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IMPACT OF POLITICAL CONNECTIONS ON TOTAL FACTOR PRODUCTIVITY IN PAKISTAN'S MANUFACTURING SECTOR

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Abstract

This study aims to measure the productivity and efficiency of non-financial firms in Pakistan. Moreover, the study decomposes the productivity and efficiency of non-financial firms into different components, namely technological change, technical efficiency, mix efficiency, and residual scale efficiency. Furthermore, the study identifies the empirical determinants of the total factor productivity (TFP). Finally, the study also examines the impact of political connection on the productivity and efficiency of firms. The study uses secondary data of Pakistani firms listed at the Pakistan Stock Exchange for a period of 20 years from 2001 to 2020. DPIN approach proposed by O'Donnell (2010) is used to measure and decompose the TFP in to different components. In addition, to investigate the determinants of TFP and impact of political connection on TFP and total factor productive efficiency (TFPE) and its further determinant we employ the system GMM estimator. The estimates show that TFPE progress is major component of productive growth during the examined period, which decreases the negative impact of technological regress on TFP. In addition, the estimates show that the TFP of firms increases over time in Pakistan except in last few years. Overall, the findings recommend that the government is required to provide incentives and cost-effective technologies that enhance the productivity and efficiency of firms because productivity enhancement is a prerequisite condition for sustainable economic development.

Key words: Productivity, Political, Growth

JEL Classification: D24, D27, O40

Introduction

Background of the Study

Firm productivity is an important driver of wealth creation, and employment generation in all over the world (Temoso & Myeki, 2023). By improving productivity, a firm can expand its market share and competitiveness (Spithoven & Merlevede, 2023). It is hard to manage for a country to achieve prosperity without achieving an extensive and sustainable growth in productivity (Rahmanian & Bahremandjouy, 2022). During the last decade, the percentage of agriculture share in GDP has declined while; the proportion of the manufacturing industry share has enlarged in this period. It shows that the manufacturing industry has filled up the gap invoked by the agriculture industry, which gestures a transfer of the economy from an agriculture-based to an industry-based economy. This enhancement in the manufacturing sector's productivity has renewed the interest of scholars and policy makers in productivity

analysis (Shahzad et al., 2021). Productivity is vital for all sectors of an economy. Generally, it is claimed that productivity growth increases firms' revenue and generates extra funds without additional cost. It also increases government revenue, which subsequently results in an increased living standard and better public services for people (Wang et al., 2021). More productive and efficient firms can decrease their output prices which consequently have positive impacts of consumers' utility and wellbeing (Giang et al., 2019).

The role of political connections in shaping firm-level total factor productivity (TFP) is a critical yet often underexplored dimension of economic performance in many developing economies. At the firm level, political connections can significantly influence the allocation of resources, access to capital, and the regulatory environment, all of which directly affect a firm's ability to efficiently combine labor, capital, and technology to produce output. While political ties can provide firms with immediate advantages such as favorable policies, tax breaks, and government contracts, these benefits may come at the cost of reducing competitive pressures and diminishing incentives for innovation and productivity improvements. As a result, the long-term impact, of political connections on TFP is complex and multifaceted. This paper examines how political connections influence firm-level TFP, focusing on how political patronage, in the context of Pakistan's manufacturing sector, can either enhance or hinder productivity growth. By analyzing this relationship, we aim to shed light on the broader implications for industrial competitiveness and economic development in politically connected environments.

Reviewing the empirical literature, we find that the prior empirical studies[1] that scrutinized the efficiency and total factor productivity change in the manufacturing sector enumerated without price data either implement Malmquist productivity index[2] (MPI), Färe-Primont index[3] (FPI), or Hicks-Moorsteen productivity index[4] (HMI). These indexes may be described by using output or input-orientated distance functions. It compares ratios of outputs with inputs across units. It is observed that most of the studies that evaluate the TFP improvement of the manufacturing, insurance, and banking sector frequently use the MPI. Worthington (1999), Chen et al. (2022) and Xu et al. (2019), are some of them, which

[1] For detail overview see Naz et al. (2017), Dakpo et al. (2019) Ilyas & Rajasekaran (2020) Zhu et al. (2020) and Demir et al. (2022).
[2] Malmquist productivity index proposed by Caves et al. (1982).
[3] Färe-Primont index proposed by O'Donnell (2010).
[4] Hicks-Moorsten productivity index proposed by Bjurek (1996).

demonstrated its prime superiority in the literature to scrutinize TFP progress. Despite the fact that there are abundant studies in the literature demonstrating that the MPI has some drawbacks in its implementation. For instance, Grifell-Tatje and Lovell (1995) demonstrated that under the variable return to scale[5] (VRS) assumption, the MPI cannot exactly evaluate a productivity change. Likewise, Glass and McKillop (2000), and Arjomandi et al. (2012) claimed that there is the possibility of getting infeasible outcomes. Additionally, Ilyas and Rajasekaran (2020) illustrated that the DEA approach, for evaluating distance functions, by adopting MPI is problematic. Moreover, Ray and Desli (1997), and O'Donnell (2012b) showed that the MPI decomposition suggested by Fare et al. (1994) has no consistency. Finally, Nguyen et al. (2019), and Temoso and Myeki (2023) demonstrated that the MPI leads to biased assessments.

Above insufficiencies, persuading in the MPI debate, finally, two other indexes, Färe-Primont index proposed by O'Donnell (2010b) and HMI suggested by Bjurek (1996) are used for the measurement of TFP. They are more consistent and reliable as compared to MPI and can be further decomposed into recognizable components without requiring any restrictive assumptions regarding statistical noise and data on prices (ur Rehman & Rashid, 2023). But, amongst two indexes, O'Donnell (2010a) claimed that, concerning reliability, the HMI is less reliable than the FPI, because the latter may be adapted to estimate more reliable multi-temporal and multi-lateral evaluations. The HMI fails to do a transitivity test and may usually use for a single binary comparison. Bearing in mind the positive effect, there are numerous explanations behind this reason why PC firms, concerning productivity, might have higher performance as compared to their counterparts. Firstly, the privileged access to credit for politically connected firms, which leads to better firm performance (Bussolo et al., 2022). Secondly, politicians are mostly better up-to-date regarding upcoming pecuniary policies, and their perception could have a positive influence on firm performance (Kroszner & Stratmann, 1998). Thirdly, PC firms tend to benefit from the government in terms of regulatory protection and contracts (Goldman et al., 2013). Fourthly, politicians are frequently outsiders to the corporate sector and can be valuable for firms, by giving an autonomous viewpoint (Niessen & Ruenzi, 2010). The above empirical outcomes recommend that PC firms are likely to assistance from government contracts, lower taxation, preferential access to credit,

[5] Variable return to scale indicates that an increase in inputs does not result in a proportional change in the output.

independent view from an outsider, and regulatory protection. Since such assistance due to political connections make it fluent for a firm to function well in the market and likely to result in higher TFP levels.

In the context of Pakistan, the relationship between political connections and TFP presents significant challenges to the efficiency and competitiveness of the manufacturing sector. Political patronage is deeply embedded in the country's economic landscape, with firms often relying on political ties to secure favorable treatment, such as government contracts, subsidies, or regulatory exemptions. While such connections can provide short-term benefits, including reduced operating costs and increased access to resources, they can also create a distorted business environment that hampers long-term productivity growth. Political connections may shield firms from market competition, leading to complacency and a lack of innovation, as connected firms often face less pressure to improve their processes or adopt new technologies. This results in a misallocation of resources, where politically favored firms may receive disproportionate benefits, irrespective of their actual efficiency or capacity for growth. As a consequence, the broader manufacturing sector experiences stagnation in productivity improvements, as firms are incentivized to maintain political relationships rather than focus on driving productivity through market-driven mechanisms. This issue undermines the overall competitiveness of Pakistan's industrial sector and limits its potential for sustained economic development.

The significance of studying the impact of political connections on TFP lies in its potential to reveal critical insights into the structural inefficiencies that hinder economic growth, particularly in developing countries like Pakistan. Political connections often play a dominant role in shaping the business environment, and understanding their effect on firm-level productivity is essential for crafting policies that promote long-term economic development. By examining how political patronage influences resource allocation, innovation, and competition, this research provides valuable information for policymakers, business leaders, and academics seeking to foster a more competitive and efficient industrial sector. Addressing the issue of political connections in relation to TFP is especially important for Pakistan, where such ties can distort market forces and create barriers to productivity growth, ultimately affecting the nation's ability to compete on a global scale. In a broader sense, this topic is significant for promoting a fairer, more transparent economic system, where resources are allocated based on efficiency and merit rather than political influence,

helping to unlock the true potential of the manufacturing sector and contribute to sustainable national development.

Literature Review

The existing literature on the relationship between PC and TFP reveals a complex association between political influence and firm-level productivity. On one hand, PC can provide firms with access to important resources such as favorable regulations, government contracts, and financial support, which may for the time being improve their total productivity. However, having these opportunities often decrease operational costs, improve market access, and foster growth in industry. On the other hand, these political connections repeatedly cause productive inefficiencies; for instance protecting firms from market competitions which diminish their incentive to innovate and enhance operational efficiency. Consequently, politically connected firms may become complacent, relying more on political support than on improving productivity through technological innovation, or advancement in managerial practices. The existing literature suggests that whilst PC may offer short-term benefits, they can have long-term harmful impacts on the productivity growth, particularly in developing economies like Pakistan where such connections often disturb resource allocations. Therefore, these arguments highlight the significance of understanding how PC influence firm behavior and how they impact broader economic outcomes. For instance, according to Song et al. (2015) and Wang (2021) the impact of firm leverage on firm total factor productivity is negative. Similarly, Cheema et al. (2016) have reported that leverage has a negative impact on firm performance when firms have a political connection. Saeed et al. (2016) have documented a negative impact of leverage on firm efficiency. Similarly, negative association between leverage and firm efficiency is reported by Cherkasova and Ivanova (2019). Li et al. (2019) have reported a negative relation between leverage and firm efficiency.

The classical theory suggests that there must be an ideal size of the firm, which is based on the concept of minimization of the average cost. The behaviorist theory suggests the firms' greater than optimal size can also exist in the economy. He et al. (2022) reported that the connection between size and firm TFP has gained attention of several researchers. The earlier researchers have explored the link between size and firm TFP. Inspiring work by Huynh et al. (2022) investigated firm size and firm performance. Sharma et al. (2020) reported that there is positive association among firm performance and size. Dicko et al. (2020) found a non-linear connection flanked by size and firm TFP. Firm age and learning is

a crucial determinant of firm TFP (Zhu et al., 2021). In other words, the amalgamation of size and age is the most crucial factor of the determinants of firm TFP. If size is held constant, then the firm age and productivity are negatively related (Demir et al., 2022). Hence, the old firms tend to grow at a slower pace. Sharma et al. (2020) have found a negative link among firm performance and age. Guo et al. (2021) have observed a negative connection flanked by firm efficiency and age for firms. Similarly, He et al. (2022) have reported negative link between age and firm productivity. Tobin Q is a crucial determinant of firm TFP and efficiency. Cherkasova and Ivanova (2019) reported a significant positive link among Tobin Q and firm efficiency in Russian firms. Rahmanian and Bahremandjouy (2022) reported a negative and insignificant impact of Tobin Q on firm efficiency in Tehran.

The resource-based view claims that the firm's benefit in its competitive markets initiates from its prestige' resources that are not easy to duplicate by its contestants in the market (Barney, 2000). These resources to some extent are distinctive to the firm and can be intangible, and settled over an extensive retro. Several resources of a firm are relationship-based, reliant on the associations a firm has with its stakeholders one of them is political connection. A piece of circumstantial suggestion on the association between politicians and firms (Khwaja & Mian, 2005; Saleh et al., 2020) demonstrates that PC firms adore extraordinary access to loans and higher leverage in financing verdicts. This assessment expects a significant positive association flanked by financial leverage and PC. Contrarily, studies are portraying the inverse association flanked by leverage and PC (Asquer & Calderoni, 2011). Prevailing research produces inconclusive results. Thus, in light of such diverse findings, it is still hard to induce any conclusive conclusion concerning the influence of PC on firm leverage.

Acquiring finance in a favored manner is a broadly assumed canal through which PC gives a reward. If allocated extreme financing is efficiently assigned, it ought to be mirrored definitely in the PC firm's performance. Empirical evidence demonstrates that PC render into improved performance of the firm (Saleh et al., 2020). However, numerous studies provide negative evidence regarding an association between PC and firm performance, frequently due to political participation in administration verdicts (Ren et al., 2020). Furthermore, the PC-performance link is recognized primarily thru privatization (Boubakri, et al., 2008). Therefore, because of the inconclusive effect of PC on performance, it is hard to forecast the relationship of direction.

The preferences of politicians do not essentially accord with other stakeholders: politicians desire the administration of the firms to assist their aims instead of following the wealth-maximization aim. According to this assessment, studies show that PC firms are depending on political interventions, which consequently outcome in the unsatisfactory performance of firms (Yu et al., 2020). Even though these studies concluded that the PC in the firm is a cause for poor performance, the ways of said interferences have usually remained ignored. Therefore, the canals by which said interferences are imposed and that one lead to Productive inefficiencies has issue having worthiness to explore.

Methodology and Data

The customary method for measurement of the firm's performance mostly depends on financial ratios. Though, firm's performance in the long-term is not captured in the ratio analysis. Over the last few years, the frontier analysis method has been proposed to evaluate the firm's performance. From this perspective, a firm that has lesser performance is distinguished from a firm that has higher performance. Both non-parametric and parametric methods possess certain disadvantages and advantages and may be useful for estimation. TFP decomposition permits a comprehensive understanding concerning a productivity change and associated policies to management and policymakers. Governing authorities recognize which factor is the cause of small productivity and assist them to develop policy in this respect as their main objective is to enhance TFP. Even though macro-level estimates are vital for multi-country studies, they neglect the circumstance that firms are heterogeneous in many aspects, among them TFP. A micro-level estimate enables us to conclude what determines TFP across firms, recommending policymakers concerning how to target such determinants to enhance TFP. As they tend to be more targeted, micro-level estimates are more likely to be fruitful than macro-level ones, which tend to accept a "one size fits all" approach. Micro-level studies could consequently contribute to the formation of more competitive firms, improved living standards for peoples, and sustainable long-run economic development.

In general analyzing the influence of PC on TFP enable the management of the firms to decide that firms should involve in political connection or not because by involving in political connection firms have to bear some political cost. The political cost which firms have to bear can be the main reason for the lower performance of PC firms. So, the firm's management will compare the benefit and cost analysis to participate in political connection.

Further, analyzing the impact of political connection, on a firm's efficiency enable the stakeholders of firms to know that the management of firms is pursuing the wealth-maximization objective of firms' shareholders or in disparity to this, the firm's management pursuing the objectives of politicians. If the management of firms is pursuing the objectives of politicians then the shareholder can change the management to improve the efficiency of firms.

Total Factor Productivity Index

The explanation of TFP used as following Jorgenson and Grilliches (1967) and O'Donnell (2010a) in this study is $TFP_{nt} = Q_{nt}/X_{nt}$ where TFP_{nt} denotes the TFP of firm n during time t, $X_{nt} = X(x_{nt})$ represents aggregate input $Q_{nt} = Q(q_{nt})$ represents an aggregate output. A parallel equation may be held for alternative firm m for time s. At that time, the index number which narrates the TFP of a firm n during time t with the TFP of firm m during time s is illustrated as:

$$TFP_{ms,nt} = \frac{TFP_{nt}}{TFP_{ms}} = \frac{Q_{nt}/X_{nt}}{Q_{ms}/X_{ms}} = \frac{Q_{nt}/Q_{ms}}{X_{nt}/X_{ms}} \quad (1)$$

where $X_{ms,nt} = X_{nt}/X_{ms}$ and $Q_{ms,nt} = Q_{nt}/Q_{ms}$ are input and output quantity index. Such description allows us to express the index number which calculates changes in TFP as the "ratio of an output to an input quantity index". The Fare-Primont TFP proved by O' Donnell (2012a) is an individual index that encompassed the upstairs explanation and maybe measured deprived of price data. Precisely, the Fare-Primont TFP index may be defined as

$$TFP_{ns,nt} = \frac{D_0(x_0,q_{nt},t_0)}{D_0(x_0,q_{ms},t_0)} \times \frac{D_I(x_{ms},q_0,t_0)}{D_I(x_{nt},q_0,t_0)} \quad (2)$$

Where $D_I^T(x_{ms}, q_0, t_0) = max(\delta > 0: (x/\delta, q) \in P^T)$ indicates input distance function, $D_o^T(x_0, q, t_0) = min(\delta > 0: (x, q/\delta) \in P^T)$ indicates output distance function, and P^T denotes the time T PPT. We use the DEA approach suggested by O'Donnell (2010a, 2012a, and 2010b), Khan et al. (2015), Maziotis et al. (2017), Ilyas and Rajasekaran (2020), and Dakpo et al. (2019), to estimate this distance function. The DEA does not require such obstructive expectations concerning the behavior of a firm, and efficiency distribution.

In addition to that, in Appendix A we depict the measurements of total factor productivity change and also elaborates its components, which include technical change and change in efficiency for manufacturing industry. Changes in efficiency are further divided into three components. These components are: (1) technical efficiency change, (2) mix

efficiency change, and (3) the residual scale efficiency change. The estimates are given in Appendix A. The estimated value greater than 1 depicts an improvement in productivity and on the contrary, whereas, estimated values less than 1 depicts deterioration in productivity. Based on our empirical analysis, our results for non-financial register firms shows TFP progress during the starting period, before 2011, the major reason behind this progress was sometime progress of TFPE and sometime due to technological progress and sometime due to both factors.

Efficiency Concepts

O'Donnell's (2010b) described numerous decompose components of multiplicatively complete TFP indices. We define the concept of efficiency by a proportion of aggregate output to input similar to as demarcated by O'Donnell (2010a). He defined the proportion degree of a scale, technical, and mix efficiency in a firm to selects an input with output combination (x_t, q_t) from the specific production possibility set in time t. Subsequently, technical and scale efficiency calculation going to be described as technically achievable input and output vectors which could be described as a scalar multiple of x_t and q_t which declares an input and output mixes are being apprehended static. Therefore, an illustration for mix efficiency going to be described by an input and output vector which is technically conceivable when an input and output mix is permitted to fluctuate.

Scale Efficiency

O'Donnell (2010b) represented this as a mix-invariant optimal scale point and it is shown in Figure 3.3. Therefore, SE shows a quantity gap among TFP at points C and D. Therefore, the TFP change is stated as a scale effect. Subsequently, an output-oriented scale efficiency (OSE) is represented as:

$$OSE_t = \frac{\bar{Q}_t / X_t}{\tilde{Q}_t / \tilde{X}_t} \qquad (3)$$

where $\tilde{Q}_t$ and $\tilde{X}_t$ represents the aggregate input and output quantities for the MIOS point. this may be realized from Figure 3.3 that estimates of SE can be defined as portion measures of TFP.

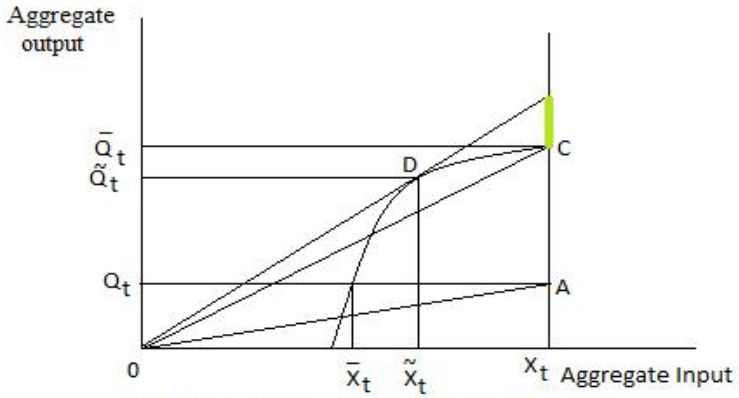

Figure 3.3 Output oriented scale efficiency for a multiple input and outputn firm.

Souce: O'Donnell (2010a, p.536), edited by author.

Impact of Political Connection on TFPE

We want to capture the effect of PC on TFPE. The efficiency scores attain from DPIN is useful in two aspects; first, the indicates the level of efficiency of different firms. Second, they will identify the possibilities for enhancement. However, the efficiency scores alone deliver no information regarding why there occur efficiency disparities among different firms. To respond to the question, we will further run a regression by using System Generalized Method of Moments (GMM) in which TFP efficiency results attaining from DPIN will be used as a dependent variable and we will check the impact of political connection on total factor productive efficiency by considering political connection as a basis of TFP inefficiency. The econometric model is provided as follows:

$$TFPE_{it} = \alpha_i + \beta_0 TFPE_{it-1} + \beta_1 Tobin's\ Q_{it} + \beta_2 PC_{it} + \beta_3 CR_{it} + \beta_4 CF_{it} + \beta_5 SIZE_{it} + \beta_6 LEVERAGE_{it} + \beta_7 ROA_{it} + \beta_8 R\&D_{it} + \beta_9 Age_{it} + f_i + Y_t + \varepsilon_{it} \quad (4)$$

where the PC is a dummy variable representing the firm's political connections, whereas Tobin's Q shows the growth opportunities (GO) accessible to a firm. Tobin's Q is measured by the price-earnings ratio. Control variables for firm TFPE were nominated based on the results of prior empirical studies. We use six control variables influencing firm TFPE in the absence of PC. The variables are current ratio, cash flow, firm size (size), Leverage, return on assets (ROA), and R&D.

Data

In this study, we use the data obtained from the annual reports of firms listed at Pakistan Stock Exchange (PSX) from 2001-2020. The total number of registered firms on PSX are 449 which include both financial and non-financial listed firms from Pakistan. However, we incorporate only non-financial listed firms from PSX. Further, we include only those non-financial listed firms which have data during the study period, if any firms that do not have relevant data for the sample period we excluded it from the sample. However, firms that were delisted during the study period are also excluded from sample in the end we have incorporated only 221 firms. The decision to incorporate only the non-financial firms is due to reason that the accounting treatment of profit and revenue for non-financial firms is significantly changed from financial firms. Given that the sample period covers 2001–2020, there are three relevant national and state elections held during the study period. The data on politicians has been attained from the Election Commission of Pakistan (ECP) official website, which overlooks elections for the Provincial and National Assemblies and maintains information concerning the list of candidates with their parties' positions, full names, and electoral outcomes. Each politician is identified uniquely through a combination of first and last name. Following Khwaja & Mian (2005) and Faccio (2006), irrespective of the electoral outcome, all politicians are considered influential individuals who can benefit firms through preferential access to finance.

Variables

In this study, we use total sales of firms as a measure of output, whereas shareholders' equity, total assets, operating expenses, and cost of goods sold as an input. This approach has been used by many pieces of research (Raheman et al., 2009; Naz et al., 2017). This approach includes four inputs and one output. Three inputs include the cost of goods sold (X_1), we measured it by the cost of labor, raw material, and factory overhead; operating expenses (X_2), total assets (X_3), and shareholder's equity (X_4), we measured by the net worth of a firm. Our outputs variable is sale revenue (Y_1). The TFPE attain from DPIN used as a dependent variable and we check the impact of political connection on TFPE by considering political connection as a source of inefficiency. The independent variable include (1) PC a firm is signified as a PC firm if its board of directors includes at least one politician which is defined as an individual who stood in the provincial or national election, held after 2000 and before 2020. (2) Growth Opportunity measured by price-earnings ratio. The control variables are

ROA (return on asset, leverage expressed as the ratio of debt-to-asset, Size is expressed by the natural logarithm of the total assets, CR measured by the ratio of current assets and current liabilities and CF expressed by the operating income plus accumulated depreciation divided by the total assets. (Putantri et al., 2018).

Estimation Method

The prior empirical studies suggest that the System Generalized Method of Moment (GMM) is a more suitable method for dynamic panel data estimation as compared to fixed effects, OLS, semi-parametric approaches, and instrumental variables, as it gives more reliable and consistent coefficient estimates of the variables. Our recommended models are the dynamic panel models. Firm TFPE is our dependent variable, which is influenced by lag value of firm TFPE. In our models first lag value of the dependent variable is also the independent variable. Therefore, these are the first order auto regressive (AR1) panel data models. In the presence of autocorrelation the use of lagged dependent variable as an instrument becomes inappropriate. There is a possibility that the blind use of the instruments may raise questions regarding the validity reliability of the instruments (Rashid et al. 2021). So we have to check that the instruments are valid or invalid. Sargan and Hansen test for autocorrelation after the estimation of GMM is used. The most appropriate test for two steps system GMM is J-test of Hansen (1982).

Results and Discussion

Descriptive Statistics

The descriptive statistics of the variable used in empirical analysis is presented. The Table 1 shows the summary statistics of full sample of micro level variables.

Table 1: Descriptive Statistics of Variables

Variable	Mean	Std. Dev.	P25	P75
TFPE	0.9992	0.3234	0.8783	1.0596
Tobin Q	6.0733	0.1228	6.0747	6.0758
TC	0.9922	0.1139	0.9298	1.0359
PC	0.3275	0.4693	0	1
R&D	0.4759	0.4994	0	1
Leverage	55.6745	23.5715	41.0068	70.5132
ROA	5.2689	0.1129	5.2417	5.2950

CR	0.8511	0.4233	0.6471	0.9895
Cash	17.8844	0.1343	17.8638	17.8782
Age	23.7510	0.3510	23.4657	24.0253

Impact of Political Connection on TFPE

We capture the impact of political connection on TFPE. Table 2 presents the result of two step system-GMM estimator results of the efficiency model, taking TFPE as a dependent variable. Our key variable of interest, PC, is incorporated in order to test the impact of PC on TFPE. Empirical results indicate that the impact of PC is statistically significant and positive at the 1% level of significance. The finding indicates that, on average, the TFPE of politically connected is higher as compared to non-connected firms. Higher TFPE of politically connected firms is mainly due to a range of benefits that is provided to politically connected firms, including preferential treatment by state-owned firms, preferential access to credit, the allocation of governmental contracts, collusive deals in tariff, relaxed regulatory oversight of the company in question, tax evasion. Theoretically, the separation of firm control and ownership, according to agency theory, can leads toward contradicting preferences between management and owners.

In principal the management of the firms want to produce more where increasing return to scale become decreasing return to scale because their concern is take more incentives by producing more goods which is not beneficial for the owners because producing at decreasing return to scale is contradicting with the objective of wealth maximization. To overcome this agency issues, politicians, as outside directors, may be able to monitor and control the management in a better manner owing to their presumed independence relative to insiders, which ultimately improves firm efficiency. Besides the source of financial favors, politicians, as directors, may also contribute to improved firm performance by offering insight into the imminent regulatory policies able to facilitate firms in making efficient investment decisions.

However, our empirical findings show that PC firms are depending on political interventions, which consequently outcome in the satisfactory performance of firms. The positive impact of PC on firm TFPE is accordance to the finding of Saleh et al. (2020) and Najaf and Najaf (2021) all of whom report high performance of connected firms as compare to non-connected firms. Which indicate that, on average, the TFPE of politically connected is

higher as compared to non-connected firms. Higher TFPE of politically connected firms is mainly due to a range of benefits that is provided to politically connected firms, including preferential treatment by state-owned firms, preferential access to credit, the allocation of governmental contracts, collusive deals in tariff, relaxed regulatory oversight of the company in question, tax evasion. The coefficient of lagged dependent variable is positive and statistically significant at the 1% level of significance. Therefore, it is confirmed that the estimated models are dynamic in nature. Positive and statistically significant coefficients of the lagged TFPE growth are in accordance with other studies (for instance, Shen et al., 2022; Wan et al., 2023; Yasmeen et al., 2023). The negative coefficient of Tobin Q entail that an augmentation in Tobin Q have a declining effect on firm TFPE. The negative linkage among Tobin Q and firm efficiency is in line with the standard economic theory (Rahmanian, & Bahremandjouy, 2022). Further, the significant negative coefficient of Tobin Q is consistent with the theoretical expectation and in opposite to the finding of Cherkasova and Ivanova (2019).

The effect of firm size on firm TFPE is negative and statistically significant at the 1% level of significance. The negative impact of size on firm efficiency is consistent with other studies (Guo et al., 2021; Wu et al., 2022). The significant negative coefficient of size indicates that the Pakistani firms are, on average, bigger than the optimal size recommended by the classical theory. The classical theory of optimal size suggests that there is an optimal size of a firm. Firms' initially grow to achieve an optimal size. Furthermore, at the optimal point firms minimize average cost of production. It means that, the smaller firms tend to grow quickly as compared to their counterparts because larger firms are likely to take more time to replace old equipment with latest technological equipment. The relationship among leverage and firm TFPE is negative and significant. This indicates that high leveraged firms have negative impact on TFPE. Further, this shows that when firms have a political connection and easily access to debt financing. Due to surplus of financing, Manager will not use the resources more efficiently in the production process, which results in having a lower return. The negative connection between leverage and efficiency is consistent with Goel et al, (2022), and Magerakis and Tzelepis (2023). Our result is supporting the agency cost theory in literature of corporate finance which argues that there is a limit to the debt amount that can be helpful to a productivity of firms implying that there exists a point beyond which debt is considered excessive. Further, the rationale could be that extremely levered firms faces

growing cost of debt, this departs fewer funds for equipment maintenance which generate inefficiency.

The association between ROA and TFPE is positive and significant in our model. It shows that firms having high ROA have greater efficiency since firms having higher ROA will concentrate and spend money on regular maintenance of equipment which subsequently result in higher firm efficiency. Our results are consistent with Wang et al. (2021) and Chang (2023). We observe that the link among CR and firm TFPE is negative and significant. These findings are consistent with He et al. (2022), Colline, (2022) and Huynth et al. (2022). Our justification regarding the CR having an undesirable control on TFPE reason could be that the firms were investing more in inventories, which have been set aside at a high storage cost, which adversely influence the capability of firms. Cash flow of the firms has statistically insignificant positive affects TFPE in our model. Our results are in line with the outcome of (Cherkasova & Ivanova, 2019; Li et al., 2019) their results also indicate that cash flow having an insignificant impact on firm performance.

We observe that the connection among age and firm TFPE is negative and highly significant. The possible explanation can be that, with the passage of time it's become difficult to hold technology up to date, possible ensuing in minor residual scale efficiency and with the passage of time these firms are overtake by those innovative productive firms, which describe as a "vintage effect" by Jensen et al. (2001). The inverse effect of age on firm efficiency is consistent with Shen et al. (2022). Their results show that, with regard to efficiency and productivity, new industry entrants have better as compared to older firms. Further, their results indicated that adopting the new available latest technology by new firms make them more productive as compared to their counterparts within an industry and forcing them to exit from an industry. The coefficient of R&D is negative and statistically significant at the 1% level of significance, which indicates the negative correlation between R&D and TFPE. The negative and statistically significant relationship between R&D and TFPE is in accordance with the existing literature (Bhattacharya et al., 2021; Pang & Wang, 2021).

Table 2: Two step System-GMM Estimation for impact of PC on TFPE

VARIABLES	TFPE
L.TFPE	0.6121***
	(0.000)

PC	0.3484***
	(0.000)
R&D	-0.0448***
	(0.000)
Tobin Q	-0.4435***
	(0.000)
ROA	0.5248***
	(0.000)
CR	-0.0615***
	(0.000)
Cash	0.0018
	(0.444)
Size	-0.0201***
	(0.000)
Leverage	-0.0007***
	(0.000)
Age	-0.00823***
	(0.000)
Constant	0.9178**
	(0.011)
Obs.	1612
Firms	220
Instrument	161
Validity Test	
AR(1)	-4.20
P-Value	(0.000)
AR(2)	-0.32
P-Value	(0.747)
Sargan	333.26
P-Value	(0.000)
Hansen	162.57

P-Value	(0.228)

Conclusion And Policy Recommendations

Based on the empirical findings we conclude that firm productivity efficiency is not only crucial for the existence and survival of a firm in the long run, but also for the growth of the economy. It is also an important source for the generation for employment opportunities in the country. Our finding concluded that the political connection has a positive and significant impact on TFPE.. This study is an attempt to contribute to the literature by documenting that PC decrease agency cost and eventually prevents firms from doing inefficient decisions. By exhibiting this, this research adds precise aspect concerning Agency cost theory which is not elaborated before in principal-agent literature. Productivity enhancement in manufacturing sector is a prerequisite condition for improving the living standard of people and sustainable economic development. In this area, adequate public policy explicitly needs the recognition of the core mechanism of productivity advancement. In manufacturing literature, two important components of productivity progress incorporate efficiency augmentation and technical progress. Efficiency improvement convey the improvement in output–input ratios more feasible, as a result of mistakes abolition in the production procedure, while technical augmentation generally elaborate the expansion of production possibilities set that initiated by implementation of innovated equipment.

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Appendix - A

Changes in Total Factor Productivity for Non-financial PSX firms

Period	dTFP	dTech	dTFPE	dTE	dME	dRSE
2001	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2002	0.9995	1.0235	0.9984	1.0054	1.0046	0.9944
2003	1.0121	1.0123	1.0131	1.0079	1.0127	1.0090
2004	1.0331	1.0549	1.0104	1.0002	1.0035	1.0066
2005	1.0274	1.0210	1.0171	1.0081	1.0052	1.0199
2006	1.0245	1.0310	1.0073	1.0080	1.0079	1.0085
2007	1.0044	1.0050	1.0113	1.0071	1.0025	1.0178
2008	1.0201	1.0064	1.0280	1.0075	1.0092	1.0276
2009	1.0118	1.0205	1.0078	1.0079	1.0017	1.0162
2010	1.0101	1.0013	1.0242	1.0079	0.9995	1.0336
2011	0.9868	0.9752	1.0281	1.0076	1.0073	1.0287
2012	0.9921	0.9886	1.0213	1.0093	1.0088	1.0200
2013	0.9945	0.9908	1.0235	1.0089	1.0110	1.0215
2014	0.9716	0.9836	1.0063	1.0064	1.0128	1.0043
2015	0.9757	0.9855	1.0079	1.0063	1.0105	1.0078
2016	0.9861	1.0016	1.0001	1.0046	1.0045	1.0071
2017	0.9781	0.9826	1.0082	1.0037	1.0052	1.0172
2018	0.9596	0.9773	0.9979	1.0046	0.9958	1.0124
2019	0.9546	0.9693	0.9994	1.0069	0.9998	1.0072
2020	0.9252	0.9678	0.9705	0.9987	0.9859	1.0068