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IMPACT OF GLOBALIZATION ON THE AUTOMOBILE INDUSTRY IN INDIA

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Abstract

Over long periods of time a variation is noticed in the factors determining Indian automobile industry growth. However, some of these factors are persistent over time. The paper attempts to identify these persistent factors determining the growth of the Indian automobile industry and then examine the impact of globalisation, as an economic shock, on the Indian automobile industry in light of these determining factors. The paper finds that profitability is a major driver of automobile industry growth in India, along with labour productivity and capital intensity. It also uses a structural break analysis to show that globalization had a considerable positive contribution in increasing the pace of growth in the Indian automobile industry for a period of 20 years. Globalization facilitated better returns from the industry's profits and opened up more avenues to explore growth for two decades and helped the industry gather the required momentum.

Keywords: *Economic shock, Growth, Globalization, Indian automobile industry, Profitability, Structural break analysis.*

Introduction

Globalization is an economic shock. It is believed to be responsible for minor and major shifts in economies and businesses. Between 1948 and 2007, world trade increased substantially from $59 billion to $14 trillion, such was the impact of globalization! Despite this, the impact of globalization is controversial. The argument in favour claims that globalization provides less-developed countries with the opportunity to expand their economies (Hasan, 2019; Shabab and Islam, 2018; Woods, 2000) and reduce inequality (Zhou et. al, 2011). Those against, argue that globalization makes it easy for multinationals to pursue private interests across

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borders, usually at the expense of domestic enterprises (Ali et. al, 2012) and in some cases create an economic divide (Shabab and Islam, 2018). It is also argued that only developed economies can benefit from globalization (Tsai et. al, 2012). Globalization is also known to have differential impacts on industries and sectors. Thus, there is a dispute regarding the impact of globalization.

The automobile industry in India is often said to be the barometer of the economy. It contributes more than 7 per cent to India's GDP (almost 49 per cent of the manufacturing GDP) and employs (directly and indirectly) over 29 million people. According to India Brand Equity Foundation (IBEF), India replaced Germany in 2019 as the world's fourth largest automobile market and is expected to reach US$ 300 billion by 2026. The industry has strong forward and backward linkages with several key segments of the economy making it one of the drivers of income and employment generation and hence of economic growth and has been marked as a sunrise sector in the Indian economy. Thus, its growth and its determinants are of major research interest. A study on the impact of globalization on various predictors of automobile industry growth can help to tailor appropriate policies and amend existing ones. Considering the fact that the automobile industry in India is becoming one of the most technologically sophisticated and innovation driven industries, well targeted industrial policies will have a twofold benefit. Firstly, it will act as a catalyst and trigger the desired industrial and eventually, economic growth. Secondly, it will work as a cushion to shield the industry from undesirable impacts of global shocks.

This research paper attempts to identify the long term determinants of the Indian automobile industry growth and analyse the impact of globalization on these identified determinants. The rest of the paper is divided into five major sections. Section 1 reviews the existing literature, Section 2 focuses on identifying the long term determinants of automobile industry growth across the pre and post globalization periods (the period covered by this study is 1974 to 2019) and Section 3 helps to measure the impact of globalization on these determinants. Section 4 summarises the findings. Section 5 concludes and states the policy implications.

The findings suggest that the growth of the Indian automobile industry is significantly impacted by its capital intensity, its profitability and the productivity of its labour force. The paper also finds a significantly positive impact of globalization on the growth of the Indian automobile industry for a period of 20 years.

Section 1: Review of Literature

A multitude of literature is available, which attempts to identify the determinants of automobile industry growth. They cover different time periods as well as different regions and nations. For some factors there is an agreement whereas authors vary in their opinion regarding the impact of some other factors. A similar pattern exists for the literature on the impact of globalization. This section is divided into two sub parts; part A reviews the literature on the

determinants of automobile industry growth and part B provides literature review on the impact of globalization.

A: Literature on Factors of Automobile Industry Growth

Kathuria (1987), Narayanan (1998), Narayanan (2001), Piplai (2001), Richet and Ruet (2008), Lieberman and Kang (2008), Ranawat and Tiwari (2009), Chaudhuri et al. (2010) and Bhasker and Sarma (2013) all stress on the importance of productivity as an indicator of growth of an industry. Productivity is measured as a ratio of output to inputs and indicates the value added by the industry. An increasing level of productivity could be caused by a multitude of factors ranging from efficiency and availability of capital, the productivity of the labour force, the competitiveness of the market, the global demand and supply, the technological progress facilitating the industry and the degree of innovation and knowledge management capability. This paper follows the above mentioned authors and takes productivity as a proxy for automobile industry growth. The growth of an industry is subject to many factors. There are numerous studies on such factors, published by industry associations, consultancy organizations, research bodies and individual authors. These studies, spanning over a long period of time, identifies multiple determinants of automobile industry growth. For instance, the studies of Narayanan (2001), Ranawat and Tiwari (2009), Badri Narayan and Vashisht (2008), Ray (2012), Bhasker and Sarma (2013) and Chowdhury and Chatterjee (2020) find that capital and its efficient use initiates growth in an industry. Again, a skilled workforce, particularly in developing nations such as India, where labour tends to be both abundantly available and inexpensive, is considered to have a positive effect on an industry's growth. The studies by Cörvers (1996), Narayanan (1998), Lall (2004), Badri Narayanan and Vashisht (2008), Bhasker and Sarma (2013), Mudkanna and Losarwar (2014), Bhatia and Kaur (2014) and Chowdhury and Chatterjee (2020) confirm that human capital is integral to automobile industry growth. Profitability is considered to be another important factor defining growth. The profits of an industry not only ensure an internal supply of funds but also make external borrowing much easier. Lenders show greater interest in investing their money in profitable ventures. According to Piplai (2001), Narayanan (2001), Ranawat and Tiwari (2009), Vikkraman and Varadharajan (2009), Srivastava (2014) and Chowdhury and Chatterjee(2020), the profitability of an industry is a significant predictor of its growth.

B: Literature on Impact of Globalization

The definition of globalization is simple. India started reducing its protectionist policies since 1980 and introduced foreign competition in the domestic market from 1991. This was done with an aim to implement specialisation and sell what India can produce at low cost, beyond its domestic markets while importing at lower cost what is expensively produced at home. Such a measure is supposed to inculcate efficiency and result in a faster pace of economic growth. However, the impact of globalization on nations and their economic systems were

found to vary. This paper specially focuses on reviewing the impact of globalization on the automobile industry. Miller and Sirgy (2011) qualitatively analyses the impact of Globalization of the Automotive Industry on the Quality of Life of the US Southeast and found a mixed impact on the region. D'Costa (2011) finds that although India's automobile industry has been expanding even during the global financial crisis, globalisation and de-regulation has resulted in capital flight to pro-business regions. He also proposes that globalisation has been responsible for changing investment patterns in the Indian automobile industry. Sasuga (2011) finds that post globalisation, the world has witnessed a major shift in automobile production from advanced countries to the emerging economies. Industrial deregulation, foreign investment, improved interstate production networks, infrastructure development and technology integration through partnerships with foreign firms were found to be major catalysts triggering the growth of the automobile industry in India. Spatz and Nunnenkamp (2002) find that the increasing integration of low-income countries from Asia, Latin America as well as Southern and Central Europe into automobile production has put competitive pressure on traditional automobile producing countries. Sturgeon and Florida (2000) find that with globalization, manufacturers have been increasingly attracted to set up final assembly plants in low-cost economies, thus resulting in job cuts in developed nations while showing a job growth in the low cost host countries.

Therefore, literature supports that globalization has had a majorly positive impact on the automobile industry of developing economies like India that had the benefits of emerging markets with low cost labour.

Section 2: Determinants of Automobile Industry Growth in both Pre and Post Globalization Periods

2.1: The Indian Automobile Industry

A study of the available literature revealed a multitude of factors impacting Indian automobile industry growth over the period under study, 1974 to 2019. However, the factors responsible were found to be different for different time periods. For example, Narayanan (2001) find a positive relationship between capital and automobile industry growth whereas Bhasker and Sarma (2013) finds no significant impact. Similarly, Narayanan (2001) found a negative relationship between firm level profit and average growth rates of automobile manufacturing firms whereas Ranawat and Tiwari (2009) found that firms became more profitable with growth in the industry. It is also true that some factors became prevalently important only in the post globalization era. For example, market competitiveness and global market share could be considered as determinants only in the post globalization era when the industry ceased to be protected and the government introduced the 'Auto Policy 2002' with a vision of establishing a globally competitive automotive industry in India. Similarly, factors like innovation and knowledge management gained momentum only post 2006 with the introduction

of the 'National Automotive and R & D Infrastructure Project (NATRIP)' scheme in 2005-06. Keeping this in mind, the paper focuses on only those factors that are considered to have some impact over the entire period of study, that is, 1974 to 2019.

2.2: Variables, Data and Analysis

Following Kathuria (1987), Narayanan (1998), Narayanan (2001), Piplai (2001), Richet and Ruet (2008), Lieberman and Kang (2008), Ranawat and Tiwari (2009), Chaudhuri et al. (2010) and Bhasker and Sarma (2013), the paper takes productivity as a proxy for automobile industry growth. The variables 'value added to sales', 'sales per rupee of capital', 'capital intensity', 'capital productivity', 'net profit margin', 'labour productivity', 'sales per employee' and 'value added per employee' were identified as determinants of automobile industry growth from the existing literature. It is evident that many of them (sales per employee and value added per employee or capital productivity and sales per rupee of capital), although measured differently, are obviously related. Therefore, a multicollinearity test was performed and the final set of predictor variables selected for analysis was capital intensity, profitability and labour productivity. Factors which became predominant post the year 2000, like, technology imports, innovation etc. were not considered for the study due to unavailability of data. Data was collected for a period of 45 years (1974 to 2019) from Annual Survey of Industries (ASI) published by the Ministry of Statistics and Programme Implementation (MOSPI). The statistical software 'STATA' was used to analyse the data.

A time series regression model was constructed with productivity as the response variable (representing automobile industry growth) and capital intensity, net profit margin and sales per employee as the predictors. The model is specified as;

$$\text{Productivity}_t = {}_0 + {}_1 \text{Productivity}^2_{t\ 1} + {}_2 \text{Capital Intensity}^2_t + {}_3\text{Net profit Margin}_t + {}_4 \text{Sales per Employee}_t + u_t \quad \ldots\ldots\ldots\ldots (1)$$

Where, β_0 is the intercept term, u_t is the stochastic error term, t represents the deterministic trend and β_1, β_2, β_3, and β_4 are coefficients to be estimated. These coefficients are expected to be positive. Productivity(PROD) is measured as the output to input ratio, Capital Intensity (CI) is measured as the capital labour ratio, net profit margin (NPM) is measured as the ratio of profit to sales and sales per employee (SPE) is taken as a measure of labour productivity. Further, it was hypothesized that past productivity may impact current growth and therefore one year lagged productivity, $\text{Productivity}_{t-1}$ (LPROD) was also included as a predictor. The OLS model parameter values and standard errors were compared with and without the lagged productivity as an explanatory variable. Both standard errors and parameter values were not impacted. The model's explanatory power is also improved after adding the lagged productivity as a predictor.

Further, the model was checked for linearity using the residual versus fitted value plot (figure 1) and the residuals "bounce randomly" around the 0 line which suggests that the relationship is linear. The residuals roughly form a "horizontal band" around the 0 line suggesting that the variances of the error terms are equal and only two residuals "stands out" from the basic random pattern of residuals suggesting that there are only two outliers.

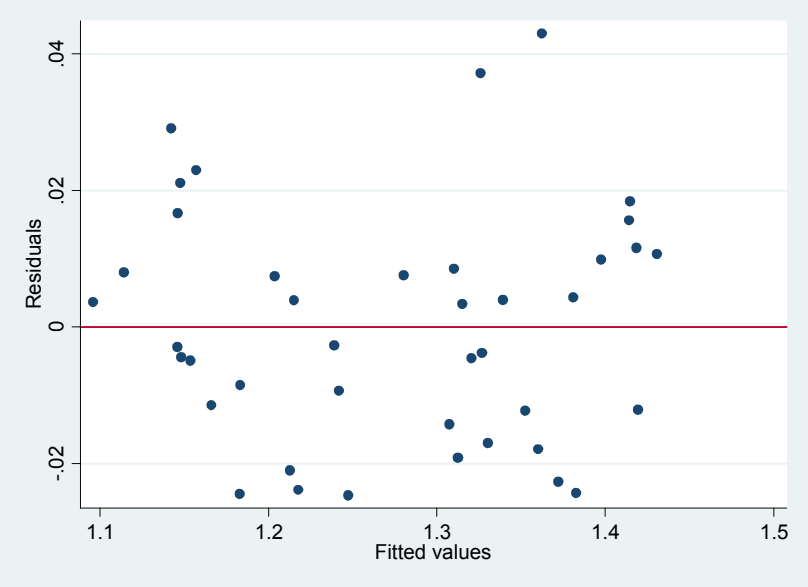

Fig. 1: Residual versus Fitted Value Plot

The variance inflating factors(VIFs) for all independent variables are less than 10 and the average VIF is 5.24, suggesting that the model does not suffer from multicollinearity. A simple OLS was performed and the model was tested to detect any possible problems of autocorrelation and heteroskedasticity. The Breusch-Godfrey LM test was used to detect autocorrelation. The test measures the increase in the error terms across the explanatory variables. The test assumes that the errors follow an AR(p) autoregressive scheme

$$u_t = {}_1u_{t\ 1} + {}_2u_{t\ 2} + ... + {}_pu_{t\ p} + {}_t \quad ..... (2)$$

An OLS is performed on the above regression equation to obtain a set of sample residuals $\hat{u}_t$ and uses the residuals obtained to estimate the following auxiliary regression;

$$\hat{u}_t = {}_0 + {}_1x_{t,1} + {}_2x_{t,2} + ... + {}_kx_{t,k} + {}_1\hat{u}_{t\ 1} + {}_2\hat{u}_{t\ 2} + {}_3\hat{u}_{t\ 3} + ... + {}_p\hat{u}_{t\ p} + {}_t \quad ..... (3)$$

Where, X represents the set of predictor variables. The R^2 is calculated from the model represented by equation (3) and $nR^2 \sim {}^2_p$.

Where, n is the number of data-points available for the regression equation (2) and the value of n depend on the number of lags of the error term (p). T is the number of observations in the

basic series.

The null hypothesis is of constant variance and the test results establish

prob >= $^2 = 0.1186$

Hence, the null hypothesis cannot be rejected at the 5% confidence level and it can be accepted that there is no serial correlation in the model.

The Breusch-Pagan test for heteroskedasticity is also performed on model. For this test the residuals are obtained from the OLS performed on the original model, are squared and divided by the Maximum Likelihood estimate of the error variance from the original regression, to obtain

$g_i = u_i^2 / \hat{}^2$, where, $\hat{}^2 = \hat{u}_i^2 / n$,

u_i representing the error terms in equation (1) and n is the sample size. Then, the auxiliary regression estimated is

$g_i = {}_1 + {}_2 z_{2i} + {}_3 z_{3i} + ... + {}_p z_{pi} + {}_i$ ..... (4)

where the z terms will typically but not necessarily be the same as the original covariates x. The LM test statistic is then half of the explained sum of squares from the above auxiliary regression.

$$LM = \frac{1}{2}(TSS \quad RSS)$$

Where, LM is Lagrange Multiplier, TSS is total sum of squared deviations of the g_i from their mean and RSS is residual sum of squares. The test statistic is asymptotically distributed as $^2_{p\ 1}$ under the null hypothesis of homoskedasticity. The test results establish

prob > $^2 = 0.5801$

Therefore, the null hypothesis cannot be rejected at the 5% confidence level and it can be accepted that there is no heteroskedasticity in the model.

The classical regression model assumes stationarity in the dependent and independent variables in order to avoid the problem of 'spurious regression' (Granger and Newbold, 1974). Non-stationarity can be tested using the Augmented Dickey-Fuller (ADF) test.

The ADF test is conducted with the following set of regression equations

$Y_t = {}_1 + Y_{t\ 1} + {}_i \sum_{i=1}^{p} Y_{t\ i} + {}_t$ ..... (5)

$Y_t = {}_1 + {}_2 t + Y_{t\ 1} + \sum_{i=1}^{p} Y_{t\ i} + {}_t$ ..... (6)

Where Y is the variable under consideration, Δ is the first difference operator, t is the time or trend variable, $_t$ is a pure white noise and p is the optimum number of lags on the dependent

variable. Equation 5 includes a drift whereas the equation 6 includes both drift and a deterministic trend. The test was applied with a lag value of 1 and the following results were obtained (Table1).

Table1: Results of ADF

Variables	p-value for drift	p-value for trend
Productivity	0.0380**	0.0113**
Lagged Productivity^2	0.0428**	0.0084***
Capital Intensity^2	0.4728	0.7916
Net Profit Margin	0.0116**	0.0193**
Sales Per Employee	0.6195	0.6908

* - significant at 10%, ** - significant at 5%, *** - significant at 1%

The test indicates the presence of non-stationarity in two of the predictor variables, namely, 'Capital Intensity' and 'Sales per Employee'. Hence the first differenced forms of the variables were taken as a solution to their non-stationarity. The ADF test was performed again and gave the following results (Table 2).

Table 2: Results of ADF on first differenced variables

Variables	p-value for drift	p-value for trend
Productivity	0.0000***	0.0000***
Lagged Productivity^2	0.0000***	0.0000***
Capital Intensity^2	0.0000***	0.0001***
Net Profit Margin	0.0000***	0.0000***
Sales Per Employee	0.0000***	0.0000***

** - significant at 5%, *** - significant at 1%

Post the diagnostic tests, the model is re-estimated using the first differenced form of the response and predictor variables as shown by equation (7)

$$\text{Productivity}_t = {}_0 + {}_1\ \text{Productivity}^2_{t\ 1} + {}_2\ \text{Capital Intensity}^2_t +$$

$${}_3\ \text{Net profit Margin}_t + {}_4\ \text{Sales per Employee}_t + u_t \quad \text{..... (7)}$$

A simple OLS is performed on equation (7) to determine the significant predictors of automobile industry growth and the following results were obtained.

The results confirm that the predictors CI (Capital Intensity), NPM (Net Profit Margin) and SPE (Sales per Employee) are significant predictors of Automobile industry growth (CI at 10%, NPM at 1% and SPE at 5%), while Lagged productivity turned out to be not significant. The relationship of the predictors with the automobile industry growth holds some surprise. The coefficients of the predictor SPE demonstrated a negative sign which needs to be explained. Looking into the behaviour of the industry it was found that in the pre-globalization phase,

Table 3: OLS Results for Determinants of Automobile Industry Growth

Productivity	Coefficients	P-value	Model Fit
LPROD	0.00271	0.588	$R^2 = 0.89$
CI	0.00008	0.098*	Prob > F = 0.000
NPM	1.4143	0.000***	
SPE	-0.00084	0.032**	

* - significant at 10%, ** - significant at 5%, *** - significant at 1%

India concentrated on building up an indigenous automobile industry. Imports were discouraged and manufacturers were encouraged to produce components internally. For the need of indigenisation, a minimum 50% indigenous content requirement was introduced. The labourers were virtually untrained and there was not much scope for specialized training. The training was mainly on the job and therefore, it took much time to show effective results. Moreover, there was a high turnover rate of employees and labourers constantly shifted from one industry to the other, depending on the kind of remuneration available. Additionally, due to constant innovation, the fixed factors were becoming outdated within short time duration, thus affecting productivity further. In short, the automobile industry in India was still in the childhood stages of its growth. Post globalization, with imports of components and technology, the productivity showed a temporary rise, but it failed to maintain the pace. The passenger car segment was de-licensed in May 1993. Along with abolition of the need for MRTP clearances, this meant that the automotive firms were free to enter, expand, diversify, merge or acquire based on their commercial judgements which led to the temporary rise. However, in 1997, the government in its industrial policy regulated the import of automotive vehicles in CBU (completely built units) form or in SKD/CKD (semi-knocked down/completely knocked down) condition. The vehicle manufacturing units were allowed to import vehicles only in SKD/CKD condition and were required to obtain a license for the same. The availability of license was subject to execution of Memorandum of Understanding (MoU) signed with the DGFT (Directorate General of Foreign Trade). This indirectly led to a fall in the productivity as the assembly units in India were still not very efficient. The productivity further fell between 2000 and 2019, with intermittent years of better performance, because of a very high rate of innovation in the industry which required a constant updating of all factors of production, material, intellectual and technical indicating a maturing stage of the product. Thus while inputs increased over time, labour productivity showed a mixed response, which may be responsible for the negative sign of the coefficient for the predictor SPE. However, the value of the coefficient is quite low (-0.00084) for the predictor to effect a strong negative pull on the industry productivity.

CI, the measure of capital intensity, returned a positive but low value of the coefficient. This, points to a weak relationship between the use of capital and the productivity of the Indian automobile industry. This can be attributed to the fact that for a unit change in capital the average rate of change in productivity was only 0.00008 times. The fast paced change in

capital could be attributed to the integration of rapid technology changes, modernization of equipment and improved modes of production. Although the industry started off with very low levels of mechanization, the technology and innovativeness increased hugely over the period and the industry was converted from being a labour intensive one to a capital intensive one. Several policies like the 1975 'automatic growth rule' applicable to CVs, ancillaries and tractors approved an automatic capacity expansion of 5% per year (25% in total for 5 years) over and above the 5% automatic growth permitted under IDRA 1951. In 1978 the government also dismantled some of its stricter controls on foreign equity collaborations which encouraged technology collaborations. The automotive industry in co-operation with the Ministry of Industry established the Automotive Research Association India in 1966 for supporting R&D efforts within the industry. In 1980, the government also relaxed the import regulations to encourage the existing firms to upgrade their technology. Fiscal incentives were provided to the passenger car manufacturers in 1984 to enable them to import technology and improve the fuel efficiency of their vehicles. In January 1985 the government announced a policy of 'broad-banding' encompassing the entire industrial sector that allows manufacturers to use the installed machinery flexibly. In the post globalization period the approval of 51 per cent and then subsequently 100 per cent FDI together with the continuous increase in budget to NATRIP and the weighted tax deductions for R&D were the main catalysts for this change. Hence, productivity could not keep pace with the change in capital use and is responsible for the weak relationship.

NPM, the measure of profitability, proved to be the most significant predictor of automobile industry growth and the model results tell that for every unit increase in NPM, productivity of the Indian automobile industry increased by 1.41 units on an average. The determinants of profitability like competitive advantages, ownership or macroeconomic factors like GDP growth rate, inflation, interest rates etc may have had significant impact on the industry's growth.

These factors are largely impacted when a country opens up its borders and hence the paper hypothesizes that globalization may have impacted the relationship between the productivity of the Indian automobile industry and its significant predictors. Section 3 attempts to verify this hypothesis empirically by using the 'structural break analysis.'

Section 3: Impact of Globalization on Automobile Industry Growth

To measure the impact of globalization on an industry we need to define and understand its possible impacts (Samimi et al., 2011). If globalization is seen as an event, then an analysis of the change in the predictors of an industry's growth before and after the globalization year can help to measure the effects of globalization on that particular industry. The studies by Dufour (1981) and Kraido (2018) confirm the procedures of structural break analysis and dummy variables to test for the impact of an event on the relationship between a dependent variable and its predictors, in the context of time series data. The structural break analysis is able to isolate the change in the relationship between automobile industry growth and its determinant

factors attributable only to globalization. If a change is found, it can be concluded that globalization had had some impact on the automobile industry growth in India. In section 2, NPM, CI and SPE were identified as significant predictors of automobile industry growth. In this section, the structural break analysis will be used to evaluate the relationship between productivity (proxy for automobile industry growth) and each of the predictor variables, using a dummy variable to represent globalization. The following set of equations is used for this analysis;

$$PROD = {}_0 + {}_1 NPM_t + {}_2 GLOB + {}_3 (NPM_t \quad GLOB) + u_t \quad \text{..... (8)}$$

$$PROD = {}_0 + {}_1 CI_t^2 + {}_2 GLOB + {}_3 (CI_t^2 \quad GLOB) + u_t \quad \text{..... (9)}$$

$$PROD = {}_0 + {}_1 SPE_t + {}_2 GLOB + {}_3 (SPE_t \quad GLOB) + u_t \quad \text{..... (10)}$$

Where, β_0 is the intercept term, u_t is the stochastic error term, and β_1, β_2, and β_3 are coefficients to be estimated. Productivity (PROD) is measured as the output to input ratio, net profit margin (NPM) is measured as the ratio of profit to sales and sales per employee (SPE) is taken as a measure of labour productivity. CI^2 is the squared value of capital intensity of year t. GLOB is a dummy variable which takes the value 0 for the pre-globalisation years 1974 to 1990 and is equal to 1 for the post-globalisation years 1991 to 2019. (NPM*GLOB), (CI*GLOB) and (SPE*GLOB) are interaction terms between the predictors and the dummy variable GLOB.

Equations (8), (9) and (10), help to test the impact of globalization on the growth of the Indian automobile industry. The most important indicators are the coefficients β_2 and β_3 which measure the change in relationship between the response variable PROD and the predictor variables NPM (eq. (8)), CI (eq. (9)) and SPE (eq. (10)). The co-efficient to the globalisation dummy (β_2) helps to measure any changes in the regression intercept between the pre and post globalisation periods whereas the co-efficient to the interaction terms (β_3) helps to measure changes in the slope of the regression relationship between the pre and post globalisation periods. Thus a positive and significant β_2 will indicate that globalisation effected an increase in the average productivity of the automobile industry in India while a positive and significant β_3 will indicate that globalisation triggered an increase in the 'rate of change' of productivity with respect to the corresponding predictor variable.

Surprisingly, the results indicate that globalization by itself, had no impact on the average productivity of the Indian automobile industry. However, the analysis finds that globalization was responsible in changing the rate of change in productivity as a result of a unit change in NPM, but this is true only for the years 1974 to 2013. If the dataset is extended by another 6 years to 2019, even NPM fails to be impacted. Thus we can conclude that the relationship between productivity of the Indian automobile industry and its profitability became more

Table 4: P-value of coefficients testing for Impact of Globalization on Automobile Industry Growth between 1974 and 2013

	Predictor Variables		
	Equation (8)	**Equation (9)**	**Equation (10)**
Coefficients	**NPM**	**CI**	**SPE**
β_2	0.614	0.953	0.767
β_3	0.000***	0.775	0.810

** - significant at 5%, *** - significant at 1%

Table 5: P-value of coefficients testing for Impact of Globalization on Automobile Industry Growth between 1974 and 2019

	Predictor Variables		
	Equation (8)	**Equation (9)**	**Equation (10)**
Coefficients	**NPM**	**CI**	**SPE**
β_2	0.945	0.980	0.782
β_3	0.524	0.658	0.800

intense after globalization, which is reflected in a positive β_3 but lasted only till 2013 after which the effect was lost. This indicates two things. One, globalization did increase the availability of opportunities to re-invest profits, leading to increased productivity levels and second, the positive shock of globalization was neutralised after a little more than 20 years post the event. After 20 years, the automobile industry had gathered enough momentum of its own, making any external force or shock unnecessary to assist its move forward. Thus it can be concluded that, globalization proved to be a significant contributor to the rising pace of the Indian automobile industry in the post-globalization period, but once the industry gained growth speed, globalization itself was no longer significant to impact automobile industry growth. In other words, the industry had matured enough to be self reliant, had an established growth trajectory and could grow without handholding.

Section 4: Findings

Based on the empirical analysis, the paper finds that profitability is a major driver of automobile industry growth in India. It also finds that although labour productivity and capital intensity are significant predictors too, labour productivity has a negative relationship with automobile industry growth and may have been responsible for slackening the pace of the industry's growth. Lack of skilled labour and a low rate of employee retention resulted in low returns per employee while the substantial cost of training workers on the job put a downward pressure on profits. Additionally, it finds that for a little more than 20 years, globalization had a

considerable positive contribution in increasing the pace of growth in the Indian automobile industry. The empirical analysis provides evidence that globalization facilitated better returns from the industry's profits and opened up more avenues to explore for growth. Several facts can back up the analysis. For example, globalisation opened up the inflow of foreign capital and provided an accessible source of funds which was earlier restricted to domestic sources. Globalisation also made import of technology and hi-tech components more easily and inexpensively available. Globalisation also made it possible for firms to enter, expand, diversify, merge or acquire based on commercial viabilities and led to higher profit levels. The full convertibility of the rupee in 1993 made imports and exports available at market-determined exchange rates. This lowering of trade barriers added to the growth pace already being acquired. Thus, globalization can be considered to have been a pace changing event for the automobile industry in India. However, it is also true that post 2013, the industry became more self reliant, as reflected in the Automotive Mission Plan (2016-26) and now contributes significantly to the Indian GDP and employment. The industry has established itself as the world's fourth largest automobile market and is expected to reach US$ 300 billion by 2026. Therefore, globalization as an event is currently no longer a significant contributor to automobile industry growth. The shock created by globalization had created a positive surge of growth propelling the industry to a positive growth trajectory.

Section 5: Conclusion and Policy Implications

Considering the fact that the automobile industry is one of the major contributors to India's GDP and employment, the government has taken a considerable number of measures to boost its growth. Starting from enabling funds to initiating research and development to assisting firms in catching up with its global competitors, the government has done a remarkable job. However, gaps are still existent. The industry is currently facing another disruption in the form of entry of electric vehicles which is currently a challenge for the country now. Without the right infrastructure in the form of charging stations and component manufacturing, the production of electric vehicles is unable to pick up the pace that it can domestically. Globally, electric vehicles are being increasingly demanded. Manufacturers hence need to maintain dual production set-ups which could be reducing their efficiency. Though the Indian government is pushing the building of the necessary infrastructure to support production and usage of electric vehicles, a little more speed and direction is required, considering the fact that capital intensity has been found as one of the significant contributors to automobile industry growth in India. The other problem is the hugely unorganised labour force employed by this industry, especially in the auto-components sector, which has very little role to play in its growth. Although still considered as labour intensive, the industry lacks trained and specialised workforce. Considering the fact that, labour productivity is another significant contributor to automobile industry growth in India; a policy gap is evident here. The current skill development programmes lack proper guidance and management while funds for training are sometimes misallocated. Policies directed

towards specialized industry based skill training, possibly near automobile production hubs, may help in building up a competent and innovative workforce. With such policy measures, the Indian automobile industry will be all set to become a global leader in the near future.

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