# Money, Trade Openness and Growth in India: A Co-Integration Approach

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**Abstract**

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The purpose of this study was to examine the causal relationship among Financial Development, Trade Openness and Economic Growth in India for the period 1971-2013. The econometric methodology employed was the Cointegration and Granger Causality test. The stationarity properties of the data and the order of integration of the data were tested using both the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test. The variables tested stationary at first differences. The Johansen multivariate approach to cointegration was applied to test for the long-run relationship among the variables and found strong relations between Growth, trade openness and financial development. The Granger-causality empirical findings suggest that trade openness and economic growth does have causal impact on financial development; conversely trade has causal impact on growth and financial development, implying support for trade-led growth and finance-led-growth. However, two important policy implications of the analysis presented in this paper deserve attention. First, although financial deepening has emerged as an important aspect of the economic growth strategy in the Indian context, since the sources of such a deepening may be both domestic as well as external; the importance of a judicious policy mix cannot be neglected, especially in the wake of the current global financial meltdown. Second, as documented in the econometric analysis, the complementarities between trade openness and financial deepening appear to be good. Broad money as percentages of GDP showed causal impact on economic growth and economic growth was seen to necessitate the increasing trend in domestic supply of money. Also, Money supply was the only instrument of financial development that was seen to cause Trade openness and growth.

## 1. Introduction

The recent financial crisis revives the debt on the finance and growth relationship and the importance of regulation of financial institutions. If we look the theoretical and empirical literature on finance and growth nexus it showed ambiguous explanation. The theoretical literature was started through pioneering work of Schumpeter (1911). He stated financial development has important for growth. Because developed financial structure offered efficient services of financial intermediaries that transfer of funds to most innovating entrepreneur. In 1955, Gurley and    Shaw realized the importance that Economic Growth leads Financial Development. Patrick (1966) studied the causal relationship between Financial Development and Economic Growth and studied the two directions of causality (i.e. Demand Following conditions and Supply Leading conditions) at different stages of Economic development. At early stage, he talks about Supply leading condition (i.e. promotion of financial system first, then it leads to economic growth, while at later stage or developed stage of development, there is a more demand for a variety of financial assets to accommodate the needs of both savers and investors which leads to the creation of new financial system.

Till the late sixties (1960s) the role of Financial Intermediation in general and banks in particular in the process of Economic growth of a country was largely ignored. The view on neutrality of Financial Intermediaries to economic growth came under attack during the late 1960s. Later, it was pointed out that there exists a strong positive correlation between Financial Development and Economic Growth of a country. The comprehensive thesis on financial repression was presented by McKinnon and Shaw (1973). They suggested that the government intervention in the financial market impede the process of financial development and thus economic growth. This McKinnon and Shaw hypothesis was supported by the endogenous growth literature, Romer, (1986); Greenwood and Jovanovic, (1990); Bencivenga and Smith, (1991), Barro, (1991); King and Levine, (1993b), Japelli and Pagano, (1994), Levine (1997)). But this McKinnon and Shaw hypothesis has criticized by the neo-Keynesians (Diamond (1983), Singh (1997, 2003) and Griffith-Jones (2003)). They recommended financial liberalization impede economic growth because financial liberalization leads crisis rather than stable and efficient functioning of the financial system. Recently neo structural list economists have stated that the financial liberalization model caused to increase interest rate, and manufacturing cost that

consequently, impede economic growth in the economy. Subsequently, the proponents of Endogenous growth theories argued that with positive marginal productivity of capital, development of financial market induces economic growth in the short as well as long run by improving efficiency of investment (Bencivenga and Smith ,1991). When we talk about the trade openness the, background of the study includes the post-independence period so as to highlight the lessons learnt from the import substituting industrialization, the analytical content focuses on the liberalization period beginning the 1980s, reinforced during 1990s and carried forward during 2000s. The temporal coverage of the empirical analysis carried out spans the period 1971 to 2013.

The relationship between openness to international trade and economic growth, and financial development and economic growth are the subject of a vast number of both theoretical and empirical literatures, (Roubini and Sala-i-Martin, 1991). The conventional wisdom is that openness to international trade and financial development has a positive impact on economic growth. The reason for the argument is partly based on the conclusions of many empirical studies, which claim that outward-oriented economies consistently have higher economic growth rates than inward-oriented economies. It is also partly due to the failures of import-substitution strategies, particularly in the 1980s and overstated expectations from trade liberalisation (Yanikkaya, 2003: 57). Lloyd and MacLaren (2000) argue that the fast-growing East Asian economies were partly a result of their early openness to international trade; less openness of economies to international trade will slow down their economic growth rates.

The objective of this study is to investigate the causal relationship between financial development, trade openness and economic growth in India. Previous empirical studies are ambiguous on the direction of causality between the three variables. Furthermore there are few studies that focus on India with these two variables. This further motivates this study. Accordingly, the objective of this paper is to identify the causal links between these three macroeconomic variables in Co-Integration framework for India. To be specific, the objectives are to examine whether in India:

1) Trade openness and financial development have causal effects on economic growth;

2) Trade openness and economic growth have causal effect on financial development; and

3) Economic growth and financial development have causal effects on trade openness

This study is structured as follows: Section 2 Introduces the theory and the literature review on financial development, Trade and Economic Growth. Section 3 deals with empirical review. Section 4 is concerned with the econometric methodology, while Section 5 explains model specification. Section 6 presents and discusses the findings of the study, consequently. Section 7 concludes with a summary and policy implication.

2. **Theory of Finance & Economic Growth**

Since 1991, Indian economy has undertaken a large number of financial sector reforms. Financial sector reforms in India have focused on the relaxation of quantitative controls, notably, progressive reduction in CRR, SLR, directed credited programme, deregulation of interest rates structure, introduction of new money market instruments to develop money market, reforming the banking system, money and capital market. These measures were aimed at improving the competitiveness, operational and allocative efficiency of the financial markets especially banking sector. These reforms were expected to improve the behavior of saving, investment and interest rates structure. In India, financial deepening has increased from 26% in 1960 to 44% in 1985 and a spectacular increase during the liberalization period (i.e from 45% in 1990 to around 80% in 2010). Indian economy has also provided positive real deposit rates especially 1985 onwards in the range of 4 to 5%, a major instrument in the hands of McKinnon-Shaw school. Spectacular growth in private corporate saving upward trends in the growth rate of GDP and Pcy. All these variables have shown upward trends during the last decade whether increasing financial deepening has been caused by the positive real deposit rates, it is a matter of empirical investigation. But certainly financial deepening, growth rate, private corporate saving and trade openness have increased over the years.

Although when regressing some measure of real economic growth on a financial development indicator, previous empirical studies generally assumed that the growth of the financial sector leads to economic development. There is no consensus in the literature, about the direction of causality between the two. Gurley & Shaw (1973) for example, seem to learn to the view that economic growth cause financial development. Gold Smith (1969) on the other hand, while observing a link between Financial Institutions and Economic Development, remains cautious about their causal relationship. Patrick (1966) suggests that both directions of causality may exist at different stages of development. He postulates that in the early stages of development,

financial expansion through the creation of financial institutions and the supply of their financial assets promotes economic growth, thus playing a Supply Leading role. In more advanced stage of development, however, demand of greater variety of financial assets to better accommodate the needs of both savers and investors leads to the creation of new financial institutions as well as a greater of financial assets. In that later, demand following stage, the financial system develops in response to the demand for financial services. Patrick's hypothesis has, however, been little explored empirically. Gupta (1984) conducted a note on causality tests in a sample of 25 countries and Jung (1986) conducted similar causality test for 56 countries. Financial infrastructure or system develops in response to the demand for financial services.

King and Levine's (1993a) study on the empirical relationship between a range of indicators of financial development and economic growth found that indicators of the level of financial development, the importance of bank relative to the central bank, the percentage of credit allocated to private firms, and the ratio of credit issued to private firms to GDP, are strongly and robustly correlated with growth rate of physical capital accumulation, and improvements in the efficiency of capital allocation. Rubini and Sala-i-Martin (1995) suggest that there is a negative relationship between inflation and growth and this association is likely to be spurious as both high inflation and low economic growth are caused by policies of financial repression. Demetriades and Luintel (1996) suggest that financial policies affects growth only through their effects on financial deepening. Also financial sector policies may affect financial deepening by altering bank behavior and in particular by changing banks willingness to attract deposits.

## 2.1 Theory of Trade Openness and Economic Growth

India had a relatively open trade regime until the 1950s with low tariff rates; quantitative import restrictions were not onerous and there was no evidence of foreign-exchange controls. The foreign exchange crisis in 1957 led to imposition of quantitative restrictions on imports, industrial licensing and foreign exchange controls, and these were progressively increased until 1966. The Ministry of Finance prioritized the usage of available foreign exchange. An array of licensing agencies was involved in the allocation process of foreign exchange. Imports of raw materials were not permitted if domestic substitutes were available. The Government of India introduced export subsidization schemes in 1962 but they were not very successful in boosting exports. One of the disadvantages of the requirement that domestically produced inputs be used

when available was that Indian exporters were compelled to use inferior-quality domestic inputs and therefore could not compete with their international counterparts.

India went through a phase of economic liberalization during 1966-68 which included measures such as the devaluation of the rupee by 57.5 per cent, removal of some import licensing controls and cuts in import tariffs. The measures were unpopular because of the widespread belief that they were in response to the dictates of the World Bank and the liberalization process was soon reversed and the protectionist regime continued until the 1970s (Panagariya, 2004). India's trade share (as percentage of GDP) went on falling continuously from late 1950s till 1970.

India undertook several liberalizing steps such partial liberalization of imports during the 1980s mainly to allow a more liberal flow of essential raw materials and machinery. It also expanded domestic demand through fiscal stimuli supported by large deficits. Consequently, India achieved a growth rate of above 5 per cent during the 1980s, though it also increased its foreign and domestic debt to unsustainable levels. The result was a major macroeconomic crisis in 1991, which prompted serious economic reforms including a systematic liberalization of trade. Within a decade, import licensing was entirely abolished and the highest tariff rate was brought down from 355 per cent to about 30 per cent (Bhat, 2011; Mukherjee and Mukherjee, 2012). Consequently, India experienced a sharp rise in its trade openness.

Broadly speaking, there are three sources of economic growth- factor accumulation, increase in productivity and innovation (Srinivasan, 2001). Trade openness can potentially enhance the growth prospects of a country by influencing any of these three sources of growth. For instance, an open economy can obtain factors (or their services) more easily from abroad compared to a closed economy. Trade openness also leads to better allocation of resources. When an economy opens up, forces of comparative advantage forces the economy to specialize in the sector for which it has better factor endowments. As a result, productivity of that sector goes up. The exports from that sector also increase which consequently boosts growth. Lastly, trade openness also encourages technology transfer from developed to developing economies which leads to an increase in factor productivity and finally enhances growth (Romer, 1991 and Chuang, 2000).

The traditional models of international trade discuss how trade openness improves the allocation of resources thus leading to an increase in production. The Ricardian Model says that trade liberalization makes an economy specialize in the sector where it has a comparative advantage. This, in turn, leads to an increase in production of output and makes the country better off. The

8

Heckscher-Ohlin Model shows that if two economies have different resources (i.e. one is more labour-intensive and the other more capital-intensive) then opening up to trade can lead to higher output (thus, higher incomes) in both the economies. That is because each economy specializes in the sector which uses its abundant factor more intensively in the H-O model. In some "new" trade theories (such as Krugman, 1979) also, the total output goes up as a country liberalizes its trade.

However, in the growth theories, the impact of trade openness on the rate of economic growth is not very unambiguous (Lopez, 2005). For example, in the neoclassical growth models such as the Solow model, the steady-state rate of output growth is exogenous. One explanation for why a change in policies (initiating trade reforms, for example) will not bring a change in the steady-state growth rate in the neoclassical models is because of the assumption that the marginal product of capital declines to zero as the capital-labour ratio increases indefinitely. The new growth theories or the endogenous growth theories do recognize trade openness as one of the primary engines of growth ( Romer, 1990 and Lucas, 1998). However, the new growth theories do not presume that trade openness will unambiguously promote economic growth (Harrison, 1991). When a closed economy opens up, the forces of comparative advantage can either promote primary sectors or technology and high-skill intensive sectors depending on the initial factor endowments of the economy. If an economy is technologically backward then trade liberalization is most likely to encourage the economy to specialize in primary or low-skilled sectors and discourage the development of its high-skilled sectors which may ultimately have an adverse effect on its long run growth rate (Grossman and Helpman, 1991). Growth after trade liberalization depends on whether the liberalization is encouraging R&D and innovation or not. However, sometimes increased competition from trade liberalization can discourage innovation by lowering expected profits. On the other hand, protectionism can facilitate long-run growth if protectionism encourages investment in research-intensive sectors (Grossman and Helpman, 1992). Furthermore, whether trade openness will accelerate growth or not depends on a large number of other factors such as macroeconomic stability and investment in physical and social infrastructure (Panagariya, 2003). In short, the theoretical literature cannot provide an unambiguous answer to the question of trade and growth.

3. **Literature Review and Empirical Findings**

Financial markets perform several functions which in turn exert a positive influence on growth (see Levine (1997)): they reduce liquidity and idiosyncratic risks, enhance the allocation of resources towards to their more productive uses, improve monitoring and corporate control, mobilize savings, and facilitate specialization a *deeper* financial systems are associated with a more effective supply of these financial services to the real sector. The thesis that financial development can influence economic growth and structural change has received strong theoretical underpinnings that identify two distinct, yet complementary channels, On the one hand, it is argued that the financial sector may influence growth through the accumulative channel and the allocative channel. The accumulation channel emphasizes the finance-induced positive effects of physical and human capital accumulation on economic growth (e.g. Pagano, 1993; De Gregorio and Kim, 2000). The allocation channel focuses on the rising efficiency of resource allocation which is caused by financial deepening and which subsequently enhances growth (e.g. King and Levine, 1993). Vamvakidis (2002) and Harrison (1996), amongst others reported openness to international trade affects economic growth positively. Openness to international trade can lead to an increase in specialization that will accelerate productivity growth by more fully realizing economies of scale. Moreover, the more open economy is expected to face more competitiveness and which stimulates productivity, which in turn stimulates economic growth huge empirical studies have emerged since the 1990s. Put briefly, those studies have mostly concluded that financial development positively contributes to the economic growth, although more country-specific researches are required to explain the heterogeneity across the countries. These studies can be roughly divided into two lines. While cross-country studies usually start with the priori assumption that finance influences growth, time series studies are largely devoted to finding the causality patterns suggested by Patrick

(1966)'s hypotheses, stated that the relationship between financial development and economic growth is bidirectional, namely, supply leading and demand-following. In addition, he argued that the direction may gradually shift from the former to the latter over time as an economy develops. We therefore review country specific study to see the direction of causality among financial development, trade openness and economic growth

Yucel (2009) examined the causality relations between financial development, trade openness and economic growth (GDP) for the Turkish economy for the period 1989 to 2007. The

econometric method employed was the Johansen and Juselius cointegration and Granger causality to test for causality test among the variables. The findings of the study showed that while trade openness has a positive effect, financial development has a negative effect on growth. Moreover, the Granger causality test results revealed the presence of bi-causal relationship between financial development, trade openness and growth indicating that economic policies aimed at financial development and trade openness have a statistically significant impact on economic growth.

Hassan and Islam (2005) examined whether financial development and openness to international trade can play any positive role in reducing poverty in Bangladesh through their growth enhancing effect for the period 1974-2003 Standard Granger-causality test is employed to ascertain whether financial development and trade openness cause growth.. Variables are found first difference stationary without having any co-integrating relationship as reported by Johansen co-integration test. As such Granger-causality test is carried out in first difference VAR. The paper does not find any causal relationship between trade openness and growth, and financial development and growth. This implies that financial development and trade openness do not reduce poverty through their effect on growth. However, bi-directional causal link evidenced between financial development and trade openness indicates that these two can contribute to poverty reduction directly through their mutual effect on each other.

Soukhakian (2007) empirically investigated the causal relationship between financial development, trade openness and economic growth in Japan covering the period 1960-2003. Results suggest that a long run equilibrium relationship exists between financial development, trade and economic growth in Japan except between domestic credit (second measure of financial development), trade and growth. The results of Granger Causality tests suggest that financial development as proxied by broad money gives causation to economic growth that supports the supply-leading growth hypothesis for the Japanese economy and support the growth-driven trade (GDT) hypothesis, which claims that economic growth causes "more efficient imports and exports" for Japan.

Katiricioglu, Kahyalar and Benar (2007) aimed at investigating the possible co-integration and the direction of causality between financial development, international trade and economic growth in India. Annual data covering the 1965-2004 period have been used to investigate co-integration and Granger causality tests between financial development, international trade, and

growth after employing unit root tests to see if the variables under consideration are stationary. Results reveal that there is a long-run equilibrium relationship between financial development, international trade and real income growth in the case of India. Furthermore, unidirectional causality was investigated that runs from real income to exports and imports, from exports to imports, M2 and domestic credits, from M2 to imports, from imports to domestic credits. Bidirectional causality has also been obtained between real income and M2, and between real income and domestic credits. Finally, no direction of causality has been obtained between M2 and domestic credits.

Wong Hock (2005) investigated the impact of openness to international trade and financial development on economic growth in Malaysia. The empirical model in the study is based on an augmented production function, where the real GDP per capita is specified as a function of the employment, the capital, a measure of openness to international trade and financial development. The study uses different measures of financial development. The unit root test results show that on the whole all the variables are found to have a unit root. Moreover, the results of the Johansen (1988) multivariate cointegration procedure show that economic growth, the employment, the capital, a measure of openness to international trade and financial development are cointegrated. All the variables are found to have the expected signs, except the measures of financial development in Model 3 and Model 4, when data set 1970-1996 is used. ECMs are estimated. The results show openness to international trade and financial development to have a significant impact on economic growth. Generally, the results suggest that openness to international trade and financial development are important for economic growth in Malaysia. Furthermore, there is strong evidence that openness to international trade Granger causes economic growth and not vice versa. However, Granger-causality between financial development and economic growth was found to be less robust, depending on the measure of financial development.

Rajan and Zingales (2003), the joint test between trade openness (TO) and capital flows (CF) is conducted using $x^2$ test statistic. If $\beta_2$ and $\beta_3$ are positive and jointly significant, this implies that the combination of financial and trade openness exerts holds, revealing that a small increase in either trade openness or capital flows would then result in greater financial development or both jointly determine the financial development.

Yanikkaya (2003) examined the impact of openness to international trade on economic growth of over 100 developed and developing countries using panel data from 1970 to 1997. The results

showed that openness to international trade does not have a simple and straightforward relationship with economic growth. However, contrary to the conventional view on economic growth effects of trade barriers, the results showed that trade barriers were positively and, in most specifications, significantly associated with economic growth, particularly for developing countries and they were consistent with the findings of theoretical economic growth.

Vamvakidis (2002) examined the relationship between openness to international trade and economic growth in developed and developing countries using cross-section data over the period 1920-1990. Estimating economic growth over a long period provides useful conclusions on the robustness of openness to international trade and other explanatory variables in the empirical model. The results showed that there was no positive relationship between openness to international trade and economic growth before 1970. The relationship was found to be negative. The positive relationship between openness to international trade and economic growth was only a recent phenomenon. However, it was sensitive to the measures of openness to international trade. The finding may suggest that openness to international trade when protection in the world economy is high does not result in economic growth benefits.

Harrison (1996) examined the relationship between openness to international trade and economic growth in developing countries using cross section and panel data for the period from 1960 to 1987. The empirical estimation is based on an augmented production function. The results suggested that the choice of time period for analysis is critical, i.e., more evidence of the positive impact of openness to international trade on economic growth is found when a longer time series data is used. This may suggest the importance of analyzing the short-run and long-run impact of openness to international trade. Generally, the results were quite robust. Openness to international trade positively affects economic growth. The results of Granger-causality suggested that the causality between openness to international trade and economic growth runs in both directions, i.e. more openness to international trade precedes a higher economic growth and a higher economic growth leads to more openness to international trade.

## 4. METHODOLOGY

The present study examines the causal relationship among financial development, trade openness and economic growth in India using annual data from 1971 to 2013. Co-integration and Granger-causality tests framework are employed to examine causal relationship among trade openness, financial development and economic growth in India. Description of data is presented first, and then procedure to examine stationarity of underlying time series is described. Next, Johansen co-integration test is described followed by Granger-causality methodology.

### 4.1 Overview of the variables (Data) used

In recent years there have been different empirical works which have shown that causation runs from financial development to economic growth, that there is a bidirectional effect, or that economic growth leads to financial development, some papers have even made a case for independent causation between growth and finance. Several indicators of financial development have been proposed in the literature. Different indicators will proxy different aspects of the relationship between the financial system and economic performance. Verifying the relationship between financial development and growth has at least two problems. First, it is necessary to assume a measure for financial development. And, secondly, many econometrics articles about this lemma do not use a theoretical model.

The sum of export and import as a percentage of GDP is used as a measure of trade openness (hereafter TO), while the Growth rate of real per capita GDP is used as the indicator of economic growth (hereafter GR). Data used in this study are published, unpublished and self generated data. Published data are available from various RBI publications, World development indicators (World Bank), IFS _CD ROM (IMF); Handbook of Statistics. RBI Currency and Finance, Economic Survey, different issues, Govt. of India. The study broadly covers period of 1971-2013. Many countries like India started liberalization process of their economies and financial system during this period in that period. Secondly, India started her financial sector reform, however, it was started in 1985, but got momentum after new economic policy of 1991. During this period financial depending i.e. M3/GDP, GDP growth rate, Pcy, Quasi Money/GDP ratio, Openness (X+M/GDP), all the variables have shown a rapid rising trend.

We use the following notations:

**Variables**

Y               =       GDP growth rate

$M^3$/GDP       =       Broad Money (C+ DD+ TD/GDP) as proxy for Financial Development.

$M^1$           =       Narrow money stock with the public (1971-2013)

$M^3$           =       Broad money stock of money which includes $M^1$ and the time deposits

TO              =       Trade Openness

**4.2 Estimation Technique**

**4.2.1 Unit Root Test**

**A. Test of Integration**

The first step involves testing the order of integration of the individual series under consideration. Researchers have developed several procedures for the test of order of integration. The most popular ones are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips (1987) and Phillips and Perron (1988). Augmented Dickey-Fuller test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. The tests are conducted with and without a deterministic trend (t) for each of the series. The general form of ADF test is estimated by the following regression

**1. Model -I: Without any Constant and Trend**

$$\Delta y_t = P y_{t-1} + \sum_{j=1}^{p} \delta_l \Delta y_{t-1} + e_t \qquad \qquad \ldots\ldots \quad (1)$$

**2. Model –II: (With Constant but No Trend)**

$$\Delta y_t = \alpha + P y_{t-1} + \sum_{j=1}^{p} \delta_j \Delta y_{t-1} + e_t \qquad \qquad \ldots\ldots \quad (2)$$

Where:

Y is a time series, t is a linear time trend, is the first difference operator, $\alpha 0$ is a constant, n is the optimum number of lags in the dependent variable and e is the random error term; the difference between equation (1) and (2) is that the first equation includes just drift. However, the second equation includes both drift and linear time trend pp.

3. **Model-III: (With Constant and Trend)**

$$\Delta y_1 = \alpha + \beta_t + Py_{i-1} + \sum_{j-1}^{p} \delta_j \Delta y_{t-1} + e_t \qquad \ldots\ldots \quad (3)$$

**B. Co-integration test**

Secondly, we test the presence or otherwise of cointegration between the series of the same order of integration through forming a cointegration equation. The basic idea behind cointegration is that if, in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary (Hall and Henry, 1989). A lack of cointegration suggests that such variables have no long-run relationship: in principal they can wander arbitrarily far away from each other (Dickey et. al., 1991). We employ the maximum-likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991).

Specifically, if Yt is a vector of n stochastic variables, then there exists a p-lag vector auto regression with Gaussian errors of the following form:

Johansen's methodology takes its starting point in the Vector Auto regression (VAR) of order P given by

$$\Delta y_t = A_0 + \sum_{j=1}^{p-1} \Gamma_j \Delta y_{t-j} + \Pi y_{t-1} + e_t \qquad \ldots\ldots \quad (4)$$

Where:

Yt is an nx1 vector of variables that are integrated of order commonly denoted (1) and εt is an nx1 vector of innovations.

This VAR can be rewritten as

$$Y_1 = A_0 + \sum_{j+1}^{p} AjY_{t-1} + \varepsilon i \qquad \dots\dots \quad (5)$$

where $T = \sum_{i=j+1}^{j \quad p}$ and $\prod = \sum_{j=1}^{p} A^{j-1}$

To determine the number of co-integration vectors, Johansen (1988, 1989) and Johansen and Juselius (1990) suggested two statistic test, the first one is the trace test (λ trace). It tests the null hypothesis that the number of distinct cointegrating vector is less than or equal to q against a general unrestricted alternatives q = r. the test calculated as follows:

$$λ \text{ trace } ( r) = -T\sum = +1 \text{ In } (1-λ^t) \qquad \dots\dots (6)$$

Where: T is the number of usable observations, and the λ1, s are the estimated eigenvalue from the matrix.

## C. Granger-causality Test

After the testing of the Cointegration relationship, we test for causality among financial development, Trade openness and Economic Growth in Nigeria. If the variables are co-integrated, an Error Correction term (ECT) is required to be included (Granger, 1988); however, if the reverse is the case we will go ahead to test our causality using the following model:

## MODEL 1

$$M3t = \sum = {}_{11t} \quad \textbf{M3}_{\textbf{t-1}} + \sum = {}_{12t} TOt\text{-}1 + \sum = {}_{13t}GRt\text{-}1 + \in_{11t} \qquad \dots\dots(7.1)$$

$$TOt = \sum = {}_{21t} \quad \textbf{M3}_{\textbf{t-1}} + \sum = {}_{22t}TOt\text{-}1 + \sum = {}_{23t}GRt\text{-}1 + \in_{21t} \qquad \dots\dots(7.2)$$

$$GRt = \sum = {}_{31t} M3t\text{-}1 + \sum = {}_{32t}TOt\text{-}1 + \sum = {}_{33t}GRt\text{-}1 + \in_{31t} \qquad \dots\dots(7.3)$$

17

Where:

M3t is broad Money Supply also used as a proxy for financial development

TOt is Trade Openness

GRt is Growth Rate of GDP


## 5. Model Specification

The primary model showing the causal relationship among financial development, trade openness and economic growth in India can be specified thus:

$$GR_t = f(FD, TO) \qquad \qquad \ldots\ldots.(5.1)$$

The function can also be represented in a log-linear econometric format thus:

$$logGR_t = \alpha_o + \alpha_1 logFD_t + \alpha_2 logTO_t + \varepsilon_t \qquad \ldots\ldots (5.2)$$

Where: FD is financial development proxied by Direct Credit (DC), Private Credit (PC) and Money Supply (M3)

GR is Growth rate of GDP

TO is Trade Openness; and

$\alpha_0$ is the constant term, 't' is the time trend, and 'ε' is the random error term.


## 6. Empirical Results

This section presents results of empirical analyses of the paper. Unit root test result is reported first followed by Johansen cointegration test result and lastly, Granger-causality test result

### 6.1 Unit Root Test

The first step is to test whether the relevant variables in equation are stationary and to determine their orders of integration. We use both the Augmented Dickey Fuller (ADF) and Phillips – Perron (PP) tests to find the existence of unit root in each of the time series. The results of both the ADF and PP tests are reported in Table 1 and 2.

The result in table 1 and table 2 shows that all the variables were stationary in levels. This can be seen by comparing the observed values (in absolute terms) of both the ADF and PP test statistics with the critical values (also in absolute terms) of the test statistics at the 1%, 5% and 10% level of significance. Result from table 1 provides strong evidence of non stationarity. Therefore, the

null hypothesis is accepted and it is sufficient to conclude that there is a presence of unit root in the variables at levels. Following from the above result, all the variables were differenced once and both the ADF and PP test were conducted on them in both tables. The result reveals that all the variables were stationary at first difference. On the basis of this, the null hypothesis of non-stationarity is rejected and it is safe to conclude that the variables are stationary. This implies that the variables are integrated of order one, i.e. 1(1).

**Table:1- ADF Unit Roots test**

Null Hypothesis: D(LOGGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

|  | t-Statistic | Prob.* |
|---|---|---|
| Augmented Dickey-Fuller test statistic | -14.10989 | 0.0000 |
| Test critical values:   1% level | -3.632900 | |
| 5% level | -2.948404 | |
| 10% level | -2.612874 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGDP,2)
Method: Least Squares
Date: 11/23/14  Time: 19:58
Sample (adjusted): 1976 2013
Included observations: 35 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(LOGGDP(-1)) | -1.675081 | 0.118717 | -14.10989 | 0.0000 |
| C | 0.038424 | 0.094446 | 0.406831 | 0.6868 |

| | | | |
|---|---|---|---|
| R-squared | 0.857813 | Mean dependent var | 0.039698 |
| Adjusted R-squared | 0.853504 | S.D. dependent var | 1.459841 |
| S.E. of regression | 0.558750 | Akaike info criterion | 1.729217 |
| Sum squared resid | 10.30266 | Schwarz criterion | 1.818094 |
| Log likelihood | -28.26130 | Hannan-Quinn criter. | 1.759898 |
| F-statistic | 199.0890 | Durbin-Watson stat | 1.775910 |
| Prob(F-statistic) | 0.000000 | | |

**Source:** Author's Estimation using Eviews 7.0

**Table: 2- PP Unit Roots Test**

Null Hypothesis: D(LOGGDP) has a unit
root Exogenous: Constant
Bandwidth: 18 (Newey-West automatic) using Bartlett kernel

|  |  | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic |  | -23.92653 | 0.0001 |
| Test critical values: | 1% level | -3.632900 |  |
|  | 5% level | -2.948404 |  |
|  | 10% level | -2.612874 |  |

*MacKinnon (1996) one-sided p-values.

| Residual variance (no correction) | 0.294362 |
|---|---|
| HAC corrected variance (Bartlett kernel) | 0.082374 |

Phillips-Perron Test Equation
Dependent Variable: D(LOGGDP,2)
Method: Least Squares
Date: 11/23/14  Time: 19:59
Sample (adjusted): 1976 2013
Included observations: 35 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(LOGGDP(-1)) | -1.675081 | 0.118717 | -14.10989 | 0.0000 |
| C | 0.038424 | 0.094446 | 0.406831 | 0.6868 |

| R-squared | 0.857813 | Mean dependent var | 0.039698 |
|---|---|---|---|
| Adjusted R-squared | 0.853504 | S.D. dependent var | 1.459841 |
| S.E. of regression | 0.558750 | Akaike info criterion | 1.729217 |
| Sum squared resid | 10.30266 | Schwarz criterion | 1.818094 |
| Log likelihood | -28.26130 | Hannan-Quinn criter. | 1.759898 |
| F-statistic | 199.0890 | Durbin-Watson stat | 1.775910 |
| Prob(F-statistic) | 0.000000 |  |  |

**Source:** Author's Estimation using Eviews 7.0

## 6.2 Cointegration Result

After confirming the stationarity of the variables at 1(1), we proceed to examine the issue of cointegration among the variables. When a cointegration relationship is present, it means that financial development, trade openness and economic growth finance, share a common trend and long-run equilibrium as suggested theoretically. We started the cointegration analysis by employing the Johansen and Juselius multivariate cointegration test. Table 3 show the result of the cointegration test. From the result both trace statistic and maximum Eigenvalue statistic indicated strong value 2 cointegrations ( i.e., our Trace Statistic 48.19 is more than Critical Value 29.79) at the 5 percent level of significance, suggesting that there is long run relationship cointegrating relations between GDP, TO and financial development.

When we talk about the Unrestricted Cointegration Rank Test here also our results are indicating long run relationship. Here our Max-Eigen Value (i.e., 30.22) is more that Critical Value ( i.e., 21.13).

## Table: 3- Johansen Co-Integration Test

Date: 11/23/14  Time: 20:06
Sample (adjusted): 1978 2013
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGM3 LOGGDP LOGOPENNESS
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.622816 | 48.19253 | 29.79707 | 0.0001 |
| At most 1 * | 0.428249 | 17.96681 | 15.49471 | 0.0208 |
| At most 2 | 0.020314 | 0.636215 | 3.841466 | 0.4251 |

Trace test indicates 2 cointegrating eqn(s) at the 0.05
level * denotes rejection of the hypothesis at the 0.05
level **MacKinnon-Haug-Michelis (1999) p-values

21

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.622816 | 30.22572 | 21.13162 | 0.0020 |
| At most 1 * | 0.428249 | 17.33059 | 14.26460 | 0.0159 |
| At most 2 | 0.020314 | 0.636215 | 3.841466 | 0.4251 |

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05
level * denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

## 6.3 Granger Causality Test

Having found strong cointegration among the variables of financial development (DC, PC and M2), trade openness (TO) and economic growth (GR), we carried out the Granger-causality. The results are reported in Table 4 show the results of model. Openness is causing Growth rate in India and further it leads to increase M3 in country also. In simple words, if we increase trade openness it will increase GDP and if GDP is increasing it will increase the money supply in the country and more and more finance will be available with the bank to deal with various trade requirements.

**Table: 4- Pair-wise Granger Causality test between LTO, LGR and LM3**

Pairwise Granger Causality Tests
Date: 11/23/14  Time: 20:09
Sample: 1971 2013
Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| LOGM3 does not Granger Cause LOGGDP | 31 | 1.02019 | 0.4187 |
| LOGGDP does not Granger Cause LOGM3 | | 0.20591 | 0.9324 |
| LOGOPENNESS does not Granger Cause LOGGDP | 31 | 3.19702 | 0.0027 |
| LOGGDP does not Granger Cause LOGOPENNESS | | 0.65108 | 0.6322 |
| LOGOPENNESS does not Granger Cause LOGM3 | 39 | 3.04295 | 0.0135 |
| LOGM3 does not Granger Cause LOGOPENNESS | | 0.84735 | 0.5065 |

## 7. Conclusion

The purpose of this study is to examine the causal relationship among financial development, trade openness and Economic Growth in India using annual data sourced from IFS-2007 CD-ROM version, RBI, Economic Survey for the period 1971-2013. The econometric methodology employed was the Cointegration and Granger Causality test. First, the stationarity properties of the data and the order of integration of the data were tested using both the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test. We found that the variables were non-stationary in levels, but stationary in first differences, that is, they are integrated of order one 1(1). We applied the Johansen multivariate approach to cointegration to test for the long-run relationship among the variables. Our result shows that there are no cointegrating relations between GR, TO and the three measures of financial development (DC, PC and M3), suggesting that there is no long-run relationship between financial development, trade openness and economic growth. Co-integration results shows log run relationship between Finance, Trade Openness and Economic Growth in India, Granger causality test is carried out with two lag lengths.

The Granger-causality results suggest that trade openness and financial development does have causal impact on economic growth; conversely M3 does have causal impact on trade. As noted, openness was found to have causal effect on M3 and growth implying support for growth-led trade and for finance-led growth. Money supply was the only instrument of financial development that was seen to cause Trade openness; which means that it was rather trade openness that was found to cause both domestic saving as an measure instrument for financial development.

**Policy Implications:**

The findings of the study shows that trade and financial development do have positive effect on economic growth due the causal impact they both have on the growth of GDP. Also, economic growth revealed a direct impact on enhancing the performance of the financial sector performance as well as increasing the strength of India participating in international trade (openness). If this is seriously considered by policy makers, its pertinent that policies enhance growth-led trade and finance –led- growth is seriously pursued for India to participate and benefit effectively from international trade. Furthermore, to enhance and guarantee the

availability of Domestic credit, private credit and money supply, effort should be made to take on measures that lead to GDP growth through other measures including trade openness.

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