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# Financial Innovation and Economic Growth: Evidence from Pakistan

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**ABSTRACT**

In any economy, GDP Growth is massively motivated by rapid innovation in the financial system. Financial system plays an important role to promote economic growth in any country. It also improves the financial operation in Foreign Trade with other countries. So, the aim of the present study is to investigate the impact of Financial Innovation on Economic Growth in case of Pakistan. For this purpose, the study used different macroeconomic variables including, GDP as dependent variable, and domestic credit to private sector is used as proxy of financial innovation. Other control variables include, Ratio of M1 to M2, Gross Capital Formation (GCF), Government Spending (GE), Trade (TR), Labor Force (LF) and Inflation (INF). Annual Time Series Data is collected of selected variables from 1980 to 2020. The study analyses data by applying Ordinary Least Square (OLS) method. The empirical results of OLS indicate that, Financial Innovation (FI), boost up economic growth, this shows the positive impact on GDP, while other variables including, M1M2, GCF, GE, TR and LF put positively significant impact on GDP, while only INF has negative and insignificant impact on GDP.

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## Introduction

In any country, the payment methods play essential position in the flat performance of the finance sectors. A well-organized payment system is one that give immediate resolution of financial transactions and speed up the exchange of goods and services on time, sheltered, and dependable way. The procedure of generating latest financial investment, products, innovation of institutions and services is called financial innovation. In simple terms, addition of new financial instruments in financial system by using new technologies.

GDP is usually deliberate using changes in the total value of goods and services produced by a country are known as GDP (Gross Domestic Product). The GDP per Capita is measured by the dividing the GDP by its total size of their population. Different countries have different level of GDP per capita, these differences in levels and in trends are motivated by augmented productivity that comes from innovation and technological progress.

According to empirical reviews present in this study, a fine – functioning system of finance may have optimistic effect on GDP growth through investment. Financial mediators make easy the stipulation of sufficient funds for investment behavior. As the financial system enlarges more capital can be channeled through it and additional funds will be obtainable for investment. A strong financial system may guide to an better aptitude to evaluate investment projects.

**Statement of the Problem**

Pakistan economy is developing economy, like many other developing countries, Pakistan is also facing the problems in financial sectors. In case of Pakistan, financial sector is very different from others in the world. Few studies have been conducted to understand the impact of innovation in financial on GDP growth. A very limited number of studies were conducted on the topic of Innovation and Economic Growth. There is a very limited number of studies are available on the topic of economic growth and innovation specifically in Pakistan.

**Literature Reviews**

Solomon and Van Klyton (2020) analyzed the impact of the use of digital technology on economic growth in 39 African countries from 2012 to 2016. This analysis applies to the GMM system analyst to understand how the use of digital technology contributes to growth using a certain degree of digitalization from the Networked Readiness Index. Unlike previous research, we distinguish between the impact of individual consumption, business, and government on growth and show that individual consumption alone has a positive impact. Also, a separate analysis of the types of uses reveals that the two indicators, the media and the importance of ICT from a government perspective, are critical to growth.

Li et al. (2021) investigates the asymmetrical effect of economic decentralization on economic growth and environmental quality through Pakistani data from 1984 to 2018. Our findings show that cost-sharing has a similar effect on economic growth and CO2 emissions in the short and long term in Pakistan. Therefore, the positive and negative decline in the use of energy allocation affects economic growth and emissions of CO2 separately in Pakistan. The results of the asymmetric ARDL suggested that the negative shocks on revenue sharing reduced economic growth and CO2 emissions in the short and long term, while positive interdisciplinary shocks reduced economic growth and CO2 emissions. Our asymmetric results are country-specific and effective in policy analysis in Pakistan. The results of this study can also help Pakistani and local governments in dealing with growth and pollution.

**Model Specification**

The econometric and mathematical equation of current framework can be written as:

**Mathematical Equation**

***GDP*** *= f (FI, GCF, GE, LF, M1M2, TR, INF)*

**Econometric Equation**

$$\boldsymbol{LGDP} = \beta_0 + \beta_1 FI + \beta_2 GCF + \beta_3 GE + \beta_4 LF + \beta_5 M1M2 + \beta_6 TR + \beta_7 INF + \boldsymbol{€}$$

Where;

LGDP = Log of Economic Growth

FI = Financial Innovation

GCF = Gross Capital Formation

GE = Government Expenditure

LF = Labor Force

$M_1M_2$ = Ratio of $M_1$ to $M_2$

TR = Foreign Trade

INF = Inflation

$\beta 0$ = Intercept

$\beta_1\ \beta_2\ \beta_3\ \beta_4\ \beta_5\ \beta_6\ \beta_7$ = Slope of Coefficient

€ = Error Term

**Results and Discussion**

**Descriptive Statistics**

Descriptive statistics is a technique used to summarize the major characteristic of collected data. Results of Descriptive statistics of dependent variable and Independent variables are given in the Table.

| | LGDP | FI | M1M2 | GCF | GE | LF | TR | INF |
|---|---|---|---|---|---|---|---|---|
| Mean: | 4.453538 | 22.75614 | 4.141049 | 17.36330 | 105.9053 | 45.75152 | 30.43404 | 8.163158 |
| Median: | 4.375561 | 24.03953 | 4.073842 | 17.72224 | 106.2778 | 42.76000 | 32.93991 | 7.844265 |
| Maximum: | 5.751199 | 29.78608 | 5.667364 | 20.70200 | 112.0384 | 73.91000 | 38.49932 | 20.28612 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum: | 3.163551 | 15.38607 | 2.788490 | 14.12063 | 99.06016 | 25.65000 | 25.30623 | 2.529328 |
| Std. Dev: | 0.82572 | 4.000333 | 0.854671 | 1.653266 | 3.561843 | 15.73181 | 3.579379 | 3.763079 |
| Skewness: | 0.150569 | -0.373067 | 0.371467 | -0.324288 | -0.160586 | 0.395806 | -0.459371 | 0.675493 |
| Kurtosis: | 1.620856 | 2.030239 | 1.912588 | 2.075316 | 2.102417 | 1.749726 | 2.395380 | 3.770034 |
| Jarque-Bera: | 3.404232 | 2.557632 | 2.962957 | 2.179306 | 1.552545 | 3.740966 | 2.066488 | 4.130948 |
| Probability: | 0.182297 | 0.278367 | 0.227301 | 0.336333 | 0.460118 | 0.154049 | 0.355851 | 0.126758 |
| Sum: | 182.5951 | 933.0016 | 169.7830 | 720.0953 | 4342.117 | 1875.812 | 1329.796 | 334.6895 |
| Sum Sq, Dev: | 27.27255 | 640.1066 | 29.21852 | 109.3315 | 507.4690 | 9899.589 | 512.4782 | 566.4304 |
| Observations: | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |

Above table 4.1, shows the summary of Descriptive Statistics of selected variables. The first row shows the average of LGDP, FI, M1M2, GCF, GE, LF, TR and INF are (4.453538), (22.75614), (4.141049), (17.36330), (105.9053), (45.75152), (30.43404) and (8.163158) in the order. The Median value of LGDP, FI, M1M2, GCF, GE, LF, TR and INF are (4.375561), (24.03953), (4.073842), (17.72224), (106.2778), (42.76000), (32.93991) and (7.844265) are in the order.

**Pair – Wise Correlations Matrix**

Correlation is a method which is used to calculate the association among DV and IVs. Pair – Wise Correlation coefficient is compulsory because the multicollinearity problems between variables are recognized. High correlation among variables demonstrates the multicollinearity trouble.

**Table 4.2: Results of Pair – Wise Correlations Matrix**

| **Variables** | **LGDP** | **FI** | **M1M2** | **GCF** | **GE** | **LF** | **TR** | **INF** |
|---|---|---|---|---|---|---|---|---|
| **LGDP:** | **1** | | | | | | | |
| **FI:** | 0.682827 | **1** | | | | | | |
| **M1M2:** | 0.736515 | -0.452766 | **1** | | | | | |
| **GCF:** | -0.685016 | 0.744330 | -0.623283 | **1** | | | | |
| **GE:** | 0.033727 | 0.011110 | 0.099766 | 0.083890 | **1** | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **LF:** | 0.959781 | -0.714372 | 0.807796 | -0.726411 | 0.033727 | **1** | | |
| **TR:** | -0.519420 | 0.549833 | -0.277043 | 0.609372 | 0.122271 | -0.583284 | **1** | |
| **INF:** | 0.019681 | 0.189897 | 0.098262 | 0.208193 | 0.187609 | -0.046381 | 0.578828 | **1** |

The table below indicates the results of Pair – Wise Correlation Matrix. It illustrates that only value of LF is highly correlated with LGDP about (0.959781), and shows the co-linearity with LGDP. Overall results demonstrate that, Multi – Colinearity does not exist in the data set.

**Breusch – Godfrey Serial Correlation LM Test:**

The problem of Autocorrelation is tackled by Serial Correlation LM test. According to this test, significant value shows the existence of autocorrelation and insignificant value shows does not existence of autocorrelation. The results of Serial Correlation LM test are given in the below:

**Table 4.4: Results of Serial Correlation LM Test:**

**Breusch – Godfrey Serial Correlation Test:**

| | | | |
|---|---|---|---|
| **F-Statistic:** | 6.542741 | **Prob. F (229):** | 0.2145 |
| **Obs* $R^2$:** | 12.43705 | **Prob. Chi – Square:** | 0.0020 |

**Source: Author's own Calculation by Using E-views-9**

The results indicate that, the probability values of LM test is insignificant (0.2145), this shows that the problem of Autocorrelation does not exist in the data set.

**Heteroskedasticity Test:**

The problem of Heteroskedasticity is tackled by Breusch – Pagan – Godfrey Test. According to this test, significant value shows the existence of Heteroskedasticity and insignificant value shows does not existence of Heteroskedasticity. The results of Breusch – Pagan – Godfrey Test are given in the below:

**Table 4.5: Results of Breusch – Pagan – Godfrey Test:**

**Breusch – Pagan – Godfrey Test:**

| | | | |
|---|---|---|---|
| **F-Statistic:** | 1.259358 | **Prob. F (229):** | 0.2998 |
| **Obs* $R^2$:** | 9.811218 | **Prob. Chi – Square:** | 0.2785 |

**Source: Author's own Calculation by Using E – Views – 9**

The results indicate that, the probability values of Heteroskedasticity test is insignificant (0.2998), this shows that the problem of Heteroskedasticity does not exist in the data set.

**Empirical Results of Ordinary Least Square (OLS) Method**

**Table 4.3: Results of Ordinary Least Square (OLS)**

| **Dependent Variable: LGDP** | | | | |
|---|---|---|---|---|
| **Method: Least Square** | | | | |
| **Observations after adjustment 40 (1980 – 2020)** | | | | |
| **Variables:** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **FI:** | 0.006194 | 0.001894 | -3.270382 | 0.0026 |
| **M1M2:** | 0.090021 | 0.013411 | 3.712329 | 0.0000 |
| **GCF:** | 0.034281 | 0.007725 | 2.437506 | 0.0001 |
| **GE:** | 0.013624 | 0.002395 | -4.687813 | 0.0000 |
| **LF:** | 0.035562 | 0.007310 | 3.864630 | 0.0000 |
| **TR:** | 0.002271 | 0.005355 | 0.424122 | 0.0335 |
| **INF:** | -0.009936 | 0.002657 | 3.739044 | 0.1375 |
| **LGDP (-1):** | -0.267357 | 0.134201 | 1.992216 | 0.0552 |
| **C:** | 2.183653 | 0.345779 | 6.315171 | 0.0000 |
| **$R^2$:** | 0.996049 | | **Adjusted $R^2$:** | 0.995030 |
| **Durbin Watson Stat:** | 2.070321 | | | |

In table 4.3 below, the value of coefficient of Financial Innovation (FI) explains the positively significant (0.0026) impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in Financial Innovation (FI) it will lead (0.006194) percentage increase in GDP.

The value of coefficient of M1M2 shows the positively significant (0.0000) impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in M1M2 it will lead (0.090021) percentage increase in GDP.

The value of coefficient of GCF also shows the significantly (0.0001) positive impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in GCF it will lead (0.034281) percentage increase in GDP.

The value of coefficient of GE also shows the significantly (0.0000) positive impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in GE it will lead (0.013624) percentage increase in GDP.

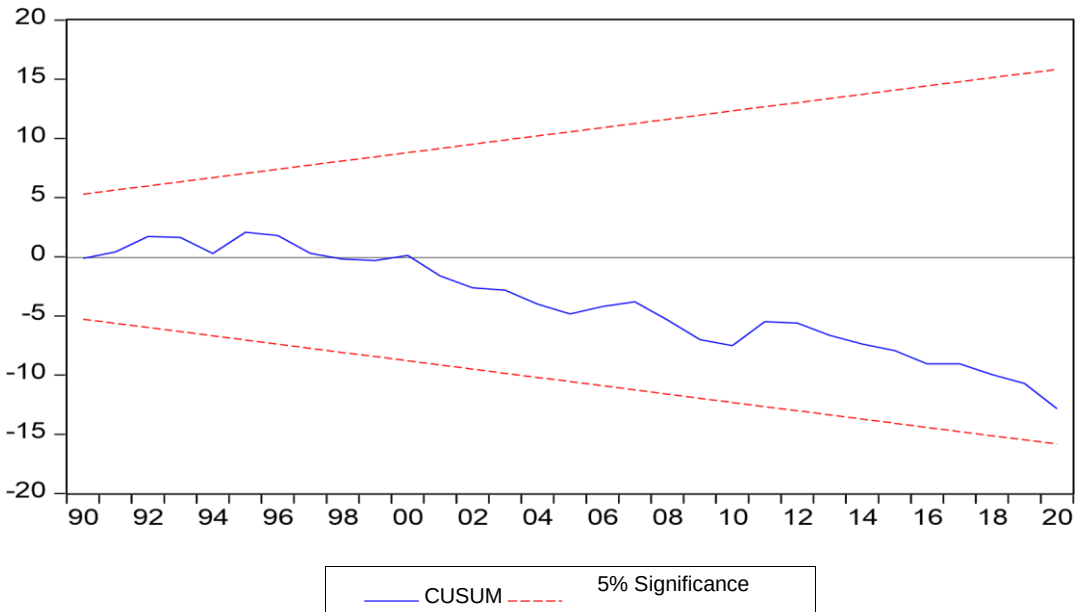
The value of coefficient of LF also shows the significantly (0.0000) positive impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in LF it will lead (0.035562) percentage increase in GDP.

The value of coefficient of TR also shows the significantly positive (0.0335) impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in TR it will lead (0.002271) percentage increase in GDP.

The value of coefficient of INF also shows the negatively insignificant (0.1375) impact on Gross Domestic Product (GDP). Empirical result shows that, 1 unit increase in INF it will lead (-0.009936) percentage decrease in GDP.

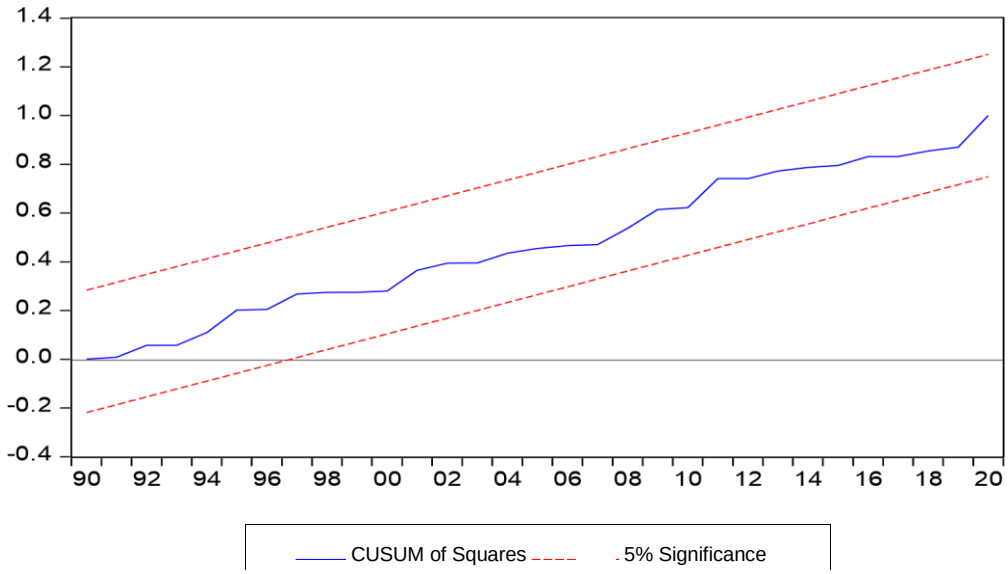
## 4.7 Stability Test

**Figure 4.1: Cumulative Sum (CUSUM) of Recursive Residuals**




4.7.2 Cumulative Sum of Recursive Residual Square (CUSUMSQ)

**Figure 4.2: Cumulative Sum (CUSUMQ) of Recursive Residual Square**




## Conclusion

The core purpose of current study is to scrutinize the effect of Financial Innovation (FI) on Economic Growth (GDP) in Pakistan. For this motive, the study used annual data over the period of 1980 to 2020. Data is collected from different data sources including World Bank (WDI) and State Bank of Pakistan (SBP). Further; the study analysed data with different techniques.

Firstly, the study explains the result of descriptive statistics. Secondly, study illustrated the results of Pair – Wise Correlation Matrix, which indicates that there is no multicollinearity. The study explains the results of Autocorrelation and Heteroskedasticity, which point out that both problems does not exist. After that, the study applied OLS, to finds the association among IVs and DV.

Empirical results of OLS illustrated that, Financial Innovation put positive and significantly impact on GDP in case of Pakistan. The growth theory clarifies that an energetic financial system facilitates the procedure of funds accretion that eventually impacts the improvement of the economy. The next variable Ratio of M1 to M2 also shows positively significant impact on GDP. The availability of money supply increases the credit opportunity with a lower interest rate. Gross Capital Formation (GCF) is showing Positively and significant impact, Government Spending (GE) is indicated positively significant impact on GDP too. Labor Force (LF) and Foreign Trade (TR) also shows positively significant impact on GDP. While, Inflation (INF) put negatively insignificant impact on Dependent variable (GDP) in Islamic Republic of Pakistan.

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