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Causal Linkage between International Financial Integration and Economic Growth: Evidence from Post Globalized Indian Scenario

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Abstract:
In recent years, there has been a growing literature highlighting, at both theoretical and empirical level, the importance of having a deep financial integration to promote economic growth. The impact of international financial integration on economic growth continues to be one of the most debated issues among international economists. This paper re-examines causal relationship between financial integration and economic growth, more precisely, the effect of international financial integration on the economic growth in India. The Johansen cointegration test suggests that there is cointegration and hence, confirmed the existence of long run equilibrium relationship between financial integration and economic growth. The Granger- causality test finally confirmed the existence of uni-directional causality which runs from economic growth (GDP) to international financial integration (IFI) and not vice versa. This indicates that economic growth accelerates financial integration in India but financial integration does not found to have any impact of economic growth of India.It is suggested that government has to deepen foreign capital inflow as well as capital outflow and undertake essential measures to strengthen the long run relationship between financial integration and economic growth.

Keywords: Economic growth, financial integration, GDP, India.

JEL classification: F3; F4; O4

1. Introduction:

In recent years, there has been a growing literature highlighting, at both theoretical and empirical level, the importance of having a deep financial integration to promote economic growth. The impact of international financial integration on economic growth continues to be one of the most debated issues among international economists. Since 1991, globalized world have observed a substantial increase in world-wide capital flows. The financial background has changed significantly since the beginning of the 1980s. Several factors, including the liberalization of international capital movements, financial deregulation and advances in information technology, have contributed to this change. The result is an increase in cross-border capital flows, a greater presence of foreign banks and more international financial integration. The attention on financial globalization has also increased and led economists to converse of it thoughtfully. Generally speaking, financial globalization consists of the opening up of a country to capital flows from other ones.

Financial integration is the process by which a country's financial markets - including money, bond, bank credit and equity markets - become more closely integrated with those in other countries. Three widely-accepted and interrelated benefits accrue from this process: more opportunities for risk sharing and diversification, the better allocation of capital across investment opportunities, and the potential for higher economic growth. First, sharing risk across regions augments specialization, increases the set of financial instruments available, and thereby provides additional possibilities for portfolio diversification. Second, the removal of barriers to trading, clearing and settlement allows firms to select the most efficient location for their financing activities. Investors also are open to invest their funds where they will be allocated to their most productive end-use. The perfection in capital allocation also enhances financial development, supporting the process of economic growth with additional funds flowing to (often less-developed) countries that have more and better productive opportunities.

Experience suggests that international financial liberalization can be a mixed blessing. International borrowing assists individual countries smooth consumption and finance productive investment. Foreign investment, particularly foreign direct investment, can assist the transfer of technological and managerial know-how. Portfolio investment and foreign bank lending can also contribute to the intensifying of the domestic financial market. Some advocates have argued that, by increasing the rewards for good policies and the penalties for bad policies, capital flows can promote more disciplined macroeconomic policies (Grilli and Milesi-Ferretti 1995). At the same time, financial liberalization entails several risks. Capital inflows can lead to an appreciation of the domestic currency and adversely affect the trade balance. Large and sudden inflows can fuel rapid consumption growth, rising or sustained high inflation, and unsustainable current account deficits. Financial liberalization in countries with underdeveloped financial systems can make them more crisis-prone.

Financial integration arises in two main ways. One is from formal efforts to integrate financial markets with particular partners, typically those that share membership in some wider regional agreement. Integration in this sense involves the elimination of cross-border restrictions on the activities of firms and investors within the region, as well as the harmonization of rules, taxes and regulations between member countries. It is usually expected that financial integration should follow from these developments. However, financial integration may also materialize less formally. Several factors contribute to this means of financial integration which include foreign bank entry into domestic markets, direct borrowing by firms in international markets, bilateral financial and trade agreements, strengthening finance and trade relationships between countries, and the convergence of business and investor practices.

Against this backdrop, this paper re-examines causal relationship between financial integration and economic growth, more precisely, the effect of international financial integration on the economic growth in India.

2. Literature Review:

Theory provides inconsistent predictions about the growth effects of international financial integration (IFI), i.e., the degree to which an economy does not restrict cross-border transactions. Some economic theories have documented various direct and indirect channels through which financial integration can enhance growth in developing countries. Financial Integration leads to higher economic growth via direct channels like augmentation of domestic savings, lower cost of capital due to better risk allocation, transfer of technology and development of financial sector, on the other hand, indirect channels of financial integration like promotion of specialization, inducement for better policies, enhancement of capital inflow by signaling better policies augments economic growth of the country like India. According to some theories, IFI facilitates risk-sharing and thereby enhances production specialization, capital allocation, and economic growth (Obstfeld, 1994; Acemoglu and Zilibotti, 1997). Further, in the standard neoclassical growth model, IFI eases the flow of capital to capital scarce countries with positive output effects. Also, IFI may enhance the functioning of domestic financial systems, through the intensification of competition and the importation of financial services, with positive growth effects (Klein and Olivei, 2000; Levine, 2001).Other theories argued that such an enhancement can not be guaranteed in the presence of pre-existing distortion. These theoretical disputes are parallelized with inconclusive empirical literature with regard to the financial integration-growth nexus. So, IFI in the presence of pre-existing distortions can actually retard growth. Boyd and Smith (1992), show that IFI in countries with weak institutions and policies may actually induce a capital outflow from capital-scarce countries to capital rich countries with better institutions. Thus, some theories predict that international financial integration will promote growth only in countries with sound institutions and good policies.

Although theoretical disputes and the concomitant policy debate over the growth effects of IFI have produced a growing empirical literature, resolving this issue is complicated by the difficulty in measuring IFI. Countries impose a complex array of price and quantity controls on a broad assortment of financial transactions. Thus, researchers face enormous hurdles in measuring cross-country differences in the nature, intensity, and effectiveness of barriers to international capital flows (Eichengreen, 2001).When theory provides conflicting predictions about the growth effects of financial integration, it is particularly interesting to look at the empirical evidence. An extensive literature has been built up over the past two decades on the impact of financial openness on economic growth.

Table 1: The Growth Effect of Financial Integration:

Study	**Number of Countries**	**Years Covered**	**Effect on Growth**
Alesina, Grilli, and Milesi-Ferretti (1994)	20	1950-89	No effect
Grilli and Milesi-Ferretti (1995)	61	1966-89	No effect

Quinn (1997)	58	1958-88	Positive
Kraay (1998)	64, 94, or 117	1975-95	No-effect
Rodrick (1998)	73	1976-89	No effect
Klein and Olivei (2000)	67	1976-95	Positive
Chanda (2001)	116 (57 non-OECD)	1975-95	Mixed
Arteta, Eichengreen, and Wyplosz (2001)	51-59	1973-81 1982-87 1988-92	Mixed
Edwards (2001)	55-62	1973-88	No effect for poor countries
Eichengreen and Leblang (2002)	21	1880-97	Ambiguous
Prasad, Rogoff, Wei and Kose (2003)	76	1980-2000	Mixed
Fratzcher and Bussière (2004)	45	1980-2002	Short run gain / long run pain
Schularick and Steger (2005)	20	1880-1914	Robust positive
Klein (2005)	71	1976-1995	Robust conditional positive

Source: Prasad, Eswar, Kenneth Rogoff, Shang-Jin Wei and M. Ayhan Kose (2003), "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence", IMF Working Paper; p.32, (modified by the author).

3. Methodology and data base:

3.1. Data and Variables

The objective of this paper is to investigate the dynamics of the relationship between international financial integration and economic growth in India using the annual data for the period, 1990-91 to 2010-11 which includes the 21 annual observations. The two main variables of this study are economic growth and international financial integration. The real Gross Domestic Product (GDP) is used as the proxy for economic growth in India and we represent the economic growth rate by using the constant value of Gross Domestic Product (GDP) measured in Indian rupee and the financial integration is the ratio of sum of capital inflow and capital outflow to the GDP. For capital inflow, we use the sum of official aid, foreign direct investment and portfolio investment in India. Since consistent and regular time series data is not available for capital outflow, we use debt servicing as a proxy for capital outflow. Empirical studies also use measures of actual international capital flows to proxy for international financial openness. The assumption is that more capital flows as a share of Gross Domestic Product (GDP) are a signal of greater IFI. The advantage of this measure is that they are widely available and they are not subjective measures of capital restrictions. A disadvantage is that many factors influence capital flows. Indeed, growth may influence capital flows and policy changes may influence both growth and capital flows, producing a spurious, positive relationship between growth and capital flows, and growth may affect capital flows. Stock of Capital Flows accumulates FDI and portfolio inflows and outflows as a share of GDP. Flow of Capital equals FDI and portfolio inflows and outflows as a share of GDP. Thus, it is total capital inflows plus outflows divided by GDP. Kraay (1998) used this indicator to measure capital account openness. As noted, it is important to measure both inflows and outflows in creating an IFI proxy. All necessary data for the sample period are obtained from the Handbook of Statistics on Indian Economy, 2010-11 published by Reserve Bank of India. All the variables are taken in their natural logarithms to avoid the problems of heteroscedasticity.

Using the time period, 1990-91 to 2010-11 for India, this study aims to examine the long-term and causal dynamic relationships between the degree of international financial integration and economic growth. The estimation methodology employed in this study is the cointegration and error correction modeling technique.

The entire estimation procedure consists of three steps: first, unit root test; second, cointegration test; third, the error correction model estimation.

3.2. Econometric specification:

3.2.1Hypothesis:

The paper is based on the following hypotheses for testing the causality and co-integration between GDP and financial integration in India (i) whether there is bi-directional causality between GDP growth and IFI (International financial integration), (ii) whether there is unidirectional causality between the two variables, (iii) whether there is no causality between GDP and IFI in India

(iv) whether there exists a long run relationship between GDP and IFI in India.

3.2.2.Model Specification

The choice of the existing model is based on the fact that it allows for generation and estimation of all the parameters without resulting into unnecessary data mining.

The growth model for the study takes the form: GDP=f (IFI) -------------------(1)

where GDP and IFI are the gross domestic product and International financial integration respectively.

Equation (1) is treated as a Cobb-Douglas function with export from India, (IFI), as the only explanatory variable.

The link between Economic growth (measured in terms of GDP growth) and International financial integration in India can be described using the following model in linear form:

$LnGDP_t = \alpha + \beta Ln\, IFI_t + \varepsilon_t$ -------------- (1.1)

α and $\beta>0$

The variables remain as previously defined with the exception of being in their natural log form. ε_t is the error term assumed to be normally, identically and independently distributed.

Here, GDP_t and IFI_t show the Gross Domestic Product annual growth rate and international financial integration at a particular time respectively while ε_t represents the "noise" or error term; α and β represent the slope and coefficient of regression. The coefficient of regression, β indicates how a unit change in the independent variable (International financial integration) affects the dependent variable (gross domestic product). The error, ε_t, is incorporated in the equation to cater for other factors that may influence GDP. The validity or strength of the Ordinary Least Squares method depends on the accuracy of assumptions. In this study, the Gauss-Markov assumptions are used and they include; that the dependent and independent variables (GDP and IFI) are linearly co-related, the estimators (α, β) are unbiased with an expected value of zero i.e., E (ε_t) = 0, which implies that on average the errors cancel out each other. The procedure involves specifying the dependent and independent variables; in this case, GDP is the dependent variable while IFI the independent variable.

But it depends on the assumptions that the results of the methods can be adversely affected by outliers. In addition, whereas the Ordinary Least squares regression analysis can establish the dependence of either GDP on IFI or vice versa; this does not necessarily imply direction of causation. Stuart Kendal noted that "a statistical relationship, however, strong and however suggestive, can never establish causal connection." Thus, in this study, another method, the Granger causality test, is used to further test for the direction of causality.

Step –I: Ordinary least square method:

Here we will assume the hypothesis that there is no relationship between international financial integration (IFI) and Economic Growth in terms of GDP. To confirm about our hypothesis, primarily, we have studied the effect of foreign trade on economic growth and vice versa by two simple regression equations:

$LnIFI_i = a + b * LnGDP_i$ ....(2)

$LnGDP_i = a_1 + b_1 * LnIFI_i$ ....(3)

GDP = Gross domestic product.

IFI = International financial integration.

t= time subscript.

This study aimed to examine the long-term relationship between International financial integration and GDP growth in India between 1990-91 and 2010-11. Using co-integration and Vector Error Correction Model (VECM) procedures, we investigated the relationship between these two variables. The likely short-term properties of the relationship among economic growth and International financial integration were obtained from the VECM application. Next, unit root, VAR, cointegration and Vector Error Correction Model (VECM) procedures were utilized in turn. The first step for an appropriate analysis is to determine if the data series are stationary or not. Time series data generally tend to be non-stationary, and thus they suffer from unit roots. Due to the non-stationarity, regressions with time series data are very likely to result in spurious results. The problems stemming from spurious regression have been described by Granger and Newbold (1974). In order to ensure the condition of stationarity, a series ought to be integrated to the order of 0 [I(0)]. In this study, tests of stationarity, commonly known as unit root tests, were adopted from Dickey and Fuller (1979, 1981) and Phillips-Perron test and KPSS test. As the data were analyzed, we discovered that error terms had been correlated in the time series data used in this study.

Step –II: The Stationarity Test (Unit Root Test)

It is suggested that when dealing with time series data, a number of econometric issues can influence the estimation of parameters using OLS. Regressing a time series variable on another time series variable using the Ordinary Least Squares (OLS) estimation can obtain a very high R^2, although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. Therefore, prior to testing Cointegration and implementing the Granger Causality test, econometric methodology needs to examine the stationarity; for each individual time series, most macro economic data are non stationary, i.e. they tend to exhibit a deterministic and/or stochastic trend. Therefore, it is recommended that a stationarity (unit root) test be carried out to test for the order of integration. A series is said to be stationary if the mean and variance are time-invariant. A non-stationary time series will have a time dependent mean or make sure that the variables are stationary, because if they are not, the standard assumptions for asymptotic analysis in the Granger test will not be valid. Therefore, a stochastic process that is said to be stationary simply implies that the mean [(E (Y_t)] and the variance [Var (Y_t)] of Y remain constant over time for all t, and the covariance [covar (Y_t, Y_s)] and hence the correlation between any two values of Y taken from different time periods depends on the difference apart in time between the two values for all t≠s. Since standard regression analysis requires that data series be stationary, it is obviously important that we first test for this requirement to determine whether the series used in the regression process is a difference stationary or a trend stationary. The Augmented Dickey-Fuller (ADF) test is used. To test the stationary of variables, we use the Augmented Dickey Fuller (ADF) test which is mostly used to test for unit root. Following equation checks the stationarity of time series data used in the study:

$$\Delta y_t = \beta_1 + \beta_1 t + \alpha\, y_{t-1} + \gamma \sum_{t=1}^{n} \Delta y_{t-1} + \varepsilon_t$$

Where ε_t is white nose error term in the model of unit root test, with a null hypothesis that variable has unit root. The ADF regression test for the existence of unit root of y_t that represents all variables (in the natural logarithmic form) at time t. The test for a unit root is conducted on the coefficient of yt-1 in the regression. If the coefficient is significantly different from zero (less than zero) then the hypothesis that y contains a unit root is rejected. The null and alternative hypothesis for the existence of unit root in variable y_t is H_0; $\alpha = 0$ versus H1: $\alpha < 0$. Rejection of the null hypothesis denotes stationarity in the series.

If the ADF test-statistic (t-statistic) is less (in the absolute value) than the Mackinnon critical t-values, the null hypothesis of a unit root can not be rejected for the time series and hence, one can conclude that the series is non-stationary at their levels. The unit root test tests for the existence of a unit root in two cases: with intercept only and with intercept and trend to take into the account the impact of the trend on the series.

The PP tests are non-parametric unit root tests that are modified so that serial correlation does not affect their asymptotic distribution. PP tests reveal that all variables are integrated of order one with and without linear trends, and with or without intercept terms.

Phillips–Perron test (named after Peter C. B. Phillips and Pierre Perron) is a unit root test. That is, it is used in time series analysis to test the null hypothesis that a time series is integrated of order 1. It builds on the Dickey–Fuller test of the null hypothesis $\delta = 0$ in $\Delta y_t = \delta y_{t-1} + u_t$, here Δ is the first difference operator. Like the augmented Dickey–Fuller test, the Phillips–Perron test addresses the issue that the process generating data for y_t might have a higher order of autocorrelation than is admitted in the test equation - making y_{t-1} endogenous and thus invalidating the Dickey–Fuller t-test. Whilst the augmented Dickey–Fuller test addresses this issue by introducing lags of Δy_t as regressors in the test equation, the Phillips–Perron test makes a non-parametric correction to the t-test statistic. The test is robust with respect to unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation.

Several tests of non-stationarity called unit root tests have been developed in the time series econometrics literature. In most of these tests the null hypothesis is that there is a unit root, and it is rejected only when there is strong evidence against it. Most tests of the Dickey-Fuller (DF) type have low power (see Dejong et al. 1992). Because of this Maddala and Kim (1998) argue that DF, ADF (augmented Dickey-Fuller) and PP (Phillips and Perron) tests should be discarded. We, therefore, use the KPSS (Kwiatkowski, Phillips, Schmidt and Shin 1992) test which is considered relatively more powerful (Bahmani-Oskooee et.al.,1999). The KPSS Lagrange Multiplier tests the null of stationarity (H_0: $\rho < 1$) against the alternative of a unit root (H_1: $\rho = 1$).

In econometrics, Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests are used for testing a null hypothesis that an observable time series is stationary around a deterministic trend. The series is expressed as the sum of deterministic trend, random walk, and stationary error, and the test is the Lagrange multiplier test of the hypothesis that the random walk has zero variance. KPSS type tests are intended to complement unit root tests, such as the Dickey–Fuller tests. By testing both the unit root hypothesis and the stationarity hypothesis, one can distinguish series that appear to be stationary, series that appear to have a unit root, and series for which the data (or the tests) are not sufficiently informative to be sure whether they are stationary or integrated.

Once the number of unit roots in the series was decided, the next step before applying Johansen's (1988) co-integration test was to determine an appropriate number of lags to be used in estimation. Second, Eagle-Granger residual based test tests the existence of co integration among the variables-FT and GDP at constant prices for the economy. Third, if a co integration relationship does not exist, VAR analysis in the first difference is applied, however, if the variables are co integrated, the analysis continues in a cointegration framework.

Step-III: Testing for Cointegration Test(Johansen Approach)

Cointegration, an econometric property of time series variable, is a precondition for the existence of a long run or equilibrium economic relationship between two or more variables having unit roots (i.e. Integrated of order one). The Johansen approach can determine the number of co-integrated vectors for any given number of non-stationary variables of the same order. Two or more random variables are said to be cointegrated if each of the series are themselves non – stationary. This test may be regarded as a long run equilibrium relationship among the variables. The purpose of the Cointegration tests is to determine whether a group of non-stationary series is cointegrated or not.

Having concluded from the ADF results that each time series is non-stationary, i.e it is integrated of order one I(1), we proceed to the second step, which requires that the two time series be co-integrated. In other words, we have to examine whether or not there exists a long run relationship between variables (stable and non-spurious co-integrated relationship). In our case, the mission is to determine whether or not international financial integration (IFI) and economic growth (GDP) variables have a long-run relationship in a bivariate framework. Engle and Granger (1987) introduced the concept of cointegration, where economic variables might reach a long-run equilibrium that reflects a stable relationship among them. For the variables to be co-integrated, they must be integrated of order one (non-stationary) and the linear combination of them is stationary I(0).

The crucial approach which is used in this study to test r cointegration is called the Johansen cointegration approach. The Johanson approach can determine the number of cointegrated vectors for any given number of non-stationary variables of the same order.

Step-IV: The Granger Causality test :

Causality is a kind of statistical feedback concept which is widely used in the building of forecasting models. Historically, Granger (1969) and Sim (1972) were the ones who formalized the application of causality in economics. Granger causality test is a technique for determining whether one time series is significant in forecasting another (Granger. 1969). The standard Granger causality test (Granger, 1988) seeks to determine whether past values of a variable helps to predict changes in another variable. The definition states that in the conditional distribution, lagged values of Y_t add no information to explanation of movements of X_t beyond that provided by lagged values of X_t itself (Greene, 2003). We should take note of the fact that the Granger causality technique measures the information given by one variable in explaining the latest value of another variable. In addition, it also says that variable Y is Granger caused by variable X if variable X assists in predicting the value of variable Y. If this is the case, it means that the lagged values of variable X are statistically significant in explaining variable Y. The null hypothesis (H_0) that we test in this case is that the X variable does not Granger cause variable Y and variable Y does not Granger cause variable X. In summary, one variable (X_t) is said to granger cause another variable (Y_t) if the lagged values of X_t can predict Y_t and vice-versa.

IFI and GDP are, in fact, interlinked and co-related through various channel. There is no theoretical or empirical evidence that could conclusively indicate sequencing from either direction. For this reason, the Granger Causality test was carried out on IFI and GDP.

The spirit of Engle and Granger (1987) lies in the idea that if the two variables are integrated as order one, I(1), and both residuals are I(0), this indicates that the two variables are cointegrated. The Granger theorem states that if this is the case, the two variables could be generated by a dynamic relationship from GDP to IFI and, vise versa.

Therefore, a time series X is said to Granger-cause Y if it can be shown through a series of F-tests on lagged values of X (and with lagged values of Y also known) that those X values predict statistically significant information about future values of Y. In the context of this analysis, the Granger method involves the estimation of the following equations:

If causality (or causation) runs from IFI to GDP, we have:

$$dLnGDP_{it} = \eta_i + \Sigma\alpha_{11}dLnGDP_{i,t-1} + \Sigma\beta_{11}dLn\ IFI_{i\ ,\ t-1} + \varepsilon_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

If causality (or causation) runs from GDP to IFI, it takes the form:

$$dLn\ IFI_{it} = \eta_i + \Sigma\alpha_{12}dLn\ IFI_{i\ ,\ t-1} + \Sigma\beta_{12}dLnGDP_{i,t-1} + \lambda ECM_{it} + \varepsilon_{2t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

where, GDP $_t$ and IFI $_t$ represent gross domestic product and export respectively, ε_{it} is uncorrelated stationary random process, and subscript *t* denotes the time period. In equation 4, failing to reject: H_0: $\alpha_{11} = \beta_{11} = 0$ implies that financial integration does not Granger cause economic growth. On the other hand, in equation5, failing to reject H_0: $\alpha_{12} = \beta_{12} = 0$ implies that economic growth via GDP growth does not Granger cause financial integration.

The decision rule:

From equation (4), dLn $IFI_{i\ t-1}$Granger causes $dLnGDP_{it}$ if the coefficient of the lagged values of IFI as a group (β_{11}) is significantly different from zero based on F-test (i.e., statistically significant). Similarly, from equation (5), $dLnGDP_{i,t-1}$ Granger causes $dLnIFI_{it}$ if β_{12} is statistically significant.

Step V: Error Correcting Model (ECM) and Short Term Causality Test :

Error correction mechanism was first used by Sargan(1984), later adopted, modified and popularized by Engle and Granger (1987). By definition, error correction mechanism is a means of reconciling the short-run behaviour (or value) of an economic variable with its long-run behaviour (or value). An important theorem in this regard is the Granger Representation Theorem which demonstrates that any set of cointegrated time series has an error correction representation, which reflects the short-run adjustment mechanism.

Co-integration relationships just reflect the long term balanced relations between relevant variables. In order to cover the shortage, correcting mechanism of short term deviation from long term balance could be cited. At the same time, as the limited number of years, the above test result may cause disputes (Christpoulos and Tsionas, 2004). Therefore, under the circumstance of long term causalities, short term causalities should be further tested as well. Empirical works based on time series data assume that the underlying time series is stationary. However, many studies have shown that majority of time series variables are nonstationary or integrated of order 1 (Engle and Granger, 1987). The time series properties of the data at hand are therefore studied in the outset. Formal tests will be carried out to find the time series properties of the variables. If the variables are *I* (1), Engle and Granger (1987) assert that causality must exist in, at least, one direction. The Granger causality test is then augmented with an error correction term (ECT) and the error correcting models could be built as below:

$dLnGDP_{it} = \eta_i + \Sigma\alpha_{11}dLnGDP_{i,t-1} + \Sigma\beta_{11}dLn\ IFI_{i,t-1} + \lambda ECM_{it} + \varepsilon_{it}$……………………….(6)

$dLn\ IFI_{it} = \eta_i + \Sigma\alpha_{12}dLn\ IFI_{i,t-1} + \Sigma\beta_{12}dLnGDP_{i,t-1} + \lambda ECM_{it} + \varepsilon_{it}$…………………………..(7)

Where t represents year, d rerepresents first order difference calculation, ECM_{it} represents the errors of long term balance which is obtained from the long run co-integrating relationship between economic growth and financial integration. If $\lambda = 0$ is rejected, error correcting mechanism happens, and the tested long term causality is reliable, otherwise, it could be unreliable. If $\beta_1=0$ is rejected, and then the short term causality is proved, otherwise the short term causality doesn't exist.

4. Analysis of the Result:

4.1.Ordinary Least Square Technique:

This section presents the nexus between export and economic growth in terms of OLS Technique.

Table: 2:Result of OLS Technique

Variable	Dependent variable is LnGDP				
	Coefficient	SE	t ratio	R^2	F Statistic
Ln IFI	2.463	0.838	2.94	0.31	8.62
	Dependent variable is LnIFI				
Ln GDP	0.1267	0.0432	2.93	0.31	8.62

Ho: There is no relationship between the variables; H_1: There is relationship between the variables

Source: Own estimates.

In ordinary least square Method, we reject the hypothesis that there is no relationship between the variable and the results of the Ordinary Least Squares Regression are summarized in the Table 2. The empirical analysis on basis of ordinary Least Square Method suggests that there is positive relationship between international financial integration and GDP and vice versa.

4.2.Unit Root Test:

Table (3) presents the results of the unit root test byADF for the two variables for their levels. The results indicate that the null hypothesis of a unit root can not be rejected for the given variable and, hence, one can conclude that the variables are not stationary at their levels. On the other hand, to determine the stationarity property of the variable, the same test above was applied to the first differences. Results from table (3) revealed that all the ADF values are not smaller than the critical t-value at 1%, 5% and 10%level of significance for all variables. Based on these results, the null hypothesis that the series have unit roots in their differences can not be rejected. Therefore, the augmented Dickey Fuller Test fails to provide result of stationary both at levels and first differences at all lag differences. The results in Table 4 show that both variables of our interest, namely LnGDP and LnIFI attained stationarity after first differencing, I(1), using PP test.

Table:3: Augmented Dickey-Fuller (ADF) Test

International Financial Integration												
Variables	Levels						First Differences					
	Intercept			Intercept&Trend			Intercept			Intercept&Trend		
	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2
LnIFI	-1.03	-0.46	0.21	-1.84	-1.28	-0.49	-5.21	-3.70	-1.69	-5.91	-4.72	-2.06
Economic Growth												
Ln GDP	Levels						First Differences					
	Intercept			Intercept&Trend			Intercept			Intercept&Trend		
	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2
	1.07	0.86	0.62	-1.67	-1.44	-1.51	-4.23	-2.59	-1.95	-4.43	-2.75	-2.08
Critical Values												
1%	-3.89			-4.57			-3.89			-4.57		
5%	-3.05			-3.69			-3.05			-3.69		
10%	-2.67			-3.29			-2.67			-3.29		

Ho: series has unit root; H1: series is trend stationary

Source: Own estimates

An inspection of the figures reveals in table-4 that each series is first difference stationary at,5% level(with intercept and trend) using the PP test. However, the ADF test result is not as impressive, as all the variables did not pass the differenced stationarity test at the one, five and ten percent levels. We therefore rely on the PP test result as a basis for a cointegration test among all stationary series of the same order meaning that the two series are stationary at their first differences [they are integrated of the order one i.e I(1)].

Table:4: Phillips-Perron Test

International Financial Integration												
Variables	Levels						First Differences					
	Intercept			Intercept&Trend			Intercept			Intercept&Trend		
	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2

LnIFI	-1.03	-0.95	-0.89	-1.84	-1.71	-1.59	-5.21	-5.24	-5.29	-5.91	-6.08	-6.46
Economic Growth												
Ln GDP	Levels						First Differences					
	Intercept			Intercept&Trend			Intercept			Intercept&Trend		
	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2	Lag0	Lag1	Lag2
	1.08	1.16	1.18	-1.66	-1.67	-1.69	-1.67	-4.23	-4.23	-4.44	-4.43	-4.44
Critical Values												
1%	-3.80			-4.57			-3.80			-4.57		
5%	-3.01			-3.69			-3.01			-3.69		
10%	-2.65			-3.29			-2.65			-3.29		

Ho: series has unit root; H1: series is trend stationary.

Source: Own estimates

More precisely, we rely on the KPSS test result as a basis for a cointegration test among all stationary series of the same order meaning that the two series are stationary at their first differences.

The results of unit root test in table-5 show that both variables of our interest, namely international financial integration (IFI) and economic growth (GDP) under our consideration attained stationarity at both level and first differences, using KPSS test as KPSS values with and without trend at first differences for all two variables-IFI and GDP are less than critical values at 1%. Therefore, the series are level and first difference stationary and they are integrated of the same order.

Table:5: Kwiatkowski, Phillips, Schmidt and Shinn(KPSS) test

International Financial Integration				
LnIFI	KPSS level		KPSS First Difference	
	Without Trend	With trend	Without Trend	With trend
	0.3669	0.1541	0.3393	0.090
Economic Growth				
Ln GDP	KPSS level		KPSS First Differences	
	Without Trend	With trend	Without Trend	With trend
	0.7158	0.1739	0.2704	0.0644

Ho: series has unit root; H_1: series is trend stationary

Note: 1%, 5% and 10% critical values for KPSS are 0.739, 0.463 and 0.347 for *without trend.*

1%, 5% and 10% critical values for KPSS *with trend* are 0.216, 0.146 and 0.1199.

Source: Own estimate.

4.3.Cointegration Test:

Having established the time series properties of the data, the test for presence of long-run relationship between the variables using the Johansen and Juselius (1992) LR statistic for cointegration was conducted. The crucial approach which is used in this study to test cointegration is called the Johansen cointegration approach. The Johanson approach can determine the number of cointegrated vectors for any given number of non-stationary variables of the same order. The results reported in table (6) suggest that the null hypothesis of no cointegrating vectors can be rejected at the 1% level of significance. It can be seen from the Likelihood Ratio (L.R.) that we have a single co-integration equations. In other words, there exists one linear combination of the variables.

Table 6: Johansen Cointegration Tests

Hypothesized N0. Of CE (s)	Eigen value	Likelihood Ratio	5% critical value	1% critical value
None **	0.740350	27.61040	15.41	24.60
At most 1	0.031588	0.641954	3.76	12.97

Ho: has no co-integration; H1: has co-integration

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates one cointegrating equation(s) at 5% significance level

Source: Own estimates

4.4.Granger Causality Test :

The results of Pairwise Granger Causality between economic growth (GDP) and international financial integration (IFI) are contained in Table 7. The results reveal the existence of uni-directional causality which runs from economic growth (GDP) to international financial integration (IFI) and not vice versa. This indicates that economic growth accelerates financial integration in India but financial integration does not found to have any impact of economic growth of India.

Table: 7: Granger Casuality test

Null Hypothesis	Lag	Observations.	F-statistics	Probability	Decision
LnGDP does not Granger Cause LnIFI	1	19*	4.48040	0.03133**	Reject
LnIFI does not Granger Cause LnGDP	1	19	0.18269	0.83498	Accept

*Observations. after lag.
** Indicates significant causal relationship at 5% significance level .
Source: Own estimates

We have found that for Ho of "LnGDP does not Granger Cause LnIFI", we reject the Ho since the F-statistics are rather larger and the probability value is less than 0.05 at the lag length of 2. Therefore, we conclude that LnGDP does Granger Cause LnIFI. On the other hand, for the Ho of "LnIFI does not Granger Cause LnGDP",we can not reject Ho since F value is smaller with respective probability value greater than 0.05 . The above results generally show that causality is unidirectional and the direction of causality runs from economic growth to financial integration and not vice versa.

In order to check the stability of the model we have estimated the vector error correction (VECM) model. The results of VECM model are presented in Table 8. The results indicate that the error correction term for GDP growth bears the correct sign i.e. it is negative and statistically significant at 5 percent significant level. It indicates 1.5 percent speed of convergence towards equilibrium position in case of any disequilibrium situation. The coefficient of error correction term for IFI bears the correct sign i.e. negative and statistically significant with the convergence speed of 21.51percent towards equilibrium.

4.5.Error Correction Mechanism(VECM):

Table: 8: Short term causality test for time series data (VECM)

Variables	Model-1 D(LnGDP)	Model-2 D(LnIFI)
ECM	-0.015239 (0.00702) (-2.17)	-0.215155 (0.0927) (-2.32)
D(LnGDP(-1))	0.169811 (0.59352) (0.28611)	-0.254507 (0.59214) (-0.42981)
D(LnGDP(-2))	-0.128711 (0.58579) (-0.21972)	0.425374 (0.58443) (0.72785)
D(LnIFI(-1))	0.262204 (0.38133) (0.68761)	-0.603395 (0.38044) (-1.58603)
D(LnIFI(-2))	-0.029744 (0.36524) (-0.08144)	-0.149439 (0.36439) (-0.41011)
R-squared	0.66982	0.502350
F-statistic	1.72297	2.422670

*indicates panel data pass the significance test by 95% level.
Source: Own estimates.

5. Conclusions:

The objective of this paper is to investigate the long run and short run dynamics between financial integration and economic growth in India over the period from 1990-91 to 2010-11.Estimation process starts with examining stationarity property of the underlying time series data. The unit root test has been applied for the same. The estimated results confirmed that financial integration and economic growth, indicated by GDP growth are non-stationary at the level data but found stationary at the first differences in P-P test and it is stationary at both level and first differences using KPSS test. Hence, they are integrated of order one. We next examined the existence of cointegration among the stationary variables. The Johansen cointegration test results declared that there is cointegration and hence, confirmed the existence of long run equilibrium relationship between financial integration and economic growth. The Granger- causality test finally confirmed the existence of uni-directional causality which runs from economic growth (GDP) to international financial integration (IFI) and not vice versa. This indicates that economic growth accelerates financial integration in India but financial integration does not found to have any impact of economic growth of India.

It can be said that an enhanced economic growth is responsible for financial integration in the Indian economy. Hence, the dynamism of economic growth in the country will foster financial integration. Hence to maintain rapid economic growth, government has to deepen foreign capital inflow as well as capital outflow and undertake essential measures to strengthen the long run relationship between financial integration and economic growth.

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Appendix:

Relevant Statistical data on GDP and Capital Flow (Rs crore)

Year	GDP	Capital inflow	Capital outflow	Total Inflow& outflow	Financial integration
1990-91	1083572	17317	276149	293466	0.270832
91-92	1099072	20438	279568	300006	0.272963
92-93	1158025	19369	280746	300115	0.259161
93-94	1223816	15256	290418	305674	0.249771
94-95	1302076	16588	311685	328273	0.252115
95-96	1396974	14739	320728	335467	0.240138
96-97	1508378	21812	335827	357639	0.237102
97-98	1573263	19413	369682	389095	0.247317
98-99	1678410	9268	411297	420565	0.250573
99-2000	1786526	21689	428550	450239	0.252019
200-01	1972605	28178	472625	500803	0.253879
2001-02	1864300	40473	482328	522801	0.280428
2002-03	2048287	10476	498804	509280	0.248637
2003-04	2222759	57679	495459	553138	0.248852

2004-05	2388768	73298	586305	659603	0.276127
2005-06	3254216	101797	620522	722319	0.221964
2006-07	3566011	140935	751402	892337	0.250234
2007-08	3898958	256551	897290	1153841	0.295936
2008-09	4162509	121108	1142125	1263233	0.303479
2009-10	4493743	346808	1179096	1525904	0.339562
2010-11	4877842	303330	1366117	1669447	0.342251
Source: Handbook of Statistics on Indian Economy, 2010-11					