

Measurement of the contribution of financial factors to GDP: Evidence from India

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Abstract

To measures the contribution of various indicators of financial market and financial institution to GDP in India for the period of 2000 to 2020. This research measures the contribution with the help of augmented dickey fuller (ADF) test, cointegration test and vector error correction model (VECM). Given results suggest that financial factors are having major effect on GDP in long-run. Indicators of financial market and financial institutions has a contribution in the growth of GDP. Following research measuring the contribution of various factors on GDP. Up to what extent each indicator contributes in the growth of GDP in India. Prior studies emphasized the consequences of financial issues together on the expansion of the economy.

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Keywords: *Financial market, Financial institution, Principal compound analysis, Co-integration, VECM.*

1. Introduction

The association between progress of financial system and development of an economy has been one of the major researched areas among economists. Many hypothetical and experimental studies have been conducted to expand our understanding of various aspects of this association. Various economists embrace various opinions on relationship

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and presence of direction of cause and effect association among various financial factors and economic growth.

The foremost opinion exist among the economists is supply leading opinion. It means here's a positive influence of financial considerations on an economy's development. As per this opinion financial factors contributes to the growth of an economy in two ways: 1. by elaborating the scope of savings and refining the efficacy of investment. 2. By improving the efficiency of capital accretion (Nain and Kamaiah, 2014).

Demand following is the economists' second point of view. It implies that expansion in the economy comes after financial difficulties. According to this argument, demand for financial amenities will grow as the economy expands (Rahul, 2020). The following hypothesis holds that financial parameters and development in the economy are directly causally related. It asserts that financial elements and economic development are causally linked in both directions. According to the last point of view, there is no connection between indicators of finance and the growth of the economy.

We infer from the aforementioned data that there is a vast body of contradictory literature on financial progression and development of the economy. As a result, we wish to analyse the published work on growth and finance nexus in this study by determining how much India's GDP is contributed by the financial elements and looking at both their long- and immediate consequences employing the vector error correction approach.

The study paper's remaining section is composed as follows: Division 2 literature review on the connection amid finance and growth is included. Division 3 provides facts and methods. Division 4 displays the outcomes. The conclusion is cited in Division 5.

2. Review of literature

(Ngare, Nyamongo and Misati, 2014) studied the long-term association amid Belgian growth of the economy from 1873 to 1935 and the development of the financial market. Results indicate a substantial causal relationship between Belgium's expanding financial market and its economy. (Naceur and Ghazouani, 2007) aimed to investigate the connection amongst the financial sector, financial institutions, and development of the economy in 11 MENA countries from 1979-2003. They discovered that there was only a small and insignificant correlation among the stock market, financial institutions, and economic expansion in 11 MENA countries. (Boubakari and Jin, 2010) discovered the causal affiliation amid for the time period 1995-2008, the security market and

GDP increased in five Euronext countries. The findings suggested that the market for securities and development in the economy are favorably associated in some countries, whereas there exists not a causal connection among the market for securities and economic development in other countries. (Christopoulos and Tsionas, 2004) compared from 1970 to 2000 the long-term link amongst financial stability and growth in GDP in 10 developing countries. The findings indicate a one-way cause-and-effect link among financial stability and the economy expanding. (Seven and Yetkiner, 2016) for the years 1991 to 2011, researchers looked for a correlation between financial institutions, the security market and the expansion of the GDP of high-, low-, and middle-income nations. They came to the opinion that while financial institution expansion benefited economic development in nations with low and moderate incomes, it had a detrimental consequence on economic advancement in high-income economies. Economic growth in countries with high and moderate incomes is positively impacted by the development of the financial markets. (Chang, Jia and Wang, 2010) investigated from 1991 to 2005 the impact of bank fund conversion on China's GDP. They discovered that the reallocation of bank funds has little effect on economic expansion. (Cheng and Degryse, 2010) analyzed the effect of bank and non-bank financial institutions on China's the expansion of the economy during 1995 and 2003. The findings indicate that both bank and non-bank financial institutions are having a considerable effect on the expansion of an economy. (Owusu and Odhiambo, 2014) studied the link between Ghana's developing financial market and its expanding economy. They came to the opinion that the expansion of the security market and the expansion of the economy are unrelated. (Malik and Amjad, 2013) investigated, between 1985 and 2011, how Pakistan's economic growth was affected by FDI and the rise of the financial market. They found a one-way causal association amid the expansion of security markets and economic development as well as a two-way causal connection among investment from abroad and growth in the economy. (Donwa and Odia, 2010) looked at the linkage among the Nigerian security market and economic progress between 1981 and 2008. The outcomes show that the growth of the market for securities has little impact on economic progress. (Muhammad Adnan Hye, 2011) studied the connection amid India's economic progress between 1978 and 2008 and the financial expansion index. They were able to conclude that the development of the financial index and economic expansion, both in both lengthy and brief timeframes, had an inverse relationship. (Nain and Kamaiah, 2014) studied the connection through India's financial growth

and progress between 1990 and 2010. The results of the analysis showed that there is no causal link among financial expansion and the expansion of the economy. (Siva Kiran Guptha and Prabhakar Rao, 2018) between 1996 and 2016, researchers examined the connection among financial growth and economic expansion in the BRICS countries. They discovered a single causal pathway connecting financial development and expansion in the economy. (Sirag, SidAhmed and Ali, 2018) looked at the effects of foreign investment and development in finance on Sudan's GDP increase from 1970 to 2014. They discovered that the development of the financial sector and foreign direct investment had a beneficial and substantial effect on the growth of the economy.

3. Data and Methodology

3.1 Data

The association across finance and economy is linear with the aggregate output of the economy in terms of aptitude to provide sources of payment. The better quality of sources of payment in the economy results in increased overall output. Conversely, studies on finance-growth association majorly emphasized the dynamic connection between financial growth and economic expansion. In this regard, two significant explanatory mechanisms came into consideration 1. Increase in investment rate depending on efficiency to summon population's savings. 2. Efficiently investing the funds will spur economic expansion (Gantman and Dabós, 2012).

Economic and financial time series statistics are used in this study. In the scientific world, data tends to be referred to as time series (TS) variables when there are temporal associations present (i.e., when data points or observations are neither independent nor auto-correlated in time rather are uniformly scattered) (Rahardja, 2020). These involve Gross Domestic Product (GDP), Bank Deposits (DEPO), Domestic Credit to Private Sector (CRE), Bank Net Interest Margin, Return on Equity, Turnover Ratio, Stock Traded, Stock Price Volatility and Market Capitalization (CAP). Global Financial Development Database and the World Bank were employed to get the annual time series data for all the variables from 2000 to 2020.

Principal Compound Analysis

Multivariate statistical study of principal compounds is one approach. Without moving the data in the big database, it converts correlated

variables into uncorrelated indicators. Principal component analysis is the process of extracting uncorrelated indicators from original dataset by employing their correlation matrix (Siva Kiran Gupta and Prabhakar Rao, 2018). We employed principal component analysis to build a reliable measure of financial development indices by using significant financial proxies of financial market and financial institution into account.

3.2 Methodology

Co-integration method is having a major role in analyzing Granger causality. Variables are said to be co-integrated if there is a common trend followed by two or more indicators. Causality takes place at least in one direction when relevant factors share a common pattern (Granger, 1988). Analysis of co-integration Granger Causality does exist, but it does not indicate the direction in which a cause-and-effect link is one of the factors. The Vector Error Correction Model (VECM) indicating causative direction (Abu-Bader and Abu-Qarn, 2008).

In this investigation, time series analysis is being used to calculate the financial elements' contribution to India's GDP. The stationarity of the factors is first examined employing the augmented Dickey Fuller test (ADF). The total number of co-integration connections between the indicators is then examined using the Johansen co-integration test. Finally, the contribution of financial factors to GDP is evaluated by applying vector error correction model outline indicated as:

$$\Delta Y_t = c + \sum b \Delta Y_{t-i} + \sum \sum b_2 \Delta F_{t-i} + \lambda ECT_{t-1} + e_t$$

Where F_t = (Bank Deposits (DEPO), Domestic Credit to Private Sector (CRE), Bank Net Interest Margin, Return on Equity, Turnover Ratio, Stock Traded, Stock Price Volatility and Market Capitalization (CAP)), Y_t = GDP, e_t = white noise residual and ECT_t = error correction term.

4. Results and Discussion

Finding the extent of integration of every measure is the first stage in our investigation. The extent of integration in the level and initial distinction of each element is evaluated employing the modified Dickey Fuller assessment. **Table 1** displays the unit root test's findings. The outcomes display that all metrics, with the exception of GDP and Turnover Ratio, are stationary at first difference.

It is possible to use the co-integration test after examining the stationarity of every measure to examine whether there is a consistent connection among the expansion of the economy and financial indicators. We initially use co-integration and a model for vector error correction to calculate measurements for the market for shares and financial institutions separately in order to calculate these elements' effects on development in the economy both now and in the future, we took 3 variables of financial market and financial institution each then we will add rest of the financial market and financial institution variables one by one to measure their contribution in the growth of GDP. Lastly, it will be determined how the stock market index and financial institution index interact to affect economic expansion. The outcomes of the vector error correction framework and the co-integration evaluation are shown in **Tables (2–9)**.

The outcome of co-integration in **Table 2** suggested that at least one indicator is co-integrated with GDP from financial market indicators, financial institution indicators and financial indices. In first series from financial market indicators shows that there is one co-integration equation in the examination. Second series of financial market proposed 2 co-integration equations and third series of financial market proposed 4 co-integration equations in both trace and maximum eigenvalue test. It illustrates a sustained connection among securities markets and economic growth. Similarly, first and second series from financial institution indicators shows that there is 1 co-integration equation in the examination and third series of financial market proposed 3 co-integration equations in trace test and 2 co-integration equations in maximum eigenvalue test. It implied a long-term link among financial institutions and the growth of the economy. The co-integration equation for financial benchmarks and economic development is the only one left. It demonstrates that financial benchmarks and economic expansion have a lasting relationship.

According to the analysis in **Table 3**, C(1), which demonstrates a long-term causal association between GDP, Domestic private sector loans and bank margins of net interest are both sizeable. C(2) shows percentage upsurge in GDP will lead to upsurge in GDP by 1.43% in short-run. C(3) show that domestic lending to the private sector has increased will lead to upsurge in GDP in short-run. C(4) indicate that rise in bank net interest margin will lead to fall in GDP in short-run C(5) is constant.

The analysis of **Table 4** indicates that C(1) is significant that shows A long-term causal link exists between GDP and the GDP lag value, bank net interest margin and return on equity. C(2) indicate Domestic private sector lending and GDP are related in a causally linked manner, bank net interest

margin and return on equity. C(3) shows percentage upsurge in GDP will lead to fall in GDP by in short-run. C(4) show that domestic lending to the private sector has increased will lead to upsurge in GDP in short-run. C(5) indicate that rise in bank net interest margin will lead to fall in GDP in short-run. C(6) indicate there is insignificant impact of return on equity on GDP in short-run C(7) is constant.

The analysis of **Table 5** indicates that C(1), C(2) and C(4) are significant that shows strong connections exist between GDP, lag value of GDP, domestic credit to private sector, return on equity and bank deposit. C(3) indicates positive but insignificant impact on GDP. C(5) indicates significant impact of lag value of GDP on GDP in short-run. C(6) shows significant impact of short-term impact of domestic private sector loans on GDP. C(7) and C(8) shows insignificant impact of bank net interest margin and return on equity on GDP in short-run. C(9) demonstrates that bank deposits have an affirmative and substantial short-term influence on GDP. C(10) is constant.

The analysis of **Table 6** indicates that C(1) is significant that shows GDP, GDP lag value, turnover ratio, and stock traded all have a long-term causal link with one another. C(2) suggests that the lag value of GDP has a sizable and favorable short-term influence on GDP. C(3) indicates insignificant and negative impact of turnover ratio on GDP in short-run. C(4) indicates significant and positive impact of stock traded on GDP in short-run. C(5) is constant.

The analysis of **Table 7** indicates that C(1) is significant that shows the long-term causal association among GDP, GDP lag value, turnover ratio, traded stock, and stock price fluctuation is present. C(2) suggests that the lag value of GDP has a sizable and favorable short-term influence on GDP. C(3) indicates insignificant and positive impact of turnover ratio on GDP in short-run. C(4) indicates significant and positive impact of stock traded on GDP in short-run. C(5) indicates insignificant and negative impact of stock price volatility on GDP in short-run. C(6) is constant.

The analysis of **Table 8** indicates that C(1), C(3) are significant it shows Long-term causality exists between GDP and GDP lag values, stock traded, stock price volatility and market capitalization. C(2). C(4) indicates significant and negative impact of past values of GDP on GDP in short-run. C(5) indicates significant and negative impact of turnover ratio on GDP in short-run. C(6) indicates significant and positive impact of stock traded on GDP in short-run. C(7) insignificant impact of stock price volatility on GDP in short-run. C(8) indicates significant and negative impact of market capitalization an GDP in short-run. C(9) is constant.

The analysis of **Table 9** indicates that C(1) is significant and it shows GDP, the Financial Market Index, and the Financial Institution Index all have a long-term causal link. C(2) implies a large and favourable impact of GDP historical values on GDP in short-run. C(3) and C(4) indicates insignificant impact of financial market index and financial institution index on GDP in short-run. C(5) is constant.

5. Conclusion

This study measures the contribution of indicators of financial market and financial institution on GDP in India for the year 2000 to 2020. Firstly, we found the contribution of financial market indicators in GDP. It shows that financial market indicators has a significant impact of GDP and they contribute in economic growth. One by one addition of financial market variables in analysis increases the adjusted R^2 . Similarly, financial institution indicators has a significant impact on GDP and they contribute in economic growth. One by one addition of financial institution variables in analysis increases the adjusted R^2 . Combined impact of financial indices on GDP decreases the adjusted R^2 but they have an important effect on GDP.

Table 1
Augmented Dickey Fuller Test

Variables	I(0)	I(1)
GDP	0.0039	-
Bank Deposit (DEPO)	0.1143	0.0018
Bank Net Interest Margin	0.0504	0.0216
Return on Equity	0.8006	0.0014
Domestic Credit to Private Sector (CRE)	0.4886	0.0000
Market Capitalization	0.0645	0.0000
Turnover Ratio	0.0016	-
Stock Market Volatility	0.2373	0.0358
Stock Traded	0.3548	0.0030

Table 2
Result of co-integration test

Series	Trace (Prob.)					Maximum Eigenvalue (Prob.)				
	None	At most 1	At most 2	At most 3	At most 4	None	At most 1	At most 2	At most 3	At most 4
Financial Market indicators										
GDP, CRE, BANK_NET_INTEREST_MARGIN	0.0047*	0.1053	0.1281			0.0153*	0.1565	0.1281		
GDP, CRE, BANK_NET_INTEREST_MARGIN, RETURN ON EQUITY	0.0000*	0.0069*	0.3719	0.3140		0.0027*	0.0051*	0.3873	0.3140	
GDP, CRE, BANK_NET_INTEREST_MARGIN, RETURN ON EQUITY, DEPO	0.0000*	0.0000*	0.0015*	0.0366*	0.2035	0.0000*	0.0013*	0.0134*	0.0415*	0.2035
Financial Institutions indicators										
GDP, TURNOVER RATIO, STOCK TRADED	0.0045*	0.0876	0.0446			0.0179*	0.2253	0.0446		
GDP, TURNOVER RATIO, STOCK TRADED, STOCK PRICE VOLATILITY	0.0012*	0.0839	0.1297	0.1282		0.0051*	0.2772	0.1930	0.1282	
GDP, TURNOVER RATIO, STOCK TRADED, STOCK PRICE VOLATILITY, MARKET CAPITALIZATION	0.0000*	0.0000*	0.0367*	0.1870	0.1683	0.0001*	0.0002*	0.0825	0.2453	0.1683
Combined										
GDP, INSTITUTE, MARKET	0.0006*	0.1500	0.0263			0.0011*	0.4647	0.0263		

* denotes rejection of the hypothesis at the 0.05 level

Table 3
Results of Vector Error Correction Model (series: GDP CRE BANK_NET_
INTEREST _MARGIN)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.149662	0.046310	-3.231725	0.0066
C(2)	1.428912	0.295192	4.840626	0.0003
C(3)	8689253.	2928543.	2.967090	0.0109
C(4)	-1798277.	535216.3	-3.359907	0.0051
C(5)	-444317.0	305374.3	-1.454991	0.1694
R-squared	0.650500	Adjusted	R-squared	0.542962

Table 4
Results of Vector Error Correction Model (series: GDP CRE BANK_NET_
INTEREST _MARGIN RETURN ON EQUITY)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.258997	0.056371	-4.594537	0.0008
C(2)	-16524421	5180216.	-3.189910	0.0086
C(3)	1.799075	0.306411	5.871441	0.0001
C(4)	8134938.	2634791.	3.087508	0.0103
C(5)	-1280961.	519915.7	-2.463786	0.0315
C(6)	-23476.47	25399.50	-0.924289	0.3752
C(7)	-834031.5	311791.5	-2.674966	0.0216
R-squared	0.806772	Adjusted	R-squared	0.701375

Table 5
Results of Vector Error Correction Model (series: GDP CRE BANK_NET_
INTEREST _MARGIN RETURN ON EQUITY BANK DEPOSIT)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.285766	0.061295	-4.662139	0.0016
C(2)	-18416370	5835710.	-3.155806	0.0135
C(3)	752424.4	672618.2	1.118650	0.2958
C(4)	-76000.19	32992.36	-2.303569	0.0502

Contd...

C(5)	1.203852	0.308471	3.902639	0.0045
C(6)	7887373.	2624475.	3.005315	0.0169
C(7)	-902736.7	510636.7	-1.767865	0.1151
C(8)	-34823.88	23851.34	-1.460039	0.1824
C(9)	9216663.	3881944.	2.374239	0.0449
C(10)	-232160.8	321322.2	-0.722517	0.4906
R-squared	0.900970	Adjusted R-squared		0.789561

Table 6

**Results of Vector Error Correction Model (series: GDP TURNOVER RATIO
STOCK TRADED)**

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.255052	0.045885	-5.558454	0.0001
C(2)	3.955293	0.607430	6.511523	0.0000
C(3)	-3374.190	2963.521	-1.138575	0.2740
C(4)	17868.71	5564.238	3.211349	0.0063
C(5)	-2839540.	584739.5	-4.856077	0.0003
R-squared	0.801427	Adjusted	R-squared	0.744691

Table 7

**Results of Vector Error Correction Model (series: GDP TURNOVER RATIO
STOCK TRADED STOCK PRICE VOLATILITY)**

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.167830	0.036954	-4.541627	0.0006
C(2)	3.067100	0.555603	5.520310	0.0001
C(3)	48.26873	3329.046	0.014499	0.9887
C(4)	24539.78	7436.796	3.299779	0.0058
C(5)	-13498.51	13993.88	-0.964601	0.3523
C(6)	-1950305.	528347.5	-3.691330	0.0027
R-squared	0.755777	Adjusted	R-squared	0.661845

Table 8

**Results of Vector Error Correction Model (series: GDP TURNOVER
RATIO STOCK TRADED STOCK PRICE VOLATILITY MARKET
CAPITALIZATION)**

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.202629	0.037001	-5.476297	0.0003
C(2)	67942.37	20515.19	3.311808	0.0079
C(3)	-125570.0	31800.45	-3.948687	0.0027
C(4)	2.708453	0.384544	7.043279	0.0000
C(5)	-34449.14	13863.31	-2.484914	0.0323
C(6)	97638.72	29016.35	3.364956	0.0072
C(7)	-12022.47	15821.77	-0.759869	0.4649
C(8)	-3779148.	1331724.	-2.837786	0.0176
C(9)	-1566803.	362372.8	-4.323732	0.0015
R-squared	0.866245	Adjusted	R-squared	0.759242

Table 9

Results of Vector Error Correction Model (series: GDP INSTITUTE MARKET)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.110926	0.028035	-3.956639	0.0014
C(2)	2.189590	0.392456	5.579194	0.0001
C(3)	-48384.27	76264.26	-0.634429	0.5360
C(4)	78302.47	130795.7	0.598663	0.5590
C(5)	-1194048.	394521.9	-3.026570	0.0091
R-squared	0.759153	Adjusted	R-squared	0.690340

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