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Abstract

The present study focuses on the cointegration between Export and Gross Domestic Product and its components at current and constant prices. Time series data for Export and Gross Domestic Product and its components has been taken for the period 1950-51 to 2001-02. In the long run export and GDP reveal that export and GDP at constant prices are not cointegrable while export and GDP at current prices are cointegrable and also the direction of causality is positive. In the short run, through error correction mechanism it has been observed that GDP as dependent variable and export as an independent variable show that short run changes in export have affected positively to GDP and its components.

Keywords: Gross Domestic Product, Export, Unit root test, Cointegration, Error Correction Model, Time series.

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Export and Economic Growth in India: Causal Interpretation

Alok Kumar Pandey*

The relationship between export and economic growth has been an important issue of discussion among scholars and economist throughout the world. The existence of nexus in between export and economic growth can be examined in several ways like growth rates relating to GDP and export, proportion of export to growth, several policies relating to accelerate economic growth and export etc. The effective way to explore nexus in export and economic growth would be the causal analysis between two variables. Scholars and economist like Michaely (1977), Kavoussi (1984), Jung (1985), Chow (1987), Darrat (1987), Hasio (1987), Afexention and Serletis (1991), Esfahani (1991), Bahmani-Oskoee, Mohtadi and Shabsingh (1991), Bahmani-Oskoee and Alse (1993), Love (1998), Jin (1996) , Riezman, Whiteman and Summers (1996), Ghatak and Price (1997), Marjit and Raychaudhuri (1997), Asafu-Adjaye and Chakroborty (1999), Dhawan and Biswal (1999), Anwer and Sampath (2001), Chandra (2001) and Sharma and Panagiotidis (2004) have attempted in their respective studies to establish causal relationship in between export and economic growth.

The present paper has been discussed in seven subsections. In section two data and research methodology has been presented. Section three deals with unit root tests / stationarity tests pertaining to Indian export and GDP. In section four, cointegration tests have been employed for Indian export and GDP. Engle Granger test for causal relation in Indian exports and GDP is contained in section five. Error correction model related to Indian export and GDP has been performed in section six. Major findings emerging from present empirical study are presented in section seven.

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II Data and Research Methodology

In the present paper, an attempt has been made to explore the relationship in between export and economic growth in Indian economy with the help of technique of causality and error correction mechanism. For this purpose, data relating to export and GDP for the period 1950-51 to 2001-02 have been taken into account. Data regarding GDP has been taken for the period 1950-51 to 2001-02 at current prices as well as at constant prices. Moreover, in order to examine causality in between export and economic growth, GDP and its components (at current and constant prices) as (1) NDP at factor cost, (2) GDP at market prices, (3) NDP at market prices, (4) GNP at factor cost, (5) NNP at factor cost, (6) GNP at market price, (7) NNP at market prices have been taken in the present study (Handbook of Statistics on Indian Economy, Economic Survey). Thus, in the present study, an attempt has been made to explore causal relation in Indian exports and eight variants of GDP (at current prices) and eight variants of GDP (at constant prices) separately.

II.1 Stationarity test: The Unit Root (Dicky Fuller) Test

The Dicky Fuller test for unit root may be conducted in the following two steps: First of all, runs OLS regression of following type:

$$\Delta Y_t = \delta Y_{t-1} + \epsilon_t \qquad \ldots \quad (2.1)$$

and save the t_δ ratio as mentioned in equation 2.1. And secondly, the existence of unit root in the time series data Y_t according to the following hypothesis.

$$H_o : \delta = 0, \text{ for non stationarity if } t_\delta > \tau$$

$$\ldots \quad (2.2)$$

$$H_\alpha : \delta < 0, \text{ for stationarity, if } t_\delta < \tau$$

Where τ is the critical value as given by Fuller (1976). On the basis of Monte-Carlo simulations, and under the null hypothesis of the existence of a unit root in the process of generating of time series, Dicky and Fuller have tabulated critical values (Fuller, 1976) for the t_δ statistic, which they called them as the τ (tau) statistics. More recently, these critical values have been extended by Mackinnon (1991) through Monte-Carlo Simulations. In other words, for a time series to be stationary the t_δ value must be much negative. Otherwise, the time series is non-stationary. Dickey and Fuller have tabulated τ

critical values when regression equation contains constant also i.e. when equation 2.1 becomes:

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \in_t \qquad \ldots. \quad (2.3)$$

Further, when the regression equation contains a constant and linear trend, equation 2.1 is written as

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \in_t \qquad \ldots. \quad (2.4)$$

For equation 2.3 the corresponding critical value called τ_μ and for equation 2.4 the corresponding critical value and called τ_t. Fuller has presented these critical values in his book "Introduction to Statistical Time Series".

II.2 Stationarity Test: The Unit Root (Augmented Dickey Fuller) Test

In order to detect unit root in a time series data as given by equations 2.1, 2.3 and 2.4, some modification have been made by Dickey and Fuller (1981). These modifications indicate how many additional terms relating to first difference of the variables should be added in equations 2.1, 2.3 and 2.4. This is known as Augmented Dickey Fuller Model. For equations 2.1, 2.3 and 2.4 as used in Dickey Fuller test the corresponding equation for Augmented Dickey Fuller test will be

$$\Delta Y_t = \delta Y_{t-1} + \sum_{j=2}^{q} \delta_j \Delta Y_{t-j+1} + \in_t \qquad \ldots. \quad (2.5)$$

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \sum_{j=2}^{q} \delta_j \Delta Y_{t-j+1} + \in_t \qquad \ldots. \quad (2.6)$$

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \sum_{j=2}^{q} \delta_j \Delta Y_{t-j+1} + \in_t \qquad \ldots. \quad (2.7)$$

Since, Dickey Fuller test as given by equations 2.1, 2.3 and 2.4 has been augmented with the lagged difference term to produce equations 2.5, 2.6 and 2.7, the usual D.F. test applied to the later equations (2.5, 2.6 and 2.7) took the name Augmented Dickey Fuller test. In fact, the critical values for DF, τ statistics still holds for the ADF test and the testing of hypothesis is still that as given in equation 2.2. In equations 2.5, 2.6, 2.7 the number of additional lagged differenced term will depend on the minimum value of AIC and SIC (Akaike, 1973 and Schwartz, 1989). In the present paper, equation 2.4 and 2.7 has been used for stationarity test.

II.3 Cointegration Test

For univariate time series, Unit Root Test is performed for stationarity, while cointegration deals with the relationship among the group of variables where (unconditionally) each has a unit root (Dickey, Janson and Thornton, 1991). Two time series Y_t and X_t are said to be cointegrated of order (d,b) where $d \geq b \geq 0$, if both time series are integrated of order d, and there exists a linear combination of these two time series, say $a_1Y_t + a_2X_t$, which is integrated of order (d-b). In mathematical terms, this definition is written:

If $Y_t \sim l\,(d)$ and $X_t \sim I(d)$, then $Y_t\ X_t \sim CI\ (d,b)$ if $a_1Y_t + a_2X_t \sim I(d\text{-}b)$ …. (2.8)

Where CI is the symbol of cointegration.

II.4 Cointegration Test: Engle-Granger Test

Engle Granger test is applied in order to test if the two variables Y_t and X_t are cointegrated. The entire procedure is based on several steps. First of all, the order of the integration of both variables using the unit root methodology is obtained. If the order of integration of two variables is same, then the concept of cointegration emerges. If the order of integration of two variables is different, it may be concluded that two variables are not cointegrated. Secondly, if the two variables are integrated of same order say I(1), estimate with OLS the long run equibliribium equation

$$Y_t = \beta_0 + \beta_1 X_t + e_t \qquad \text{….} \quad (2.9)$$

which is called cointegration regression and save the residuals e_t, as are estimate of the equilibrium error, $\in_t$.

In the third step, for the two variables to be cointegrated the equilibrium errors must be stationary. In order to test this stationarity the unit root methodology in form of DF test and ADF test may be applied. For example, the DF test for error term, which involves the estimation of a version of the following equation with OLS will be:

$$\Delta e_t = \delta e_{t-1} + \nu_i \qquad \text{….} \quad (2.10)$$

And finally, conclusion about the cointegration of two variables may be obtained (Dickey, Janson and Thornton, 1991) according to following hypothesis.

H_o: $\delta = 0$, for non-stationarity of e_t, i.e. for non-cointegration, if $t_\delta > \tau$

…. (2.11)

H_a: $\delta < 0$, for stationarity of e_t, i.e. for cointegration, if $t_\delta > \tau$

II.5 Engle-Granger Causality Test

This section attempts to explain Engle Granger causality in between two variable X and Y. Thus, the Engle Granger causality test (Love, 1994) involves the estimation of two regression equation which are given below:

$$Y_t = a + \sum_{i=1}^{M} \alpha_1 Y_{t-1} + \sum_{i=1}^{N} \alpha_2 X_{t-1} + u_t \qquad \ldots. \qquad (2.12)$$

$$X_t = b + \sum_{i=1}^{j} \beta_1 X_{t-1} + \sum_{i=1}^{k} \beta_2 Y_{t-1} + u_t \qquad \ldots. \qquad (2.13)$$

Equation 2.12 postulates that current value of Y is related to past values of Y itself as well as of X. Similarly equation 2.13 postulates a similar behavior. In order to detect causality from X to Y in equation 2.12 involves, first, treating the dependent variable in equation 2.13 as a one dimensional autoregressive process and regression it on its own lagged values (Love, 1994). The Akike FPE is estimated as

$$\text{FPE}\ (m) = \frac{T + m + 1}{T - m - 1} \cdot \frac{S(m)}{T} \qquad \ldots. \qquad (2.14)$$

Where T = number of observation,

m = order of lags from l to M

and S (m) = sum of squared residuals.

The value of m, which minimizes FPE, is the optimum number of lags m^*.

In the second stage Y is controlled with the order of lags given m* and X is regarded as a manipulated variables with the order of lags varying from 1 to N. The resulting FPE is given as:

$$\text{FPE}\ (m^*, n) = \frac{T + m^* + n + 1}{T - m^* - n - 1} \cdot \frac{S(m^*, n)}{T} \qquad \ldots. \qquad (2.15)$$

The optimum number of lags on n, n* is determined as that which minimize FPE (m*, n). Conclusion on causation are derived from comparisons of FPE (m*) and FPE (m*, n*), If FPE (m*, n*) < FPE (m*), X is taken to cause Y. F test for the joint significance of the coefficient may then the constructed on the basis of the sums of squared residuals in the first stage constrained equation and in the second stage unconstrained equation. The direction of causation is determined by the sign of the sum of coefficient $\sum_{i=1}^{n} \alpha_{2i}$ for causation from X to Y and $\sum_{i=1}^{k} \beta_{2i}$ for causation from Y to X. With respect to causality from Y to X equation 2.13 the same procedure is repeated with X as the controlled variables and Y as the manipulated variable.

II.6 Error Correction Mechanism

There exist long run equilibrium relationship between two variables if they are cointegrated. But in the short run there may be disequilibrium. Therefore, one can treat the error term in equation 2.9 as the equilibrium error (Griffiths, Hill and Judge, 1993). One can use the error term to tie the short run behavior of variable Y_t in equation 2.9 in its long run value. The error correction mechanism (ECM) was first used by Sargan (1964) and later popularized by Engle and Granger (1987). In order to employ error correction mechanism, equation 2.9 has been estimated and residual for the equation has been saved. Thus, the corresponding ECM model will be written as:

$$\Delta Y_t = \alpha + \beta \Delta X_t + \gamma \in_{t-1} + v_{ti} \quad \ldots \quad (2.16)$$

Where Δ as usual denotes first difference; $\in_{t-1}$ is the one period lagged value of the residual from regression 2.9, the empirical estimates of the equilibrium error terms; and v_{ti} is the error term with the usual properties.

Regression equation 2.16 relates the change in Y to change in X and the equilibrium error in the previous period. In this equation, ΔY captures the short run disturbances in X whereas the error correction term $\in_{t-1}$ captures the adjustment toward the long-run equilibrium. If γ is statistically significant, it tells us what proportion of the disequilibrium in Y in one period is corrected in the next period.

III Stationarity tests of Export and GDP

III.1 Unit Root Test for GDP and Export: Dickey Fuller Test

In our present study, we have data relating to eight forms of GDP at current prices, eight forms of GDP at constant prices and export for the period 1950-51 to 2001-02. In order to perform Dickey Fuller test regression equation of type

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \in_t \quad \ldots \quad (3.1)$$

have been estimated and are presented in Appendix 1-3. Based on regression coefficients as given in Appendix 1-3 calculated τ values and tabulated τ values relating to equation

3.1 for level, first difference and second difference are presented in Table 1. Table 1 reveals that in case of GDP at current prices calculated τ values are found higher than tabulated τ values at level and first difference. However, in this connection, calculated τ is less than tabulated τ at second difference. Thus, GDP at current prices for the period 1950-51 to 2001-02 contains unit root at level and at first difference. However, it is found stationary at second difference. So far as GDP at constant prices is concerned, it is obvious from Table 1 that at level, calculated τ is found higher than the tabulated τ and thus having unit root in GDP at constant price at level. However, at first difference calculated τ is found less than tabulated τ for GDP at constant prices thus, stationary at first difference is found for the period under study. Similarly, in case of Indian exports, calculated τ is greater than tabulated τ at the level. Further, calculated τ is found less than tabulated τ in this connection at first difference. Thus, Indian export for the period 1951-2002 is found stationary at first difference.

Thus, Dickey-Fuller test results for unit roots in Indian exports, GDP at current prices and GDP at constant prices as given in Table 1 reveal that GDP at current prices is found stationary at second difference, while GDP at constant price as well as export are found stationary at first difference.

III.2 Unit Root Test for GDP and Export: Augmented Dickey Fuller Test

For Augmented Dickey Fuller test regression equation of type

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \sum_{j=2}^{q} \delta_j \Delta Y_{t-j+1} + \epsilon_t \qquad \ldots. \qquad (3.2)$$

has been estimated for seventeen variables (GDP at current prices – eight components GDP at constant prices – eight components and exports) and regression result are presented in Appendix 4-6. The regression results as presented in Appendix 4-6 relate to level, first difference and second difference respectively. Based on these regression results, calculated value of τ as well as critical values relating to seventeen variables at level, first difference and second difference are shown in Table2.

Comparisons of calculated τ value and tabulated τ value at level and first difference for all seventeen variables (as given in Table 2) reveal that calculated τ values are higher than tabulated critical values. It shows that at level and at first difference all the seventeen variables under study for the period 1950-51 to 2001-02 are found non-stationary as per ADF test. Table 2 also shows that at second difference calculated τ values for all seventeen variables are found less than the tabulated τ values. Thus, at second differences all seventeen variables under, present study for the period 1950-51 to 2001-02 are found stationary as per ADF test. Thus, is our present study all the seventeen variables are cointgrable of order two i.e. I(2).

IV Cointegration Tests: Indian Exports and GDP

Tests for unit root are performed on univariate time series. In contrast, cointegration deals with the relationship among a group of variables (Dickey, Jansen and Thornton, 1991) . A number of methods for testing of cointegration have been proposed by the scholars in the available literature. Details theoretical discussions regarding this cointegration test are given in section II Research Methodology. The cointegration test in Export and GDP for the period 1950-51 to 2001-02 in the present study is based on Engle Granger Test.

IV.1 Cointegration Test for Indian Export and GDP (1950-51 to 2001-02) : Engle Granger Test

In the present section, an attempt has been made to test cointegration in Indian export and GDP during the period 1950-51 to 2001-02 based on Engle Granger Methodology. As per Engle Granger cointegration test, residuals for the equation 4.1 and equation 4.2 have been saved.

$$Y_t = \beta_0 + \beta_1 X_t + e_t \quad \ldots. \quad (4.1)$$

$$X_t = \beta_0 + \beta_1 Y_t + \eta_t \quad \ldots. \quad (4.2)$$

Based on these residuals for equations 4.1 & 4.2 Dickey-Fuller test have been applied.

$$\Delta e_t = \delta_1 e_{t-1} + \nu_i \quad \ldots. \quad (4.3)$$

$$\Delta \eta_t = \delta_2 \eta_{t-1} + \kappa_i \quad \ldots. \quad (4.4)$$

The regression equations presented by equation 4.3 & 4.8 have been estimated through the technique of ordinary least square and the estimated regression results are shown in Appendix 7 & 8. Based on regression result as shown in Appendix 7 & 8, the calculated τ value and tabulated τ value for cointegration test are presented in Tables 3 and 4.

If is significant to mention here that cointegration of variables in the present study is governed on the basis of following hypothesis (Engle and Granger 1987).

H_o : for non-cointegration, τ value related coefficient of residuals in equations 4.3 & 4.4 > tabulated τ value.

…. (4.5)

H_a : for cointegration, τ value related to coefficient of residuals in equations 4.3 & 4.4 < tabulated τ value.

Table 3 presents calculated τ values as well as tabulated τ values for Engle Granger Cointigration test relating to Export and GDP (at current and constant prices) treating GDP as dependent variable. A comparison of calculated τ values and tabulated τ values as shown in Table 3 reveals that calculated τ values have been found less than tabulated τ values for export and GDP at constant prices for equation 4.3. This shows that export and GDP at current prices are cointegratable for the period 1950-51 to 2001-02. Similarly, it is clear from the table that calculated τ values have been found higher than the tabulated τ value for export and GDP at constant prices for equation 4.3. This reveals that export and GDP at constant prices are not cointegrable during the period under study.

Table 4 presents calculated τ values as well as tabulated τ values for Engle Granger coinitegration test relating to Export and GDP (at current and constant prices) treating Export as dependent variable. A comparison of calculated τ values and tabulated τ values as shown in Table 4 reveals that calculated τ values have been found less than tabulated τ values for export and GDP at current prices for equation 4.4. This shows that export and GDP at current prices are cointegrable for the period 1950-51 to 2001-02. It is significant to observe that calculated τ values have been found higher than the tabulated τ values for export and GDP at constant prices for the equation 4.4. This reveals that export and GDP at constant prices are not cointegrable during the period under study.

The empirical results as contained in Table 3 and Table 4 shows that export and GDP (at constant price) are not cointegrable. However, it is significant to observe that Export and GDP at current prices are cointegrable as per Engle Granger methodology during the period 1950-51 to 2001-02.

V Export and GDP in Indian Economy (1950-51 to 2001-02): Engle Granger Causality Test

In the present section, an attempt has been made to test the causality (Engle Granger) in between Indian export and GDP for the period 1950-51 to 2001-02. The causality between Export and GDP is divided in to two subsections.

V.1 Engle Granger Test: Exports Cause GDP (1950-51 to 2001-02)

In order to detect causality from export to GDP (eight components at current prices) equation 5.1 has been estimated.

$$Y_t = a + \sum_{i=1}^{M} \alpha_1 Y_{t-1} + \sum_{i=1}^{N} \alpha_2 X_{t-1} + u_t \quad \ldots. \quad (5.1)$$

The optimum lag lengths for eight components of GDP i.e. m and export i.e. n have been calculated as per Equations 5.2 and 5.3.

$$\text{FPE}(m) = \frac{T+m+1}{T-m-1} \cdot \frac{S(m)}{T} \quad \ldots. \quad (5.2)$$

$$\text{FPE}(m^*, n) = \frac{T+m^*+n+1}{T-m^*-n-1} \cdot \frac{S(m^*, n)}{T} \quad \ldots. \quad (5.3)$$

These optimum values of m and n have been shown in Table 5 and Table 6. Based on optimum values of m and n as shown in Table 5 and Table 6, the regression results have been presented in Table 7. The minimum value of Akike FPE for eight components of GDP as well as export for eight estimated regression equations as given in Table 7 are reported in Table 8. Here it is significant to mention that if optimal values of m and n taken together are found less than optimal values of n then export is taken to cause GDP. Thus, export causes GDP when FPE (m^*, n^*) < FPE (m^*). It is obvious from Table 8 for all components of GDP values of FPE (m^*,n^*) are found less than FPE (m^*). For example, if GDP at Factor Cost treated as dependent variable as shown in equation 5.1 the corresponding value of FPE (m^*, n^*) is found 0.1701 that is less than the value of FPE (m^*), which is 0.1716 (Table 8).

Thus, a comparison of optimum values of FPE (m^*n^*) with the optimum values of FPE (m^*) reveals that export cause eight components of GDP at current prices during the period 1950-51 to 2001-02.

The direction of causation from export of GDP is determined by sign of sum of coefficients of Export i.e. α_2. Based on the regression results as shown in Table 7, the sum of coefficient of exports for all eight components of GDP at current prices are shown in Table 9. Table 9 reveals that the sums of coefficient of export in case of all eight components of GDP are found negative.

Thus empirical results of this section reveal that export has caused negatively to GDP and eight components in case of Indian economy during the period 1950-51 to 2001-02.

V.2 Engle Granger Test: GDP Causes Export (1950-51 to 2001-02)

In the present section, an attempt has been made to find out the causality from GDP (eight components at current prices) to export for the period 1950-51 to 2001-02. For this purpose, equation 5.4 has been estimated.

$$X_t = b + \sum_{i=1}^{j} \beta_1 X_{t-1} + \sum_{i=1}^{k} \beta_2 Y_{t-1} + u_t \qquad \ldots. \qquad (5.4)$$

The optimum lag lengths for export i.e. m and eight components of GDP i.e. n have been calculated as per equation 5.2 and equation 5.3. The optimum values of m and n have been presented in Table 10 and Table 11 respectively. In the light of optimum values of m and n as shown in Table 10 and Table 11, the regression results have been presented in Table 12. The minimum values of Akike FPE for export as well as eight component of GDP for eight estimated regression results as presented in Table 12 are reported in Table 13. Here it is significant to observe that optimal values of m and n taken together are found less than optimal values of n, and then GDP is taken to cause export. Thus GDP causes export when FPE (m^*n^*) < FPE (m^*). It is obvious from Table 13 that values of FPE (m^*n^*) corresponding to export is found FPE (m^*). For instance, export is treated as dependent variable as shown in equation 5.4 and the corresponding value of FPE (m^*) is 0.0202 which is less than value of FPE (m^*n^*) i.e. 0.0285 (Table 13).

The forgoing analysis relating to a comparison of optimum value of FPE ($m^* n^*$) with the optimum value of FPE (m^*) shows that eight components of GDP at current prices have caused to the exports during the period 1950-51 to 2001-02.

Also, it is significant to mention that direction of causation from GDP to export is determined by the sign of sum of coefficients of GDP i.e. β_2. As per regression results which are shown in Table 12 the sum of coefficient of GDP (eight components) are shown in Table 14. It is obvious from Table 14 that sum of coefficient of eight components of GDP are found positive.

Thus, forgoing analysis reveals that eight components of GDP have caused positively to Indian exports in the Indian economy for the period 1950-51 to 2001-02.

VI Export and GDP: Error Correction Mechanism

In previous two sections, it has been observed that export and eight components of GDP (at current price) are cointegrated that is, there is a long term equilibrium relationship between the two. Of course, in the short run, there may be disequilibrium. Therefore, one can treat the error term in equation 4.1 and equation 4.2 as equilibrium error (Griffiths, Carter and Judge 1993). One can use this error term to tie the short run behavior of GDP and export to there respective long run values.

Equation 6.1 has been estimated through the technique of OLS and estimated regression results are shown in Table 15. Similarly, equation 6.2 also has been estimated through the technique of OLS and estimated regression results have been shown in Table 16.

$$\Delta Y_t = \alpha + \beta \Delta X_t + \gamma \in_{t-1} + v_{ti} \quad \ldots \quad (6.1)$$

$$\Delta X_t = \chi + \lambda \Delta Y_t + \eta \in_{t-1} + \mu_{ti} \quad \ldots \quad (6.2)$$

Table 15 deals with error correction model with GDP as dependent variable and export as independent variables. It is obvious from the table that coefficients of export in eight equations are positive. This reveals that short run changes in export affect positively to GDP and its components. Also, it is worth mention that estimated coefficient of residual are found negative and insignificant.

Similarly, Table 16 deals with error correction model for export as a dependent variable and GDP and its eight components as independent variable. Table 16 reveals that the coefficients of GDP in eight equations are found positive. Thus, it shows that short run changes in GDP affect positively to the exports. Further, the coefficient of residual in eight equations is found negative and significant. This shows that a deviation of the exports from its long run equilibrium level is corrected each year.

VII Causality in Export and GDP in India: Major Findings

In the present paper an attempt has been made to find out the causal relationship in export and eight components of GDP for the period 1950-51 to 2001-02. This has been done in four subsections of the present paper and major findings are listed below:

1. All seventeen variables (eight components of GDP at current prices, eight components of GDP at constant prices and export) under present study are found stationary at second difference as per ADF test. Thus, these seventeen variables are cointegrable at I(2).

2. The empirical findings related to CRDW cointegration test in between export and GDP reveal that export and GDP at constant prices are not cointegrable while export and GDP at current prices are cointegrable. The same inference has been drawn as per Engle Granger Cointegration test.

3. Engle Granger Causal relationship in between export and GDP for the period 1950-51 to 2001-02 reveals that export has caused negatively to GDP and its components (at current price).

4. Empirical results pertaining to Engle Granger causal relationship in between export and GDP for the period 1950-51 to 2001-02 reveal that GDP (eight components) at current prices has caused positively to the export in the Indian economy.

5. Empirical results relating to error correction model with GDP as dependent variable and export as an independent variable show that short run changes in export have affected positively to GDP and its components. Thus, it can be inferred that in short run enhancement in export has led enhancement in GDP.

6. And, finally empirical investigations relating to error correction model with export as dependent variable and GDP and its components as independent variable reveal that short run change in GDP has affected positively to the exports. Thus, it can be inferred that enhancement in GDP has resulted in enhancement in export.

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Table 1: Dickey Fuller Test: GDP, its components (at current and constant prices) and export.

GDP, its components and export	At level			At first difference			At second difference		
	τ calculated	τ tabulated	H_0 : accepted/ rejected	τ calculated	τ tabulated	H_0 : accepted/ rejected	τ calculated	τ tabulated	H_0 : accepted/ rejected
Current Price									
GDPFC	12.5390	-4.146	Accepted	-1.2530	-4.1490	Accepted	-10.3200	-4.1540	Rejected
NDPFC	12.4050	-4.1460	Accepted	-1.3720	-4.1490	Accepted	-10.6250	-4.1540	Rejected
GDPMP	12.9250	-4.1460	Accepted	-1.1890	-4.1490	Accepted	-8.8730	-4.1540	Rejected
NDPMP	12.8460	-4.1460	Accepted	-1.2850	-4.1490	Accepted	-9.0660	-4.1540	Rejected
GNPFC	12.7930	-4.1460	Accepted	-1.1480	-4.1490	Accepted	-10.1420	-4.1540	Rejected
NNPFC	12.6930	-4.1460	Accepted	-1.2620	-4.1490	Accepted	-10.4790	-4.1540	Rejected
GNPMP	13.1770	-4.1460	Accepted	-1.0980	-4.1490	Accepted	-8.8940	-4.1540	Rejected
NNPMP	13.1310	-4.1460	Accepted	-1.1910	-4.1490	Accepted	-9.1310	-4.1540	Rejected
Constant Price									
GDPFC	4.2450	-4.1460	Accepted	-5.3780	-4.1490	Rejected	-	-	-
NDPFC	3.7870	-4.1460	Accepted	-5.8110	-4.1490	Rejected	-	-	-
GDPMP	4.0490	-4.1460	Accepted	-5.4640	-4.1490	Rejected	-	-	-
NDPMP	3.6310	-4.1460	Accepted	-5.8550	-4.1490	Rejected	-	-	-
GNPFC	4.4280	-4.1460	Accepted	-5.2860	-4.1490	Rejected	-	-	-
NNPFC	3.9700	-4.1460	Accepted	-5.7140	-4.1490	Rejected	-	-	-
GNPMP	4.2110	-4.1460	Accepted	-5.4190	-4.1490	Rejected	-	-	-
NNPMP	3.7920	-4.1460	Accepted	-5.8110	-4.1490	Rejected	-	-	-
Export	4.3130	-4.1460	Accepted	-5.0420	-4.1490	Rejected	-	-	-

Note : (i) Calculated τ values for level, first difference and second difference have been taken from regression result as shown in Appendices 1-3.

Table 2: Augmented Dickey Fuller Test: GDP, its components (at current and constant prices) and export.

GDP, its components and export	At level			At first difference			At second difference		
	τ calculated	τ tabulated	H_0 : accepted/ rejected	τ calculated	τ tabulated	H_0 : accepted/ rejected	τ calculated	τ tabulated	H_0 : accepted/ rejected
Current Price									
GDPFC	1.5280	-4.1498	Accepted	-0.7780	-4.1540	Accepted	-6.3680	-4.1580	Rejected
NDPFC	1.7110	-4.1498	Accepted	-0.8350	-4.1540	Accepted	-6.4790	-4.1580	Rejected
GDPMP	1.3450	-4.1498	Accepted	-0.8990	-4.1540	Accepted	-7.1030	-4.1580	Rejected
NDPMP	1.4820	-4.1498	Accepted	-0.9570	-4.1540	Accepted	-7.1230	-4.1580	Rejected
GNPFC	1.7440	-4.1498	Accepted	-0.6870	-4.1540	Accepted	-6.5520	-4.1580	Rejected
NNPFC	1.9420	-4.1498	Accepted	-0.7380	-4.1540	Accepted	-6.7270	-4.1580	Rejected
GNPMP	1.5930	-4.1498	Accepted	-0.8010	-4.1540	Accepted	-7.2980	-4.1580	Rejected
NNPMP	1.7510	-4.1498	Accepted	-0.8510	-4.1540	Accepted	-7.3790	-4.1580	Rejected
Constant Price									
GDPFC	3.7490	-4.1498	Accepted	-3.4230	-4.1540	Accepted	-8.5670	-4.1580	Rejected
NDPFC	3.6320	-4.1498	Accepted	-3.7090	-4.1540	Accepted	-8.7620	-4.1580	Rejected
GDPMP	3.5740	-4.1498	Accepted	-3.5090	-4.1540	Accepted	-8.2750	-4.1580	Rejected
NDPMP	3.4450	-4.1498	Accepted	-3.7590	-4.1540	Accepted	-8.4280	-4.1580	Rejected
GNPFC	3.9340	-4.1498	Accepted	-3.3430	-4.1540	Accepted	-8.6940	-4.1580	Rejected
NNPFC	3.8290	-4.1498	Accepted	-3.6220	-4.1540	Accepted	-8.8990	-4.1580	Rejected
GNPMP	3.7720	-4.1498	Accepted	-3.4330	-4.1540	Accepted	-8.4040	-4.1580	Rejected
NNPMP	3.6530	-4.1498	Accepted	-3.6760	-4.1540	Accepted	-8.5660	-4.1580	Rejected
Export	4.2070	-4.1498	Accepted	-2.0170	-4.1540	Accepted	-7.6810	-4.1580	Rejected

Note : (i) Calculated τ values for level, first difference and second difference have been taken from regression result as shown in Appendices 4-6

Table 3: Cointegration test (Residual test): GDP (constant and current price) as dependent variable and Export as independent variable

Variables		τ calculated	τ tabulated	H_0 : Accepted/rejected
Current prices				
GDPFC	Export	-3.035	-2.608	Rejected
NDPFC	Export	-3.101	-2.608	Rejected
GDPMP	Export	-2.934	-2.608	Rejected
NDPMP	Export	-2.980	-2.608	Rejected
GNPFC	Export	-3.116	-2.608	Rejected
NNPFC	Export	-3.189	-2.608	Rejected
GNPMP	Export	-3.006	-2.608	Rejected
NNPMP	Export	-3.059	-2.608	Rejected
Constant prices				
GDPFC	Export	-1.114	-2.608	Accepted
NDPFC	Export	-1.154	-2.608	Accepted
GDPMP	Export	-1.111	-2.608	Accepted
NDPMP	Export	-1.145	-2.608	Accepted
GNPFC	Export	-1.157	-2.608	Accepted
NNPFC	Export	-1.202	-2.608	Accepted
GNPMP	Export	-1.148	-2.608	Accepted
NNPMP	Export	-1.186	-2.608	Accepted

Note : Calculated τ values for residuals test have been taken from regression results as shown in Appendix 7.

Table 4: Cointegration test (Residual test): Export as dependent variable and GDP (constant and current price) as independent variable

Variables		τ calculated	τ tabulated	H_0 : Accepted/rejected
Current prices				
Export	GDPFC	-2.977	-2.608	Rejected
Export	NDPFC	-3.047	-2.608	Rejected
Export	GDPMP	-2.869	-2.608	Rejected
Export	NDPMP	-2.919	-2.608	Rejected
Export	GNPFC	-3.064	-2.608	Rejected
Export	NNPFC	-3.143	-2.608	Rejected
Export	GNPMP	-2.948	-2.608	Rejected
Export	NNPMP	-3.006	-2.608	Rejected
Constant prices				
Export	GDPFC	-0.074	-2.608	Accepted
Export	NDPFC	-0.126	-2.608	Accepted
Export	GDPMP	-0.028	-2.608	Accepted
Export	NDPMP	-0.067	-2.608	Accepted
Export	GNPFC	-0.139	-2.608	Accepted
Export	NNPFC	-0.199	-2.608	Accepted
Export	GNPMP	-0.085	-2.608	Accepted
Export	NNPMP	-0.131	-2.608	Accepted

Note : Calculated τ values for residuals test have been taken from regression results as shown in Appendix 8.

Table 5: Determining optimum lag length (m) for GDP and its components : Relevant statistics

GDP	Lag of GDP (m)	FPE (m)
GDPFC	1	0.3415
GDPFC	2	0.1999
GDPFC	3	0.1854
GDPFC	4*	0.1716
GDPFC	5	0.1719
NDPFC	1	0.2821
NDPFC	2	0.1809
NDPFC	3	0.1668
NDPFC	4*	0.1516
NDPFC	5	0.1550
GDPMP	1	0.3839
GDPMP	2*	0.2149
GDPMP	3	0.2173
NDPMP	1	0.3202
NDPMP	2	0.1963
NDPMP	3	0.1962
NDPMP	4*	0.1714
GNPFC	1	0.3309
GNPFC	2	0.1968
GNPFC	3	0.1877
GNPFC	4	0.1769
GNPFC	5*	0.1699
GNPFC	6	0.1752
NNPFC	1	0.2715
NNPFC	2	0.1774
NNPFC	3	0.1684
NNPFC	4	0.1552
NNPFC	5*	0.1537
NNPFC	6	0.1556
GNPMP	1	0.3711
GNPMP	2*	0.2142
GNPMP	3	0.2182
NNPMP	1	0.3075
NNPMP	2	0.197
NNPMP	3	0.1964
NNPMP	4*	0.1728

Note : (i) *-optimum lag of GDP; (ii) Relevant statistic and optimum value of FPE i.e. m have been calculated on the basis of equations 5.1 and 5.2.

Table 6: Determining optimum lag lengths (m and n) for GDP and Export: Relevant statistics

GDP	Lag of GDP (m)	Export	Lag of export (n)	FPE(m*,n) x 10^8
GDPFC	4	Export	1	0.1776
GDPFC	4	Export	2*	0.1388
GDPFC	4	Export	3	0.1439
NDPFC	4	Export	1	0.1560
NDPFC	4	Export	2*	0.1360
NDPFC	4	Export	3	0.1412
GDPMP	2	Export	1	0.2228
GDPMP	2	Export	2*	0.2089
GDPMP	2	Export	3	0.2094
NDPMP	4	Export	1	0.2015
NDPMP	4	Export	2	0.1943
NDPMP	4	Export	3	0.1940
NDPMP	4	Export	4	0.0819
GNPFC	5	Export	1	0.1739
GNPFC	5	Export	2*	0.1386
GNPFC	5	Export	3	0.1443
NNPFC	5	Export	1	0.1582
NNPFC	5	Export	2*	0.1359
NNPFC	5	Export	3	0.1415
GNPMP	2	Export	1	0.2228
GNPMP	2	Export	2*	0.2043
GNPMP	2	Export	3	0.2044
NNPMP	4	Export	1	0.2008
NNPMP	4	Export	2	0.1900
NNPMP	4	Export	3	0.1895
NNPMP	4	Export	4	0.0843

Note : (i) *-optimum lag of export; (ii) Relevant statistic and optimum value of FPE i.e. m and n have been calculated on the basis of equations 5.1 and 5.3.

Table 7: Engle-Granger test for determining direction of causality (with GDP as dependent variable and Export as independent variable): Regression results.

Variables	Constant	GDP(-1)	GDP(-2)	GDP(-3)	GDP(-4)	GDP(-5)	X(-1)	X(-2)	X(-3)	X(-4)	X(-5)	R2	DW	AIC	SC
GDPFC	1276.92	1.504	0.198	0.105	-0.87	-	1.061	-1.968	-	-	-	0.999	2.057	21.662	21.935
	(0.522)	(11.038)	(0.706)	(0.376)	(-3.169)		(2.287)	(-3.689)							
NDPFC	1540.06	1.524	0.21	0.057	-0.866	-	0.747	-1.483	-	-	-	0.999	2.066	21.64	21.913
	(0.630)	(10.761)	(0.717)	(0.198)	(-2.905)		(1.580)	(-2.833)							
GDPMP	968.69	1.902	-0.847	-		-	0.801	-1.396	-	-	-	0.999	2.234	22.018	22.209
	(0.341)	(15.476)	(-5.600)				(1.424)	(-2.223)							
NDPMP	-2155.12	1.234	-0.732	0.367	0.471	-	0.214	0.226	4.082	-5.145	-1.631	0.999	2.117	20.791	21.185
	(-1.295)	(7.687)	(-2.741)	(1.508)	(1.659)		(0.498)	(0.205)	(5.28)	(-3.987)	(-1.345)				
GNPFC	1801.98	1.489	0.157	0.194	-0.686	-0.246	1.568	-2.525	-	-	-	0.999	2.044	21.689	22.004
	(0.693)	(10.53)	(0.546)	(0.655)	(-1.593)	(-0.621)	(2.472)	(-3.465)							
NNPFC	1969.79	1.515	0.16	0.148	-0.699	-0.223	1.186	-1.975	-	-	-	0.999	2.058	21.67	21.985
	(0.762)	10.404)	(0.531)	(0.481)	(-1.526)	(-0.540)	(1.976)	(-2.871)							
GNPMP	1138.58	(1.896	-0.847	-	-	-	0.998	-1.536	-	-	-	0.999	2.223	21.995	22.187
	(0.404)	(15.741)	(-5.758)				(1.800)	(-2.461)							
NNPMP	-1756.27	1.243	-0.764	0.428	0.411	-	0.432	0.049	4.082	-4.939	-1.695	0.999	2.095	20.791	21.185
	(-1.063)	(7.765)	(-2.806)	(1.706)	(1.458)		(1.004)	(0.044)	(5.307)	(-3.821)	(-1.395)				

Note : (i) Regression results of type 5.1 have been obtained on the basis of optimum values of m and n as given in Table 6; (ii) Figures in the parenthesis are t-values.

Table 8: Direction of causality from Export to GDP: Optimum lag length

Lag of GDP (m*)	Lag of export (n*)	Minimum FPE for GDP (x 10^8)	Minimum FPE for GDP and export (x 10^8)	Causation from export to GDP
GDPFC (-4)	Export (-2)	0.1716	0.1388	Export Cause GDPFC
NDPFC (-4)	Export (-2)	0.1516	0.136	Export Cause NDPFC
GDPMP (-2)	Export (-2)	0.2149	0.2089	Export Cause GDPMP
NDPMP (-2)	Export (-5)	0.1943	0.056	Export Cause NDPMP
GNPFC (-5)	Export (-2)	0.1699	0.1386	Export Cause GNPFC
NNPFC (-5)	Export (-2)	0.1537	0.1359	Export Cause NNPFC
GNPMP (-2)	Export (-2)	0.2142	0.2043	Export Cause GNPMP
NNPMP (-2)	Export (-5)	0.193	0.056	Export Cause NNPMP

Note : (i) Optimum lag lengths (i.e. m and n) and FPE are based on values of these parameters as given in Tables 5 and 6.

Table 9: Direction of causality from Export to GDP

Direction	Sum of coefficients of export	Positive or Negative
Export to GDPFC	-0.906	(-) Negative
Export to NDPFC	-0.735	(-) Negative
Export to GDPMP	-0.594	(-) Negative
Export to NDPMP	-2.253	(-) Negative
Export to GNPFC	-0.956	(-) Negative
Export to NNPFC	-0.789	(-) Negative
Export to GNPMP	-0.537	(-) Negative
Export to NNPMP	-0.071	(-) Negative

Note : The positive/negative values are sum of coefficients of exports as shown in Table 7

Table 10: Determining optimum lag length (m) for Export: Relevant statistics

Export	Lag of export (m)	FPE (m)x10^8
Export	1	0.0297
Export	2*	0.0285
Export	3	0.0296

Note : (i) *-optimum lag of export; (ii) Relevant statistic and optimum value of FPE i.e. m have been calculated on the basis of equations 5.2 and 5.4.

Table 11: Determining optimum lag lengths (m and n) for GDP and Export: Relevant statistics

Export	Lag of export (m*)	GDP	Lag of GDP (n)	FPE(m*,n) x 10^8
Export	2	GDPFC	1*	0.020215
Export	2	GDPFC	2	0.020958
Export	2	NDPFC	1*	0.020077
Export	2	NDPFC	2	0.020791
Export	2	GDPMP	1	0.019917
Export	2	GDPMP	2*	0.019645
Export	2	GDPMP	3	0.020068
Export	2	NDPMP	1	0.019756
Export	2	NDPMP	2*	0.019096
Export	2	NDPMP	3	0.019099
Export	2	GNPFC	1*	0.020444
Export	2	GNPFC	2	0.021125
Export	2	NNPFC	1*	0.020330
Export	2	NNPFC	2	0.020958
Export	2	GNPMP	1	0.020100
Export	2	GNPMP	2*	0.019669
Export	2	GNPMP	3	0.020192
Export	2	NNPMP	1	0.019962
Export	2	NNPMP	2*	0.019096
Export	2	NNPMP	3	0.019248

Note : (i) *-optimum lag of GDP; (ii) Relevant statistic and optimum value of FPE i.e. m and n have been calculated on the basis of equations 5.3 and 5.4.

Table 12: Engle-Granger test for determining direction of causality (with Export as dependent variable and GDP as independent variable): Regression results

Variables	Constant	Export (-1)	Export (-2)	GDP (-1)	GDP (-2)	R^2	DW	AIC	SC
GDPFC	-1649.11	0.533	0.102	0.049	-	0.993	1.897	19.682	19.835
	(-1.854)	(3.263)	(0.511)	(4.616)					
NDPFC	-1727.61	0.526	0.101	0.056	-	0.993	1.885	19.676	19.829
	(-1.931)	(3.226)	(0.513)	(4.665)					
GDPMP	-1475.85	0.618	0.113	0.101	-0.072	0.994	2.022	19.654	19.845
	(-1.694)	(3.579)	(0.589)	(2.693)	(-1.568)				
NDPMP	-1497.11	0.639	0.095	0.123	-0.094	0.994	2.055	19.626	19.817
	(-1.727)	(3.685)	(0.502)	(2.977)	(-1.841)				
GNPFC	-1645.11	0.54	0.095	0.049	-	0.993	1.884	19.693	19.846
	(-1.833)	(3.293)	(0.473)	(4.540)					
NNPFC	1721.04	0.534	0.094	0.056	-	0.993	1.871	19.688	19.841
	(-1.904)	(3.261)	(0.471)	(4.575)					
GNPMP	1480.27	0.629	0.100	0.105	-0.077	0.994	2.015	19.654	19.846
	(-1.696)	(3.658)	(0.519)	(2.827)	(-1.689)				
NNPMP	-1504.18	0.652	0.079	0.128	-0.099	0.994	2.047	19.626	19.817
	(-1.733)	(3.78)	(0.415)	(3.129)	(-1.978)				

Note : (i) Regression results of type 5.4 have been obtained on the basis of optimum values of m and n as given in Table 11; (ii) Figures in the parenthesis are t-values.

Table 13: Direction of causality from GDP to Export: Optimum lag length

Lag of Export (m*)	Lag of GDP (n*)	Minimum FPE for GDP (x 10^8)	Minimum FPE for GDP and export (x 10^8)	Causation from export to GDP
Export (-2)	GDPFC (-1)	0.0285	0.0200	GDPFC cause export
Export (-2)	NDPFC (-1)	0.0285	0.0200	NDPFC cause export
Export (-2)	GDPMP (-2)	0.0285	0.0196	GDPMP cause export
Export (-2)	NDPMP (-2)	0.0285	0.0190	NDPMP cause export
Export (-2)	GNPFC (-1)	0.0285	0.0200	GNPFC cause export
Export (-2)	NNPFC (-1)	0.0285	0.0203	NNPFC cause export
Export (-2)	GNPMP (-2)	0.0285	0.0196	GNPMP cause export
Export (-2)	NNPMP (-2)	0.0285	0.0190	NNPMP cause export

Note : (i) Optimum lag lengths (i.e. m and n) and FPE are based on values of these parameters as given in Tables 10 and 11.

Table 14: Direction of causality from GDP to Export

Direction	Sum of coefficients of GDP	Positive or Negative
GDPFC to Export	0.0376	(+) Positive
NDPFC to Export	0.0585	(+) Positive
GDPMP to Export	0.0336	(+) Positive
NDPMP to Export	0.0511	(+) Positive
GNPFC to Export	0.0382	(+) Positive
NNPFC to Export	0.0586	(+) Positive
GNPMP to Export	0.0332	(+) Positive
NNPMP to Export	0.0525	(+) Positive

Note : The positive/negative values are sum of coefficients of exports as shown in Table 12

Table 15: Error correction model for GDP as dependent variable: Regression results for equations 6.113-6.120

Equations	Constant	Δ Export	Residuals (-1)	R^2	DW	AIC	SC
GDPFC	16165.86 (2.648)	6.073 (8.047)	-0.078 (-0.819)	0.612	1.561	23.978	24.092
NDPFC	14322.97 (2.599)	5.484 (8.054)	-0.090 (-0.929)	0.609	1.565	23.774	23.887
GDPMP	18031.00 (2.718)	6.581 (8.004)	-0.059 (-0.638)	0.615	1.640	24.144	24.257
NDPMP	16190.51 (2.679)	5.991 (8.003)	-0.067 (-0.717)	0.612	1.650	23.957	24.070
GNPFC	15870.87 (2.593)	6.088 (8.080)	-0.097 (-1.004)	0.608	1.559	23.985	24.099
NNPFC	14033.7 (2.54)	5.496 (8.095)	-0.112 (-1.132)	0.605	1.563	23.780	23.894
GNPMP	17730.21 (2.663)	6.598 (8.029)	-0.076 (-0.806)	0.610	1.638	24.152	24.265
NNPMP	15893.02 (2.621)	6.006 (8.033)	-0.086 (-0.900)	0.608	1.648	23.965	24.078

Note : (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in parenthesis are t-values

Table 16: Error correction model for Export as dependent variable: Regression results for equations 6.121-6.128

Equations	Constant	Δ GDP (Components at Current Prices)	Residuals (-1)	R^2	DW	AIC	SC
Export	8.927 (0.010)	0.098 (8.535)	-0.318 (-2.837)	0.663	1.985	19.827	19.940
Export	35.517 (0.043)	0.108 (8.532)	-0.329 (-2.926)	0.662	1.980	19.828	19.941
Export	19.440 (0.020)	0.090 (8.514)	-0.298 (-2.706)	0.663	2.056	19.827	19.941
Export	2.824 (0.003)	0.099 (8.506)	-0.307 (-2.773)	0.662	2.057	19.828	19.942
Export	29.964 (0.036)	0.098 (8.548)	-0.331 (-2.950)	0.661	1.987	19.833	19.946
Export	56.580 (0.069)	0.109 (8.550)	-0.344 (-3.046)	0.660	1.982	19.834	19.948
Export	2.568 (0.003)	0.090 (8.520)	-0.311 (-2.811)	0.661	2.056	19.833	19.946
Export	25.468 (0.031)	0.099 (8.515)	-0.320 (-2.886)	0.660	2.057	19.834	19.948

Note : (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in parenthesis are t-values

Appendix 1: Regression results: Dickey Fuller test

Equations	Constant	Trend	Independent variables	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-10398.96 (-1.897)	806.55 (3.169)	0.096 (12.539)	0.925	0.779	22.335	22.448
NDPFC (at current pr ice)	-9252.70 (-1.849)	708.51 (3.049)	0.097 (12.405)	0.922	0.859	22.155	22.268
GDPMP (at current pr ice)	-11139.98 (-1.919)	873.81 (3.234)	0.095 (12.925)	0.929	0.743	22.446	22.560
NDPMP (at current pr ice)	-9987.88 (-1.876)	775.39 (3.127)	0.096 (12.845)	0.928	0.807	22.274	22.388
GNPFC (at current pr ice)	-10060.32 (-1.858)	774.98 (3.084)	0.097 (12.793)	0.926	0.791	22.311	22.425
NNPFC (at current pr ice)	-8915.49 (-1.807)	676.88 (2.955)	0.099 (12.693)	0.924	0.874	22.127	22.241
GNPMP (at current pr ice)	-10793.82 (-1.882)	841.76 (3.153)	0.097 (13.176)	0.930	0.763	22.423	22.536
NNPMP	-9643.33	743.27	0.098	0.929	0.832	22.247	22.361
(at current pr ice)	(-1.837)	(3.041)	(13.131)				
GDPFC (at constant pr ice)	-6147.23 (-1.822)	-5.35 (0.018)	0.064 (4.244)	0.719	2.220	21.640	21.750
NDPFC (at constant pr ice)	-6014.45 (-1.824)	-8.42 (-0.029)	0.064 (3.786)	0.671	2.301	21.608	21.722
GDPMP (at constant pr ice)	-5905.10 (-1.573)	-9.55 (-0.028)	0.062 (4.049)	2.200	2.200	21.852	21.965
NDPMP (at constant pr ice)	-5755.42 (-1.565)	-11.51 (-0.034)	0.062 (3.630)	0.661	2.271	21.821	21.935
GNPFC (at constant pr ice)	-6297.79 (-1.871)	-61.57 (-0.208)	0.067 (4.428)	0.722	2.244	21.641	21.755
NNPFC (at constant pr ice)	-6215.33 (-1.886)	-65.06 (-0.223)	0.068 (3.970)	0.674	2.325	21.608	21.721
GNPMP (at constant pr ice)	-6035.11 (-1.610)	-67.16 (-0.200)	0.066 (4.211)	0.709	2.238	21.851	21.965
NNPMP (at constant pr ice)	-5928.02 (-0.210)	-69.64 (-1.613)	0.066 (3.791)	0.663	2.309	21.822	21.936
Export	-1756.95 (-1.044)	127.51 (1.759)	0.097 (4.313)	0.590	2.155	20.020	20.130

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 2: Regression results: Dickey Fuller test

Equations	Constant	Trend	Independent variables	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-6035.53 (-1.244)	466.33 (2.034)	-0.073 (-1.253)	0.089	2.671	21.93	22.04
NDPFC (at current pr ice)	-5845.76 (-1.263)	448.35 (2.059)	-0.084 (-1.372)	0.087	2.707	21.84	21.96
GDPMP (at current pr ice)	-6180.00 (-1.233)	482.46 (2.026)	-0.066 (-1.188)	0.091	2.424	21.99	22.11
NDPMP (at current pr ice)	-5943.15 (-1.245)	461.26 (2.042)	-0.074 (-1.284)	0.088	2.456	21.90	22.01
GNPFC (at current pr ice)	-5982.07 (-1.234)	458.40 (2.005)	-0.067 (-1.147)	0.090	2.632	21.93	22.05
NNPFC (at current pr ice)	-5791.50 (-1.254)	440.37 (2.031)	-0.078 (-1.262)	0.088	2.675	21.84	21.96
GNPMP (at current pr ice)	-6179.32 (-1.226)	478.07 (2.001)	-0.061 (-1.098)	0.093	2.420	22.01	22.12
NNPMP (at current pr ice)	-5944.13 (-1.239)	457.07 (2.018)	-0.070 (-1.191)	0.090	2.459	21.91	22.03
GDPFC (at constant pr ice)	-6808.14 (-1.632)	920.72 (4.442)	-0.771 (-5.378)	0.382	2.074	21.91	22.03
NDPFC (at constant pr ice)	-6479.81 (-1.613)	883.64 (4.621)	-0.848 (-5.810)	0.419	2.077	21.85	21.97
GDPMP (at constant pr ice)	-7132.40 (-1.563)	1011.07 (4.476)	-0.784 (-5.464)	0.390	2.065	22.11	22.22
NDPMP (at constant pr ice)	-6746.11 (-1.530)	970.51 (4.628)	-0.853 (-5.854)	0.423	2.027	22.05	22.17
GNPFC (at constant pr ice)	-6880.40 (-1.636)	913.37 (4.401)	-0.763 (-5.285)	0.375	2.064	21.94	22.05
NNPFC (at constant pr ice)	-6560.64 (-1.619)	877.44 (4.579)	-0.841 (-5.713)	0.412	2.014	21.88	21.99
GNPMP (at constant pr ice)	-7260.97 (-1.577)	1011.26 (4.467)	-0.783 (-5.418)	0.386	2.055	22.13	22.24
NNPMP (at constant pr ice)	-6878.26 (-1.546)	971.40 (4.620)	-0.854 (-5.810)	0.420	2.015	22.07	22.19
Export	-3864.13 (-1.993)	258.88 (3.299)	-0.711 (-5.041)	0.351	1.916	20.27	20.38

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 3: Regression results: Dickey Fuller test

Equations	Constant	Trend	Independent variables	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-3737.51 (-0.943)	319.23 (2.410)	-1.404 (-10.320)	0.698	2.105	21.81	29.93
NDPFC (at current pr ice)	-3361.26 (-0.894)	288.35 (2.298)	-1.425 (-10.625)	0.710	2.122	21.71	21.83
GDPMP (at current pr ice)	-3637.19 (-0.849)	314.35 (2.191)	-1.274 (-8.872)	0.631	2.149	21.97	22.08
NDPMP (at current pr ice)	-3279.01 (-0.804)	285.29 (2.094)	-1.290 (-9.065)	0.641	2.160	21.87	21.98
GNPFC (at current pr ice)	-3976.41 (-1.001)	330.66 (2.491)	-1.400 (-10.142)	0.691	2.117	21.81	21.93
NNPFC (at current pr ice)	-3603.70 (-0.958)	300.11 (2.392)	-1.424 (-10.478)	0.704	2.145	21.71	21.82
GNPMP (at current pr ice)	-3925.89 (-0.915)	330.10 (2.298)	-1.289 (-8.894)	0.632	2.157	21.97	22.09
NNPMP (at current pr ice)	-3570.53 (-0.876)	301.32 (2.213)	-1.309 (-9.130)	0.644	2.176	21.87	21.98

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 4: Regression results: Augmented Dickey Fuller test

Equations	Constant	Trend	Y_{t-1}	ΔY_{t-1}	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-5964.41 (-1.247)	463.20 (2.049)	0.023 (1.528)	0.731 (5.216)	0.952	2.330	21.925	22.070
NDPFC (at current pr ice)	-5720.00 (-1.261)	438.95 (2.056)	0.027 (1.710)	0.685 (4.648)	0.947	2.313	21.825	21.978
GDPMP (at current pr ice)	-6186.20 (-1.244)	485.78 (2.058)	0.020 (1.345)	0.762 (5.491)	0.957	2.152	21.997	22.150
NDPMP (at current pr ice)	-5916.12 (-1.255)	460.38 (2.064)	0.023 (1.481)	0.727 (4.999)	0.953	2.143	21.896	22.046
GNPFC (at current pr ice)	-5846.28 (-1.232)	450.29 (2.012)	0.026 (1.743)	0.712 (5.137)	0.953	2.282	21.913	22.066
NNPFC (at current pr ice)	-5587.79 (-1.244)	424.57 (2.013)	0.031 (1.942)	0.664 (4.568)	0.947	2.268	21.809	21.962
GNPMP (at current pr ice)	-6132.58 (-1.236)	477.64 (92.032)	0.023 (1.593)	0.736 (5.335)	0.957	2.123	21.996	22.149
NNPMP (at current pr ice)	-5852.62 (-1.246)	451.12 (2.035)	0.027 (1.750)	0.698 (4.836)	0.953	2.119	21.892	22.045
GDPFC (at constant pr ice)	-6840.99 (-1.854)	29.78 (-0.095)	0.072 (3.749)	-0.120 (-0.763)	0.719	2.025	21.692	21.845
NDPFC (at constant pr ice)	-6930.25 (3579.60)	-42.75 (306.71)	0.076 (0.020)	-0.163 (0.156)	0.674	2.046	21.647	21.800
GDPMP (at constant pr ice)	-6569.20 (-1.609)	-30.96 (-0.087)	0.070 (3.573)	-0.109 (-0.696)	0.706	2.022	21.903	22.056
NDPMP (at constant pr ice)	-6593.20 (-1.660)	-42.99 (-0.122)	0.072 (3.444)	-0.146 (-0.934)	0.663	2.038	21.864	22.017
GNPFC (at constant pr ice)	-7048.21 (-1.916)	-93.32 (-0.297)	0.077 (3.933)	-0.131 (-0.838)	0.722	2.034	21.688	21.841
NNPFC (at constant pr ice)	-7204.11 (-2.018)	-108.59 (-0.352)	0.082 (3.829)	-0.176 (-1.129)	0.678	2.056	21.643	21.796
GNPMP (at constant pr ice)	-6787.28 (-1.668)	-98.50 (-0.276)	0.075 (3.772)	-0.128 (-0.818)	0.709	2.032	21.899	22.052
NNPMP (at constant pr ice)	-6866.51 (-1.734)	-112.87 (-0.321)	0.078 (3.653)	-0.167 (-1.068)	0.667	2.049	21.859	22.012
Export	-2014.67 (-1.169)	138.03 (1.884)	0.165 (4.207)	-0.460 (-2.138)	0.626	1.875	19.989	20.142

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 5: Regression results: Augmented Dickey Fuller test

Equations	Constant	Trend	Y_{t-1}	ΔY_{t-1}	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-5907.31 (-1.216)	461.65 (2.040)	-0.044 (-0.778)	-0.381 (-2.735)	0.219	2.083	21.842	21.996
NDPFC (at current pr ice)	-5552.36 (-1.208)	432.01 (2.027)	-0.050 (-0.835)	-0.400 (-2.903)	0.231	2.098	21.736	21.891
GDPMP (at current pr ice)	-6366.68 (-1.211)	493.83 (2.008)	-0.051 (-0.899)	-0.249 (-1.701)	0.146	2.121	21.994	22.148
NDPMP (at current pr ice)	-6021.26 (-1.207)	465.46 (2.002)	-0.057 (-0.957)	-0.263 (-1.809)	0.151	2.130	21.893	22.048
GNPFC (at current pr ice)	-5887.07 (-1.210)	456.00 (2.017)	-0.039 (-2.687)	-0.381 (-0.687)	0.217	2.093	21.849	22.004
NNPFC (at current pr ice)	-5529.33 (-1.204)	426.29 (2.006)	-0.044 (-0.737)	0.402 (-2.874)	0.230	2.119	21.740	21.895
GNPMP (at current pr ice)	-6349.87 (-1.206)	489.41 (1.992)	-0.046 (-0.800)	-0.267 (-1.804)	0.154	2.127	22.001	22.155
NNPMP (at current pr ice)	-5997.48 (-1.203)	460.68 (1.987)	-0.050 (-0.850)	-0.284 (-1.941)	0.160	2.144	21.897	22.051
GDPFC (at constant pr ice)	-6193.01 (-1.381)	782.58 (3.180)	-0.626 (-3.422)	-0.199 (-1.357)	0.412	2.070	21.930	22.080
NDPFC (at constant pr ice)	-6151.44 (-1.418)	779.60 (3.365)	-0.718 (-3.709)	-0.163 (-1.099)	0.439	2.048	21.887	22.042
GDPMP (at constant pr ice)	-6481.60 (-1.319)	866.41 (3.204)	-0.646 (-3.509)	-0.188 (-1.278)	0.415	2.051	22.129	22.283
NDPMP (at constant pr ice)	-6355.21 (-1.334)	856.11 (3.357)	-0.727 (-3.758)	-0.158 (-1.070)	0.441	2.035	22.085	22.240
GNPFC (at constant pr ice)	-6239.71 (-1.384)	772.57 (3.146)	-0.613 (-3.342)	-0.208 (-1.408)	0.407	2.070	21.949	22.104
NNPFC (at constant pr ice)	-6198.94 (-1.420)	768.48 (3.326)	-0.705 (-3.621)	-0.173 (-1.157)	0.434	2.045	21.905	22.059
GNPMP (at constant pr ice)	-6529.62 (-1.322)	855.53 (3.171)	-0.635 (-3.433)	-0.203 (-1.373)	0.415	2.054	22.143	22.298
NNPMP (at constant pr ice)	-6407.17 (-1.337)	845.48 (3.320)	-0.715 (-3.676)	-0.174 (-1.168)	0.441	2.035	22.101	22.255
Export	-3219.11 (-1.545)	207.08 (2.355)	-0.434 (-2.017)	0.514 (-1.764)	0.397	1.981	20.264	20.418

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 6: Regression results: Augmented Dickey Fuller test

Equations	Constant	Trend	Y_{t-1}	ΔY_{t-1}	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-4675.51 (-1.106)	374.37 (2.551)	-1.598 (-6.367)	0.140 (0.922)	0.704	1.958	21.858	22.014
NDPFC (at current pr ice)	-4283.41 (-1.069)	343.05 (2.475)	-1.638 (-6.478)	0.150 (0.994)	0.717	1.961	21.752	21.907
GDPMP (at current pr ice)	-5659.44 (-1.281)	443.19 (2.867)	-1.676 (-7.103)	0.331 (2.113)	0.665	1.971	21.938	22.094
NDPMP (at current pr ice)	-5232.42 (-1.244)	409.13 (2.785)	-1.706 (-7.123)	0.336 (2.126)	0.675	1.995	21.838	21.994
GNPFC (at current pr ice)	-5074.02 (-1.204)	396.68 (2.713)	-1.639 (-6.552)	0.174 (1.142)	0.700	1.939	21.852	22.008
NNPFC (at current pr ice)	-4701.25 (-1.181)	366.73 (2.665)	-1.689 (-6.726)	0.191 (1.257)	0.715	1.944	21.739	21.895
GNPMP (at current pr ice)	-6091.00 (-1.385)	467.51 (3.040)	-1.716 (-7.298)	0.357 (2.261)	0.671	1.948	21.927	22.083
NNPMP (at current pr ice)	-5686.17 (-1.364)	435.01 (2.987)	-1.757 (-7.379)	0.367 (2.310)	0.683	1.975	21.821	21.976
GDPFC (at constant pr ice)	-1184.84 (-0.260)	129.35 (0.874)	-2.081 (-8.566)	0.382 (2.707)	0.787	2.076	22.032	22.188
NDPFC (at constant pr ice)	-12.44.65 (-0.277)	123.24 (0.844)	-2.119 (-8.761)	0.399 (2.846)	0.794	2.088	22.006	22.162
GDPMP (at constant pr ice)	-1212.52 (-0.238)	137.36 (0.827)	-2.052 (-8.274)	0.370 (2.523)	0.781	2.095	22.257	22.413
NDPMP (at constant pr ice)	-1272.63 (-0.253)	131.36 (0.801)	-2.085 (-8.428)	0.383 (2.623)	0.787	2.104	22.237	22.390
GNPFC (at constant pr ice)	-1463.21 (-0.323)	143.06 (0.969)	-2.104 (-8.694)	0.397 (2.818)	0.789	2.066	22.026	22.182
NNPFC (at constant pr ice)	-1524.22 (-0.341)	136.94 (0.941)	-2.145 (-8.898)	0.415 (2.966)	0.796	2.078	21.999	22.155
GNPMP (at constant pr ice)	-1491.81 (-0.293)	151.36 (0.913)	-2.079 (-8.403)	0.383 (2.610)	0.784	2.086	22.254	22.409
NNPMP (at constant pr ice)	-1553.04 (-0.309)	145.34 (0.888)	-2.114 (-8.566)	0.397 (2.717)	0.791	2.094	22.229	22.385
Export	-1662.37 (-0.870)	106.69 (1.657)	-2.598 (-7.681)	0.617 (2.272)	0.722	2.103	20.263	20.419

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 7: Regression result: GDP (at current and constant prices) as dependent variable and export as independent variable

Equations	Residuals (-1)	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-0.319 (-3.035)	0.155	2.001	24.371	24.409
NDPFC (at current pr ice)	-0.329 (-3.100)	0.161	2.001	24.149	24.187
GDPMP (at current pr ice)	-0.302 (-2.933)	0.146	2.066	24.557	24.595
NDPMP (at current pr ice)	-0.308 (-2.980)	0.150	2.072	24.355	24.393
GNPFC (at current pr ice)	-0.331 (-3.116)	0.162	2.008	24.360	24.398
NNPFC (at current pr ice)	-0.342 (-3.189)	0.168	2.009	24.136	24.174
GNPMP (at current pr ice)	-0.312 (-3.005)	0.152	2.072	24.546	24.584
NNPMP (at current pr ice)	-0.320 (-3.058)	0.157	2.079	24.344	24.382
GDPFC (at constant pr ice)	-0.046 (-1.114)	0.024	1.797	23.660	23.690
NDPFC (at constant pr ice)	-0.048 (-1.154)	0.025	1.840	23.442	23.480
GDPMP (at constant pr ice)	-0.045 (-1.110)	0.024	1.827	23.879	23.917
NDPMP (at constant pr ice)	-0.047 (-1.144)	0.025	1.867	23.683	23.721
GNPFC (at constant pr ice)	-0.048 (-1.156)	0.025	1.837	23.639	23.677
NNPFC (at constant pr ice)	-0.050 (-1.201)	0.027	1.884	23.417	23.455
GNPMP (at constant pr ice)	-0.047 (-1.148)	0.025	1.865	23.859	23.897
NNPMP (at constant pr ice)	-0.049 (-1.186)	0.027	1.909	23.662	23.699

Note: (i) Figures in the parenthesis are τ-values

Appendix 8: Regression results: Export as dependent variable and GDP (at current and constant prices) as independent variable

Equations	Residuals (-1)	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-0.320 (-2.976)	0.150	1.978	19.749	19.786
NDPFC (at current pr ice)	-0.330 (-3.046)	0.156	1.979	19.749	19.787
GDPMP (at current pr ice)	-0.302 (-2.869)	0.140	2.040	19.749	19.787
NDPMP (at current pr ice)	-0.309 (-2.919)	0.145	2.047	19.750	19.788
GNPFC (at current pr ice)	-0.332 (-3.064)	0.157	1.986	19.754	19.792
NNPFC (at current pr ice)	-0.343 (-3.142)	0.164	1.987	19.756	19.794
GNPMP (at current pr ice)	-0.313 (-2.948)	0.147	2.047	19.755	19.792
NNPMP (at current pr ice)	-0.321 (-3.005)	0.152	2.055	19.756	19.794
GDPFC (at constant pr ice)	-0.003 (-0.074)	0.006	1.654	20.374	20.412
NDPFC (at constant pr ice)	-0.006 (-0.125)	0.006	1.691	20.406	20.444
GDPMP (at constant pr ice)	-0.001 (-0.028)	0.007	1.676	20.400	20.438
NDPMP (at constant pr ice)	-0.003 (-0.067)	0.006	1.709	20.432	20.469
GNPFC (at constant pr ice)	-0.006 (-0.138)	0.005	1.687	20.375	20.413
NNPFC (at constant pr ice)	-0.009 (-0.198)	0.005	1.726	20.408	20.446
GNPMP (at constant pr ice)	-0.004 (-0.085)	0.006	1.706	20.401	20.439
NNPMP (at constant pr ice)	-0.006 (-0.131)	0.005	1.743	20.434	20.471

Note: (i) Figures in the parenthesis are τ-values

Appendix 9: Regression results: GDP (at current and constant prices) as dependent variable and export as independent variable

Equations	Constant	Export	R^2	DW	AIC	SC
GDPFC (at current pr ice)	50672.40 (4.991)	10.132 (60.705)	0.986	0.637	25.009	25.084
NDPFC (at current pr ice)	45982.29 (5.115)	9.059 (61.298)	0.986	0.655	24.765	24.840
GDPMP (at current pr ice)	56666.84 (4.978)	11.120 (59.413)	0.986	0.604	25.238	25.313
NDPMP (at current pr ice)	51976.73 (5.087)	10.046 (59.814)	0.986	0.616	25.021	25.096
GNPFC (at current pr ice)	50030.28 (5.017)	10.038 (61.235)	0.986	0.658	24.973	25.048
NNPFC (at current pr ice)	45240.17 (5.144)	8.965 (61.866)	0.987	0.679	24.726	24.801
GNPMP (at current pr ice)	56024.47 (5.004)	11.026 (59.898)	0.986	0.622	25.204	25.279
NNPMP (at current pr ice)	51334.61 (5.116)	9.952 (60.335)	0.986	0.636	24.985	25.060
GDPFC (at constant pr ice)	300286.60 (16.570)	5.358 (17.982)	0.866	0.085	26.168	26.243
NDPFC (at constant pr ice)	275036.6 (17.212)	4.702 (17.898)	0.864	0.088	25.916	25.991
GDPMP (at constant pr ice)	330156.40 (16.118)	5.894 (17.501)	0.859	0.082	26.412	26.488
NDPMP (at constant pr ice)	304905.80 (16.624)	5.238 (17.371)	0.857	0.085	26.192	26.267
GNPFC (at constant pr ice)	298343.50 (16.722)	5.291 (18.038)	0.866	0.086	26.136	26.211
NNPFC (at constant pr ice)	273094.80 (17.397)	4.635 (17.961)	0.865	0.089	25.880	25.955
GNPMP (at constant pr ice)	328215.30 (16.248)	5.827 (17.546)	0.860	0.083	26.385	26.460
NNPMP (at constant pr ice)	302964.60 (16.778)	5.171 (17.419)	0.858	0.086	26.160	26.235

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values

Appendix 10: Regression result: GDP (at current and constant prices) as dependent variable and export as independent variable

Equations	Constant	GDP	R^2	DW	AIC	SC
GDPFC (at current pr ice)	-4538.79 (-4.384)	0.097 (60.705)	0.986	0.648	20.364	20.439
NDPFC (at current pr ice)	-4621.31 (-4.503)	0.108 (61.298)	0.986	0.666	20.344	20.419
GDPMP (at current pr ice)	-4612.46 (-4.358)	0.088 (59.413)	0.986	0.614	20.406	20.481
NDPMP (at current pr ice)	-4695.28 (-4.463)	0.098 (59.814)	0.986	0.626	20.393	20.468
GNPFC (at current pr ice)	-4529.71 (-4.413)	0.098 (61.235)	0.986	0.669	20.346	20.421
NNPFC (at current pr ice)	-4611.32 (-4.535)	0.110 (61.866)	0.987	0.689	20.326	20.401
GNPMP (at current pr ice)	-4605.51 (-4.387)	0.089 (59.898)	0.986	0.633	20.390	20.465
NNPMP (at current pr ice)	-4687.93 (-4.495)	0.099 (60.335)	0.986	0.647	20.376	20.451
GDPFC (at constant pr ice)	-44585.51 (-8.997)	0.161 (17.982)	0.866	0.102	22.667	22.742
NDPFC (at constant pr ice)	-46607.34 (-9.189)	0.183 (17.898)	0.864	0.105	22.675	22.750
GDPMP (at constant pr ice)	-44011.36 (-8.700)	0.145 (17.501)	0.859	0.100	22.713	22.788
NDPMP (at constant pr ice)	-45736.04 (-8.833)	0.163 (17.371)	0.857	0.102	22.726	22.801
GNPFC (at constant pr ice)	-44941.13 (-9.066)	0.163 (18.038)	0.866	0.103	22.661	22.736
NNPFC (at constant pr ice)	-47044.23 (-9.269)	0.186 (17.961)	0.865	0.106	22.669	22.744
GNPMP (at constant pr ice)	-44328.56 (22.709)	0.147 (22.784)	0.860	0.101	22.709	22.784
NNPMP (at constant pr ice)	-46117.15 (-8.899)	0.166 (17.419)	0.858	0.103	22.721	22.796

Note: (i) Raw data pertaining to regression results in this appendix have been taken from Handbook of Statistics on Indian Economy and Economic Survey; (ii) Figures in the parenthesis are τ-values