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RIS-DP # 29/2002

Research and Information System for the Non-Aligned and Other Developing Countries

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June 12, 2002

RESEARCH AND INFORMATION SYSTEM FOR THE NON-ALIGNED AND OTHER DEVELOPING COUNTRIES (RIS)
Zone IV-B, Fourth Floor, India Habitat Centre
Lodi Road, New Delhi-110 003 (India)
Tel: +91-11-4682177-80; Fax: 4682174
email: saikat@ris.org.in

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Saikat Sinha Roy*

Abstract

Persistence in performance is necessarily a long-term phenomenon, but this empirical occurrence is often not taken into account in traditional applied trade models. Apart from being ad-hoc, models for estimating export functions, which primarily analyse response of exports to relative prices alone, do not serve the purpose of separating out factors that have implications for long run performance. The recent studies on India's export performance are in the same tradition and have not analysed empirically the long run phenomenon of persistence in export performance. The endeavour in this paper is to analyse persistence in India's manufactured export performance during 1960-97 by taking into consideration various demand and supply factors, which have bearing on long run performance. Apart from the effects of real effective exchange rate and manufacturing value-added, world demand determines persistence in India's manufactured export performance. The perpetuating market access problem sets an upper limit to the realisation of potential world demand. The trends in lower realised world demand, in turn, determine manufactured export growth in the long run.

JEL Classification No. F14

* Research and Information System for the Non-aligned and other Developing Countries (RIS), Core IV-B, Fourth Floor, India Habitat Centre, New Delhi - 110 003. e-mail:saikat@ris.org.in

An earlier version of the paper was presented at a *Conference honouring Professor K.L. Krishna* at the Delhi School of Economics in December, 2000. The author is grateful to the organisers of the conference for giving him the opportunity to convey his regards to the revered Professor Krishna. The author is indebted to V. R. Panchamuki, Sarmila Banerjee, Pulapre Balakrishnan and Nagesh Kumar for discussions at various stages, to Kavita Rao for her help throughout, to Surekha Rao for a clarification during the conference, to K. L. Krishna, Satya P. Das and Aditya Bhattacharjea for their incisive observations on an earlier draft of the paper during the conference and afterwards. However, the author is solely responsible for errors, if any.

Persistence in India's Manufactured Export Performance

1. *Introduction*

The empirical occurrence of persistence in performance is necessarily a long-run phenomenon. Depending on the duration of the process, persistence can be strong or weak. For instance, persistence is strong when the process is prolonged and weak when it is transitory. The inertia to remain in such a state of performance over a long period can result from slow adjustments to either demand and supply shocks[1], and can have immense implications on developing country performance, especially that relating to exports. A study on persistence in export performance assumes particular importance when developing countries like India are trying to evolve WTO-consistent trade policies so that exports are on a higher growth trajectory.

Even though export growth in India has persisted to remain low to moderate for a long phase during 1960 to 1997, empirical accounting of the phenomenon of persistence in export growth is a rather neglected area of research. A growing literature can be cited on persistence in India's industrial output growth[2], but the scope of applied trade models on India is somewhat limited to finding price and income elasticities of tradables. This is very evident from the exhaustive survey by Panchamukhi (1997). Even recent studies on India's export performance, for instance by Joshi and Little (1994), Brahmbhatt et al. (1995), Krishnamurthy and Pandit (1995), Marjit and Ray Chaudhuri (1997) and Srinivasan (1998), do not attempt to account for persistence in performance, even if some of them analyse long run growth behaviour.

In a clear departure from the existing studies on India's export performance, the present study attempts to document persistence in India's manufactured export performance and accounts for the factors contributing to such a long run phenomenon. The study by Mody and Yilmaz (1994) on persistence in developing country export performance can provide some insights on the issue. Mody and Yilmaz (1994) find that manufactured export growth performance in developing countries tends to be persistent. The study finds that correcting for

[1] Campbell and Mankiw (1987) define a shock to an economy as persistent if the process continues "for a long time into the future", thus challenging the earlier belief that shocks to output almost dissipate in four to five years. Persistence can even arise from slow adjustment to short term fluctuations, which last for some quarters.

[2] A recent debate on this issue of persistence in industrial output can be highlighted, for instance. The studies, Krishnan and Sen (1995) and Dua and Mishra (1999), focus on either weak or strong persistence arising either from the demand or the supply side. While the former study finds weak persistence in index of industrial production, the latter arrives at the finding of strong persistence arising due to supply side shocks.

measurement errors in addition to price and income factors do not sufficiently explain the long-run phenomenon of persistence in performance. The persistence of developing country export growth is often explained by unobserved factors. The study also provides indirect evidence of varied responses of "insider" and "outsider" suppliers in the world trade for manufactured goods, a condition that tends to perpetuate itself, as an indication to persistence in developing country export performance. Further, the development of transactional infrastructure such as telecommunications network can also explain the phenomenon.[3]

The scheme of the present study is what follows. Section 2 puts forth some empirical evidence on India's manufactured export performance over the long run. While the third section discusses in detail the econometric method used to arrive at the evidence of persistence in performance, Section 4 provides a profile of data used in the study. The fifth section gives econometric evidence on the existence of persistence in performance and the factors contributing to such a phenomenon. Finally, the paper concludes with major findings and their policy implications.

2. *Some Stylised Facts on India's Export Performance*

Manufactured exports, like aggregate exports, have shown an increasing trend over the period 1960/61 to 1997/98. The trends in manufactured export growth show a turnaround and accordingly, the period-wise growth rates, as Table 1 shows, point to the evidence of low to moderate export growth in the initial phases till mid-eighties and a phase of high growth thereafter. However, the declining share of India in world manufactured exports persisted to remain low through till 1997/98.[4] Nonetheless, manufactured exports from India witnessed high rates of growth during trade liberalisation. Further, it is evident from Table 1 that, growth rates are more stable after the mid-eighties. Despite high average growth during post-reforms, the annual rates of growth in manufactured exports lowered after the mid-nineties, especially in 1997/98 (see Chart 1). This is indeed indicative of the fact that trade liberalisation is not the sufficient condition for sustaining high export growth.[5] The issue of persistence in performance can, thus, be situated in the context of the above growth profile of manufactured exports.

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[3] In particular, a recent study, Kumar (2002), points to the positive impact of availability of quality infrastructure on export orientation of foreign affiliate production in host countries.

[4] It is well documented in the existing literature that India's share in world trade has been declining since the early fifties. Though the decline in the share is arrested since the mid-seventies and a turnaround can be observed from the mid-eighties onwards, the share continues to remain low.

[5] Sinha Roy (2001 b) has analysed the unsustained pattern of post-reforms export growth in India.

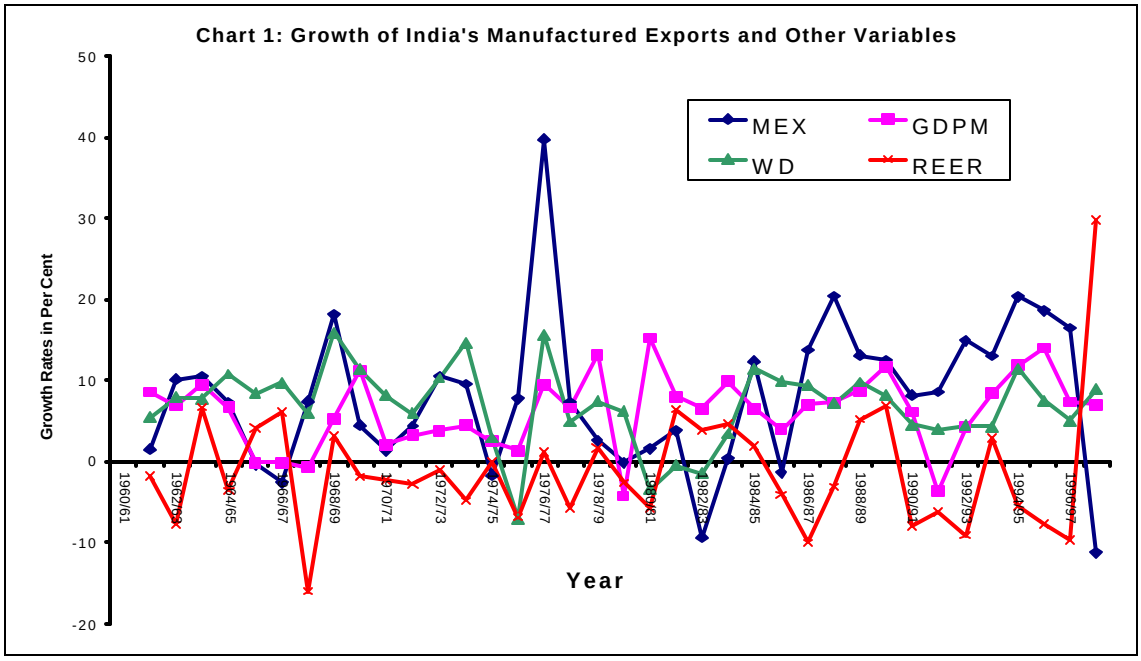


Table 1: Growth and Instability of India's Manufactured Exports and Other Associated Variables

(growth rates in per cent)

Period	Manufactured Exports	Total Demand	REER	GDP in Manufacturing
Growth				
1960/61-1972/73	6.05	8.99	-1.41	4.70
1973/74-1984/85	6.19	4.52	-0.52	6.63
1985/86-1997/98	11.33	7.28	-1.43	7.23
Instability				
1960/61-1972/73	0.96	0.32	4.46	0.85
1973/74-1984/85	1.95	1.56	8.71	0.80
1985/86-1997/98	0.79	0.35	7.66	0.61

Note: Growth rates are annual average growth rates. Instability is measured in terms of coefficient of variation. Source: Author's calculation based on different sources.

The long run manufactured export performance can be related to various demand and supply-side factors. In this context, the policy regime becomes the most important factor. In the import-substituting phase of industrialisation, production of manufactures had been primarily for the domestic economy with a limited focus on the external market. With protection during import substitution, as is often stressed in the literature[6], the exchange rate

[6] See Bhagwati and Srinivasan (1975), for instance.

remained overvalued and resulted in anti-export bias. The changes in policies relating to the external sector in India have moved in two directions: the reforms relating to tradeables since the mid-eighties and exchange rate reforms from an earlier period onwards. External sector reforms in India have proceeded in terms of reducing price and cost distortions in the economy by eliminating quantitative restrictions and replacing them with tariffs, rationalising the tariff structure and simplifying trade procedures. The trajectory of such trade reforms was incremental between the mid-eighties and the late nineties. The attempts to liberalise external trade are meant to create export opportunities by allowing competition at the margin apart from providing access to cheap inputs at near-world prices. Thus, reforms in the external sector in a way attempted to make exports responsive to changes in relative prices. In the presence of market imperfections, however, the outcomes of trade liberalisation may be vastly different[7].

The major thrust of exchange rate reforms in India has been towards a depreciating currency for promotion of exports. To that end, the rupee, a managed float by 1985, was devalued in 1991. The depreciation of the currency was carried forward with current account convertibility. In addition, the Reserve Bank of India has often intervened in the foreign exchange market to maintain a depreciating rupee. The real rupee, as Table 1 and Chart 1 would show, depreciated almost throughout. But, as Chart 1 also shows, the devaluation of the currency in 1966 and 1991 did not lead to sustained real rupee depreciation in the following years.[8] The high instability in REER depreciation is indeed indicative of years of real currency appreciation, high rate of appreciation being observed in 1997.

The growth of manufacturing production during different policy regimes, which indicates growth in supply capabilities, can also be an important factor explaining long-run growth of manufactured exports. The growth of manufacturing production provides an expanding base for exports to grow. With changes in policy, not only growing manufacturing production is expected to provide an expanding base for exports, manufacturing production is expected to be more efficient. This would necessarily result in higher export growth. Chart 1 shows that manufacturing production grew at high rates in the early sixties followed by a relative slow down thereafter for about a decade. Growth in manufacturing production revived in the mid-seventies and it continued throughout except for a couple of years during

[7] Studies by Bhagwati (1988), Bose (1993), Marjit and Sarkar (1995) and Bhattacharjea (1995) point to this evidence.

[8] The rate of depreciation particularly in these years may seem to be high only with respect to real rupee appreciation in the immediate preceding years.

the early nineties and also in 1979/80. It is thus evident that manufacturing production in India grew irrespective of the trade regime and it has provided the base for expanding manufactured exports.

In addition to movements in relative prices and growth in manufacturing production, trends in world demand tend to explain export growth in a significant way. At the outset it needs to be stressed that developed country destinations are the permanent source of demand for India's exports. The emerging destinations, which changed from the Middle-east Asian countries during the seventies to include East and South-east Asia after the mid-eighties, gave rise to additional demand during the period. Total world demand, as is evident from Table 1, grew at high rates till the early seventies, with a somewhat different growth scenario after 1973. This is despite the emergence of new destinations of exports during the period. In the period after the mid-eighties, there is a revival in total demand for India's exports arising due to a revival of demand from permanent destinations together with that from the emerging markets. The lowering of world demand after the mid-nineties is synchronous with declining rates of export growth then.

Overall, most of the above variables are found to have a changing growth path over time. The break in trend can be statistically significant, which can determine the long run behaviour of manufactured exports from India.[9] The significance of the break in trend is ascertained in terms of Chow test.[10] Certainly, high average growth in manufactured exports after the mid-eighties is supported by a significant break in trend in 1985. As Table 2 would show, for manufactured exports with breaks in 1976 and 1985, the Chow test F-statistic of 71.66 is significant at 1 per cent level. Individually, however, the break at 1976 gives a Chow test F-statistic significant at 5 per cent level, while that with respect to the break in 1985 is significant at 1 per cent level. Even the variables total world demand and GDP in manufacturing show significant multiple breaks in respective trends. The structural breaks in trend of real effective exchange rate and GDP in manufacturing, however, predate the mid-eighties. Such changing growth pattern for manufactured exports and associated variables is indeed important in determining persistence in performance.

Even if all these factors tend to explain export performance in India over the long run, the issue that remains is whether these necessarily explain the persistence in performance.

[9] Though Table 1 has adopted a uniform periodisation across variables, it is evident from Chart 1 that the break-point in respective trends are not the same.

[10] Chow tests or any other structural break test is inconsistent if the time series has unit roots. The Chow test applied in case of these variables is only indicative of the existence of a break in trend.

The short run dynamics assume importance in the context of such long run performance. It is thus important to understand whether the changes in relative price or various demand and supply factors contribute to the long run phenomenon. Accordingly, the study has taken into account the market access problem on the demand side and various institutional factors on the supply-side which are persisting over the long run. Even if growth in manufacturing production is an important supply side factor determining long run export performance, provision of services has assumed centre-stage in the context of long run growth. This would require not only transactional infrastructure as discussed by Mody and Yilmaz (1994), but also various transactional services associated with export sale of manufactured goods.

Table 2: Structural Break in Different Variables during 1960-97

Variable	**Breakpoint(s)**	**Estimated Chow Test F-Statistic**	**Probability**
Manufactured Exports (MEX)	1976	3.81	0.0322
	1985	35.05	0.0000
	1976 1985	71.66	0.0000
World Demand (WD)	1973	39.46	0.0000
	1982	19.07	0.000003
	1973 1982	42.37	0.0000
Real Effective Exchange Rate	1983	9.48	0.005
(REER)	1984	6.28	0.005
GDP in Manufacturing (GDPM)	1964	6.55	0.0039
	1975	66.47	0.0000
	1964 1975	39.56	0.0000

Source: Author's Calculation

3. *The Method*

In applied studies, persistence is often measured by estimating distributed lagged model.[11] The phenomenon of persistence in export performance is obscured due to the adoption of ad-hoc procedures while estimating export functions. Very often a lagged independent variable is incorporated as an explanatory variable or a time trend variable is added as an explanatory factor to capture various other determinants into the export equation. Moreover, such estimations are done without taking into account the long run properties of

[11] This is evident from the survey on persistence in profits provided by Martin (1993).

the variables and accordingly, these methods do not serve the purpose of separating out factors that have implications on long run performance. As against these existing methods, the presence of persistence is studied here by testing for unit root in a univariate time series model. Other than unit roots, Campbell and Mankiw (1987) have outlined three methods to observe the phenomenon of persistence in performance.

With unit roots in time series, the OLS estimates cannot be used. The presence of unit roots would require estimation statistic other than that for the classical method. The Augmented Dickey-Fuller statistic is used instead. The Augmented Dickey-Fuller equation involving trend and intercept is:

$$\Delta x_t = a_0 + a_1 t + a_2 x_{t-1} + \sum_{i=1}^{k} b_I \Delta x_{t-j} + e_t \quad \ldots\ldots\ldots (1)$$

In this model, which includes both a drift term and a deterministic trend, α_2 measures the degree of persistence of deviations of x_t from its mean. In the ADF test, the unit root is the null hypothesis. If $\alpha_2=0$, then the sequence, $\{x_t\}$, has a unit root and the deviations are permanent. In the ADF test, the estimated t-statistic of α_2 is compared with the appropriate critical value of the Dickey-Fuller statistics to validate the null hypothesis. The presence of a unit root implies the predominance of random effects, which have a permanent impact on the stochastic trend. In contrast, for the Mody and Yilmaz (1994) equation involving pooled cross-section and time series data, the intercept term was of special interest for identfying persistence. It specifies the effect of country features that remain unobserved, which can be a potential cause of persistence in performance.

However, with the presence of a structural break in the time series, as is often the case with long sequence, usual Augmented Dickey Fuller equation cannot be applied. This is because the ADF test for unit roots is biased in favour of non-rejection of the unit root (Enders, 1995: 243). The unit root test in the presence of structural break is different from the ADF test. Perron (1989) developed a formal procedure to test for unit roots incorporating structural change. The Perron's procedure, which is primarily based on a modified Augmented Dickey Fuller equation, is as follow[12]:

$$\Delta x_t = a_0 + a_1 t + a_2 x_{t-1} + g D_L + \sum_{i=1}^{k} b_I \Delta x_{t-j} + e_t \quad \ldots\ldots (2)$$

[12] This is adopted from Enders, 1995: 245-248.

where D_L=1 if t> λ and zero otherwise. Here, $\alpha_2 = 1$ is the null hypothesis. Equation (2) can be rewritten with two breaks, as most of the series exhibit so. Despite the existence of statistically significant multiple breaks for many variables, the present unit root exercise is carried out with only one break due to reasons relating to the degrees of freedom. The above equation (2) can be further simplified by testing the null hypothesis of a change in the drift term against the alternative of a change in the slope of the trend. Then the null hypothesis can be written as:

$$Dx_t = a_0 + a_1 x_{t-1} + g D_L + \sum_{i=1}^{k} b_I Dx_{t-j} + e_t \quad \text{..... (3)}$$

However, the null hypothesis can neither be compared to the critical values calculated by Perron (1989), as they are applicable only in large sample cases. The Mackinnon values for testing the null, as used in case of Augmented Dickey Fuller model, are used instead[13]. Even if the above procedure would help to identify unit roots in individual time series, it would not necessarily lead to conclude the factors causing such persistence.

To arrive at factors determining long-run persistence in manufactured export performance, the following reduced form equation can be estimated:

$$mex_t = a_0 + a_1\ reer_t + a_2\ gdpm_t + a_3\ wd_t + e_t \text{ ..... (4)}$$

where 'mex' represents manufactured exports at constant prices, 'reer' represents real effective exchange rate, 'gdpm' is value-added in manufacturing production, 'wd' is world demand and all the variables are in logarithmic form. It would have been ideal to estimate a simultaneous demand-supply equation system for the purpose or even a reduced form equation. The above equation (4) is somewhat similar in structure to a reduced form equation, often termed as an "eclectic" equation in the literature.[14]

The long-run equilibrium condition of equation (4) is estimated using the Engle-Granger two-step procedure.[15] The long run equilibrium relationship between exports and various explanatory factors might even exhibit a structural break. As is often the case with long run time series models, the adjustments are done in the cointegration regression by

[13] See Mackinnon, 1991.

[14] Srinivasan (1998) uses this term while estimating India's export function. It is justified to term the equation "eclectic" in the sense that it accounts for both demand and supply side factors apart from the relative price variable REER, around which there is a sharp division in viewpoints on the factors determining India's export performance.

[15] The Johansen (1988) multivariate VAR procedure could have been used instead. But, it would be difficult to identify the exact cointegrating vector from the multiple equations involved in the Johansen method. Thus, given the objective finding the long run determinants of exports and given the simplicity of the method, the Engle-Granger "two step procedure" is used. For an exposition, refer Engle and Granger (1987: 262-4).

introducing a dummy variable. In the cointegrating regression, if the break point is known, the adjusted ADF test statistic would test for the null of no cointegration. With an unknown break point, the Gregory-Hansen procedure[16] is applied. Accordingly, the smallest value of the ADF test statistic would specify the time point at which the structural break has taken place while establishing a cointegrated relationship.

The dynamic error correction mechanism (ECM) of the cointegrated variables depicts the short run dynamics towards the achievement of long run equilibrium conditions. The ECM representation of the above equation (4) involving structural break can be as follows:

$$\mathbf{D\ mex_t = g_0 + g_1 D\ reer_t + g_2\ D\ gdpm_t + g_3\ D\ wd_t + g_4 D_L + g_5 D\ (D_L^*\ reer) + g_6 D\ (D_L^*\ gdpm) + g_7\ D\ (D_L^*\ wd) + g_8\ e_{t-1} + \mu} \quad \ldots\ldots (5)$$

In equation (5), The coefficients γ_i represent the effects of various determinants on manufactured export performance, with $\gamma_1 < 0$, $\gamma_2 > 0$, and $\gamma_3 > 0$. "γ_8" - the coefficient of the error correction term - is indicative of the speed of adjustment and the negative coefficient shows that the errors correct to the equilibrium in the long run. In the ECM representation of the model, often lagged values of variables (dependent and independent) are introduced as explanatory variables.

4. *The Data*

The data on different variables used in this paper have been drawn from different sources. Among these variables, while the data on manufactured exports (MEX) and production (GDPM) are used at constant prices, the data on real effective exchange rate (REER) and world demand (WD) are estimated, which needs elaboration. The data on the different variables are detailed as follows.

MEX: The data on India's manufactured exports are collected from the Monthly Statistics of Foreign Trade of India published by the Directorate General of Commercial Intelligence and Statistics (DGCI&S), Calcutta. For constant price estimates, the value of manufactured exports is deflated by unit value index (UVI) of manufactured exports. In fact, unit value index for aggregate manufactured exports is not available. It is estimated based on the UVI of exports of different manufactured items, as provided by the DGCI&S, Calcutta. The DGCI&S quantity index data also provides an estimate of the volume of trade. As value of exports at constant prices and the export volume index have similar trends (Sinha Roy, 2001 a), the latter data could have been used instead.

[16] Gregory and Hansen, 1996: 105-6.

GDPM: The data on manufacturing value-added are taken from the Government of India, National Accounts Statistics (NAS), various years. The data from this source covers not only production of registered units, but also of unregistered manufacturing units. That is why aggregate manufacturing value-added data used from the NAS source is better than that from the Annual Survey of Industry (ASI) source, which covers only registered manufacturing. The constant prices estimate is arrived at by deflating the current price figure by wholesale price index (WPI) for aggregate manufacturing.

REER: Real exchange rate (REER) is generally defined as REER = e. (P*/ P) ----(6), where P* and P are price indices of domestic economy and the trading partner economy respectively and "e" is the exchange rate of the domestic economy with respect to the trading partner economies calculated in terms of a numeraire as the SDR. Often WPI, consumer price index (CPI) or implicit GDP deflator are used for the purpose. An alternative way of constructing a proxy for the real exchange rate index is to use the trading partner country's WPI and the domestic country's CPI, where the former is treated as a proxy for prices of tradeables and the latter can be used for price of non-tradaeables. However, for the purpose here, unit value of exports is used relative to the WPI or import unit values of trading partner countries. In this exercise, bilateral real exchange rate is calculated with respect to the most prominent eleven trading partners of India. The multilateral or the real effective exchange rate of the rupee is the weighted average of the bilateral rates, the weights being the 1985 share of India's exports for these eleven trading partner countries. While the above weighting diagram has often been the practice in the literature, there are instances of using contemporaneous weights[17].

WD: World Demand is represented by a sum total of imports of different countries would necessarily mean aggregate world demand.[18] As realized demand for India's exports are essentially lower than the potential, the aggregation of imports across countries necessitates adjustment. The effective demand is calculated as a weighted sum of imports of individual destination country, the weights being the destination's share in India's total exports in 1985. Such a weighting diagram not only takes into the importance of the individual country, but also takes into account, though indirectly, the structure of imports of individual destination country. The data on value of total imports of different destination

[17] The real exchange rate series as generated by the RBI and Pradhan use the share of exports for a particular base year as weights, Trivedi (1996) uses contemporaneous weights for the purpose.

[18] Muscatelli et. al (1995) use imports of export destination countries as a scale variable as against the practice of using world income, as in Goldstein and Khan (1978).

countries are obtained from the IMF, International Financial Statistics Yearbook, various years.

5. *The Econometric Evidence*

The existence of structural break, often multiple, in different variables led to the use of Perron model in the context of verifying stationarity. For 'mex', while testing for unit roots, 1985 is taken as the only breakpoint even if there are structural breaks at 1976 and 1985. On the other hand, even if the 'reer' series is found to have no significant break in trend, different breakpoints are tried while testing for unit roots. For other variables as well, even if there are multiple breaks, the estimation of the Perron equation took into account a single break only keeping in view the degrees of freedom. In the estimation of unit roots, as elucidated earlier, only level dummy ($\mathbf{D_L}$) is considered. Though none of the variables are found to be level stationary, it is interesting to observe from Table 3 that the t-statistic of the coefficient $\mathbf{a_1}$ for all the variables are found to be significant at 1 per cent level. Thus, manufactured exports along with all other variables are found to be integrated of order 1, I (1), after incorporating structural break. The unit root test confirms the existence of persistence in India's manufactured export performance. But, the existence of persistence in performance does not necessarily outline the causes behind such a long run phenomenon. The estimation of the long run equilibrium relationship between manufactured exports and other variables and the short-run dynamics involved therein would establish the case of persistence in manufactured export growth performance and the causes underlying such a phenomenon.

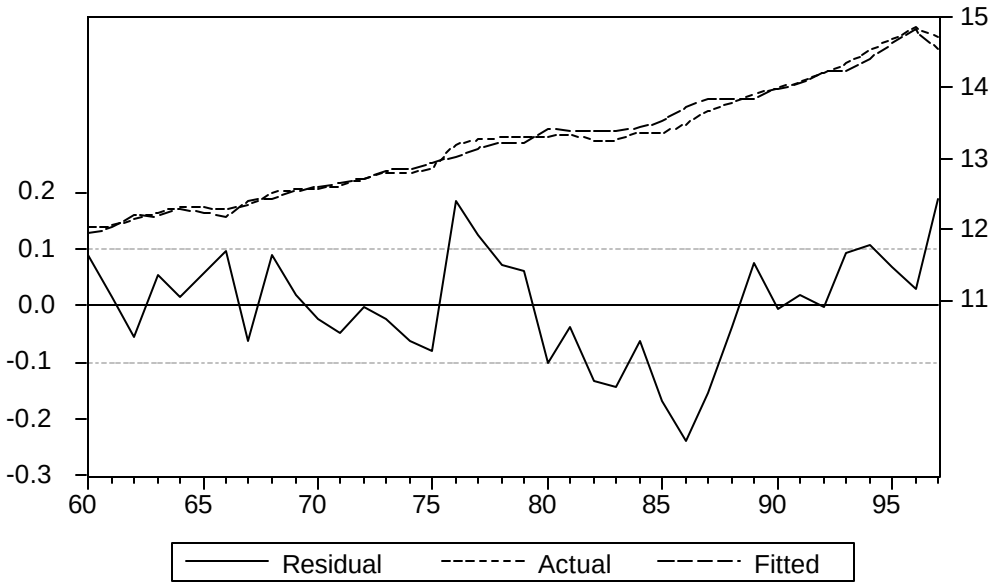
Table 3: Unit Root Test for Manufactured Exports and Other Variables

Variable	Levels/1st Difference	Structural Break at	t-Statistic	Level of Significance	Inference
MEX	1st Difference	1985	-4.443	1%	I (1)
REER	1st Difference	1984	-5.964	1%	I (1)
		1983	-5.910	1%	I (1)
		No break/time	-6.007	1%	I (1)
WD	1st Difference	1973	-5.644	1%	I (1)
		1982	-5.010	1%	I (1)
GDPM	1st Difference	1975	-5.921	1%	I (1)
		1964	-5.439	1%	I (1)

Note: The level of significance is based on Mackinnon's critical values in Mackinnon (1991)
Source: Author's Calculation

Since the dependent variable along with all the three independent variables are I (1), they are cointegrated. As all the variables have structural breaks, there is a possibility that the equilibrium relationship also might have a structural break In identifying the break, it is necessary to view the residual plot of the actual relationship in Equation (4). Figure 2 plots the actual, fitted and residual plots of Equation 4. The figure very clearly shows that the residual plot has breaks at around the mid-seventies and the mid-eighties. This would necessitate a trial and error method of identifying the breakpoint of the cointegrating regression. This would be in terms of the minimum ADF, as required by the Gregory-Hansen (1996) method discussed above.

Figure 2: Residual Plot of Equation 4



Though more than one break in the residuals can be observed from Figure 2, the cointegrating relationship is found out incorporating only one break around the mid-eighties. For the purpose, estimations are carried out with structural breaks at years between 1982 and 1987. Table 4 shows that the estimated cointegrating equations with breaks at different years are without lag and the ADF statistic is significant at 1 per cent level for all the years. The lowest ADF for the year 1984 is indicative of a significant structural break in the cointegrating relationship in that year.

Table 4: Cointegrating Relationship involving Structural Break with Unknown Breakpoint

Break at	No. of Lag(s) in CR	Coefficient of CR	t-Statistic	Level of Significance
1982	No lag	-0.677	-4.380	1%
1983	No lag	-0.686	-4.363	1%
1984	No lag	-0.738	-4.593	1%
1985	No lag	-0.715	-4.480	1%
1986	No lag	-0.740	-4.589	1%
1987	No lag	-0.684	-4.334	1%

Note: CR means cointegrating regression.
Source: Author's calculation.

By incorporating structural break at 1984, the estimated equation of long term manufactured export performance is as follows:

$$\mathbf{mex_t = 9.691 - 1.162\ reer_t + 0.480\ gdpm_t + 0.285\ wd_t - 10.236\ d84 + 1.015\ d84{*}wd_t +}$$
$$\text{(3.86)\#} \quad \text{(-3.87)\#} \quad \text{(3.94)\#} \quad \text{(2.70)\#\#} \quad \text{(-2.38)\#\#} \quad \text{(0.44)}$$

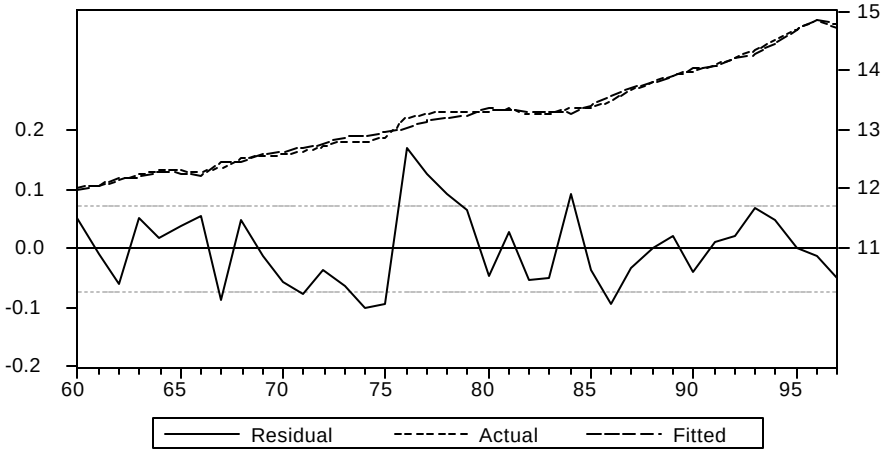
$$\mathbf{+ 0.439\ d84{*}reer_t + 0.45\ d84{*}gdpm_t + e_t} \ldots\ldots (7)$$
$$\text{(1.12)} \quad \text{(0.85)}$$

$$\mathbf{Adj.\ R^2 = 0.99,\ d.w. = 1.45,\ s.e.e. = 0.07.}$$

[Figures in the parentheses denote tabulated t-statistic. (#) denotes significance at 1 %, while (##) denotes significance at 5 %.]

The results in Equation (7) could have been improved by dropping the explanatory variables that are insignificant. But, all the explanatory variables, whether statistically significant or insignificant, are retained as they together determine long run performance of manufactured exports. Figure 3 plots the residuals of the above estimated equation (7), which is indeed different from the residual plot shown in Figure 2.

Figure 3: Time path of "e_t" with break at 1984



The stationarity test of the residual "e_t", which confirms cointegration with a break at 1984, is as follows:

$$\mathbf{De_t = - 0.738\ e_{t-1} + e_t} \ldots\ldots (8)$$
$$(-4.593)^{**}$$

$$\mathbf{Adj.\ R^2 = 0.37,\ d.w. = 1.91,\ s.e.e. = 0.06.}$$

(Figures in the parenthesis denote tabulated t-statistic, which is significant at 1 % against the Mackinnon critical value of -2.626.)

The above estimates in Equations (7) and (8) unambiguously confirm that manufactured exports from India and world demand, GDP in manufacturing and real effective exchange have an equilibrium long run relationship. The error correction model would help to understand the short run dynamics and identify the different causal factors leading the long run phenomenon of persistence in performance.

The estimates of the ECM equation (5) are given Table 5. In all the ECM specifications, the coefficient of "e_{t-1}" is significant indicating that the errors correct for the long run equilibrium path. The various factors such as real effective exchange rate, GDP in manufacturing and world demand have impact on correcting short-run disequilibrium and thus, contribute to the existence of persistence in manufactured export performance. However, none of these variables are found to have significant impact after 1984.

Table 5 shows the significance of the relative price factor, real effective exchange rate, in the short run dynamics of manufactured export performance. But, the relative price factor is not found to be significant during the post-1984 period when the exchange rate was used as a policy instrument to promote exports. The supply-side scalar factor, GDP in manufacturing, also cause the errors to adjust for the long run equilibrium. The impact of GDP in manufacturing on persistence of manufactured export performance is not as significant as in the case of real effective exchange rate. In fact, in ECM Specification III, the variable is not found to be having a significant impact or in ECM Specification I, the significance of the coefficient is only at 10 per cent level. Nonetheless, growth of GDP in manufacturing is found to have a relatively better impact on growth in manufactured exports after the mid-eighties.

Apart from the above factors, world demand is found to have significant impact on India's exports of manufactured items. Table 5 would show that the impact of this demand side scalar variable is significant at 1 per cent level in certain specifications. Thus, world demand has a predominant effect on persistence in manufactured export performance in India

over the long run. However, the coefficient for the variable has a negative sign for the post-1984 period, though insignificant. Nonetheless, market access related problems assume importance in this context. Even after liberalisation of world trade in various rounds of multilateral trade negotiations, market access problems for exports from such developing countries as India continue to persist[19]. Elsewhere (Sinha Roy, 2002) it is argued that the market access problems necessarily lead to mismatch between structures of India's exports and world demand. As a result, the perpetuating market access problem provides an upper limit to the realisation of potential world demand and hence, realised world demand differs from the potential.[20] It is the growth of effective world demand that is of relevance to the growth of manufactured exports over the long run.

Table 5: Error Correction Specification of Manufactured Export Growth (Δmex_t) with Structural Break at 1984

Variable	ECM Specification I	ECM Specification II	ECM Specification III	ECM Specification IV
D reer$_t$	-0.49 (-2.38) **	-0.42 (-2.06) **	-0.47 (-2.31)**	-0.42 (-2.20)**
D gdpm$_t$	0.34 (1.73)***	0.46 (2.52) **	0.29 (1.41)	0.39 (2.06)**
D wd$_t$	0.60 (3.65)*	0.55 (3.31) *	0.49 (2.73) **	0.43 (2.47)**
d 84	0.01 (0.46)	0.01 (0.62)	-0.01 (-0.24)	
D (d84* reer$_t$)	-0.18 (-0.71)	-0.28 (-1.08)	-0.24 (-0.91)	-0.30 (-1.35)
D (d84* gdpm$_t$)	0.85 (1.81)***	0.12 (1.07)	0.78 (1.66)	0.14 (1.37)
D (d84* wd$_t$)	-0.58 (-1.59)		-0.51 (-1.39)	
D mex$_{t-1}$			0.21 (1.44)	0.22 (1.70)***
e$_{t-1}$	-0.57 (-3.95)*	-0.56 (-3.76)*	-0.65 (-4.16)*	-0.64 (-4.13)*
Adj. R^2	0.67	0.64	0.60	0.60
Period	1960-97	1960-97	1960-97	1960-97

Source: Author's Calculation.

On the whole, persistence in India's manufactured export performance is explained by such factors as world demand, real effective exchange rate and GDP in manufacturing. However, the short run variations of these explanatory variables do not fully explain yearly

[19] Despite substantial liberalisation of trade in the Uruguay Round of multilateral negotiations, market access problems of developing country exports continue to exist necessarily in terms of tariff peaks, other non-tariff barriers and tariff escalation (UNCTAD, 2000). Mehta and Mohanty (1999) have shown the extent of tariff and non-tariff barriers hindering market access to Indian exports in the post-Uruguay Round scenario.

[20] Nayyar (1988) have also argued that various barriers to trade have put an upper limit to growth of exports from India.

changes in manufactured exports. This is evident from the Adjusted R^2 of the different specifications of the ECM model, as shown in Table 5. Various other supply side factors such as investment or productivity growth, sunk cost, transactional infrastructure and procedural bottlenecks[21], if taken into account, could have explained the phenomenon of persistence in export performance in a much more robust way.

6. *Summary and Implications*

The paper confirms the existence of persistence in India's manufactured export performance. This result is consistent with the findings of Mody and Yilmaz (1994). India's manufactured export performance persists despite structural break in 1984. Such persistence in India's manufactured export performance is explained in terms of a large number of demand and supply side factors. Though real effective exchange rate and GDP in manufacturing are significant factors explaining long run behaviour of manufactured exports, their effects are not as significant as that of world demand in determining persistence in manufactured export performance. As relative prices are relatively less significant in explaining persistence in manufactured export performance, they are less effective as an instrument in promoting manufactured exports.

On the demand-side, persistence in performance is largely due to the continuing market access problem in world trade faced by developing countries like India. The perpetuating market access restrictions creates an asymmetry between India's export structure and the pattern of world demand and thus, set an upper limit on the realisation of potential world demand. To a large extent, persistence in manufactured export performance is determined by the resulting effective world demand. This is typically a phenomenon relating to developing countries facing residual world demand. Such persisting market access problem has to be tackled by developing countries adopting a two pronged strategy. Apart from negotiating for a greater market access at the multilateral level, developing countries, and especially India, have to stress on diversifying the export basket towards more value-added and high technology products.[22] This would entail India to move on to a higher value-added growth path.

[21] Based on a microtheoretic approach, Marjit (1998) has provided evidence on the extent of procedural bottlenecks faced by exporters and the transaction costs involved therein.

[22] Lall (1999) is of the view that, in contrast to trade in high technology and knowledge intensive products, low skill and technology intensive products are not only low value adding but are also slow moving due to increasing price competition.

The relatively less importance of manufacturing GDP as a supply-side determinant of persistence in manufactured export growth shows that the shifts to higher value-added growth would improve the significance of the factor in explaining long run performance. Along with improvements in efficiency, the performance of manufactured exports can also be improved by removing structural impediments in terms of provision of better infrastructure, simplification of trade procedures and focussing on various transactional factors as marketing associated with the sale of manufactures. Further, improvements on the supply side can result from the preparedness of the domestic manufacturing sector to face the challenges and opportunities emerging in the post-MFA scenario. Such developments on the supply side would necessarily result in the diversification of the export basket towards more efficient[23] and higher value-added products. As a result, higher world demand can be realised and larger benefits would accrue to the export sector from every outward shift in world demand.

[23] Das (2001), in terms of a disaggregated analysis, has shown that productivity growth has improved in case of certain manufactures during reforms.

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