Financial Globalisation and Total Factor Productivity Growth in Pakistan

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ABSTRACT

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The study aimed at examining the impact of financial globalisation and natural resource rents on Total Factor Productivity growth in Pakistan. The total factor productivity growth is computed by the growth accounting model assuming the Cobb-Douglas production Function, while the KOF index of globalisation is used to quantify financial globalisation. The series encompassed the time period from 1985 to 2019, and in order to get empirical results, an Autoregressive Lag Distributed Model is used. The empirical outcomes proved that financial globalisation positively impacts productivity. Hence, the propositions put forth by endogenous growth and new trade theories that globalisation has a central role in achieving productive growth are confirmed by the empirical findings of this study. On the other hand, the results indicated that rent-seeking behaviour concerning natural resources has a negative influence on total factor productivity growth in the long run demonstrating a natural resource curse exists for Pakistan’s economy. Based on its findings, the study recommended that promoting outward-oriented policies with a primary focus on financial integration is crucial for augmenting the overall productivity of domestic factors of production. Likewise, it is imperative to discourage rent-seeking behaviour from natural resources to increase the factor’s productivity.

INTRODUCTION

The impact of globalisation on growth has long been debated in literature, according to the conventional perspective, the process of globalisation within a nation facilitates the attainment of economic efficiency by enabling consumers and producers to acquire goods and services at lower costs (Gereffi & Kaplinsky, 2001). The correlation between globalisation and productivity has gained significant attention in the economic literature due to the recognition of productivity as a fundamental driver of sustained growth (Zhi et al., 2003). Arısoy (2012) illustrated that in endogenous growth models, there is a significant emphasis on leveraging innovation and globalisation as drivers for augmenting Total Factor Productivity Growth (TFPG) within an economy. Likewise, Linh (2021) mentioned that financial globalisation has been witnessed to facilitate an increase in foreign investment inflows towards developing countries (Linh, 2021). Foreign inflows have been identified to yield several advantages, including the acquisition of worker skills and technological advancements, ultimately leading to an enhancement of TFP growth in developing nations (Baltabaev, 2014).
During the 1990s, several developing nations around the world, particularly South Asian countries such as Pakistan, embraced the concept of financial globalisation. The proponents of the endogenous growth paradigm, who attributed the success of East Asian nations to globalisation, have exerted an impact on policy shifts towards liberalisation. Kaynak and Fatemi (2006) mentioned that advocates of the endogenous growth model argued that financial globalisation assisted East Asia in attaining technological and financial inflows, resulting in improved TFP growth. Consequently, considering the potential advantages of financial globalisation and in accordance with the policy directives of the International Monetary Fund, Pakistan adopted globalised policies. Afzal (2007) maintained that Pakistan was classified as a nation with a significant degree of globalisation during the period spanning from 1980 to 1990.

Several empirical studies conducted in Pakistan have assessed the influence of globalisation on TFP growth. For instance, a study by Siddique (2023) found that trade augments TFP growth in Pakistan. On the other hand, Majeed et al. (2010) found an insignificant effect of trade on TFP in context of Pakistan. Moreover, Adnan et al. (2020) established that FDI amplifies TFP growth in Pakistan. However, all these studies have used different parameters to measure globalisation, moreover, the aspect of financial globalisation is somehow overlooked by these studies as financial globalisation is a multidimensional concept and measuring it with a single metric cannot provide a precise description. Hence, this study is unique as it takes into account an index for capturing financial globalisation and does not rely on a single indicator. Moreover, literature suggests that not only globalisation but also natural resources are equally important in augmenting TFP growth, as contended by Zidouemba and Elitcha (2018) that in the presence of natural resource rents, financial globalisation has an adverse effect on TFP growth in developing nations. The study has demonstrated that the natural resource curse did persist in the developing nations, which hindered their ability to fully realise the advantages of financial globalisation in augmenting TFP growth. Hence, the current study also takes into account a vital aspect of resource rent that is often disregarded in TFP growth literature in the context of Pakistan.

The paper is designed to investigate the research question of how financial globalisation and resource rent shape TFP growth in Pakistan. Moreover, this study has twofold objectives, firstly, it seeks to examine the influence of financial globalisation on Pakistan's TFP growth. Secondly, it aims to investigate whether natural resource rents are a blessing or curse for TFP growth in Pakistan. This study will be distinctive as only a limited body of literature has considered the aspects of financial globalisation and natural resources within the context of TFP literature. The findings of this study will prove valuable for the policymakers in providing an in-depth analysis of the significance of financial globalisation for Pakistan's economy, likewise, the outcomes will also guide the policymakers about how to reallocate the resource rents towards the economy's productive use.
Theoretical Perspective

The debate over TFP growth originated from the beginnings of the neoclassical growth accounting paradigm, which suggested that the expansion of output is contingent upon the accumulation of factors and their corresponding productivity. The neoclassical growth models contended that the enhancement of the production possibility frontier could only be achieved through the improvement of the productivities of the three primary production factors, namely land, labour, and capital (Hulten, 1978). Solow (1956) put forward a growth model that is widely recognised as a prominent neoclassical growth model, this model considered TFP as an exogenous factor. The discussion surrounding TFP has resurfaced as a group of economists, recognised as endogenous growth theorists, criticise neoclassicals for characterising TFP as an exogenous phenomenon. Hence, later the concept that TFP growth did not entirely depend on production factors became prominent.

Literature suggests that TFP growth is induced by external factors and therefore is considered endogenous (Grossman & Helpman, 1991; Lucas Jr, 1988; Romer, 1992). Moreover, advocates of endogenous growth models have put forward evidence that liberalisation and other public policies are crucial for technological inflows and consequently augment TFP and overall growth. In this regard, Pack (1992) argued that TFP has an indirect impact on the growth of a country and this associated attribute make it crucial to investigate the factor that determines it. Endogenous growth models have laid the foundation for the new trade theories by underlining that policy changes can be proven to be vital factors in enhancing TFP growth. Based on the concept derived from endogenous models, new trade theories sightsee the significance of liberalised policies by arguing that trade openness aids in capital and technological inflows. Consequently, innovations in an economy ascend, and new production methods result in rapid output production thereby increasing productivity growth (Baltabaev, 2014). Likewise, Sala-I-Martin and Barro (1995) maintained that globalisation can assist developing countries in gaining the benefits of technological advancements in developed nations. Due to globalisation developing countries can catch up to the level of developed nations, hence globalisation is essential for underdeveloped countries to experience convergence. The endogenous growth models serve as a pioneering framework for inducing the role of endogenous policy factors on TFP growth. The theoretical framework of this study is derived from new trade theories and endogenous growth models that served as pillars for explaining the role of financial globalisation in determining the TFP growth of a country.

LITERATURE REVIEW

For an investigation relating to the influence of infrastructure and other key factors on TFP Rehman and Islam (2023) gathered data from 67 middle-income countries and applied cross-sectional ARDL. The results revealed that FDI, innovations, and trade openness enhance TFP. The authors argued that trade encourages exports and assists in acquisition of innovative technologies to nurture TFP growth. To find the connection between trade and TFP growth, Qiao et al. (2023) undertook a study by applying fixed effects (FE) to the data gathered from Chinese manufacturing units covering the period 2000 to 2014. The study concluded that trade stimulates technological diffusion, and
consequently, rapid production methods induce productivity. On the other hand, barriers to trade produce unfruitful outcomes for a country by hindering technological inflows. Majeed (2019), while exploring the distributional effects of trade revealed that in developed countries trade enhances the factor's productivity and lessens inequality, however, the author found contrasting results for the developing countries. The study's findings specified that the consequences of globalisation, whether beneficial or detrimental, are contingent upon the specific characteristics of the economies.

Haider et al. (2021) by gathering data from 12 industrial countries spanning the period 1990 to 2006, determined how openness assists countries in convergence. The study illustrated those countries with more distance from the frontier experience high TFP growth and vice versa. The results revealed that countries far behind the frontier benefited more from openness and converged quickly, while for the countries that stayed near the frontier, openness did not assist in the catching-up process. Likewise, Linh (2021) while investigating the factors contributing to TFP growth, argued that trade enhances the TFP of the firm as the exporting firms approach new markets and implement innovative methods to double their production. Similarly, the author maintained that FDI also increases the TFP by two methods, firstly, by inducing direct capital inflows, and secondly, by technological spillovers. Falki and Mahmood (2023) after applying the FE model to the data garnered for 9 Asian economies spanning the year 2000 to 2018, found out that FDI and ICT augment TFP growth.

Globalisation is a determining factor behind TFP growth, in this regard, Ding et al. (2023) collected data from 30 Chinese provinces for the period 2006-2015 to determine how globalisation affects TFP. Results proved that globalisation plays a crucial role in enriching green TFP. Likewise, Sulaiman et al. (2017) while utilising secondary time series data for the Malaysian economy spanning from 1990 to 2010 checked how globalisation and the manufacturing sector’s TFP are related. TFP was computed through the utilisation of the Cobb-Douglas function and assuming constant returns. Various indicators of globalisation, such as FDI, openness, and technological agreements were utilised for empirical investigation. The findings of the FE model indicated that FDI and openness boost TFP. Furthermore, Ngo et al. (2020) conducted a study on the Vietnamese manufacturing sector by collecting annual data from 21 firms from 2010 to 2015. The study employed the GMM technique to underline the determinants of TFP at the firm level. Empirical results demonstrated that firm size and exports are the major determinants, moreover, the share of capital as well as labour has a direct influence on TFP growth.

As a distinctive element in the existing literature on TFP growth, Aljarallah and Angus (2020) examined the influence of natural resource rent on TFP growth in the Kuwaiti economy. After applying the ARDL model, empirical results indicated the presence of a resource curse in the long-run (LR) that resulted in a reduction of TFP growth. Conversely, empirical evidence suggests that in the short-run (SR), natural resource rents positively affect TFP growth. It was maintained that natural resources can stimulate productive investments and generate additional employment opportunities in SR. While projects that extend over extended periods of time often prove ineffective in generating technological advancements that can enhance TFP growth. Likewise, Aljarallah (2020) gathered data for Saudi Arabia for period 1984 to 2014, to check the significance of natural resource endowment on the TFP
growth. After applying the ARDL model, the empirical estimates make it evident that natural resources increase the TFP growth over LR. Hence, the author concluded that for a resource-rich country, these rents are considered a blessing and assist such countries to catch-up the converge process.

Technology also impacts TFP growth, in this regard, Ali et al. (2016) examined the influence of ICT and innovation on TFP of the Iranian industrial sector from 1996 to 2014. After applying the fixed effect model results showed that ICT and innovation augment TFP. Chou et al. (2014) did a similar kind of study by checking the influence of information technology (IT) on TFP across a panel of 20 OECD nations during the time frame spanning from 2000 to 2009. Empirical findings after the application of the fixed effect model verified that IT and FDI play a significant role in enhancing TFP. Likewise, Jajri (2007) examined the interrelationship between technological advancements, technical efficiency, and TFP growth in Malaysia from the period 1971 to 2004. By utilising Malmquist Productivity Index, the TFP was split into two factors such as technological change and technical efficiency. While the DAE method was employed to examine the alterations in the production frontier. The regression analysis revealed that investment had an adverse influence on TFP growth due to diminishing returns on capital. Whereas technological advancements supplement TFP growth by inducing rapid production methods.

There are limited studies that discuss the empirical relation between globalisation and TFP growth in the context of Pakistan, one such study was conducted by Majeed et al. (2010) to explore the impact of trade liberalisation on TFP growth within the manufacturing sector. The TFP was computed by employing a growth accounting model and ARDL was applied for empirical examination. The results obtained from the empirical analysis were in opposition to the theoretical predictions of the endogenous growth model as the trade openness variable remained insignificant. On the contrary, in a study on the determining factor behind TFP growth in Pakistan's economy, Ahmed et al. (2007) discovered that the exports of manufactured goods are a key contributing factor in the growth of TFP. Furthermore, the study argued that the TFP growth of Pakistan is significantly influenced by both monetary and fiscal policies. The period from 1992 to 2002 witnessed a decline in TFP growth, whereas from 2002 to 2006, there was a sustained high TFP growth rate. Similarly, Siddique (2023) while exploring the factors of TFP growth in Pakistan covering the period 1972 to 2019 found out that liberalisation is a driving force behind TFP. The author argued that in periods of liberalisation and political stability, the TFP increased. The study concluded that with openness, economies are exposed to foreign competition, and in this way, domestic industries adopt innovative methods to increase their outputs. Hence, productivity growth is channelled with the help of liberalisation.

Ahmed et al. (2007) posits that the variance in TFP growth between two distinct time frames can be attributed to the implementation of contractionary and expansionary monetary and fiscal policies, respectively. Likewise, Adnan et al. (2020) accomplished a similar kind of country-specific study for Pakistan, the study covered the period from 1970 to 2018. After applying the ARDL model the results obtained confirmed that FDI influences TFP growth while the trade variables remain insignificant. The study concluded that balance in trade is essential and that Pakistan's economy is lacking, making the country incapable of enjoying liberalisation's benefits. In the same way, Khan (2006), using a
sample spanning from 1960 to 2003 explored the determinants of TFP growth in Pakistan. Regression results revealed that macroeconomic stability, openness, and financial development are key determinants of TFP growth. The empirical estimates revealed that globalisation negatively impacts TFP while all other determinants appeared to have a positive correlation with TFP growth.

In the case of Pakistan, different researchers got contrary results while determining the impact of globalisation on TFP growth. For instance, Majeed et al. (2010) found an insignificant impact of globalisation on TFP growth arguing that the Pakistani economy is deficient in the institutional infrastructure required for the complete execution of the liberalisation as the implementation of liberalised policies in Pakistan is primarily driven by pressure from international organisations. On the contrary, Khan (2006) found an undesirable impact of globalisation on TFP growth, the author claimed that Pakistan's economy has an inability to acquire technological progress through globalisation. While Ahmed et al. (2007) confirmed that globalisation strengthens TFP growth in Pakistan. Therefore, it is imperative to conduct a study in Pakistan to ascertain the actual impact of globalisation on TFP growth. An empirical study by Rehman and Islam (2023) has made it evident that financial globalisation is considered an efficient medium to produce technological spillovers and relatively stable investment. Moreover, (Aljarallah & Angus, 2020; Aljarallah, 2020) added a unique dimension to the literature by considering the role of natural resource rent in determining TFP growth. Hence, by following (Aljarallah & Angus, 2020; Aljarallah, 2020) the study intends to find the impact of resource rent on TFP growth for Pakistan, moreover, the aspect of financial globalisation has not been fully investigated in the context of Pakistan.

DATA AND METHODOLOGY

Construction of TFP

Solow (1956) laid the groundwork for the formation of TFP by putting forward the growth accounting framework, the neoclassical production function is employed for estimating TFP, and the simple form of the neoclassical production function is given as:

\[ Y = F(A, K, L) \]  

In the above equation (1), Y shows the total output while K and L represent the factors of input capital and labour respectively. By assuming the Cobb-Douglas function, equation (2) is re-written as,

\[ Y = A(K^\alpha L^\beta) \]  

According to Cobb Douglas production, there is a constant return to scale, so the sum of the share of all factor input is taken as 1, such as \( \alpha + \beta = 1 \).

\[ \frac{K^\alpha L^\beta}{Y} = A \]  

In equation (4) “A” denotes the total factor productivity.

\[ Y = \frac{\text{Real GDP at Constant 2017 Prices}}{\text{Number of Persons Engaged (in million)}} \]
\[ K^\alpha = \text{weighted share of capital with a standard weighting of 0.3} \]  
\[ L^\beta = \text{weighted share of capital with a standard weighting of 0.7} \]

Pakistan, being a developing nation, adheres to the common trend of labour-intensive production processes among these countries, where capital inputs are relatively lower than labour inputs. In accordance with the methodology proposed by Maryam and Jehan (2018), a weight of 0.3 is allocated to capital inputs, while the remaining 0.7 is allocated to labour inputs.

Putting the values of each variable in equation (4) provides the index of TFP, the growth rates are then computed by using the growth formula given below.

**For Computation of Growth**

\[ TFP_G = \frac{TFP_t - TFP_{t-1}}{TFP_{t-1}} \times 100 \]  
In order to calculate the growth rates of TFP, a simple mathematical procedure is employed. In this formula, the TFP of the current year is subtracted from that of the previous one, and later the results are divided by the TFP of the previous year. Subsequently, the entire numerical quantity is subjected to multiplication by a factor of 100, thereby making it a percentage.

**Model Specification and Estimation Technique**

Different researchers have employed various estimation techniques to scrutinise the relationship between globalisation and TFP growth. For instance, (Ali et al., 2016; Falki & Mahmood, 2023; Qiao et al., 2023) utilised FE to undertake empirical analysis, on the other hand, (Jajri, 2007; Khan, 2006) employed regression to get empirical estimates. This paper aimed at determining the LR association between financial globalisation, resource rent, and TFP growth, hence, this goal can only be met by applying the Co-integration approach that is widely accepted for investigating LR relations. As explained by Gujarati (2009), the co-integration approach is preferred over Ordinary Least Square (OLS) for several reasons. Firstly, it did not account for the stationarity of variables and secondly, in the presence of non-stationarity OLS produced biased and spurious outcomes. Hence, the authors suggested the use of the co-integration approach as it caters for stationarity issues and yields unbiased results.

Prior to the implementation of the co-integration approach, it is imperative to determine the specific attributes of the series, for instance, if it is stationary or non-stationary. In the case of non-stationarity, it is a prerequisite to transform the series into stationary, as the choice of a specific kind of co-integration technique is entirely dependent upon the variable's order of integration. Pesaran and Shin (1998) recommended the application of the ARDL model for dealing with variables with mixed orders of integration. Furthermore, ARDL exhibits a notable superiority over alternative co-integration methodologies in terms of mitigating endogeneity concerns and yielding efficient results, even when
the independent variables are endogenous. In addition, the ARDL approach yields reliable outcomes even with limited sample sizes and eliminates the impact of sample bias (Pesaran et al., 2001). Consequently, the present investigation has several grounds for utilising the ARDL approach. Firstly, the sample size comprises a modest 34 observations. Secondly, the variables incorporated in the model exhibit a mixed order of integration. Thus, considering the prevailing conditions, the ARDL approach emerges as the sole feasible methodology.

In this study, the following simple model has been considered for empirical scrutiny:

$$\Delta TFPG_t = \beta_0 + \beta_1 FG_t + \beta_2 INNO_t + \beta_3 INV_t + \beta_4 RENT_t + \mu_t$$  \hspace{1cm} (8)

In equation (1) TFPG is Total Factor Productivity Growth, FG is Financial Globalisation, Inno is Innovation, Inv is domestic investment, and \(\mu_t\) is a random error term across time. The present study encompasses a temporal span ranging from 1985 to 2019. The data is gathered from diverse secondary sources, for instance, the data related to innovation, rent, and investment is garnered from the World Development Indicators (WDI). Whereas the data for financial globalisation is collected from the KOF Index of Globalisation (details in appendix).

For equation (8), the unrestricted error correction version of ARDL can be provided as:

$$TFPG_t = \sum_{i=1}^{\rho} \alpha_1 TFPG_{t-i} + \sum_{i=1}^{\rho} \alpha_2 FG_{t-i} + \sum_{i=0}^{\rho} \alpha_3 INNO_{t-i} + \sum_{i=1}^{\rho} \alpha_4 INV_{t-i} + \sum_{i=1}^{\rho} \alpha_5 RENT_{t-i} + \sum_{i=1}^{\rho} \alpha_6 \Delta TFPG_{t-i} + \sum_{i=0}^{\rho} \alpha_7 \Delta FG_{t-i} + \sum_{i=0}^{\rho} \alpha_8 \Delta INNO_{t-i} + \sum_{i=1}^{\rho} \alpha_9 \Delta INV_{t-i} + \sum_{i=1}^{\rho} \alpha_{10} \Delta RENT_{t-i} + \mu_t$$  \hspace{1cm} (9)

Equation (9) comprises two distinct components, whereby the first one elucidates the dynamics of the long run (LR), whereas the latter component pertains to the SR dynamics. The symbol \(\Delta\) utilised in the above equation denotes the initial difference in SR dynamics, while \(\mu_t\) represents white noise. The ARDL model is a two-step process, whereby the initial step entails ascertaining the occurrence of a LR relationship through the application of the bound test. The subsequent procedure relates to the estimation of both the LR and SR coefficients. The determination of the long-run coefficient is contingent upon the existence of an LR relationship (Pesaran et al., 2001). Consequently, the present study applied bound test restrictions to equation (9) in order to determine the existence of an LR relationship.

$$H_0 = There \ is \ no \ long - run \ relation$$

$$H_1 = There \ is \ a \ long - run \ relation$$

The comparison of F-statistics values with those of the upper bound supports making verdict regarding the acceptance or rejection of \(H_0\). For instance, if the value of the F-statistic becomes greater than that of the upper bound at a significance level of 5%, then \(H_0\) is rejected. On the contrary, when the value of the F-statistic lies underneath that of the lower bound, it is indicative of insignificant results. Similarly, the F-statistic value staying between the limits of the lower and upper bounds specifies the region of uncertainty.
The SR dynamics of the ARDL including the error correction term (ECT) can be written as:

\[
\Delta TFP_G_t = \sum_{i=1}^{\rho} \alpha_1 \Delta TFP_{G_{t-i}} + \sum_{i=1}^{\rho} \alpha_2 \Delta F_{G_{t-i}} \sum_{i=0}^{\rho} \alpha_3 \Delta INNO_{t-i} + \sum_{i=1}^{\rho} \alpha_4 \Delta INV_{t-i} + \sum_{i=1}^{\rho} \alpha_5 \Delta RENT_{t-i} + \eta ECT_{t-1} + \mu_t \tag{10}
\]

Error correction term for this model can be defined by the underneath equation:

\[
ECT_{t-1} = TFP_G_t - \sum_{i=1}^{\rho} \alpha_1 TFP_{G_{t-i}} - \sum_{i=1}^{\rho} \alpha_2 F_{G_{t-i}} - \sum_{i=0}^{\rho} \alpha_3 INNO_{t-i} - \sum_{i=1}^{\rho} \alpha_4 INV_{t-i} - \sum_{i=1}^{\rho} \alpha_5 RENT_{t-i} \tag{11}
\]

The ECT shows the convergence of SR relation into the LR, this is also termed the speed of adjustment. In addition, stability tests and diagnostic analyses of the ARDL model are performed in this paper. The Jarque Bera and Durbin Watson tests are used to evaluate the assumptions of normality and serial correlation. The Cumulative Sum (CUSUM) and Cumulative Sum Square CUSUM tests are used to evaluate the stability of estimates.

**RESULT AND DISCUSSION**

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Standard Deviation</th>
<th>Jarque-Bera Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP Growth,</td>
<td>1.126</td>
<td>0.602</td>
<td>20.83</td>
<td>-12.33</td>
<td>7.323</td>
<td>0.696</td>
</tr>
<tr>
<td>Financial Globalisation,</td>
<td>32.78</td>
<td>32.46</td>
<td>41.79</td>
<td>24.49</td>
<td>3.837</td>
<td>0.793</td>
</tr>
<tr>
<td>Rent,</td>
<td>1.705</td>
<td>1.476</td>
<td>2.89</td>
<td>0.948</td>
<td>0.587</td>
<td>0.216</td>
</tr>
<tr>
<td>Innovation,</td>
<td>3459.9</td>
<td>1404.3</td>
<td>14627</td>
<td>161</td>
<td>3941</td>
<td>0.102</td>
</tr>
<tr>
<td>Investment,</td>
<td>15.81</td>
<td>15.96</td>
<td>19.11</td>
<td>12.52</td>
<td>1.726</td>
<td>0.450</td>
</tr>
</tbody>
</table>

*Source: Author’s Computation*

The table presented above indicates that the growth of TFP exhibits a mean value of 1.12 units and displays a high degree of variation with the value of standard deviations reaching up to 7.32 units. The phenomenon of financial globalisation has sustained a mean value of 32.78 units, exhibiting significantly lower deviations of 3.83 units. In comparison to other variables, it is observed that innovations showed the greatest deviation of 3941 units, indicating a higher level of deviation from the mean value of 3459 units. In contrast, it can be witnessed that resource rent and innovations have significantly lower deviations of 0.587 and 1.726 units from the mean, respectively. The final column displays the p-value derived from the Jarque-Bera test, whose null hypothesis assumes the normal distribution. Consequently, the p-values for all variables are not significant, indicating a lack of
evidence to deny the null hypothesis. Therefore, the p-values of the test verify that all variables adhere to a normal distribution.

**Unit Root Test Results**

Table II: Results of ADF Unit Root Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>At Levels</th>
<th>At First Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFPG t</td>
<td>-1.876</td>
<td>-4.126***</td>
</tr>
<tr>
<td></td>
<td>(0.576)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Financial Globalisation t</td>
<td>-2.565</td>
<td>-6.069***</td>
</tr>
<tr>
<td></td>
<td>(0.110)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Innovations t</td>
<td>-3.703**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td></td>
</tr>
<tr>
<td>Rent t</td>
<td>-1.811</td>
<td>-5.318***</td>
</tr>
<tr>
<td></td>
<td>(0.368)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Investment t</td>
<td>-2.581</td>
<td>-4.980***</td>
</tr>
<tr>
<td></td>
<td>(0.290)</td>
<td>(0.001)</td>
</tr>
</tbody>
</table>

Note: **p \leq 0.01; ***p \leq 0.001
Source: Author’s Computation

The Augmented Dickey-Fuller (ADF) test is used for the purpose of identifying the level of integration of the variables. However, the ARDL test does not necessitate preliminary unit root testing. The ADF test is utilised to verify that neither of the series exhibits second-order integration. The findings suggest that TFP growth, financial globalisation, rent, and investment exhibit integration first-order stationarity, denoted as I(1). The series of innovations is integrated into order zero, represented as I(0). Therefore, it has been demonstrated that variables have mixed order, and in this case, the appropriate co-integration technique is ARDL.

**Bound Test Results**

Table III: Results of Bound Test

<table>
<thead>
<tr>
<th>Significance</th>
<th>I0 Bound</th>
<th>I1 Bound</th>
<th>F-Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>2.17</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td>2.72</td>
<td>3.83</td>
<td>8.08</td>
</tr>
</tbody>
</table>

The presence of an LR association is established through the utilisation of the bound test. As depicted in the table, the lower and upper bound values are 2.72 and 3.83, respectively at a 5% level of significance. The computed F-statistic of 8.08 surpasses the critical upper bound value, thereby suggesting the presence of an LR relationship or co-integration. Consequently, after verifying co-integration, this study proceeds to the next stage of the ARDL model, which involves identifying the LR coefficient.
Table IV: Long Run (LR) Results of the ARDL Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Globalisation</td>
<td>0.898***</td>
<td>0.244</td>
<td>0.001</td>
</tr>
<tr>
<td>Rent</td>
<td>-2.662**</td>
<td>1.127</td>
<td>0.025</td>
</tr>
<tr>
<td>Investment</td>
<td>1.515***</td>
<td>0.485</td>
<td>0.004</td>
</tr>
<tr>
<td>Innovations</td>
<td>0.0053***</td>
<td>0.0011</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Panel B: Diagnostic Tests

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-Square</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>DW-Statistics</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

Note: **p \leq 0.01; ***p \leq 0.001

Source: Author’s Computation

The findings indicate that financial globalisation has a positive impact on the growth of TFP. Specifically, a rise of one unit in financial globalisation leads to a 0.24% increase in TFP growth. Moreover, the coefficient of financial globalisation is statistically significant at the 1% level of significance. The aforementioned outcome is consistent with the empirical findings provided by Sulaiman et al. (2017) that globalisation has an indirect effect on TFP growth through the proliferation of the manufacturing sector. Furthermore, existing literature has indicated that financial globalisation can lead to the attainment of the highest level of TFP growth, as it serves as a catalyst for technological inflows (Hall & Jones, 1999; Kim et al., 2009). Likewise, Rehman and Islam (2023) argued that developing countries can benefit from foreign inflows due to the technological spillover effect, which can lead to increased productivity. Rehman and Inaba (2020) claimed that financial integration facilitates the borrowing of funds and accumulation of capital in developing countries, which in turn enhances TFP growth. Empirical findings of (Adnan et al., 2020; Falki & Mahmood, 2023; Qiao et al., 2023) proved that globalisation increases TFP growth. The findings of the current study confirmed the perspective posited by endogenous growth and new trade theorists, which contend that outward-oriented policies exert a significant impact on TFP growth. The financial inflows in Pakistan contribute to productive investment and serve as a catalyst for capital generation. Consequently, financial globalisation has a direct positive impact on TFP growth in Pakistan.

The coefficient of rent exhibits a negative sign and is significant at 1%, implying that a rise in natural resource rents by one unit will lead to a 2.66% decrease in TFP growth in Pakistan over the LR. The present empirical finding is consistent with the conclusions drawn by (Aljarallah & Angus, 2020; Zidouemba & Elitcha, 2018) regarding the persistence of the resource curse phenomenon in developing nations. The aforesaid studies considered the fact that foreign investors in such countries tend to prioritise the extraction of natural resources and the associated rent-seeking behaviour while neglecting the potential gains that could be achieved by enhancing the TFP of local production factors.
As a consequence, TFP growth in developing nations experiences a decline due to the acquisition of rent from natural resources.

The co-efficient of investment shows that a one-unit increase in investment will increase TFP growth by 1.5%, this result is significant at a 1% significance level. This result is in line with the finding of (Ali et al., 2016; Khan, 2006; Qiao et al., 2023) who argued that investment provides new areas for efficiently utilising resources, and in this way, it directly increases TFP growth. Likewise, Falki and Mahmood (2023) also found investment to be a crucial factor behind TFP growth, the authors argued that domestic investment adds new stock to the economy, hence it directly supplements TFP by inducing capital.

The empirical findings for the innovation variable are in line with the economic theory that innovations are necessary for TFP growth. The empirical results showed that a one-unit increase in innovations will increase the TFP growth in Pakistan by 0.005 units, and this result is significant at a 1% significance level. Aligning with current results, the empirical estimates of (Ali et al., 2016; Falki & Mahmood, 2023; Rehman & Islam, 2023; Siddique, 2023) confirmed that innovations boost TFP growth. Innovations within a nation bring forth novel approaches to manufacturing, resulting in decreased production expenses through the implementation of varied production techniques, thereby fully capitalising on the advantages of economies of scale (Rehman & Islam, 2023).

**Short Run Results**

**Table V: Short Run (SR) Results of ARDL Model**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Co-efficient</th>
<th>Standard Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ Financial Globalisation$_t$</td>
<td>0.862***</td>
<td>0.301</td>
<td>0.008</td>
</tr>
<tr>
<td>Δ Rent$_t$</td>
<td>5.263**</td>
<td>1.976</td>
<td>0.012</td>
</tr>
<tr>
<td>Δ Investment$_t$</td>
<td>1.454**</td>
<td>0.581</td>
<td>0.018</td>
</tr>
<tr>
<td>Δ Innovations$_t$</td>
<td>0.00517****</td>
<td>0.0013</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Panel B: ECT Results

<table>
<thead>
<tr>
<th>CointEq (-1)</th>
<th>P-value (0.000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.95***</td>
<td></td>
</tr>
</tbody>
</table>

*Note: **p<0.01; ***p<0.001*

*Source: Author’s Computation*

The SR co-efficient of all the variables except rent has the same sign as the LR co-efficient and is highly significant. While the sign of resource rent differs illustrating, that one unit increase in natural resource rent will increase TFP growth by 5.2 units, this result is significant at a 1% significance level. Aljarallah and Angus (2020), while checking the impact of resource rents on TFP growth for Kuwait's economy, found contrasting SR results. It is argued that during SR, natural resources inspire productive investment and create more employment opportunities. However, over LR such projects fail to bring any technological change to increase TFP growth.
Panel B of the above table shows the result of the error correction term. This particular term indicates the rate at which the temporary imbalance in the SR is rectified in the LR. The statistical analysis reveals that the error correction term holds a significant value at a 1% level of significance, indicating that 95% of the SR disequilibrium is corrected in every period.

**Stability Tests**

**CUSUM and CUSUM SQUARE Test**

The stability of the model can be gauged by testing the recursive residuals, in this regard, Brown et al. (2017) recommended the application of the CUSUM and CUSUM square tests on recursive residuals for this purpose. The occurrence of a significant and steady connection among the variables included in the model becomes prominent in the case of the value of recursive residuals residing within the 5% critical line of the test.

The aforementioned figures indicate that the cumulative sum and cumulative sum of squares of recursive residuals are staying within the critical boundaries at a 5% significance level. Therefore, the results of this test demonstrate that the parameters utilised in the model exhibit stability and that the cumulative sum did not surpass the established limit.

**CONCLUSION AND POLICY IMPLICATION**

The objective of the research was to investigate the influence of financial globalisation and natural resource rent on TFP growth in Pakistan. The findings derived from the implementation of ARDL indicated that financial globalisation has a favourable effect on TFP growth in both the SR and LR. The obtained empirical outcomes validate the propositions put forth by endogenous growth and new trade theories, which posit that globalisation plays a crucial role in achieving productive growth. Empirical estimates indicated that rent-seeking behaviour with respect to natural resources has a negative influence on TFP growth in the LR. This is due to investors prioritising their own benefits over efforts to improve the productivity of production factors. The results indicated that the coefficient of investment retained its positive and significant effect in both the SR and LR. This suggested that
domestic investment has a vital role in enhancing capital accumulation and generating employment opportunities, ultimately leading to increased productivity of both labour and capital. Similarly, the coefficient of innovation maintained a positive and significant value in both the SR and LR models, indicating that a country's innovations can lead to technological advancements or the implementation of superior production methods. Empirical evidence confirmed that financial globalisation, rent, investment, and innovations serve as influential determinants of TFP growth in Pakistan. Additionally, the diagnostic tests evidence the reliability of estimates by verifying model stability and indicating that the SR disequilibrium of the model quickly adjusts over LR.

Based on the study's empirical findings, various policies can be recommended to enhance TFP growth in Pakistan. Firstly, it is imperative to acknowledge the significance of financial globalisation. Accordingly, promoting outward-oriented policies with a primary focus on financial integration is crucial for augmenting the overall productivity of domestic factors of production. In this regard, policymakers can play their role in easing the process of capital and foreign investment inflows. Secondly, in order to enhance productivity, it is imperative to discourage rent-seeking behaviour with natural resources. The government can play a pivotal role by ensuring that investors avoid exploitation of production factors and direct their rents towards productive investments, thereby augmenting the capital stock. Thirdly, the introduction of innovative production techniques in a country can enhance TFP growth, hence, it is crucial to provide incentives to encourage innovators. Finally, it is noteworthy that domestic investment is considered a significant factor in determining TFP growth, in this regard, it is essential for the government to prioritise the accumulation of capital and provide a conducive environment to investors for augmenting TFP and overall growth.

This study has a few limitations, firstly, due to the restricted availability of data, only data up to the year 2019 is taken, which is one of the drawbacks of the current study. Additionally, this study has a focus on a particular country, and the analysis can be expanded to include a group of emerging nations. Moreover, to better comprehend how the presence of financial globalisation in an economy can play a role in reallocating the rent, future studies can develop a refined model by including interaction terms for resource rents and financial globalisation.
REFERENCES


Appendix A

Table VI: Variables, Description, and Data Sources

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP growth</td>
<td>TFP Index is constructed by using growth accounting model. Afterwards the growth rate formula was used to compute growth.</td>
<td>Penn World Table (2023)</td>
</tr>
<tr>
<td>Financial Globalisation</td>
<td>Index of financial globalisation based on FDI, portfolio investment, international debt, international reserve, and international income payment.</td>
<td>KOF Index of Globalization (2023)</td>
</tr>
<tr>
<td>Innovations</td>
<td>Number of scientific papers publish in a year.</td>
<td>WDI (2023)</td>
</tr>
<tr>
<td>Rent</td>
<td>Rent on natural resources as % of GDP.</td>
<td>WDI (2023)</td>
</tr>
<tr>
<td>Investment</td>
<td>Gross fixed capital formation</td>
<td>WDI (2023)</td>
</tr>
</tbody>
</table>