

MULTI-VARIATE ANALYSIS

(CIA 3)

MINI PROJECT



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"Assessing the Causal Relationship between Financial Development and Economic Growth in India: A Multivariate VAR Approach"

Introduction:

"Amidst the intricate dance between financial systems and economic progress, a captivating tale of interdependence unfolds, revealing how the development of one fuels the growth of the other, shaping the destiny of nations and the course of history." The process of upgrading and growing financial systems within an economy, such as banking, stock markets, insurance, and other financial services, is called financial development. By making it more straightforward for people, companies, and governments to save, borrow, invest, and manage financial risks, it seeks to increase the effectiveness, stability, and accessibility of financial institutions. Economic growth depends on financial development since it helps with efficient resource allocation and fosters productivity and innovation. Both theoretical and empirical data have established the relationship between financial development and economic growth. However, the importance of financial institutions in promoting economic growth and development has gotten new attention with the advent of new endogenous growth theories. In 2018, Biplab Kumar Guru and Inder Sekhar Yadav concluded from their study that there is a solid and positive association between financial development and economic growth of selected economies (BRICS). Also, according to research by Greenwood and Jovanovich (1990), Pagano (1993), and King and Levine (1993), financial development facilitates investment, saving, capital productivity, and practical information management, all of which have been linked to economic growth.

Analyses of financial development and economic growth have distinct strands in the literature, particularly time series analyses that point toward the causal direction. According to Patrick (1966), the "supply-leading" theory, which he used to describe how finance can spur economic growth, and the "demand-following" hypothesis, which explains how economic growth can also spur financial development, are two interrelated concepts. Since these arguments were first put forth, empirical findings regarding the direction of causality between financial development and economic growth have remained ambiguous.

Time-series studies on financial development and economic growth have seen an upsurge in the employment of multivariate VAR models in recent years. Luintel and Khan (1999), Chang and Caudill (2005), Liang and Teng (2006), Ang and Mckibbin

(2007), Abu-Badr and Abu-Qarn (2008), Masih et al. (2009), Gries et al. (2009), and Wolde-Rafael (2009) are prominent examples. This is due to the fact that endogenous growth models have demonstrated how a variety of channels, such as investment, productivity, and savings, frequently mediate the connection between financial development and growth. As a result, recent empirical studies are currently using multivariate VAR methods to explore some of these channels. The question of whether financial development and economic growth are causally related still needs to be answered, nevertheless.

The current study developed testable hypotheses based on the foregoing, which were empirically tested during the course of this investigation.

1. $H_0: \beta = 0$ - Economic growth and financial development indicators (measured by liquid liability, deposit money bank assets, and private sector credit of deposit money banks) do not have a short-term meaningful link.
2. $H_0: \beta = 0$ - In India, there is no strong causal link between economic growth and liquid liabilities.
3. $H_0: \beta = 0$ - There is no causal significant relationship between deposit money bank assets and economic growth in India
4. $H_0: \beta = 0$ - There is no causal significant relationship between the private sector credit of deposit money banks and economic growth in India

Theoretical Framework: Financial Development and Economic Growth

Following the literature on financial development, including Patrick (1966), Gurley and Shaw (1955), Goldsmith (1969), Hicks (1969), McKinnon (1973), and Shaw (1973), there is a causal relationship between financial development and economic growth, suggesting that financial markets and institutions will expand their offering of financial services. Real economic growth that is both rapid and sustained will result from this. The relationship between economic growth and financial development had previously attracted the attention of economists like Schumpeter (1911), who claimed that the services provided by financial intermediaries, such as mobilizing savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions, are essential for the technological innovation and economic development of a nation; even so, the channel and even the direction of causality were not clear.

Gurley and Shaw (1955). Goldsmith (1969) and Hicks (1969) are the researchers at the fore of these studies who made the case that the development of a financial system is crucial in stimulating economic growth and that under-developed financial systems inhibit economic growth, so policies aimed at expanding the financial system should be formulated in order to foster growth. The importance of financial intermediaries and financial markets in the growth process has also been highlighted by McKinnon (1973) and Shaw (1973).

The McKinnon model (McKinnon, 1973) assumes that investment in a typical emerging country is mostly self-financed; hence, given its lumpy nature, investment can only materialize if adequate saving is amassed in the form of bank deposits. Shaw (1973) added that by borrowing and lending, financial intermediaries encourage investment and boost productivity growth. This is accomplished by shifting resources from economic units with excess to those with deficits. As a result, they developed the right structures for the functions of intermediation that they carry out. According to Ang's 2007 argument, the outcome of such financial liberalization will result in higher output growth.

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Evidence based on Advanced and Emerging Markets

The relationship between finance and economic growth has been researched and recorded in many ways by academics. Wadud (2005), for instance, looked at the long-term causal relationship between financial development and economic growth for three South Asian nations: Bangladesh, Pakistan, and India. A co-integrated vector autoregressive model was used in the study to analyse the long-term link between financial development and economic growth. The findings show a causal relationship between financial development and economic growth, although it starts with financial development before moving to economic growth.

Using low frequency data from 1970 to 2000, Waqabaca (2004) investigated the causal relationship between financial development and growth in Fiji. Within a virtual VAR

framework, the study used unit root tests and co integration techniques. According to empirical findings, Fiji's financial development and economic growth are positively correlated, with a causal chain connecting the two. He asserted that nations with less advanced financial systems frequently see this result.

Arestis and Demetriades (1977), employing time series analysis for the United States and Germany and Johansen co-integration, concluded that there is insufficient evidence to support the premise that financial development promotes economic expansion. Their analysis of the data seemed to indicate that the growth of the stock market and the banking sector are both influenced by actual GDP.

The cointegration approach and vector error correction model on the monetization ratio, also known as the ratio of M2 to GDP and the intermediation ratio, the ratio of bank claims on the private sector to GDP against economic growth as measured by real GDP per capital, were used by Odiambho (2001) to study the relationship between finance and growth in South Africa. Their findings disproved the supply leading concept and showed a demand-following relationship between financial development and economic growth.

Guryay et al. (2007) investigated the relationship between financial development and economic growth for Northern Cyprus for the years 1986 to 2004 and came to the conclusion that there was hardly any positive impact on the country's economic growth. Instead, the analysis demonstrates that there is evidence linking the rise of financial intermediaries to economic growth. (Levine, Zervos, 1998; King and Levine, 1993). Rajan and Zingales (1998) discovered that financial development has a significant impact on economic growth using time series analysis (1980–1990). Additionally, the time series analysis for the Australia study by Tngevelu et al. (2004) provides proof that financial markets have a direct impact on growth.

A variety of endogenous growth models, according to Murinde and Eng (1991), Luintel and Khan (1999), and Kar and Pentecost (2000), reveal a two-way relationship between financial development and economic growth. Reexamining the fundamental cross-country panel result, Rousseau and Wachtel (2006) discovered that the influence of financial dependence on growth is less pronounced with more recent data. It was mentioned in the first panel studies that used data from 1960 to 1989 and concluded that, when done responsibly, financial development has a favourable impact on growth. Bidirectional causality theory was promoted by Altay and Atgur (2010). In this study, the relationship between financial development and economic growth was examined in Turkey from 1970 to 2006 using a VAR model technique. His empirical results

demonstrated that in Turkey, financial development and economic expansion were causally related in both directions.

According to Bailey (2002), who examined the connection between the financial sector and economic growth in transition nations, the province of Spain has not experienced economic growth as a result of increasing competition in the banking industry (which results in higher deposit and lower lending rates). Financial development was not even addressed on Stern's list of topics that should be investigated more but were left out of the poll. The book by development economics pioneers Myers and Seers (1984), which is a compilation of essays, also discusses future disregard of the importance of financial development in economic development.

Data Description and Methodology Data Description

The impact of financial development on economic growth was examined in this study using annual data spanning the years 1974 through 2018.

Table 1:

Variables	Year	Explanation and Apriori Expectations	Source
GDP	1974-2018	Gross domestic product (GDP) is an inflation-adjusted measure that reflects the value of all goods and it captures the demand and supply of financial activities in the economy.	https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?q=quantity=1&locations=IN
Net incurrence of liabilities, total(% of GDP)	1974-2018	The ratio of Net incurrence of liabilities to GDP measures the size of the financial intermediary system relative to the size of the Indian economy and the ability of financial intermediaries to meet unanticipated demand to withdraw deposits by customers	https://data.worldbank.org/indicator/GC.LBL.TOTL.GD.ZS?view=chart
Deposit Money Bank Assets to	1974-2018	The ratio of deposit money bank assets to GDP captures the overall size of the banking sector relative	https://fred.stlouisfed.org/series/DDDI02IN

GDP for India		to the size of the Indian economy.	A156NWDB
Government expenditure	1974-2018	This variable is included in the study to control for the influence of other components of the Indian macro economy	https://data.worldbank.org/indicator/NE.CON.GOV.ZS?locations=IN
Private Credit by Deposit Money Banks to GDP for India	1974-2018	credit to the private sector by deposit money banks (% GDP) which excludes credit issued to the public sector (government, government agencies and public enterprises as well as the credit issued by the monetary authority), The volume of domestic credit to the private sector by deposit money banks relative to the size of the Indian economy measures the contribution of financial intermediaries to private sector activities through intermediation	https://fred.stlouisfed.org/series/DDDI01IN A156NWDB

Estimation Procedure:

1. Unit root Test:

Prior to performing the co-integration test in time series analysis, the variables must be checked for stationary behavior. We employ the standard ADF tests for this purpose. Therefore, we test for the null hypothesis $H_0: \rho = 0$ (i.e., has a unit root), and the alternative hypothesis is $H_1: \rho < 0$ before performing this test to establish the order of integration of all variables. To prevent erroneous results, this is done to make sure that all the variables are integrated at $I(1)$.

2. Johansen Co integration

In order to investigate co-integration, this study used dynamic vector autoregressive regression (VAR). The key is to examine both long- and short-term dynamics while capturing the causal dynamics link between monetary policy and exchange rate. For

instance, if a VAR among a group of variables has the potential for long-term cointegration

3. Vector Error Correction Model (VECM) and Granger Causality Test

The estimated long run coefficients of the variables are determined after a co-integration test among the variables. For determining the direction of causality between the variables, this study used the Engle and Granger (1987) test with the addition of the error correction term. The benefit of adopting the vector error correction (VECM) modeling framework for causality testing is that it enabled the assessment of both long-run and short-run causality using the lagged ECM term and lagged differenced explanatory variables. The long-term causation from the explanatory variables to the dependent variable is represented by an ECMt1 term that is statistically significant.

Data Presentation and Analysis:

Our analysis here divided into namely; descriptive statistics and empirical analysis

Table 2: Unit root test

Augmented Dickey Fuller(ADF)					
Variables	Levels		1 st Diff		Order of Integration
	t-stat	P-value	t-stat	P-value	I(1)
GDP	4.530	1	-4.375	0.0003	I(1)

NILGDP	-3.550	0.0068	-10.917	0.000	I(1)
DMBAGDP	-0.887	0.7922	-5.351	0.000	I(1)
GOVEXP	-3.103	0.0263	-6.032	0.000	I(1)
PCDMBGDP	-0.443	0.9027	-5.864	0.000	I(1)

Since p-value of GDP,DMBAGDP and PCDMBGDP is >0.05therefore non stationary.

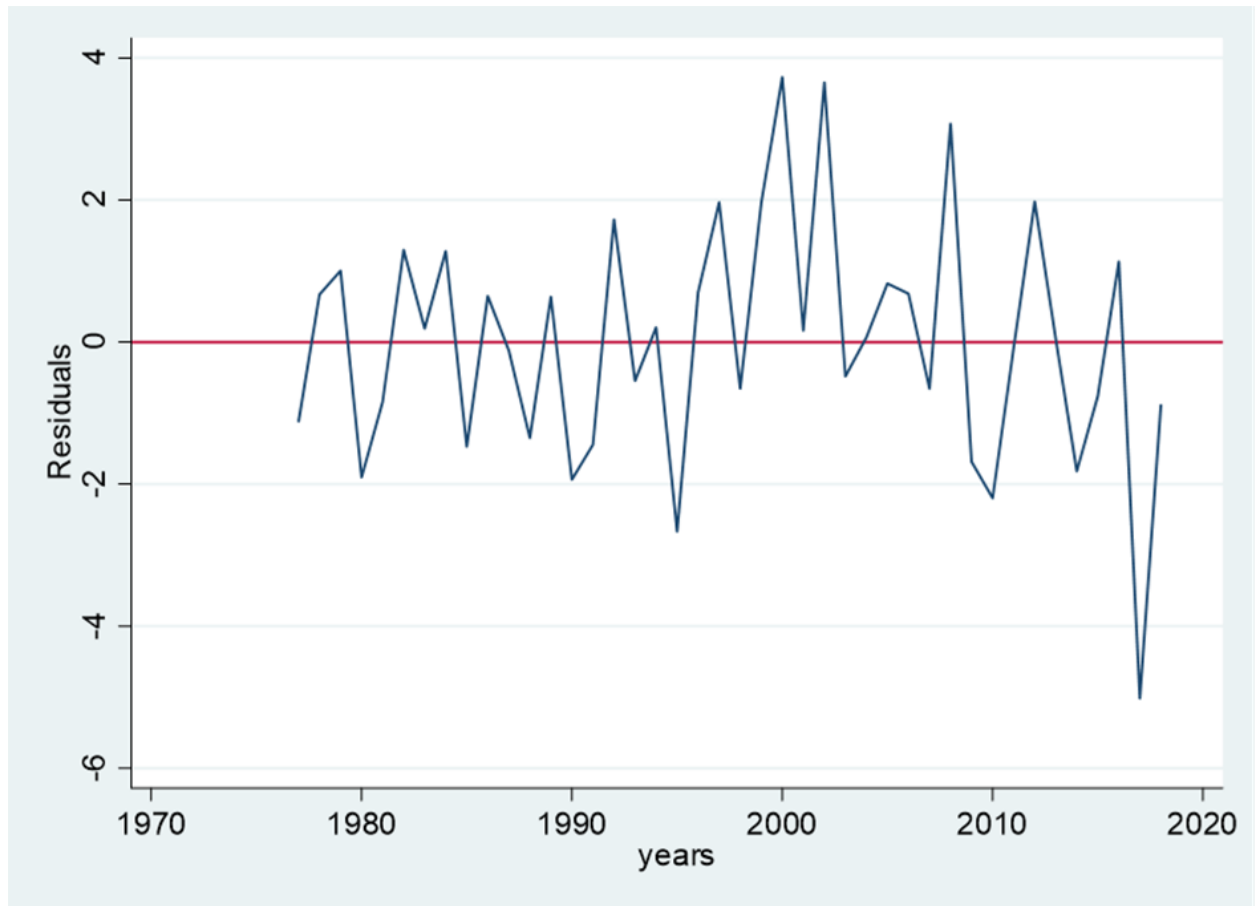
When 1st difference,...all the variable become stationary

Therefore selected variables are NILGDP,GOVEXP,dpcd,ddmba and dgdg.

By AIC, HQIC and SBIC we can say that lag is the optimal lag for our model.

To check autocorrelation in residuals we plot mean of error and errors

that is shown by:



Multivariate Johansen Cointegration-Maximum Likelihood Framework

Table 3: Johansen co-integration result

Hypothesis	Trace statistics	5% critical value	Max.Likelihood Value	5% critical value
$r=0$	80.7661	68.52	33.8992	33.46

r<=1	46.8670	47.21	26.1349	27.02
r<=2	20.7321	29.68	12.4980	20.97
r<=3	8.2341	15.41	8.2341	14.07
r<=4	-0.000	3.76	-0.000	3.76

Causality Test

Table 4: Short run causality estimates.

VECM Granger Casuality							
Type of Casuality							
		Short Run	Excluded variables				
Dep.var		dgdg	NILGDP	GOVEXP	ddmba	Dpcd	
dgdg	Chi-sq		2.8842	5.3759	1.0081	1.3926	

	P-value		0.236	0.068	0.604	0.498	
NILGDP	Chi-sq			6.2491	.55491	1.403	
	P-value			0.044	0.758	0.496	
GOVEXP	Chi-sq		2.4864		.37903	1.1005	
	P-value		0.288		0.827	0.577	
ddmba	Chi-sq		1.0076	.4558		2.2891	
	P-value		0.604	0.795		.318	
dpcd	Chi-sq		.34164	.7729	6.3205		
	P-value		.843	.679	0.042		

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