Casual Linkages Between India's Economic Growth, Exports, and Foreign Direct Investment After the Liberalisation

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Abstract: The present study analyses the relationship between Gross Domestic Product (LNGDP) per capita, exports, and Foreign Direct Investment (LNFDI) of India after the liberalization period from 1991 to 2022. Analysis is done on short- and long-term relation. The cointegration test Johansen employed for this study of long run equilibrium relationship among India's economic growth/LNGDP per capita, LNEXPORTS of goods and services, and LNFDI. The test shows economic growth/LNGDP, LNEXPORT, and LNFDI are displaying long-run relationships and all moving in tandem throughout time. Changes in LNGDP per capita have a major short-term impact on LNFDI growth. Exports and foreign direct investment do not Granger-cause short-term fluctuations in LNGDP per capita. Additionally, LNFDI and LNGDP per capita have unidirectional Granger causality.

Keywords: Growth, Export, FDI, cointegration and causality

1.INTRODUCTION

Currently India shows one of the world's economies with the fastest rate of growth with an advantage of the highest populated country in the world. Conventionally export is an engine of growth, based on economists. Trade has positive as well as negative impacts on economic growth, though. For trade has been reliant on trade policies, geopolitical concerns, and other economic and non-economic factors. According to Dadora (1991), economies in export-oriented nations would grow more rapidly than those in less export-oriented nations. Since 1991, India has also significantly liberalized its trade in services. Although the government used to heavily intervene in the service industry, a lot of progress has been made in allowing the private sector, particularly foreign investors, to participate (Konya and Singh 2008) in the economy. Dash (2009) pointed out that India's export-driven growth is a result of

Akoto (2016) studied Granger causal linkages between exports, GDP, and foreign direct investment (FDI) and export response to FDI shocks, with a focus on South Africa. According to this study, FDI significantly increases exports over time. In the short term, existing unidirectional granger causality from GDP to exports and as well as between FDI and GDP and exports. Exports are not particularly affecting inflow of FDI as a result of variance decomposition.

Dornean et al. (2012) examined the associations between the financial crisis in Central and Eastern European (CEE) countries and the FDI. As the financial crisis worsened in 2009, FDI in CEE countries decreased from 6.02 percent of GDP in 2008 to 2.52 per cent of GDP. They found that the financial crisis has a direct effect on the amount of FDI. Furthermore, they confirm that economic expansion has a positive and substantial impact on FDI.

Toaca and Victoria (2022) found a unidirectional causal linkage from FDI to economic output, a Granger causality from FDI to exports, and a Granger causation between GDP and merchandise export. VECM models have been used to conduct an impulse-response. In the Republic of Moldova, a 1per cent increase in foreign direct investment results in a 0.09 per cent GDP growth and a 0.08 percent rise in goods exports.

Against this backdrop thepresent study examines the effects of economic growth in India from 1991 to 2022, paying particular attention to both long run and short run cause and effect relation between GDP, FDI, and exports in order to ascertain whether high GDP dynamics draw FDI inflows or high exports, and whether this type of investment

2. METHODOLOGY

Secondary data from 1991 to 2022 is used in the study. This research gathered information from the World Bank Indicators and measures economic growth using GDP per capita, export of goods and services, and FDI. GDP per capita and exports were taken current US\$ and FDI has taken BoP, current US\$. The study transforms GDP per capita, export of goods and services, and FDI data into natural logarithms to stationarity and employs the Johansen cointegration test. Examining whether a unit root exists in the chosen variables is the initial step. The stationarity of the variables in this study is assessed using the Augmented Dickey-Fuller (ADF) tests. Subsequently, the long-term relationships among the variables are analysed through the Johansen co-integration test. Upon establishing a long-term relationship, the analysis advances to the Vector Error Correction Model (VECM), VEC Granger Causality, and Variance Decomposition. Following this, diagnostic tests, including the LM test, normality test, and heteroskedasticity test, are conducted. The LM test is utilized to identify any potential model misspecification, particularly concerning autocorrelation. The normality test is applied to evaluate whether the residuals of the model are normally distributed, with the Jarque-Bera test confirming the normality of the analysis.

3. RESULTS AND DISCUSSIONS

3.1. Summary of the Data

An overview of the data set is provided in the form of summary (table1). This table shows a summary of the data; for this analysis, data is taken in the form of a log.

Table 1: Summaries of the Data

| | LNGDP | LNEXPORTOF | LNFDI |
|--------------|----------|------------|----------|
| | PER | GOODS AND | |
| | CAPITA | SERVICES | |
| Mean | 6.72789 | 25.7829 | 22.9429 |
| Median | 6.79418 | 26.1392 | 23.8108 |
| Maximum | 7.76908 | 27.3800 | 24.8878 |
| Minimum | 5.70877 | 23.8563 | 18.1133 |
| Std. Dev. | 0.70465 | 1.16389 | 1.74207 |
| Skewness | -0.01791 | -0.27494 | -0.93682 |
| Kurtosis | 1.44366 | 1.50427 | 3.18471 |
| Jarque-Bera | 3.23129 | 3.38607 | 4.72620 |
| Probability | 0.19876 | 0.18396 | 0.09413 |
| Sum | 215.292 | 825.054 | 734.173 |
| Sum Sq. Dev. | 15.3925 | 41.9945 | 94.0792 |
| Observations | 32 | 32 | 32 |

Source: Authors evaluation using E-views software.

All the variables show a minimum in 1991 (Table 1). But in the case of maximum, exports are in 2022, LNGDP in 2021, and LNFDI in 2020. LNEXPORT of goods and services have the highest mean, while foreign direct investment has the second-highest. LNFDI has the greatest SD, followed by exports of commodities and services. The Jarque-Bera test for each variable indicates that the distributions of LNFDI, LNGDP per capita, and LNEXPORT do not substantially differ from normality.

3.2. Unit Root Test

The study uses Augmented Dickey-Fuller (ADF) tests to assess the stationarity of data series, particularly GDP per capita, exports of goods and services, and FDI, before utilizing Johansen cointegration and Granger causality tests. Stationarity was absent at the level, as indicated by the table 2. The test statistics indicate that the series is stable at the

initial difference, which may refute the null hypothesis of a unit root, when the p-values are less than 0.05. Based on this, they are order one integrated. The results of the test show that, as required by the cointegration test, a number of LNGDP per capita, LNEXPORT of goods and services and LNFDI have a single unit root.

Table 2: Unit Root Test

| Variable | | Model | Test | 5% | p- |
|-----------|------------|-----------|------------|----------|-------|
| | | | Statistics | critical | value |
| | | Intercept | -0.17455 | -2.960 | 0.932 |
| | | Intercept | -1.81700 | -3.563 | 0.672 |
| | | with | | | |
| | Level | trend | | | |
| | | Intercept | -5.34800 | -2.964 | 0.000 |
| LNGDP Per | | Intercept | -5.24946 | -3.568 | 0.001 |
| capita | First | with | | | |
| | Difference | trend | | | |
| | | Intercept | -1.11941 | -2.960 | 0.695 |
| | | Intercept | -0.89316 | -3.563 | 0.944 |
| | | with | | | |
| LNEXPORT | Level | trend | | | |
| OF GOODS | | Intercept | -4.09775 | -2.964 | 0.003 |
| AND | | Intercept | -4.13435 | -3.568 | 0.014 |
| SERVICES | First | with | | | |
| | Difference | trend | | | |
| | | Intercept | -4.18464 | -2.960 | 0.002 |
| | | Intercept | -3.67694 | -3.562 | 0.039 |
| | Level | with | | | |
| | | trend | | | |
| | | Intercept | -4.91049 | -2.964 | 0.000 |
| LNFDI | First | Intercept | -5.15772 | -3.568 | 0.001 |
| | Difference | with | | | |
| | | trend | | | |

Source: Authorsevaluation using E-views software.

3.3. Cointegration Test

The maximum eigenvalue statistic or the trace statistic can be used to calculate the number of cointegrating relationships. Because the trace statistic value above the crucial value of 5%, the results indicate that the null hypothesis—that there is no cointegration—is rejected (Table 3). Similarly, the null hypothesis that there is no cointegration is rejected because the Max-Eigen statistic value is greater than the crucial 5% level. Thus, the results suggest a consistent, long-term relationship between foreign direct investment, exports of products and services, and GDP per capita.

The findings reveal a long-term equilibrium relationship among exports, foreign direct investment, and LNGDP per capita. It implies that over time, variables pertaining to economic growth or LNGDP per capita, LNFDI, and LNEXPORT of goods and services are interacting. Singh (2017) discovered a cointegration between India's LNGDP, exports, and LNFDI outflows. According to Bhatt (2013), China and Vietnam's GDP, exports, and foreign direct investment have a long-term equilibrium link.

Table 3: Johansen cointegration Test

Series: LNGDP PER CAPITA LNEXPORTS OF GOODS AND SERVICES LNFDI

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

| , | | | | |
|--------------|-----------|------------|-----------|------------|
| Hypothesized | Trace | 5%critical | Max- | 5%critical |
| No. of CE(s) | statistic | value | Eigen | value |
| | | | statistic | |
| None | 36.34 | 29.797 | 25.259 | 21.131 |
| At most 1 | 11.08 | 15.494 | 7.085 | 14.264 |
| At most 2 | 3.998 | 3.841 | 3.998 | 3.841 |

Source: Authors evaluation using E-views software.

Trace test and Max-eigenvalue test indicates

indicates 1 cointegrating eqn(s) at the 0.05 level

* Denotes rejection of the hypothesis at the 0.05 level.

3.4. Vector Error Correction Model (VECM)

The Vector Error Correction Model (VECM) is used to assess the relationship of LNGDP, LN EXPORT and LNFDI in short-term and long-term.

Table 4: Vector Error Correction Estimates

| G 1 | G : .E 1 | | |
|-------------------|------------|------------|------------|
| Cointegrating Eq: | CointEq1 | | |
| LNGDP PER | 1.000000 | | |
| CAPITA (-1) | | | |
| LNEXPORT OF | 8.997651 | | |
| GOODS AND | | | |
| SERVICES (-1) | | | |
| | (3.05549) | | |
| | [2.94475] | | |
| LNFDI (-1) | -10.03062 | | |
| | (2.24850) | | |
| | [-4.46103] | | |
| Error Correction: | D(GDP P | D(EXPORT | D(FDI) |
| | ER CAPI | OF GOODS | |
| | TA) | AND SERVĪ | |
| | _ ′ | CES) | |
| CointEq1 | -0.003613 | 0.002795 | 0.038414 |
| | (0.00268) | (0.00405) | (0.00875) |
| | [-1.34610] | [0.69074] | [4.39077] |
| D (LNGDP PER | -0.177463 | 0.346373 | 2.343486 |
| CAPITA (-1)) | | | |
| | (0.27007) | (0.40718) | (0.88025) |
| | [-0.65709] | [0.85067] | [2.66231] |
| D(LNEXPORT OF | 0.173326 | 0.075528 | -0.480010 |
| GOODS AND | 0.173320 | 0.073320 | 0.100010 |
| SERVICES (-1)) | | | |
| (1)) | (0.17737) | (0.26741) | (0.57811) |
| | [0.97719] | [0.28244] | [-0.83031] |
| D (LNFDI (-1)) | 0.012471 | -0.045204 | 0.117963 |
| D (E111 D1 (-1)) | (0.03784) | (0.05705) | (0.12333) |
| | [0.32958] | [-0.79240] | [0.95651] |
| С | 0.056565 | 0.091972 | 0.045771 |
| | (0.02255) | (0.03400) | (0.07351) |
| | [2.50788] | [2.70468] | [0.62262] |
| D. aguanad | | 0.125051 | 0.572482 |
| R-squared | 0.082207 | -0.014941 | 0.572482 |
| Adj. R-squared | -0.064640 | -0.014941 | 0.304079 |

Source: Authorsevaluation using E-views software.

Long-Run Relationship

LNGDP per capita is the dependent variable, and it has been normalized to 1. The t-statistic for exporting goods and services (-1) is 2.94, and the coefficient is 8.997651. This suggests a long-term, statistically significant, and positive relationship with LNGDP per capita. LNFDI (-1) has a t-statistic of -4.46 and a coefficient of -10.03. This demonstrates a negative and statistically significant long-run relationship. The constant term is -7.63, which captures other factors affecting LNGDP per capita in the long term.

LNGDP Per Capita error correction term has a coefficient of -0.00 and a t-statistic of -1.35, which shows that the long-run equilibrium will be adjusted at a slow and statistically negligible rate. The low coefficient indicates a very slow adjustment of long-term equilibrium errors.

With a t-statistic of 0.69 and a coefficient of 0.00 for products and services exported, the effect is statistically negligible. With a t-statistic of 4.39 and an LNFDI coefficient of 0.04, there is a notable and favourable adjustment to long-term disequilibrium for LNFDI.

Short-Run Dynamics

The coefficient of -0.18 and t-statistic of -0.66 for LNGDP per capita (-1) illustrates that the lagged LNGDP per capita has a negative and statistically insignificant short-term impact on current LNGDP per capita. The coefficient of 0.17 and t-statistic of 0.97 show that export of goods and services (-1) have a short-term, positive, but negligible

effect on LNGDP per capita. The short-term effect of LNFDI (-1) on GDP per capita is insignificant, as indicated by its coefficient of 0.01 and t-statistic of 0.32.

The growth in LNFDI is significantly impacted in the short term by changes in LNGDP per capita. Neither export nor LNFDI exerts any short-run impact on LNGDP growth.

3.5. VEC Granger Causality/Block Exogeneity Wald Tests

The study determines the causal relationship and direction among LNFDI, LNGDP, and LNEXPORTS Of GOODS AND SERVICES. The study appliedd Granger causality test to estimate relationship of the variable with the following hypothesis;

H0. LNEXPORTS and LNFDI are not cause affect economic growth.

H0. Economic growth and LNFDI are not affecting LNEXPORT.

H0. Economic growth/LNGDP and LNEXPORTS do not affect LNFDI.

Table 5: VEC Granger Causality

| LNGDP PER CAPITA | | | |
|------------------|------------|------|--------|
| | Chi-sq | df | Prob. |
| LNEXPORTOF | 0.954892 | 1 | 0.3285 |
| GOODS AND | | | |
| SERVICES | | | |
| LNFDI | 0.108626 | 1 | 0.7417 |
| A11 | 1.171979 | 2 | 0.5566 |
| LNEXPORT OF GOOD | S AND SERV | ICES | |
| | Chi-sq | df | Prob. |
| LNGDP PER CAPITA | 0.723644 | 1 | 0.3950 |
| LNFDI | 0.627904 | 1 | 0.4281 |
| A11 | 1.736012 | 2 | 0.4198 |
| LNFDI | | | |
| | Chi-sq | df | Prob. |
| LNGDP PER CAPITA | 7.087871 | 1 | 0.0078 |
| LNEXPORTOF | 0.689422 | 1 | 0.4064 |
| GOODS AND | | | |
| SERVICES | | | |
| A11 | 9.073996 | 2 | 0.0107 |

Source: Authorsevaluation using E-views software.

LNEXPORT OF GOODS AND SERVICES test statistics is 0.954892 and the p value is 0.33. It shows that there is no significant evidence to LNEXPORT Granger cause LNGDP PER CAPITA. LNFDI with p value of 0.74, it also shows that there is no significant evidence to LNFDI Granger cause LNGDP PER CAPITA. Similarly, LNEXPORT and INFDI jointly shows as p value is greater than 5%. It also proved that LNEXPORT and LNFDI are not cause affect LNGDP Per capita. So, the study is accepting the hypothesis of LNEXPORTS and LNFDI are not cause affect economic growth.

In the case of LNEXPORT OF GOODS AND SERVICES, LNGDP PER CAPITA p value is greater than 0.05, there is no evidence to LNGDP cause affect LNEXPORT OF GOODS AND SERVICES. LNFDI p value is also higher than 0.05 and it confirmed that there is no evidence to LNFDI cause affect LNEXPORT. Likewise, jointly LNGDP and LNFDI do not Granger cause LNEXPORTS. Therefore, the analysis accepts the hypothesis that LNGDP per capita and LNFDI do not cause LNEXPORT,

LNFDI has dependent variable, LNGDP per capita p-value is 0.0078, it means is less than 0.05. The result depicts

that there is strong evidence to LNGDP per capita Granger cause LNFDI. However, the LNEXPORT OF GOODS AND SERVICES p-value is higher than 0.05, it confirms that there is no significant evidence to LNEXPORT granger cause affect LNFDI. Conversely, GDP per capita and LNEXPORT jointly cause affecting LNFDI. So, the study rejects the third hypothesis of LNGDP and LNEXPORTS are do not affect LNFDI.

The analysis established a unidirectional Granger causality from LNFDI to LNGDP per capita. This suggests that short-term changes in LNFDI are highly predicted by changes in economic performance, which lends credence to the idea that growth draws in foreign investment. Similarly in Greece, unidirectional causal linkages from LNGDP per capita to LNFDI as shown by Georgantopoulos, and Tsamis, 2012.

3.6. Variance of Decomposition

A statistical method for determining the percentage of a variable's forecast error variance that can be ascribed to the variable and other variables in the system is called variance decomposition. In particular, Vector Autoregression (VAR) and Vector Error Correction (VEC) technique are commonly used in time series analysis. It aids calculating how much each variable contributes to the explanation of another variable's fluctuations. It also gives information about how variables interact dynamically throughout time. So, it is helpful in comprehending how shocks in various variables affect a target variable's variability and how much of the prediction variance can be attributed to the variable's own past shocks. The variance of decomposition can be performed for the study of unit shocks in the variables of LNGDP per capita, LNEXPORT OF GOODS AND SERVICES and LNFDI.

Table 6: Variance of Decomposition Variance Decomposition of LNGDP per capita

| Perio | S.E. | LNGDP | LNEXPORT | LNFDI |
|-------|---------|---------|----------|---------|
| d | | PER | OF GOODS | |
| | | CAPITA | AND | |
| | | | SERVICES | |
| 1 | 0.07691 | 100.000 | 0.00000 | 0.00000 |
| 2 | 0.10853 | 98.1846 | 0.58778 | 1.22755 |
| 3 | 0.13889 | 97.9099 | 0.46018 | 1.62989 |
| 4 | 0.16307 | 97.2167 | 0.41874 | 2.36453 |
| 5 | 0.18540 | 96.7596 | 0.35135 | 2.88904 |
| | | | | |

Variance Decomposition of LNEXPORT of Goods and Services

| Period | S.E. | LNGDP | LNEXPORT | LNFDI |
|--------|---------|----------|----------|--------|
| | | PER | OF GOODS | |
| | | CAPITA | AND | |
| | | | SERVICES | |
| 1 | 0.11595 | 59.35004 | 40.64996 | 0.0000 |
| 2 | 0.19166 | 64.78701 | 34.32313 | 0.8899 |
| 3 | 0.24398 | 63.69587 | 35.22346 | 1.0807 |
| 4 | 0.28775 | 63.72686 | 35.03690 | 1.2363 |
| 5 | 0.32481 | 63.55707 | 35.17351 | 1.2694 |

Variance Decomposition of LNFDI

| Period | S.E. | LNGDP | LNEXPORT | LNFDI |
|--------|--------|---------|----------|---------|
| | | PER | OF GOODS | |
| | | CAPIT | AND | |
| | | A | SERVICES | |
| 1 | 0.2507 | 0.10482 | 2.927724 | 96.9674 |
| 2 | 0.3529 | 21.9744 | 2.850245 | 75.1752 |
| 3 | 0.4056 | 29.7332 | 2.370408 | 67.8963 |
| 4 | 0.4439 | 37.8429 | 2.707922 | 59.4491 |
| 5 | 0.4708 | 42.3409 | 3.943050 | 53.7159 |

Source: Authors evaluation using E-views software.

3.6.1 GDP Per Capita

The results of variance decomposition shed light on the percentage of each variable's forecast error variation that can be ascribed to shocks in both the variable and other variables. This aids in comprehending how the variables interact dynamically throughout time. Although it is the most significant contributor, the proportion of LNGDP per capita volatility that can be attributed to its own shocks gradually declines. In the case of LNGDP per capita, the fraction of errors that can be attributed to personal shocks is 100% and begins to decline more slowly with time. In contrast, LNFDI's contribution is marginally growing and had little impact in the early years. Exporting goods and services continues to have a small but noticeable impact.

3.6.2 Export of Goods and Services

First, its own shocks account for the majority of the variance in exports, with shocks to LNGDP per capita accounting for a sizable portion. As the influence of its own shocks diminishes, the LNGDP per capita contribution to the forecast error variance of LNGOODS and services exports stays comparatively constant over time. LNFDI's contribution is still quite minor, but it has somewhat increased. LNGDP per capita's continuously large contribution suggests that export success is significantly influenced by domestic economic growth. While the fraction attributable to FDI itself declines over time, the percentage of variance in LNFDI explained by LNGDP per capita rises significantly. Despite a little increase, the export of goods and services still makes up a very tiny portion of the total.

3.6.3. Foreign Direct Investment

Its own shocks account for the majority of the volatility in LNGDP per capita, with LNFDI steadily contributing more over time. With LNFDI having a stable effect, the variance in the exports of India's goods and services' is mostly explained by its own shocks as well as shocks to LNGDP per capita. LNFDI's own shocks account for a considerable portion of its variance at first, but as time goes on, LNGDP per capita's contribution grows in importance while its own contribution declines.

3.7. Diagnostic Test

In the diagnostic test, in the LM test,all of the p-values are high - 0.05, indicating that the null hypothesisthat there is no serial correlation-cannot be rejected. It demonstrates that the VEC model's residuals do not include any discernible indication of serial correlation. In the normality test, the p-values, including the joint Jarque-Bera test, are above 0.05, indicating no significant deviation from normality in any residual components or jointly, confirming normal distri-bution. The VEC Residual Heteroskedasticity test shows no heteroskedasticity in residuals, indicating stable variance across observations.

4. CONCLUSION

Following the liberalization period from 1991 to 2022, the study examined the relationships between FDI, exports of goods and services, and economic growth (GDP per capita) in India. The Johansen co-integration test is confirmed that in the long period, the variables are moving together. In the vector error correction model, LNGDP per capita and LNEXPORT are positively related, but LNFDI and LNGDP per capita are negatively related over the long run. LNFDI growth is significantly impacted in the short term by changes in LNGDP per capita. LNFDI and exports

have no short run effect on LNGDP growth. Short-term changes in LNGDP per capita are not Granger-caused by LNFDI or the LNEXPORTS of goods and services. Short-term changes in exports are not Granger-caused by LNGDP per capita. Short-term fluctuations in exports are not Granger-caused by LNFDI. Short-term fluctuations in FDI are not Granger-caused by the export of goods and services. There is unidirectional Granger causality from LNGDP per capita to LNFDI. In order to attract more FDI to the nation, policy implications are crucial for increasing GDP growth. It will support further economic growth and overall sustained development in the country.

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