is still an important sector. It is a source of livelihood for a major segment of Pakistan's population and fulfils the food requirements of the country. It also a source of raw material for other industries of Pakistan. Besides, the sector also has linkages with small-scale industries, such as motorcycles and other consumer goods.

Table 4 shows the sources of growth and investment-GDP ratio in agriculture. The decline in the share of the agriculture sector is a stylised fact and is often accompanied by an increase in TFP growth (Favaro & Koehler-Geib, 2009). However, this is not the case for Pakistan. In the agriculture sector, the TFP growth over the period of analysis was 1.42 percent. Looking at the sub-periods shows that TFP growth has fluctuated widely, ranging from -0.79 percent (the 1970s) to 1.66 percent (2010s).

Table 4

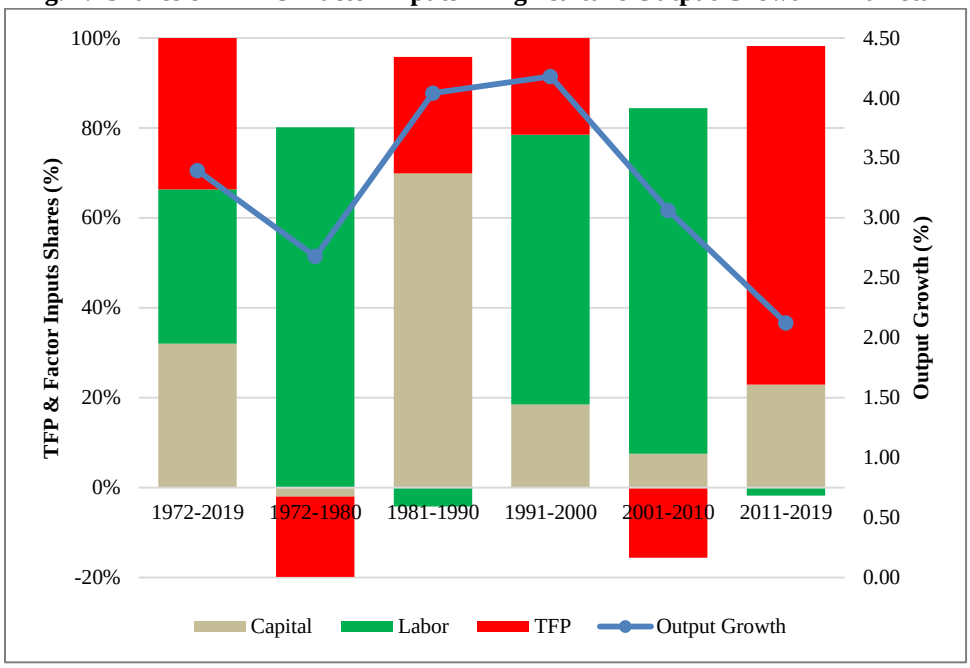
Sources of Growth in the Agriculture Sector in Pakistan

	Annual Average Growth (%)				Investment
Period	Output	Capital	Labour	TFP	(% of GDP)
1972-2019	3.39	5.43	1.46	1.42	4.05
1972-1980	2.68	-0.44	4.45	-0.79	1.20
1981-1990	4.04	15.42	-0.23	1.14	7.55
1991-2000	4.18	3.86	3.13	0.90	4.97
2001-2010	3.06	1.68	4.27	-0.70	3.19
2011-2019	2.12	2.52	-0.05	1.66	2.95

Source: Author's estimations.

The overall TFP growth rate in the agriculture sector (1.42 percent) in our analysis is similar to what other studies report but the sub-period TFP growth and the share of TFP in agriculture output growth (Figure 4) vary widely across studies. That is due to different periods chosen as well as due to the use of different datasets.

Fig. 4. Shares of TFP & Factor Inputs in Agriculture Output Growth in Pakistan



Source: Author's estimations.

The TFP growth turned positive in the 1980s from negative growth in the 1970s. The negative TFP growth in the 1970s may be attributed to the nationalisation program of the government, which kept production and distribution of key farm products to itself. The benefit of the rupee's devaluation was also not transferred to the agricultural sector. The agriculture sector was subject to export duties and government monopolies. In the 1980s, as Amjad and Awais (2015) have noted, better performance of agriculture was partly due to the availability of credit to the farmers, especially to the small farmers. This reform increased the use of fertilisers and pesticides. Furthermore, input distribution was liberalised encouraging private firms to distribute and produce these inputs, which was previously subject to many government controls. Several high yield varieties were also introduced in the 1980s that contributed to better performance of the agriculture sector in the 1980s as well as in the 1990s.

Although the agriculture sector's performance was respectable in both these decades, Figure 4 shows that the main contributors to the agriculture output growth were the capital input in the 1980s and the labour input in the 1990s. In the period 2001-10 again, the agriculture growth rate declined to just over 3 percent and the TFP growth rate turned negative. One of the main reasons for the lacklustre performance of agriculture in this decade was drought-like conditions in the earlier half of this decade. High energy costs, resulting in high fertiliser prices also contributed. The period 2011-19 paints an interesting picture. In this period although the agriculture sector grew at a very modest 2.12 percent and the investment was only 2.95 percent of the GDP, the TFP grew at 1.66 percent. Its contribution to the agriculture output growth in the 2010s is also the highest among all the decades at 78.10 percent.

Due to the potential benefit of the agriculture sector for large parts of the population, addressing the low productivity in agriculture is very important. The literature has identified numerous reasons, but the major reasons are still high levels of government intervention in the production and marketing of crops, low level of education of the rural population, and poor development of the service interface linking farmers to markets. The modern business farm sector or the commercial interface between farmers and industry is not very developed in Pakistan. The presence of such interface in most countries allows farmers to focus on producing crops and outsourcing outsource supporting services like a selection of appropriate seeds, fertilisers, and pesticides, mechanical support to plant and harvest crops, financing of crops, transportation, to farmer cooperatives or associations or private corporations (Favaro and Koehler-Geib, 2009).

Industry

The industrial sector, which includes the manufacturing sector, is supposed to be the linchpin of the economic activity as the structural change takes place. In Pakistan, however, this has not been the case. The share of industrial output in GDP has increased from about 15 percent in 1972 to 20 percent in 2019. Similarly, the total labour force employed by the industrial sector has increased from 17 percent to only 24.47 percent in 2019. As can be seen from Table 5, the performance of the industrial sector since 1972 has been modest, except for in the 1980s when the industrial sector grew at 7.35 percent on average. The TFP growth rate for the entire period is 2.37 percent. Table 5 shows the trends in industrial output and GDP growth rates. During this period, the contribution of TFP to industrial output growth is 43.78 percent (Figure 5).

Table 5

Sources of Growth in the Industrial Sector in Pakistan

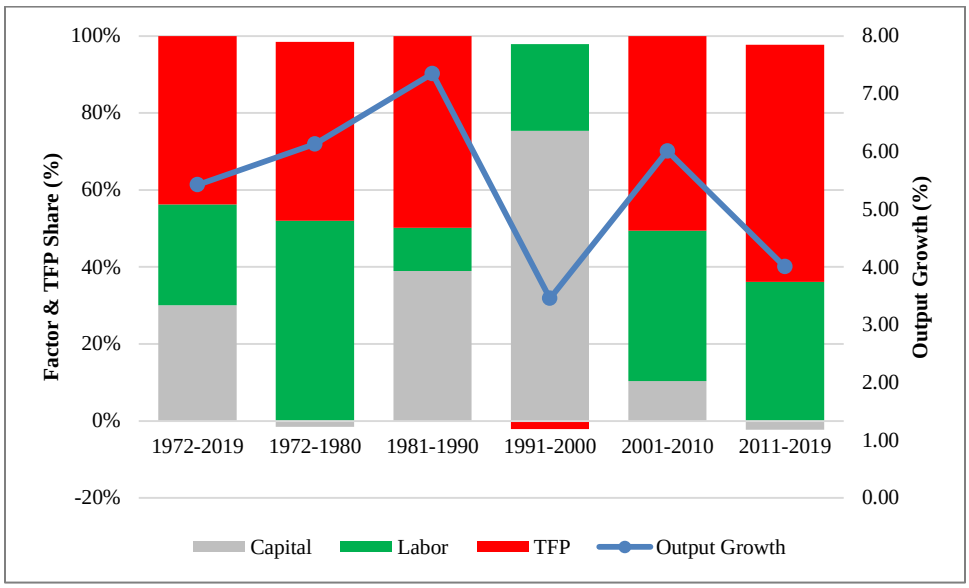
	Annual Average Growth (%)				Investment
Period	Output	Capital	Labour	TFP	(% of GDP)
1972-2019	5.42	3.13	2.96	2.37	5.85
1972-1980	6.13	-0.19	6.85	2.94	4.49
1981-1990	7.35	5.51	1.71	3.66	8.47
1991-2000	3.45	5.23	1.69	-0.08	8.43
2001-2010	6.01	1.20	4.89	3.04	4.83
2011-2019	4.00	-0.19	3.16	2.58	2.59

Source: Author's estimations.

The highest output and TFP growth were observed in the 1980s, which is also the period when the investment-GDP ratio was the highest. The 1990s saw a sharp downturn in industrial output growth and the TFP growth turned negative during this period. Interestingly, the investment-GDP ratio was also quite high during this period, just a shade lower than in the 1980s. The contribution of the capital input was the highest at 78 percent during the 1990s. Activity in the industrial sector picked up in the decade that followed. The industrial output grew at 6.01 percent and the TFP grew at 3.04 percent. The dynamics of the growth in this decade, as also observed by Amjad and Awais (2015),

are difficult to explain because the investment-GDP ratio declined from 8.43 percent in the 1990s to 4.83 percent. The capital grew marginally at 1.20 percent but the labour force grew at 4.89 percent. This could be due to the engagement of the idle capacity resulting from the high investment-GDP ratio in the preceding decade. This could also be due to data issues but what is important to note that there is a strong correlation between the output growth and the TFP growth.

Fig. 5. Share of TFP & Factor Inputs in Output Growth in the Industrial Sector in Pakistan



Source: Author's estimations.

The ongoing decade (2011-19) presents an even more intriguing case. During this period although the output growth in the industrial sector has declined to 4.0 percent, the TFP growth, though lower than the previous decade, is 2.58 percent. The investment rate has also declined in this period to 2.59 percent of GDP. The contribution to TFP to output growth has been consistently high in the industrial sector, barring the 1990s, when it was negative.

Services

The services sector of Pakistan has become the most important sector in terms of its share in the GDP, which has increased to almost 60 percent in 2011-2019 from about 49 percent in the 1970s. It also employs 34.54 percent of the total employed labour force, up from 26.78 percent in the 1970s. The average output and TFP growth in this sector from 1972 to 2019 was 5.21 percent and 1.46 percent, respectively. The decade-wise patterns are quite similar to those observed in the industrial sector. The output growth rate was high at 6.46 percent in the 1980s, which dropped down to 4.15 percent in the 1990s. The TFP growth rate also dropped to less than 1 percent. In the subsequent period, however, both the output and TFP growth rates picked up.

Table 6

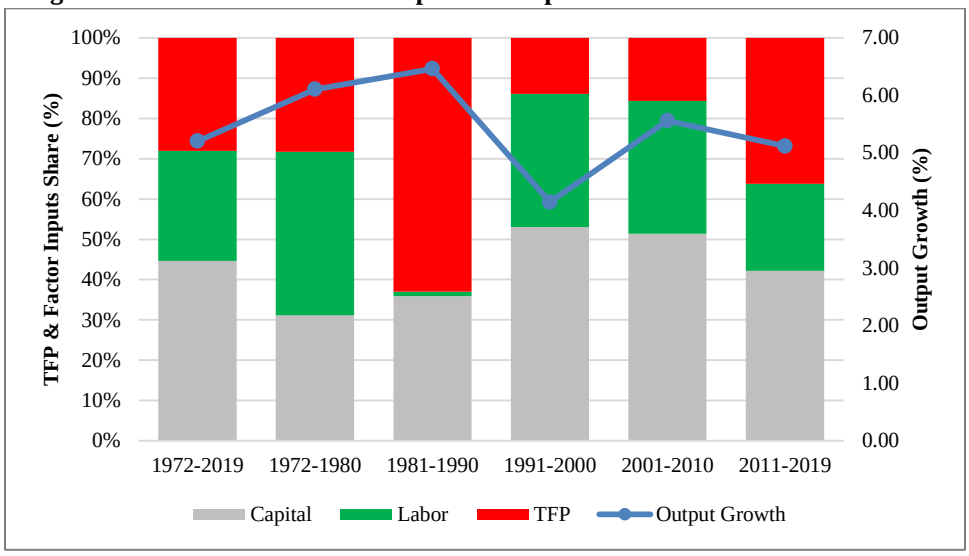
Sources of Growth in the Services Sector in Pakistan

Period	Annual Average Growth (%)				Investment (% of GDP)
	Output	Capital	Labour	TFP	
1972-2019	5.21	4.47	2.96	1.46	8.99
1972-1980	6.10	3.66	5.16	1.73	9.16
1981-1990	6.46	4.47	0.14	4.07	9.37
1991-2000	4.15	4.23	2.85	0.58	8.30
2001-2010	5.56	5.49	3.82	0.87	9.08
2011-2019	5.12	4.15	2.30	1.86	9.06

Source: Author's estimations.

In the ongoing decade (2011-2019), the output growth rate of the services sector has decreased marginally but the TFP growth rate has increased from the previous decade (the 2000s). This pattern of a decrease in the output growth but an increase in the TFP growth, which is the case for the total economy as well as for the agriculture and industry, is also observed for the services sector. On average, the contribution of TFP to output growth is 28.04 percent, which means the in the services sector the output growth is mainly input driven. The contribution, however, has fluctuated between decades. The highest contribution was in the 1980s and the lowest in the 1990s. On average, the capital input has contributed more to the output growth in the services sector as compared to the labour input.

Fig. 6. Shares of TFP & Factor Inputs in Output Growth in Services in Pakistan



Source: Author's estimations.

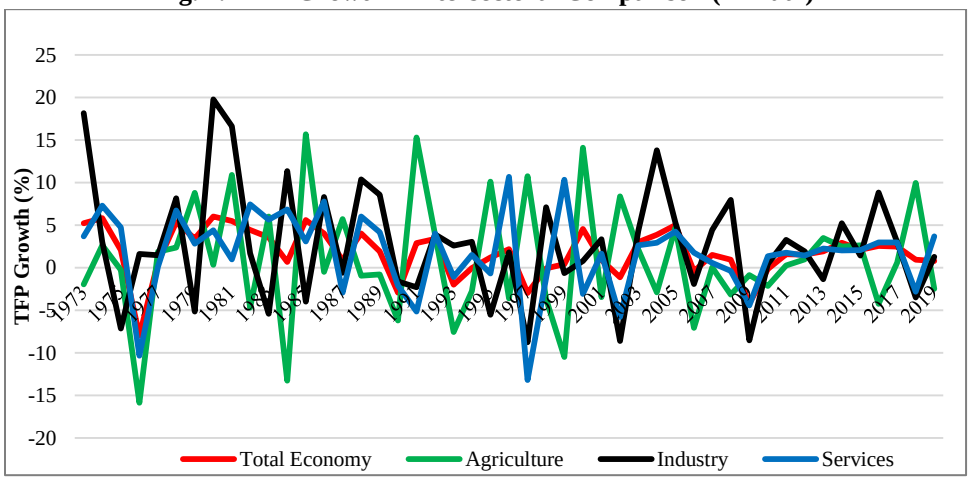
Despite having the highest investment-GDP ratio among the three sectors, the services sector's performance has been underwhelming. This fact is also highlighted by others, including Amjad and Awais (2015), López-Cálix et al. (2012), and Pasha et al. (2002). To understand why TFP growth in the services sector has been low compared to the agriculture

and industrial sectors, it is helpful to look at the investment in the subsectors of the services sector.[1] According to the data, the highest investment in the subsectors of the services sector is in the housing services[2] sector followed by the general government services sector.[3] In the 2010s, for example, the investment in housing services and general government services averaged about 60 percent of the total investment in the services sector. The financial services sector, which is perhaps the most productive among the services, has the lowest investment in the services sector in Pakistan. Both housing services and general government services are although important in terms of their share in the output, are low-productivity sectors. This is perhaps the reason that despite having the highest investment-GDP ratio, the TFP growth in the services sector has been low.

4.1. Intersectoral Comparison

TFP growth in different sectors has followed almost the same pattern from 1972 to 2019, which is visible from Figure 7 below. There are only a few years in which sectoral TFP growths, especially that of industry and agriculture, moved in the opposite direction. This becomes clear in Figure 8, which presents decade-wise annual averages of TFP growth rates for the total economy and sectors as well. Figure 8 shows that the TFP growth rates in different sectors have followed the same path. The only exception is the 2000s when TFP growth in the services sector increased marginally (from 0.58 percent to 0.87 percent) and increased sharply in the industrial sector (from -0.08 percent to 3.03 percent). On the other than, the TFP growth in the agriculture sector declined (0.90 percent to -0.70 percent) from the 1990s to the 2000s.

Fig. 7. TFP Growth—Intersectoral Comparison (Annual)



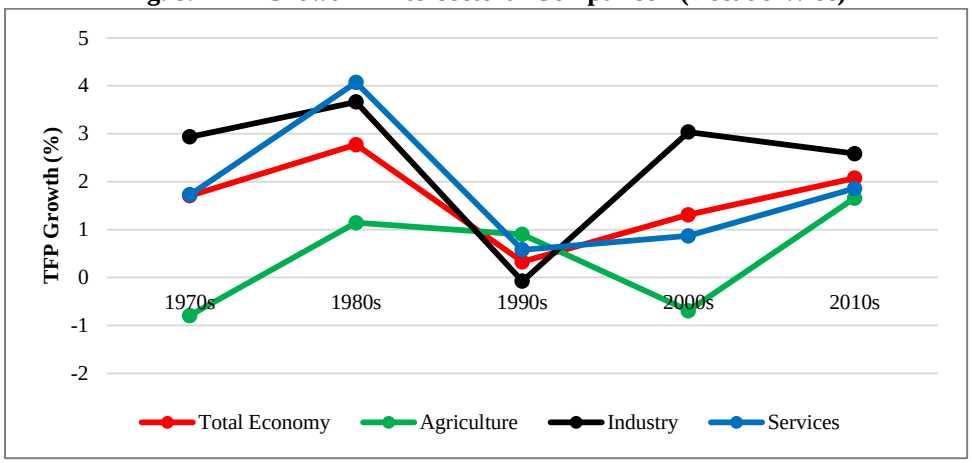
Source: Author's calculations.

[1]The subsectors are the following: (i) wholesale and retail trade, (ii) transport, storage, and communication, (iii) finance and insurance, (iv) housing services (including ownership of dwellings), (v) general government services, and (vi) other private services.

[2]The housing services include services provided to tenants as well as (imputed) services provided to the owner of the dwelling.

[3]The general government services include public administration and defense services, among others.

Fig. 8. TFP Growth—Intersectoral Comparison (Decade-Wise)



Source: Author's calculations.

The reasons for the slump in the agriculture output and TFP growth in the 2000s include drought-like conditions in 2000 and 2001, hostile weather conditions, power cuts, an increase in energy prices that led to an increase in fertiliser prices, and a significant decrease in investment in the agriculture sector. As noted above, the reasons for the increase in industrial output and GDP growth rate that the 2000s saw structural reforms that led to trade and financial sector openness. Besides, there was macroeconomic and political stability in that period which was missing from the 1990s. As regards the services sector, it also witnessed an increase in output and TFP growth though not as pronounced as in the industrial sector.

5. SUMMING UP—KEY TAKEAWAYS

Framework for Economic Growth (FEG) concludes that the most crucial problem for Pakistan's growth challenge is its abysmally low productivity (Planning Commission, 2011). It has been almost 9 years since the FEG was published and our analysis shows that Pakistan's GDP and TFP growth are declining. Our results are broadly in concordance with the results found in other studies:
The main results are:

- On average it is the input accumulation that has driven growth in Pakistan. It was only in the 1980s and 2010s that the TFP growth contributed respectably to the output growth—in the total economy and the industrial sector. In the other sectors, the main contributors to the output growth have been capital and labour.
- The labour input has contributed the most in the agriculture output growth, except for in the 1980s.
- In the services sector, the main contributor has been the capital input except for in the 1980s.
- There has been some revival in the TFP growth in the current decade (the 2010s) because of, perhaps, the utilisation of idle capacity and some of the reforms undertaken in the previous decade.

There is substantial scope for the private sector to invest and lead the economic recovery of Pakistan:

- In agriculture, for example, there is a need to do away with the government's purchase of the output and setting the prices. Also, the agriculture supply chain can benefit from the presence of the private sector, which encourages competition and ultimately benefitting both producers and consumers.
- Similarly, in the housing sector and the construction industry, there is excess demand, but the private sector is held back by over-regulation in the form of zoning laws.
- Evidence points towards the positive effects of participation of the private sector and deregulation on GDP and TFP growth (Kim and Loayza, 2019), necessitating the opening up of Pakistan's economy.

The decade-wise trends in the TFP growth and GDP growth clearly show:

- Liberalisation episodes in Pakistan's economy have resulted in higher TFP growth leading the GDP growth.
- Political stability, which perhaps leads to macroeconomic stability, is also associated with better economic performance in Pakistan.
- A World Bank study notes, "not only political stability" but high levels of external aid and ability to push through reforms appear associated with growth spurts" (World Bank 2010). However, in Pakistan, the reform efforts to deregulate and liberalise the economy have been sporadic to have any meaningful impact on the long-run economic growth.
- In the 1980s, as discussed above, the participation of the private sector was encouraged along with greater import liberalisation. On the contrary, in the 1990s despite the introduction of major economic reforms, the economy went into a lull. The main reasons identified for low economic growth are political instability, macroeconomic instability, unstable policy environment in terms of rules, taxes, and import tariffs. Particularly, the arbitrary use of SROs distorted the level playing field.
- The 2000s saw improvement, albeit mild ones, improvements in stabilisation policies, and most importantly to structural reforms. There were improvements in trade openness and financial depth.
- The growth in the 2000s took place due to better macroeconomic fundamentals, structural reforms, institutions, governance, and private sector dynamism (Muslehuddin, 2007). Certain structural reforms, i.e. financial sector restructuring, privatisation, liberalisation, and deregulation of the economy and bank reforms leading towards market-led economy were undertaken. The privatisation process was pursued; the focus was on banking, telecommunication, oil and gas, and the energy sector.

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