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The Control of Corruption and Economic Growth: An Empirical Analysis for Pakistan

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Abstract
In this study, the authors analyze the lasting impacts of control of corruption, foreign direct investment (FDI), gross fixed capital formation, and trade openness on GDP per capita for a country panel spanning 2001 to 2024 using the Autoregressive Distributed Lag (ARDL) model. The long-run estimates show that there is a negative relationship between control of corruption and the coefficients are -0.45, whereas FDI shows positive relationship and its coefficient is 0.13. Other indicators with positive long-run relationships with economic growth include gross fixed capital formation (0.26) and trade openness (0.32). Overall, FDI, capital formation and openness to trade have stronger statistical evidence than other indicators, while control of corruption has the weakest statistical evidence. However, the reported t-ratios indicate that the statistical evidence is relatively strong for FDI, capital formation and openness to trade, while control of corruption has the weakest evidence. The results overall indicate the significance of investment and trade openness to economic growth in the long term, and the influence of institutional quality on economic performance.

Keywords: Corruption, Economic Growth, Gross Fixed Capital Formation (GFC), Autoregressive Distributed Lag (ARDL) Model

1. Introduction

Economic growth is considered to be an important measure of economic activity and development of a country. Its meaning is the continuing growth of production of goods and services within an economy and it is usually reported using Gross Domestic Product (GDP). Sustainable economic growth relies on a number of interconnected macro-economic factors, such as institutional quality, foreign direct investment (FDI), capital formation and international trade. These factors have an impact on the productive capacity of an economy, the efficiency of the allocation of resources and on the attractiveness of the economy for investment and

involvement in world markets. To determine the crucial determinants of economic growth and to draw up appropriate economic policies, it is important to understand the relationship between these variables. The corruption control is an important facet of institutional quality and is one variable that can have a significant impact on the economic performance. Corruption leads to uncertainty, higher transaction costs, undermines public institutions, and deters domestic and foreign investors. The rule of law and the control of corruption are strongly associated with the efficiency of public resources use, transparency and accountability. Countries with better corruption-control mechanisms are generally better able to create a favorable business environment, bolster investor confidence and enhance the effectiveness of their economic policies. Institutional integrity, therefore, can be potentially a catalyst to economic growth through its impact on the productive investment and the minimization of the economic inefficiencies.

Foreign direct investment (FDI) is another significant factor affecting economic growth, especially in less-developed and emerging economies. Foreign investment in companies and productive assets in a different country, typically through a long-term interest in or substantial influence over the business. FDI brings about economic development in the following ways: capital inflows, technological development, job creation, managerial expertise and knowledge transfer. In addition, foreign investment can enhance local productivity and help boost the competitiveness of local industries. The impact of FDI on economic growth, however, could be subject to the institutional and infrastructural environment, the human capital and the absorptive capacity of the host country. The gross fixed capital formation (GFCF) represents investment in fixed assets like equipment, transportation facilities, industrial equipment, buildings, infrastructure and machines. An essential measure of investment activity and productive capacity of an economy. An increase in the amount of capital formation can increase production capacity, increase the technological capacity, create jobs and increase labor productivity. Investment on physical infrastructure also helps to lower production and transportation expenses, which could boost economic activities in various fields. Hence, it is clear that GFCF is very important for a country's long-term economic development.

The level of trade openness is also regarded as one of the factors that can affect economic growth because it indicates the level of involvement of the economy in international trade through exports and imports. More trade openness creates opportunities for international markets, enhanced technologies, imports of goods, and inputs. It can stimulate competition, better allocation of resources, specialization and opportunities for domestic businesses to grow their business. In addition, international trade allows countries to reap economies of scale and international knowledge spillovers. However, the impact of trade openness can differ across countries based on the level of industrial competitiveness and institutional capacity, and the structure of the economy. In aggregate, these four variables economic growth, corruption, FDI, gross fixed capital formation, and trade openness are interrelated aspects of macroeconomic development. Institutional quality can be a determinant in investment decisions and foreign investment and domestic capital formation can bolster productive capacity. In the same way, international trade can be used to promote technology transfer and expand the market. These factors can be examined together to gain a broader perspective about the economic and institutional components of economic growth and provide useful information for policy makers who want to encourage sustainable economic growth.

2. Literature Review

There has been extensive economic research on the macroeconomic and institutional aspects of economic growth. The institutional quality, foreign direct investment (FDI), gross fixed capital formation (GFCF) and trade openness affect economic performance has been studied across countries and income groups. While these variables are generally taken as significant factors in economic development, empirical evidence varies with geographical scope, institutional arrangements, research techniques and time periods of enquiry. In the literature, economic growth has been linked to an increase in productive capacity, technological change, accumulation of capital and efficient use of resources. Solow (1956) viewed capital accumulation, labour growth and technological progress as essential factors of long-term economic growth. Likewise, the endogenous growth theory, especially Romer (1990) highlights the need to invest in technological innovation, knowledge accumulation and investment to maintain economic development. These theories are useful for the study of the role of institutional and macroeconomic factors in economic growth.

The control of corruption is an important institutional determinant of economic performance. Mauro (1995) shows that corrupt acts have a negative impact on investment and economic growth because they induce uncertainty and inefficiency in resource allocation. In a like manner, Mo (2001) names corruption as a major impediment to economic growth, in part because of its negative impact on investment and political stability. Aidt (2009) is, however, less optimistic about the economic impacts of corruption as they are heavily conditioned by institutional quality and governance structures. A robust institutional environment can help minimize rent-seeking behavior, increase efficiency in the public sector and create a positive investment climate. Thus, overall good governance in combating corruption is expected to have a positive impact on economic growth by enhancing the credibility of the institutions and supporting productive economic activities. The impact of foreign direct investment has also been well studied as a factor of economic growth. Borensztein et al. (1998) show that FDI has a positive impact on economic growth, especially in countries that have adequate human capital to answer to foreign technologies. From their results, they conclude that technological diffusion and knowledge transfer brought by foreign investment are significant. Likewise, Alfaro et al. (2004) conclude that FDI has positive growth impacts, but that depends on the development of domestic financial markets. Li and Liu (2005) also find an important link between FDI and economic growth, highlighting the effect of technological spillovers and the synergy between foreign investment and domestic economic growth. Some of these studies indicate that the positive impact of FDI on host countries' growth depends on the absorptive capacity and institutions of the host countries.

Another key element of economic growth is gross fixed capital formation, which adds to the pool of capital and productive capacity. The neoclassical growth model of Solow (1956) specifies that the growth of physical capital adds to an economy's stock of productive resources. Khan and Reinhart (1990) discuss the link between investment and economic growth in developing economies and the role of capital accumulation in the country's economic performance. In the same way, De Long and Summers (1991) have evidence that investments in machinery and equipment are tightly linked with economic growth. The results suggest that a greater level of fixed capital formation will generate better infrastructure, efficiency in production and long-term economic growth. A second important element that affects economic growth is trade openness, given its role of supporting economic specialization, competition and technological diffusion between countries. Frankel and Romer (1999) give empirical evidence that trade contributes to a rise in income. Likewise, Wacziarg and Welch (2008) show that in general, trade liberalization is correlated with greater economic growth and higher investment. Not all the relationship is

positive, though. Empirical evidence supporting the growth-boosting impact of trade liberalization is put in doubt by Rodriguez and Rodrik (2001), and they stress the need for proper policy and institutional environment. Therefore, the economic advantages of international trade could be contingent on the productive potential and institutional frameworks of the nations.

Overall, the existing literature suggests that both institutional and macroeconomic factors affect economic growth. An improvement in corruption control, FDI, GFCF, and trade openness can lead to a better performance of governance, capital transfer, productive capacity, and international economic integration, respectively. The strength and direction of these connections can be different in each country and under different economic conditions, however. This gives an explanation why the variables are studied together to gain a complete picture of the factors of economic growth.

3. Data and Methodology

The present study is based on annual time series data from Pakistan for the time period 2001-2024, which is accessible from World Development Indicators (WDI) database. The empirical analysis includes five variables: GDP per capita growth (annual percentage) as the dependent variable, Control of Corruption Index (CCI) (scale 0 to 100, where a higher score indicates better institutional quality), foreign direct investment (FDI), growth rate of gross fixed capital formation (GFCF), and trade openness (TOP) as the ratio of total trade (exports and imports) to GDP.

$$GDP = f(CC, FDI, GFC, TOP) \qquad (1)$$

$$GDP = \alpha_0 + \alpha_1 CC + \alpha_2 FDI + \alpha_3 GFC + \alpha_4 TOP + \varepsilon_t \qquad (2)$$

The Autoregressive Distributed Lag (ARDL) methodology is suitable for a study when the data set is relatively small and the variables are of different orders, in this case I(0) and I(1), as long as none of these variables is I(2). Moreover, the ARDL bounds testing approach provides an efficient method of analyzing cointegration in time series data as it enables both short-run dynamics and long-run equilibrium relationships to be captured within a single econometric framework.

Table.1 Source and Data Description.

Variables	Unit of Measurement	Source
GDP	Annual % growth	WDI
CC	Scaled from 0 to 100	WDI
FDI	Net inflows as % of GDP	WDI
GFC	Annual % growth	WDI
TOP	% of trade share in GDP	WDI

Notes: GDP=GDP per capita, CC= Control of Corruption, FDI=Foreign direct investment flow, GFC=Gross fixed capital formation, TOP= Trade openness.

The stationary values of variables are presented in table 2.

Table 2: The Findings of ADF Test

`Variables	Parameters	ADF Calculated	At 5%	Trend/ Intercept	Conclusions
GDP	-0.31	-3.12	-2.17	Intercept	I(1)
CC	-0.42	-4.59	-3.64	Intercept	I(0)
FDI	-0.39	-4.19	-3.69	Intercept	I(0)
GFC	-0.52	-5.21	-4.25	Trend	I(1)
TOP	-0.48	-4.46	-2.45	Intercept	I(0)

Note: The Results of the Table 2 are based on author's self-calculations

4. Results and Discussion

The long run ARDL estimates in Table 3 shed light on the relationship between GDP per capita and the included institutional and macroeconomic variables in Pakistan. The results show that the impact of control of corruption, foreign direct investment (FDI), gross fixed capital formation (GFC) and trade openness (TOP) on economic growth is different across them both in the long run. The results emphasize that the quality of institutions, domestic investment, and international economic integration are factors which influence the economic performance of Pakistan. The coefficient of control of corruption (CC) is negative, CC = −0.45, and has a standard error of 0.23 and a t-ratio of −1.96. This finding suggests that in the long run, high levels of corruption are associated with low GDP per capita. From economic point of view, the negative coefficient implies that a decrease in the level of corruption control causes GDP per capita to decrease, other factors being equal. This result is a bit surprising as it runs counter to the institutional theory, but this could be related to the institutional and economic context of Pakistan. For instance, one step toward reducing corruption could be more stringent enforcement of regulations, administrative changes, and institutional modifications, which might impose short-term economic burdens. This interpretation should be taken with a pinch of salt, however, as it does not necessarily mean that better institutions have a negative effect on economic growth, as the negative coefficient does not necessarily mean this. The t-ratio further suggests that there is borderline statistical significance at the 5% level.

The coefficient of Foreign Direct Investment (FDI) is +0.13 with a standard error of 0.06 and a t-ratio of 2.16. This discovery indicates that FDI has a positive impact on the economic growth of Pakistan in the long-run. Foreign investment can boost economic activity by providing capital inflows, technological sparks, job creation, and introducing managerial know-how. Further, foreign investors can bring in new production methods and international business methods which will improve domestic productivity. The significant and positive coefficient suggests that foreign investment can be one of the crucial ways to enhance the long-term economic performance of Pakistan. In a similar manner, the coefficient of gross fixed capital formation (GFC) is 0.26 and t-ratio is 2.17, which shows a positive relationship between gross fixed capital formation and economic growth. The finding implies that physical capital (such as infrastructure, machinery, buildings, and industrial facilities) investment helps economic expansion. The accumulation of capital increases productive capacity, increases the efficiency of operations, and helps expand economic activities. In Pakistan, the development of productive sectors and increased infrastructure investment can help create jobs, develop industry, and improve overall economic productivity. This coefficient is statistically significant and further underscores the value of domestic capital expenditures to sustainable economic development.

Trade openness (TOP) is also positively related with the coefficient of 0.32, the standard error of 0.16 and t-ratio of 2.00. This suggests that the more integrated in the international market, the more favorable the relationship between integration and long run economic growth. Openness to trade may help bring in international markets, advanced technologies, imported machinery and intermediate production inputs. It may also lead to competition, specialization and efficiency gains within the domestic production. The positive correlation indicates that greater opportunities in international trade could be beneficial for Pakistan's economic growth, but this would rely on the competitiveness of exports and Pakistan's ability to handle external economic factors. Lastly, the constant term is positive (3.26), and has a t-ratio of 2.06, while the time trend coefficient is positive (0.096) but not significantly different from zero (t-ratio 1.07). This suggests that the model captures a positive underlying trend in economic growth, although the estimated trend effect is not statistically distinguishable from zero. The overall results suggest that FDI,

gross fixed capital formation and trade openness are significant positive determinants of the long run economic growth of Pakistan whereas the effect of control of corruption is negative and close to the significance level. The findings highlight the pivotal role of fostering productive investment, enhancing international trade integration and institutional effectiveness in promoting sustainable economic development**.**

Table 3: Long- Run Results of ARDL bounding testing. Dependent variable is GDP

Explanatory Variables	Coefficients	Standard Error Coefficients	T-Ratio
CC	-0.45	0.23	-1.96
FDI	0.13	0.06	2.16
GFC	0.26	0.12	2.17
TOP	0.32	0.16	2.00
Constant	3.26	1.58	2.06
Trend	0.096	0.089	1.07

Notes: GDP=GDP per capita, CC= Control of Corruption, FDI=Foreign direct investment flow, GFC=Gross fixed capital formation, TOP= Trade openness.

5. Conclusion and Policy Implication

The long-run results of ARDL model confirm that foreign direct investment, gross fixed capital formation and trade openness are positively associated with economic development of Pakistan. The results highlight the need to encourage foreign investment, boost domestic capital accumulation and encourage international trade to boost productive capacity and economic performance. Similarly, GDP per capita has a negative correlation with corruption control, it is statistically significant, suggesting that there are possible transitional issues in the economic institutions. A key policy issue is to establish a conducive investment environment by maintaining regularity in policies, developing infrastructure and providing incentives to productive investment, both domestic and foreign. In addition, export diversification and trade facilitation, as well as support for competitive domestic industries, should be fostered to take the most from international trade. Improving transparency, accountability and institutional effectiveness is also essential to efficiently allocate investment resources and contribute to sustainable economic growth.

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