

TRADE REFORMS AND PERFORMANCE IN INDIAN MANUFACTURING SECTOR: A PANEL DATA ANALYSIS

Dr. NILESH PANDYA, Assistant Professor AGBS – Ahmedabad.

DISHA SHAH, Assistant Professor, AGBS – Ahmedabad.

Abstract

The rupee exchange rate, growth rate of output, and productivity growth are the important indicators in economy, including the Indian economy. The debate regarding the relationship among the exchange rate, trade liberalization, and productivity growth has been persisting for several decades. The aim of this research is to obtain the empirical evidence of the causal relationship among the exchange rate, trade liberalization, and productivity growth by using the annual data from 1991 to 2013. For calculation of Total Factor Productivity (TFP) present study used Tran slog Index. Present study found that key macro-economic variables like employment, exchange rate, real wage rate, growth rate of output, direction and composition of foreign trade have significant impact on productivity after the post liberalization period.

I: Introduction:

“Movement of productivity” has been both curiosity and concern for development economists and policy makers. The realization of productivity growth in the industrial sector continues to drive the overall economic performance of the Indian economy. The Indian economy has witnessed more than two decades of wide ranging economic liberalization surrounding many sectors. In order to make India’s industrial sectors; both, internally efficient and globally competitive, liberalization of international trade and industrial policies was endeavored. Encouraging results have been seen in the industrial productivity performance; from a turnaround in the mid-1980s to improved performance in the 1990s (Ahluwalia, 1991). Cost and price-competitiveness of companies and industries of a country are determined by productivity, among other major factors. This subsequently influences the competitive strength of global market exports by these companies and industries. As per this concern, to make the manufacturing sector vigorous, every effort is put into enhancing India’s productivity performance in broad industrial sectors. Monetary and exchange rate policy behaviors cannot be decided independent of the economy’s productivity performance. Magnitude and direction related questions still exist within estimates of productivity growth. For the aforementioned reasons, it is important to measure both, the levels of productivity and its growth rate.

Before the trade liberalization policies of 1991, Indian industries failed to compete in the global market due to uneven resource allocation by government policies such as high custom tariff rates, domestic trade tax and excise duty structure, reservation of production etc. These misleading trade policies and tax strategies of the Government caused shutting down of India’s industries through limitation of productivity in Indian manufacturing sector and buckling under pressure of normal competitive market forces.

The liberalization of import policy has been accompanied by a substantial depreciation of the exchange rate. The nominal exchange rate depreciated by about 50 per cent between 1990 and 1995 and the real effective exchange rate depreciated by about 24 per cent in this period. The depreciation of exchange rate made imported manufactured goods costlier. It neutralized to some extent the potential effects of lowering of tariff rates and relaxation of quantitative restrictions on imports. There are two mechanism of movements in the exchange rate can have an impact on productivity, one mechanism which focuses on demand side effects, often referred to as the competitiveness approach, emphasizes the export growth impact of exchange rate depreciation and the productivity consequences of that growth. Another heterodox stream of literature focuses on the supply side consequences of a sustained real exchange rate depreciation arguing that it can contribute to lower productivity growth and a larger productivity gap between the depreciating country and the leading countries.

Harris (2000) provided support to include productivity in endogenous factors within a macroeconomic outline where exchange rate period is either fixed or floating. As per theory stated in various studies on the pro-cyclical productivity effects of demand shocks such as the macro models of the New Keynesian variety with nominal rigidities state that increased utilization, learning-by-doing effects or increasing returns to scale, subsequently giving a higher measured productivity growth. The demand for commodities of trade increases with real exchange rate depreciation and such depreciation would be inclined to have similar effects. These are among the situations which make productivity growth faster during real exchange rate depreciations as emphasized by competitiveness approach.

Historically, terms such as ‘product net’, ‘production’, and ‘rate of production’ were used to describe what modern economists now refer to as ‘productivity’. In the 18th century, classical French economists were under the impression that if same amount of labour was applied in agricultural and manufacturing sectors, the latter would not yield any ‘product net’ on surplus. The Physiocrats School in France broadly classified economic activities under two classes; productive and sterile of which manufacturing services, primarily Government activities fell under the latter category.

RBI exchange rate management policy has targeted at maintaining orderly conditions in the foreign exchange market by eliminating uneven demand and supply and preventing speculative activities, without setting a particular exchange rate target. Reserve Bank of India used a combination of tools which including sales and purchase of currency in both the forward and the spot segments of the foreign exchange market, domestic liquidity adjustment through the use of Bank Rate, CRR, Repo rate etc. Movements in exchange rate may have an effect on firm performance through a variety of channels, like price of exports relative to foreign competitors, the cost of imported inputs relative to other factors of production, or the cost of external borrowing. Though the impact on the performance of firms is only one element determining how exchange rate changes affect aggregate economic growth, it can be a crucial and important determinant of the same.

Balassa (1964) and Samuelson (1964) have shown that real exchange rate will appreciate in countries where productivity growth is faster compared to the rest of the world. However, for developing countries one cannot generalize the hypothesis that a real appreciation of one currency will positively impact productivity. An overvaluation of currency, according to most authors, will negatively affect productivity growth by reducing the competitiveness of tradable goods sectors. Since the past two decades, the productivity issue has become central to the debate in India on the causes and consequences of the significant real depreciation of the Indian Rupee after the post-liberalization period.

Amongst other things, export growth has been robust since 1990 and the share of tradables in aggregate output has expanded to almost 30 percent in 2004–05 as against 19 percent in 1980. Productivity in the tradable sector has increased after 1991 and real per capita income growth has accelerated to 4.1 percent and 6.1 percent in 2000–05 and 2013-14 from 3.8 percent and 3.7 percent respectively in the 1980s and 1990s (Renu and Sudip, 2007). In inevitably, India has been catching up with the rest of the world in terms of productivity growth in the tradable sector which is leading to resource shifts away from non-tradable sectors and increased inflation rate for non-tradables leading to a real appreciation of the exchange rate.

India's customs tariff rates have been declining since 1991. The "peak" rate (applicable to all manufactured and mineral products except alcoholic beverages and automobiles) was 150% in 1991-92 and came down to 40% in 1997-98. The downward momentum was reversed the next year with the imposition of a surcharge (Virmani and Hashim, 2011). This momentum resumed with the reduction of the "peak" rate to 35% in 2001-02 and 30% in 2002-03. "Peak" rate was reduced to 20% at the end of 2003-04. Further it reduced from 20% to 10% at the end of 2011-12.

A number of empirical studies examine the impact of India's trade reforms, particularly tariff reforms, on domestic industry. Goldar and Kumari (2002), Topalova (2011) and Virmani, Goldar, Veermani and Bhatt (2004) find a significant favourable effect of tariff reforms on industrial productivity. Das (2003) finds that, on an average, the import penetration ratio in Indian industries did not increase in the period 1991-95 as compared to the period 1986- 90, and there was only a marginal increase in the import penetration ratio in the period 1996-2000 despite marked reduction in the tariff and non-tariff barriers.

Privatization, Liberalization, and Globalization are affecting a transition within the world economy as well as Indian Manufacturing too. The last two decade following the liberalization has seen revolutionary changes in the state of manufacturing sector in India. In the face of intensified global competition and liberalized trade environment, productivity has emerged as a key indicator of successful restructuring and upgrading by firms and industries. Policy regime, in India has undergone a U-turn during the decade of 1990's. At the same time mega change industry was in developing stage, which was to be followed by the matching growth of service sector. The industries former supported in a subsidized and protected environment have been suddenly opened to face market and the global competitors. The period associated with privatization, liberalisation and globalisation has seen Indian

companies developing main competencies in terms of technologies and managing the dynamism and opportunities that have come by over the years. These reforms were aimed at making Indian industry more efficient, technologically modern. This enhancement of competitiveness, technological up-gradation and efficiency improvement was expected to enable Indian industry to achieve rapid growth. Productivity in turn reduces unit cost, enhance product quality, increase workers wage and offers returns on investment. Productivity is the prime determinant of a country's level of competitiveness, higher standard of living and sustained growth in the long run (Kaur and Kiran, 2006).

How does trade liberalization on productivity growth affects the manufacturing sectors of developing countries is a topic of constant debate. Traditionally, it was believed that trade liberalization has a very positive impact on the productivity growth. But this point of view is defied often by the new theories of endogenous growth. As said by Chand and Sen (1996), it is considered by these new growth theories that trade reforms may bring about a change that is steady in nature in productivity growth. But the hypothetical text gives an ambiguous prediction on the direction in which this change occurs. Due to this ambiguity, the level till which these trade policies affect productivity growth is eventually an experimental question.

Objectives of this study:

1. To investigate whether the role of exchange rate in determining productivity increased during the post reform period.
2. To examine whether the nature of the trade policy regime make a difference to the productivity growth.

II: Literature Review

Ahluwalia's (1991) extensive study attempts to analyse the long-term trends in total factor and partial factor productivities in the organized manufacturing sector in India over the period from 1959-60 to 1985-86. Ahluwalia, in her 1991 study on productivity and growth in Indian manufacturing, came to the conclusion that there was a marked acceleration in total factor productivity growth (TFPG) in Indian manufacturing in the 1980s. According to her estimates, the growth rate of TFP in Indian manufacturing was 3.4 per cent per annum in the period 1980-81 to 1985-86, as against an estimated growth rate of -0.3 per cent per annum for the period 1965 to 1979-80. Her estimates of TFP growth rate were based on the single-deflated value added method, Balakrishnan and Pushpangadan (1994) and Rao (1996) have pointed out the inadequacies of TFP estimates based on the single-deflated value added measure of output, and have given strong arguments for using the double-deflated value added method or the gross output function framework.

Krishna and Mitra (1998) in their study covering four Indian industries found that in the post-reform period, markup declined significantly in three of the four industries, using the structural regression approach of Hall to study the effect of economic reforms on markups in Indian industries and employing a post-reform dummy variable . The decrease was to such a level that the markup parameter for firms dropped to a value of less than one, i.e. the firm

would incur losses. They found evidence of a significant favorable effect of reforms on industrial productivity.

A relatively slow growth in TFP in Indian manufacturing in the post-reform period, as compared to the pre-reform period, has also been reported in a study undertaken recently by the Goldar and Kumar (2002) major industry groups for the period 1981-82 to 1997-98. This study has focused on the impact of trade reform on productivity growth of Indian manufacturing sector. Main findings of the study are (i) Substantial liberalization of imports in India in the 1990s, did not result in any surge in manufactured imports nor did it lead to a sharp rise in the extent of import penetration in the manufacturing sector. (ii) There was significant growth in total factor productivity in Indian manufacturing in the 1980s. In the post-reform period, there has been a notable decrease in the growth rate of TFP in manufacturing. (iii) The gestation lag in investment projects may have had an adverse effect on productivity and this appears to be an important cause of the deceleration in total factor productivity growth in Indian manufacturing in the 1990s.

Parameswaran et. al. (2006) examines the productivity growth of Indian manufacturing industry during the post liberalization period. The study focuses on two sources of productivity growth that one could expect in a liberalizing economy, namely resource reallocation and catching up. Using firm-level panel data for the period 1992-93 to 2005-06, the study shows that the portion of productivity growth accounted by the reallocation of resources to more productive firms is not only significant but also increasing over time in majority of the industries. Regarding the catching up, the study finds that in majority of the industries, the catching up process and consequent convergence in productivity across firms is present, particularly during the second half of the study period. The study also finds that, in most of the industries, exporting firms have higher productivity and that resource allocation to exporting firms increased industry-level productivity. This provides evidence for an additional source of aggregate productivity growth from trade liberalization.

Virmani and Hashim (2011) in their study expected a positive effect on growth as well as total factor productivity, which are expected to broadly follow an S-shape pattern in moving from the lower steady state to a higher steady state level. At more disaggregated level of manufacturing sub-sectors, we would expect a majority of sub-sectors to follow an S-curve pattern, but to also find some sub-sectors that will in fact decline because they are fundamentally non-competitive. The puzzle of India's reforms was that such a pattern was indeed found consequent to the 1980s reforms, but no such pattern or perhaps even an inverse pattern was found after the 1990s reforms. The latter appeared to lend support to the ideological opponents of reforms who related negative effects of productivity to reforms.

Rogoff (1992) take a broad view the Balassa-Samuelson model by permitting for aggregate demand shocks as well as aggregate supply shocks, matter for real exchange rate dynamics. He incorporates nontraded goods into an empirical intertemporal model, his main focus is on explaining the random walk behavior of real exchange rates. He used ratio of government spending to GDP is used to proxy the demand side component. He applied open capital markets as well as fixed factor model to the Yen/Dollar exchange rate over the period of 1975

to 1990. He empirically shows a positive supply shock in favour of Canada leads to an appreciation in real exchange rate, which was consistent with the Balassa-Samuelson hypothesis and commodity price shocks tend to be an important determinant of exchange rate movements over the short and medium run, but supply shocks have the largest impact over the long run.

Harris (2000) argued that, within a macroeconomic framework, productivity treat as an endogenous variable, in which the exchange rate regime is either fixed or floating. The competitiveness approach highlights that real exchange rate depreciations accelerate productivity growth in certain circumstances. Richard Harris (2001) gave evidence for panel model that supports the competitiveness view of the positive short run effects of exchange rate depreciation on productivity. Choudhri and Hakura (2000) investigate that effect of increased openness on productivity growth varies across sectors and the effect depends on the growth potential of the sector and found export expansion in high-growth sectors leads to an increase in productivity growth.

Das (2008) in his study found industry-level evidence regarding the connection between trade policy reforms and labour market indicators within organized manufacturing industries in India. The period of study is from 1980-81 to 1999-2000 in four phases of trade liberalization, 1980-85; 1986-90; 1991-95, and 1996-2000, and the sample covers around 75 industries in the three-digit classification of the Annual Survey of Industries. The study attempts to the connection between trade policy reforms and employment, labour productivity, and real wages growth in the organized manufacturing industries. Trade liberalization is quantified in terms of various trade policy indicators - customs tariff as well as non-tariff measures.

III: Research Methodology

(A) Calculation of Total Factor Productivity Growth at the Industry Level

The present study makes use of growth accounting approach for estimation of productivity growth. The Translog Index of Total Factor Productivity (TFP) is a discrete approximation to the Divisia Index of Technical Change. Translog Index Number is symmetric in data of different time periods and also satisfies the factor reversal test approximately. The Translog production function of TFP has been used for the TFP estimates presented in the study, as done earlier by Alhuwalia (1991), Rao (1996), Pradhan and Barik (1998) Das (2003), Goldar and Kumari (2003), Goldar (2004), Das and Kalita (2009) and Virmani & Hashim (2011). The Translog production function of TFP has been used for the measurement of TFP and the methodology assume perfect competition and constant returns to scale, further, the revenue share of the factor inputs sum to unity. This study concentrates on individual industry productivity rather than aggregate productivity. Consider an aggregate production function with four factor of production.

$$Y = F(L, K, R, E, T) \quad \text{Equation (1)}$$

Where, 'Y' denotes aggregate output, 'L' denotes labour input 'K' denotes capital input, 'M' denote consumption of raw material, 'E' denote energy input and 'T' denote time. It is assumed that 'F' characterized by constant return to scale. These aggregates are taken as function of their components.

Following Translog measure of Total Factor Productivity Growth.

$$\ln \left(\frac{TFP_t}{TFP_{t-1}} \right) = \left[\ln \left(\frac{Y_t}{Y_{t-1}} \right) \right] - V_K \left[\ln \left(\frac{K_t}{K_{t-1}} \right) \right] - V_L \left[\ln \left(\frac{L_t}{L_{t-1}} \right) \right] - V_M \left[\ln \left(\frac{M_t}{M_{t-1}} \right) \right] - V_E \left[\ln \left(\frac{E_t}{E_{t-1}} \right) \right] \quad \text{Equation (2)}$$

Using the equation 2, the growth rates of TFP have been calculated for each year. These have then been used to obtain an index of TFP in the following way. Let index of TFP is denoted by A. The index for the base year, A₀, is taken as 100. Then, the index for subsequent years is calculated using the following equation:

$$\left(\frac{A_t}{A_{t-1}} \right) = \exp (\square \square \ln TFP_t) \quad \text{Equation (3)}$$

Having obtained the TFP index for different years, estimates of TFP growth rate have been made for the periods of 1975-76 to 2011-12. The estimation of TFP growth rate for the entire period has been done by fitting an exponential (or semi-log) trend equation to the TFP index.

(B) Panel Regression Model

A multiple regression analysis has been applied to study the effect of liberalization on industrial productivity. The analysis is based on pooled cross-section and time-series data. Growth rates of TFP computed for different years for the 22 two-digit industries are pooled. Panel regression runs for the entire period from 1975-76 to 2011-12.

The multiple panel regression equation is specified as:

$$TFPG_{it} = F(Y/N_{it}, CR_{it}, K/L_{it}, NP_{it}, W_{it}, ERP_{it}, ICR_{it}, IPR_{it}, REER_{it}, uit)$$

Where i denotes the ith industry and t = time period. Total number of Indian industries = 22

Y/N_{it} is output per factory is taken as a measure of firm size.

CR_{it} is concentration ration of a particular industry group captures the effect of market structure on TFPG.

K/L_{it} is the capital-labour ratio serves as technological variable.

NP_{it} is the non-production employee per production worker is also a technological variable and is related to the composition of work force.

W_{it} is the real wage rate

ERP_{it} is the effective rate of protection

ICR_{it} is the import coverage ration

IPR_{it} is the Import Penetration Ratio

$REER_{it}$ is the Real Effective Exchange Rate

Data are collected from Annual Survey of Industries (ASI), Office of the Economic Advisor, Government of India, Ministry of Commerce & Industry and the Department of Industrial Policy & Promotion (DIPP) and Reserve Bank of India.

IV: Data Analysis and Interpretation

Total Factor Productivity Growth: Trends

The growth rates trend of TFP obtained using the growth accounting framework (i.e., discrete approximation of the translog production function). As mentioned earlier, opinions have differed over the inclusion of the year 1991-92 as a post or pre-reform year. In view of this, we have estimated productivity with two alternative pre and post reform periods. We also highlight the annual variations in TFPG which allow us to view the fluctuations in TFPG over the span of the study.

Table 1: TFPG in Pre-Liberalization and Post-Liberalization

NIC Code-2004	Classification of Industry	Pre-Liberalization Period TFPG	Post-Liberalization Period TFPG
15	Manufacture of Food Products and Beverages	6.24	7.65
16	Manufacture of Tobacco Products	5.31	2.46
17	Manufacture of Textiles	5.62	5.87
18	Manufacture of Wearing Apparel Dressing and Dyeing of Fur	15.92	10.15
19	Tanning and Dressing of Leather Manufacture	6.68	6.54
20	Manufacture of Wood and Products of Wood and Cork	2.05	7.87
21	Manufacture of Paper and Paper Products	6.58	9.97
22	Publishing, Printing and Reproduction of Recorded Media	1.32	6.79
23	Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	8.03	7.80
24	Manufacture of Chemicals and Products	8.97	9.27
25	Manufacture of Rubber and Plastic Products	9.85	10.03
26	Manufacture of Other Non-Metallic Mineral Products	8.25	8.72
27	Manufacture of Basic Metals	6.80	11.04
28	Manufacture of Fabricated Metal Products	4.14	11.44
29	Manufacture of Machinery and Equipments	5.41	11.56
30	Manufacture of Office, Accounting and Computing Machinery	13.28	7.26
31	Manufacture of Electrical Machinery and Apparatus N.E.C.	7.86	9.20
32	Manufacture of Radio, Television and Communication Equipments and Apparatus	16.39	10.94
33	Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	10.87	6.64
34	Manufacture of Motor Vehicles, Trailers and Semi-Trailers	7.56	13.16
35	Manufacture of Other Transport Equipment	4.18	10.10
36	Manufacture of Furniture	2.85	15.47

The growth rate of Food and Beverages, Wood and Wood Products, Paper and Paper Products, Publishing, Printing and Reproduction of Recorded Media, Chemicals and Products, Other Non-Metallic Mineral Products, Basic Metals, Fabricated Metal Products, Machinery and Equipments, Electrical Machinery and Apparatus, Radio, Motor Vehicles, Other Transport, Furniture industries show a high growth rate during post-liberalization

period as compare with the pre-liberalization period. The growth rate of Tobacco Products, Office, Accounting and Computing, Wearing Apparel, Coke and Petroleum, Radio, Television and Communication Equipments, Medical, Precision and Optical industries show lower TFP growth during post liberalization than pre-liberalization period. The growth rate of Textiles, Leather, Rubber and Plastic Products industries have a constant TFP growth in both the periods.

Basic Panel Regression Results

Following Table 2 presents the results of panel regression analysis. The first regression shown in the table regression (1) is for the period of pre-liberalization, regression (2) is for the period of post-liberalization and regression (3) is for whole period.

Table 2: Determinants of Productivity Growth

Dependent Variable: TFPG

Explanatory Variables	Regressions		
	1975-76 to 1990-91	1991-92 to 2011-12	1975-76 to 2011-12
	(1)	(2)	(3)
CLR	0.0128	0.1332	0.0891
	0.5074	4.1612	4.0463
		*	*
CR	0.6008	-0.4204	-0.0760
	1.3097	-1.0409	-0.2534
ERP	0.0848	0.0287	0.0183
	1.2501	1.1760	0.9037
ICR	-0.0018	0.002106	0.0013
	-0.0153	0.17875	0.1273
IPR	-0.0084	-0.0260	-0.0104
	-1.7674	-2.2747	-2.0033
	****	***	***
NPWPE	-0.0075	-0.0116	-0.0102
	-0.4504	-0.5508	-0.7193
OPF	0.2595	0.1126	0.1291
	7.4099	6.5183	8.8267
	*	*	*
REER	-0.2047	0.3766	0.2198
	-2.3444	3.4366	3.0720
	***	*	**
RW	0.3411	0.4797	0.4682
	7.7768	10.6851	14.5678
	*	*	*

CLR= Capital-Labour Ratio; CR= Concentration Ratio; ERP= Effective Rate of Protection; ICR= Import Coverage Ratio; IPR= Import Penetration Ratio; NPWPE= Non-Production Worker to Production Employees; OPF= Output per Factory; REER= Real Effective Exchange Rate; RW= Real Wage Rate

* - Significant at 0.1 %, ** - Significant at 1%, *** - Significant at 5% and **** - Significant at 10%

The coefficient of CR is positive for the pre-liberalization period but statistically insignificant, whereas the coefficient of CR is negative for the post-liberalization period and entire period but it is also statistically insignificant for both the period. The coefficient of the IPR for the pre-liberalization era is found to be negative and statistically significant at 10 per cent level and estimated elasticity of TFP growth with respect to IPR is -0.008. As we compare this result with post-liberalization era, there is an improvement in significant level as well as elasticity of an IPR. During post-liberalization era, the coefficient of the IPR is negative and statistically significant at 5 per cent level and its elasticity is about -0.03 per cent. For the entire period, the coefficient of the IPR is found to be negative and statistically significant at 10 per cent level and estimated elasticity of the TFP growth with respect to IPR is -0.01. This implies that, for the period of 1975-76 to 2011-12, a fall in IPR by 10%, productivity growth increased by 0.01%.

There is a negative relationship found in case of REER and TFP growth during the pre-liberalization period. The coefficient is negative and statistically significant at 5 per cent level and the estimated elasticity of TFP growth with respect to REER is about -0.2 per cent. But after the post-liberalization period, there is a positive relationship between TFP growth and REER.

V: Conclusion

As regards, the TFPG in the organized manufacturing sector is concerned, this study finds that the post-reform period has witnessed acceleration in TFPG in all the industries (except tobacco products, office, accounting and computing, wearing apparel, coke & petroleum, radio-television communication equipment, medical-precision & optical industries). However, Virmani and Hashim (2009), interpret it as an evidence of 'J-curve' effect of the reforms. Growth rate of productivity in some industries has shown poor performance during the post-reforms period, it does not mean that this has been caused by reforms.

India's trade liberalization raised several questions at the micro as well as macro level regarding economic performance of the country. Generally, growth rate has shown a trend to increase in the last three decade or so, reflecting the effects of domestic and external policy changes in the 1980's, 1990's and 2000's. Likewise there have been variations in the findings of studies on other key macro-economic variables like total factor productivity, employment, exchange rate, real wage rate, growth rate of output, direction and composition of foreign trade and so on. This observation raises the central question; whether trade liberalization in India has led to greater economic performance or is it necessary to complement the trade

reforms with other domestic policy reforms to capture the positive effects of trade liberalization and to embark in a sustainable path of growth as well as development?

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