Pakistan Research Horizon
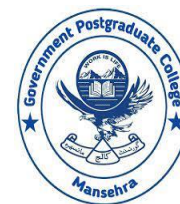
The Dynamic and Non-Linear Nexus between the Financial Development and Economic Growth: Evidence from Pakistan

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Abstract

This study intended to explore the dynamic nexus of financial advancement indicators (Money Supply and Credit) and Economic Growth in Pakistan. The intentions were to quantify both linear and non-linear type connections between financial advancement and economic prosperity. This study also evaluated the direction of the causation between the two financial development indicators and economic prosperity. This study employed Time Series Data (TSD) from 1991 to 2021. The study employed Co-integration and Error Correction Mechanism (ECM) to quantify the nexus. The study also utilized the granger causality test to ascertain the causation. The results verified the existence of a non-linear type of nexus between financial advancement and economic prosperity. Physical capital and human capital have a direct impact on the GDP, while, trade openness has inverse effects. The results of granger causality stated two opposites. The nexus of Broad Money Supply and GDP stated that the causation runs from the economic growth to the BMR that verified the Demand Side Theory. The granger causality test between the GDP and Private Credit revealed that causality run from financial growth to GDP which confirmed the existence of Supply Leading Theory. This study recommended speeding up the digitization of financial markets which will increase velocity and facilitates financial transaction. Additionally, it will ultimately improve the per capita income and leads to Economic prosperity.

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1. Introduction

Economic growth is the catalyst of high standards of living in developed countries. Economic Growth increases the capacity to produce and supply goods to its residents. To reach high economic growth, a country needs physical and human capital, which will increase the Gross Domestic Product (GDP). The increase in GDP will increase the per capita consumption and living standard of the masses, (Bunyamin, 2021). The investment can be increased by the strong capital formation and capital formation in turn depend upon an efficient and dynamic financial system. The financial system is an integral part of increasing investment economic prosperity. The increase in capital and material prosperity is the outcome of the vibrant financial markets (Benhabib & Spiegel, (2000). The availability of the mechanism for saving promotes investment and increases productivity. Developing an enthusiastic financial system is a necessary condition for an increase in investment and GDP.

The increase in financial velocity and the use of automation are important for the increase in GDP and investment (Beck et al, 2000). The vibrant financial system increases optimality in resource allocation and increases the GDP (Rajan & Zingales, 1998). Many economists revealed a non-linear nexus of financial dynamics and economic progress. Which states that when financial progress is at the initial stages it decreases the per capita income. When economic progress reaches a sufficiently developed stage it has a direct impact on the GDP. The nonlinear impact of financial advancement on economic prosperity and environmental degradation was revealed by economists (Ruza & Caro-Carretero, 2022). Another economist also verified the nonlinear nexus of financial advancement and GDP (Hung, 2009).

Similarly, investment is also important for employment and the GDP of the country. Investment plays an important and positive role to accelerate the GDP and lead the country toward prosperity (Erden & Holcombe, 2005). A rise in savings and investment leads to an increase in the GDP of a country. Investment also creates job opportunities and increases the tax revenues of the government; thereby moving towards sustainable growth in the economy. It raises the productivity of the country and helps to increase the exports, to produce the import substitutes, which in turn build the foreign exchange reserves. Again the investment also promotes the means of transportation and communications (Looney, 1997).

The increase in literacy rate also plays and crucial role in the economic progress of a country. Gupta and Chakraborty (2004) stated that academic improvement increases the GDP. Haouas and Yagoubi (2005) examine the relationship between trade and literacy rate and GDP. They conclude that Human Capital contributes to economic growth. However, they were unable to find any nexus between Human Capital and productivity growth. Apian and McMahon (2002) examine the total effect of education as a key factor of development in Africa. They found a significant effect of education on several factors, including mortality, longevity, increase in physical capital investment, political stability, decreasing population growth, decline in fertility, and reduction in poverty and inequalities.

Greiner et al., (2005) empirically investigated the importance of education in economic advancement by employing the time series econometric technique for UAS and Europe. They applied an augmented form Lucas growth model and test it for the period 1962-1996. They estimated the nonlinear nexus of Human capital and GDP.

Financial Development is the progress and dynamism in the private credit and channelization of the resources towards best use which can be divided into the financial deepness and financial advancement. Financial advancement is gauged by the credit given to the private sector. Financial progress means an increase in the credit to private investors and the removal of regulation from money and stock markets, (Levine & King, 1993). The introduction of brand-new and vital tools for obtaining a loan by the private sector is also financial progress, (Tufano, 2002). Perera and Paudel (2009), used two proxies of financial progress Money supply (M2) and Credit to private investors. The nexus of financial progress and GDP can be unidirectional when either GDP affects the financial progress or vice versa. The nexus can be bi-directional when simultaneously both affect each other, this can be explained by the following 3 theories.

The unidirectional nexus explained by the Supply theory indicated that it is the financial progress that determines the GDP and growth as Agarwal (2001) and Rehman and Cheema (2013) stated. Demand theory also narrated the uni-directional nexus of financial growth and GDP but stated that it is the GDP increase, which affects financial advancement, Kar and Pentecost (2000) and Al-Zubiet et al., (2008) in their research verified the demand theory. There is another school of thought that there may be a bi-directional nexus between GDP growth and financial advancement, which is called feedback theory, Luintel and Khan (1999) and Perera and Paudel (2009) verified the multi-directional nexus of GDP and financial advancement.

1.1 Objectives

The objectives of this research study are to empirically evaluate the;

1. To evaluate the nexus of financial advancement (Broad Money Supply M2) on Growth.
2. To evaluate the nexus of financial advancement (Private Sector Credit) on Growth.
3. To evaluate the nexus of advancement and Physical Capital (GFCF) on Growth.
4. To evaluate the nexus of advancement and Human Capital (HSSC Literacy Rate) on Growth.
5. To quantify the nonlinear nexus of financial advancement and growth.
6. To evaluate the causation of financial advancement and Economics Progress.

2. Literature Review

Al-Zubi et al., (2008) have identified the nexus of financial progress and GDP and stated to improve the GDP the financial market must be vibrant. Perera and Paudel (2009) evaluated the dependence of the GDP on the improvement in the financial transaction and they quantified the direction of nexus among these variables. They verified that money has a direct nexus with GDP.

Nega, (2021) has investigated the nexus between the financial progress and GDP of African countries. He used investigated the institutional quality as a moderator. He use the GMM technique to evaluate the data. He concluded that for higher institutional quality the financial progress has a direct impact on GDP but for lower institutional quality has a negative impact on the GDP.

Rehman and Cheema (2013) supported the demand theory and verified the direct impact of growth on financial growth. Ali et al., (2014) used TSD for the quantification of the nexus of financial progress and GDP and concluded the prevalence of the Supply theory in Pakistan. He advised making the financial sector dynamic for the rapid increase in GDP.

Javed et al., (2014) investigate the nexus of Credit and Exports with an increase in GDP and verified that these are the important determinants of the GDP. He advised that Govt. should formulate a loose monetary policy to increase credit and boost the GDP.

Khan and Lodhi (2014) investigated the nexus of the money supply and GDP. They identified that M2 and GDP are negatively related. They concluded a feeble impact of financial growth on the GDP.

Asghar and Hussain (2014) for developing countries they analyzed the impact of financial advancement on the GDP. They inferred that financial progress has a direct impact on the GDP. They identified a bi-directional nexus between the GDP and the financial progress of developing countries.

Gokmenoglu et al.,(2015) examined the nexus of trade, financial progress, and the GDP of Pakistan and said that trade, and credit have a direct impact on the GDP

Guru, and Yadav (2019) evaluated the nexus of financial progress and GDP for India, China, and Brazil. They used panel data econometrics techniques. They concluded that CPR and CPS have a direct impact on the GDP of the BRICS countries.

Chaudry et al., (2019) have investigated the impact of the use of technology and financial progress on the GDP of south Asian countries. They use panel data techniques for the quantification of the nexus. They concluded that education, the use of technology, and financial progress have a direct impact on the GDP.

3. Materials and Methods

This study attempted to evaluate the nexus of financial progress with the GDP of Pakistan. The study employed a 2-proxy measure for the financial progress, the Credit as a percentage of GDP and money Supply M2. This study also planned to gauge the effects of Physical and Human capital on the GDP. Moreover, this study also intended to verify the nonlinear nexus of financial progress GDP. The nexus between financial progress and GDP can be linear when it does not change the sign of the relationship with economic growth while it can be a non-linear type of relationship when it is changing the sign of the relationship at various financial development levels. The theories that link financial progress and GDP are divided into three categories: supply, demand, and feedback theories.

Financial Development is the progress and dynamism in the private credit and channelization of the resources, which can be divided into financial depth and financial advancement. Financial advancement is gauged by the credit given to the private sector. Financial progress means an increase in the credit to private investors and the removal of regulation from money and stock markets, (Levine & King, 1993). The introduction of brand-new and vital tools for obtaining a loan by the private sector is also financial progress, (Tufano, 2002). Perera and Paudel (2009) used two proxies of financial progress Money (M2) and Credit to investors. The nexus of financial progress and GDP can be unidirectional when either GDP affects the financial progress or vice versa. The nexus can be bi-directional when simultaneously both affect each other, this can be explained by the following 3 theories.

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3.1 Variables

This study employed the GDP as a dependent variable and financial advancement is used as an explanatory variable. Two proxies of financial progress are used, the money supply and Credit while GFCF (Investment), Human Capital, and trade are used as the independent variables (control variables).

Table: 1 Variable

S No	Name	Nature	Nexus
01	GDP Per Capita	Dependent	
02	Private Sector Credit to GDP ratio.	Independent	Linear/Non linear
03	Broad Money Supply to GDP ratio.	Independent	Linear/Non linear
04	Gross Fixed Capital Formation as	Control	Positive
05	Human Capital (No of HSSC	Control	Positive

3.2 Econometric methodology and research design

This study employed the long-run methodology devised by Johansen. The steps of Johansen co-integration are as follows.

Check all the dependent and independent variables for the unit root, if all variables are I (0) then OLS will be the most appropriate method to analyze the data.

If the variable has a unit root at level mean nonstationary at level and

Having no unit root after differencing the series means the data is integrated of order one I (1). Then there is a chance of prevalence of long-run co-integrated nexus between the variables.

To affirm the prevalence of the long-run nexus the Johansen cointegration test is used. It uses the trace and max eigenvalue to verify the existence of the cointegration. If both statistics verify the prevalence of cointegration, then

The OLS co-integrated is used for the quantification of long-run coefficients and the error correction mechanism (ECM) is used for the quantification of short-run coefficients.

The causality between financial progress and GDP is assessed by the Granger Causality test.

The econometric model used in this study is as follows:

$$\text{Eco-Growth} = \beta_o + \beta_1 MBR + \beta_2 PSC + \beta_3 GFCF + \beta_4 HC + \beta_5 TO + \mu$$

Where

Eco-Growth is the GDP Per Capita, MBR is the (Broad Money Supply), and PSC is the Credit to the Private sector. GFCF is Gross Fixed Capital Formationused proxy for Physical Capital, the HC is the human capital and is measured as the level of higher secondary Education while the TO is the trade openness and u = Random Error Term.

3.3 Diagnostics tests

This study employed the following diagnostic tests to gauge the validity of the regressions.

Table 2: Specification of the model

S No	Name of Test	Purpose
01	Jarque Bera Test	Normality of the residual
02	White Test	Heteroscedasticity test
03	Durbin Watson test	Autocorrelation
04	Bruech Godfrey LM test	Autocorrelation
05	Wald Test	Joint Significance of the Co-efficient
06	CUSUM test	To gauge the model stability.

3.4 Data sources

This study used the TSD from 1991 to 2021 for 31 years. The data has been collected from World Development Indicators.

4 Data Analysis and Estimation

This section includes a table of the output of the data analysis. This study used the Johansen cointegration technique to quantify the nexus among the variables.

4.1Stationarity of all variables

The results of the unit root test revealed that all variables have a unit root at a level and stationary ate first difference, I (1).

Table 3: Results of Unit Root Test

Variables	Test at	t-values	Critical values	Results
Eco-Growth	Level	-2.978046	-3.574244	*I (1)*
	1st difference	-5.047638	-3.580623	
Broad Money supply	Level	-2.383544	3.568379	*I (1)*
	1st difference	-4.555305	-3.574244	
Public Sector Credit	Level	-1.943247	-3.568379	*I (1)*
	1st difference	-4.200167	-3.574244	
Physical Capital	Level	-2.387979	-3.568379	*I (1)*
	1st difference	-4.756816	-3.574244	
Human Capital	Level	-3.235623	-3.568379	*I (1)*
	1st difference	-6.197556	-3.580623	
Trade Openness	Level	-2.303987	-3.568379	*I (1)*
	1st difference	-5.626974	-3.574244	

4.2 Johansen Test

The Co-integration test evaluates the prevalence of the co-integration. The Null hypothesis of this test is that there is no Cointegration. The trace and Max-Eigen value are used to verify the long-run co-integration. The results confirmed the existence of long-run co-integration.

Table 4: Johansen Test

Trace Test Results				
Hypothesis	Trace value	Critical value	P-Value	Results
Ho: No Co-integration	201.1064	125.6154	0.00000	Rejected
Max-Eigen Test Results				
Hypothesis	Max-Eigen	Critical value	P-Value	Results
Ho: No Co-integration	76.79594	46.23142	0.0000	Rejected

4.3 Long run results

This section is comprised of long-run relationship results of linear as well as non-linear models and the direction of causation is confirmed through the granger causality test.

4.3.1 *Linear model long run results*

The linear model evaluated the impact of financial advancement on economic prosperity with the following equation and the results are in table 4.3.

Eco-Growth = βo+ β1MBR+ β2PSC+ β3GFCF+ β4HC+β5TO+μ

Table5: Results of linear long-run model

Variable	Co-efficient	P-value
Broad Money supply	20.15286	0.0332
Private Sector Credit	-14.47759	0.3012
Physical Capital	8.383706	0.6681
Human Capital	0.490213	0.0052
Trade Openness	-18.41894	0.0414
Intercept C	215.6692	0.5075
R^2	0.932636	----------
F-Statistic	69.22416	0.000000

The results stated the inverse effect of the financial progress (Private sector Credit) on the economy while the financial progress (Broad Money) has a direct effect on the financial progress. The two proxies showed different natures of relationships with GDP. The inverse effects of the financial progress indicate there is a non-linear type of nexus between financial progress and GDP. The coefficient of physical capital states a direct impact on the GDP. Human capital has a strong and direct impact on economic growth. Trade openness has an inverse impact on GDP growth. The R2 revealed that the model explains about 93 % of the total variations in the criterion variable. The values of the F-test revealed that the model is overall significant.

The diagnostic test revealed a good and valid econometric model. The Jarque-Bera test results showed that the model is correctly specified and residuals are normally distributed. The white test of Heteroscedasticity confirmed that there is no heteroscedasticity. The Durbin-Watson test and BPG test of Autocorrelation revealed that there is no autocorrelation. The Wald test also confirmed the significance of the model. The results of the CUSUM test revealed that the model is statistically stable the results are in the following figure.
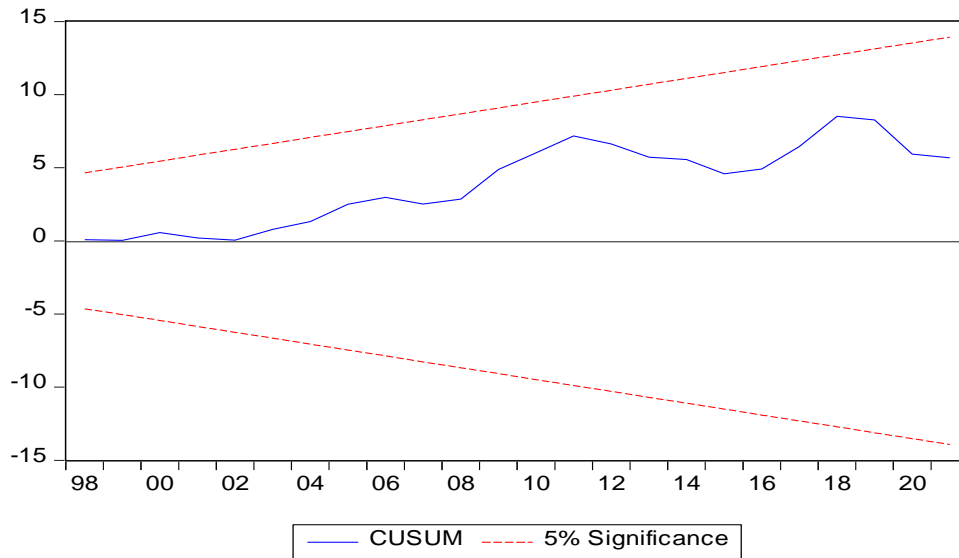
Figure 1: Results of CUSUM TEST

4.3.2 *Non-Linear model Long Run Results*

The non-linear model quantifies the possible sign-reverting nexus of financial progress and economic prosperity. Usually in UDC when the financial advancement starts it has an indirect effect on the GDP while at a high level of financial advancement, it has a direct impact on the GDP.

Table 6: Results of Non-linear long-run model

Variable	Co-efficient	P-value
Broad Money supply	15.41519	0.1276
Private Sector Credit	-133.5927	0.2082
Physical Capital	5.067719	0.7961
Human Capital	0.469386	0.0072
Trade Openness	-14.61950	0.1216
Private Sector Credit^2	2.752496	0.2561
Intercept C	1628.695	0.2070
R^2	0.936232	----------
F-Statistic	58.72746	0.000000

The results concluded that financial advancement has a non-linear nexus with GDP. At a low level of financial advancement, it has an inverse impact on the GDP while at a high level of financial advancement, it has a direct impact on the GDP. While financial advancement (Broad Money) has a direct impact on the GDP. The two proxies showed different natures of relationships with GDP. The coefficient of physical capital states a positive but insignificant relationship with the GDP. Human capital has a strong and direct impact on the GDP. Trade openness has an inverse impact on GDP. The R2 revealed that the model explains about 93 percent of the total variations in the criterion variable. The values of the F-test revealed that the model is overall significant.

The diagnostic test revealed a good and valid econometric model. The Jarque-Bera test results showed that the model is correctly specified and residuals are normally distributed. The white test of Heteroscedasticity confirmed that there is no heteroscedasticity. The Durbin-Watson test and BPG test of Autocorrelation revealed that there is no autocorrelation. The Wald test also confirmed the joint significance of the model.

4.3.3. The Direction of Causation

This test gauged the direction of causation of GDP and Financial Advancement. The results of the granger test are as follows.

Table 7: Results of Granger Test

H_o	P-value	Results
Eco-Growth does granger cause MBR	0.03	H_o Rejected
MBR does granger cause Eco-Growth	0.21	H_o Accepted
Eco-Growth does granger cause PSC	0.13	H_o Accepted
PCR does granger cause Eco-Growth	0.01	H_o Rejected

The results revealed the direction of causation. The nexus between the BMR and Eco-Growth states that the causation run from the economic growth to the BMR. It is the economic growth that causes the BMR, not the BMR that causes Economic growth. The analysis proves there exists the Demand Following Hypothesis. The granger test between GDP and Credit to the Private sector revealed the opposite results. The causality run from financial advancement to the GDP not from GDP to financial advancement. The results confirmed the existence of the Supply Leading Hypothesis.

4.4. Results of ECM

ECM is used to grasp the short-run nexus between GDP growth and its handles. The ECM value shows the speed of adjustment, the value of ECM is between 0 and -1.

Table 8: Results of ECM

Variable	Co-efficient	P-value
Broad Money supply	-4.425463	0.3885
Private Sector Credit	-3.401476	0.6909
Physical Capital	30.09836	0.0140
Human Capital	0.205468	0.0218
Trade Openness	4.720051	0.3842
ECM	-0.473363	0.0022
Intercept C	36.57167	0.0072
R^2	0.530990	----------
F-Statistic	4.339907	0.004528

The short-run coefficients of the relationship between the GDP and independent variables revealed that both indicators of the financial progress of the Broad money Supply and credit have a negative but insignificant impact on the GDP. It means that in the short run, with an increase in financial progress at the early stages of financial development the per capita GDP will decrease later on along with a much rise in the financial progress the increase in the financial progress will increase the economic growth and per capita GDP. In the short run, the physical and human capital has a positive and significant impact on the GDP. While trade openness also increases economic growth and per capita income in the short run but its coefficient is statistically insignificant. The ECM factor shows the speed of adjustment towards the long-run equilibrium relationship when any short-run shock disturbs the long-run equilibrium relationship. The value of ECM should be negative and between 0 and -1 for the model to be dynamic and the ECM value must be statistically significant. Here in this case the ECM is -0.47 and it is statistically significant. The value of ECM revealed that the effects of any short-run shock will diminish in 2.12 years and the relationship will convert to its long-run co-integrated path. The value of R2 showed that about 53 percent of the total variation in the dependent variable is explained. The value of the F statistic confirmed that the model is overall significant.

5. Conclusion and Policy Implications

5.1 Conclusion

This study intended to explore the dynamic relationship between the two financial progress indicators and the GDP of Pakistan. The intentions were to quantify both linear and non-linear types of nexus between the financial progress and GDP. Moreover, this study also evaluated the direction of the causation between the two financial progress indicators and GDP. This study employed Time Series Data from 1991 to 2021. The study employed the Johansen technique and ECM technique to evaluate the data. The study employed the granger test to ascertain the direction of causation. The results of the long-run linear model explained that financial progress (BMR) has a positive impact on growth while financial progress (Private sector credit) has a negative impact on Economic growth. Physical capital and human capital have a positive significant impact on the GDP. The results of non-linear regression confirmed the existence of a non-linear type relationship between financial progress and GDP. The results stated that at a low level of financial progress, the increase in financial development would decrease the per capita income indicating a negative relationship while at a high level of financial progress, the increase in financial progress will have a positive impact on the economic growth. The results of granger causality state two opposite results. Both demand-following and Supply leading hypotheses are verified through two different financial development indicators. The results of the granger causality test revealed the direction of causation. The relationship between the BMR and Eco-Growth states that the causation run from the economic growth to the BMR. It is the economic growth that causes the BMR, not the BMR that causes Economic growth. The analysis proves there exists the Demand Following Hypothesis.

The granger causality test between Economic Growth and Credit to the Private sector revealed the opposite results. The causality run from financial development to Economic Growth not from Economic growth to financial development. The results confirmed the existence of the Supply Leading Hypothesis.

The short-run analysis revealed that financial development has a negative impact on economic growth. Physical and human capital has a positive impact on economic growth. Trade openness also in the short run has a positive impact on economic growth. The results showed that the model is dynamic and any short-run shock on the long-run equilibrium path will return back in 2.12 years.

5.2. Policy Implications

On the basis of the quantitative result of the analysis this study suggests the following recommendations:

The mechanism should be formulated to make easy access to credit by private investors.

Financial integration is necessary for a vibrant financial sector so Govt must integrate the financial system across the banks and NBFIs.

The Govt should take initiative for the digitization of the financial sector to reduce the cost of transactions and process of transactions.

The commodity markets should be integrated with the banks and other financial markets to boost GDP growth.

To prevent the black marketing and Hundi transfer of the foreign exchange should be regulated, and checked for boost savings, investment, and GDP growth.

The credit has an inverse impact on the GDP, which revealed that the credit is improperly allocated the Govt of Pakistan should enforce and improve the regulation to allocate credit only to the most efficient uses.

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