Export Competitiveness in the Indian auto-component industry: Does Low Wage Cost matter?

Madhuri Saripalle*
PhD, University of Connecticut, U.S.A
msaripalle@yahoo.com
Visiting Research Scholar
Madras School of Economics

*Presently Assistant General Manager, Knowledge Management,
TVS Logistics Services Limited, 58, Eldams Road, Teynampet, Chennai - 18.

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MADRAS SCHOOL OF ECONOMICS
Gandhi Mandapam Road
Chennai 600 025
India

Phone: 2230 0304/ 2230 0307/2235 2157
Fax : 2235 4847 /2235 2155
Email : info@mse.ac.in
Website: www.mse.ac.in

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Abstract

This paper analyzes the differences in the export behavior of domestic and multinational firms in the Indian auto component industry. Three types of firms are identified according to ownership: purely domestic and licensees, domestic joint ventures and joint ventures with majority stakes by the multinationals. Although all the types of firms face the same labor costs, any difference in export performances could arise because of higher productivity of labor. The paper tests whether this is true for the domestic firms and the multinational firms in the Industry. It finds that only in the case of the multinational firms, it is not just cheap labor in terms of low wage rate per worker, but low wage in relation to productivity of that labor which leads to comparative cost advantage in exports. The domestic firms are competing based on low wage cost more than the productivity of the labor. Among other factors discussed, of the reasons is the low value added nature of the components that are being exported. The role of other factors like, size, import- intensity and distribution expenses is also examined, followed by an analysis of the scope for domestic firms to become a part of the global supply chain.

JEL Classification code: L 62
Key words: Export intensity, labor costs, productivity, competitiveness, import intensity, auto component industry, India.

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Introduction

In the early 1990's a number of measures were taken to deregulate the Indian automobile industry and increase its competitiveness by encouraging exports, reducing tariffs on imports and allowing 100 per cent foreign equity participation. The extent to which the reforms have made impact on the export competitiveness of the domestic industry depends on the firm level responses to policy factors, on economy-level comparative advantage in labor productivity and the impact of foreign direct investment (FDI). This paper tries to analyze the differences in the export behavior of domestic and multinational firms in the auto component industry. Although both types of firms face the same labor costs, any difference in performances could arise because of higher productivity of labor. While low labor cost is an important factor in influencing export competitiveness, it is not just cheap labor in terms of low wage rate per worker, but low wage *in relation to* productivity of that labor which leads to comparative cost advantage in exports (Tendulkar and Bhavani, 2003).

The automobile component sector in India offers a good case study as an industry in transition. The economy was liberalized in the early nineties, leading to numerous multinational entrants. However, discernible changes in the component sector can be seen only from the late nineties. Some of these changes are adoption of best work practices, improvement in quality parameters and increase in exports. The industry has shown tremendous growth in sales as well as exports in the recent years, coming from a diversified, fragmented base prior to the nineties. Given the low volumes in the domestic market, many firms are now

focusing on the export market to achieve scale economies and grow. However, exports from developing countries are generally restricted to1ow/medium technology segments and products that involve labor-intensive processes. Section I analyses export trends in the component Industry and highlights the import intensive nature of exports in the Industry. It is followed by a literature review on the determinants of export competitiveness, which include size, import intensity, labor intensity, royalty and advertisement intensity. Section III discusses the data and methodology to analyze the export competitiveness. The paper does ANOVA followed by a Tobit regression. Since there are firms with nil exports, because of censored distribution, a Tobit regression is done and results presented in section III b. Section IV discusses the results of the analysis followed by conclusions in section V.

I.1 Export Trends in the Indian Automobile Component Industry

Since deregulation, India has become an emerging production site of auto components for global markets. The limited size of the domestic market has forced both auto companies and their suppliers to look for exporting markets. The automobile industry has been exporting more than 10% of its output to OEM's and Tier 1 suppliers for the last few years. Table 1 shows the total value as well as the percentage share of exports and imports in the total value of auto component production. It clearly shows that although exports have grown while imports have declined in the recent years, the magnitude of imports is much higher than exports, highlighting the import intensive nature of component production.

The compound annual growth rate for production and exports of auto components for 1990 to 2003-04 were 11.3% and 15.3% respectively. In the year 2003-04, the industry exported $ 1 billion worth of components. Until a decade ago, a major proportion of exports were to the replacement market with only 20 per cent direct exports to OEMs. In the recent times direct exports to OEMs comprise almost 55 per cent of total exports (The Hindu, May 2004). Many OEMs are sourcing components directly from Indian suppliers for their plants in other locations. For instance, Kalyani Brakes supplies drum brakes to Mercedez-Benz for its operations in Indonesia while Goetze exports its products to vehicle manufacturers in South-east Asia and African countries (ICRA report, 1999). However, replacement market continues to be the major destination for exports because of long validation processes and tougher quality requirements by OEMs and higher volume requirement as well. Principal export items include replacement parts; tractor parts; motorcycle parts; piston rings; gaskets; engine valves; fuel pump nozzles; fuel injection parts; filter and filter elements; radiators; gears; leaf springs; brake assemblies and bearings; clutch facings; head lamps; auto bulbs and halogen bulbs; spark plugs; and body parts.

Another noticeable change can be seen in the direction of exports since deregulation. While the US, Germany and the UK are still major export destinations of auto components; new destinations have emerged in the past decade including Mexico, Italy, Nepal, South Africa, Netherlands, Belgium, France, and Japan. In contrast, some African and Asian countries, such as Sudan, Iran, Jordan, Thailand, Tanzania,

Kenya, and Iraq, which have been importing components for agricultural equipments, mopeds, and scooters, have dropped out of the top 20 list. According to the latest ACMA report, U.S and Europe account for 31.13 % and 30.15 % of auto component exports from India. Asia and Africa account for 18.33% and 10.71% respectively, while the Middle East accounts for 7.61% of total exports.

FDI and Foreign collaborations: According to the ACMA, 95.5 percent of its members (401 of 420 companies) are currently in collaboration with foreign companies through technical, financial collaboration or joint venture. The growing presence of global suppliers in the Indian auto component industry has coincided with a significant increase in localization in auto production. Fiat India, for example, imported around 70 percent of needed auto components in 1999, but its dependence on imported components declined to 42 percent in 2000, 20 percent in 2001 and to 15 percent in 2002.

As figures 1.1-1.7 and tables 1.1-1.2 show, in the later half of eighties upto the early nineties, value of exports were larger than imports for all but one component segment—others. In the latter half of the nineties, through 2003, the situation has reversed, with imports (including engines, electrical transmission and equipment components) being higher than exports for all but suspension items. In the category of "others", the situation has reversed in the latter part of nineties, with exports higher than imports. Value wise, in the latter part of nineties, one can say that India is a net importer of engine, electrical, transmission and automobile equipment items, while a net exporter of

"other" component parts, which include sheet metal components, rubber components, safety glass and other accessories, and components which fall under suspension and brake category. But this does not tell us anything about the quantity of exports or imports or about change in product composition and technology. Value of imports may be high, but quantity imported may be low in certain segments. Also, imports of certain components may have been discontinued because of technological obsolescence, resulting in change in import composition. The same is true of exports too.

II. Determinants of Export performance

There are various demand and supply factors affecting export performance in the developing countries. Some of the important variables discussed in this paper include size, labor productivity, import intensity, royalty intensity, advertisement and distribution expenses intensity.

Size

Firm size could positively influence export competitiveness because of economies of scale, ability to take risks and utilization of slack resources in big organizations, to quote some of the reasons. However, empirical findings on the relationship between size and export competitiveness have been mixed (Wagner, 1995, Patibandla 1995). In the context of the Indian automobile Industry, Narayana (1998) finds an inverse relationship between size and export intensity in the post de-regulation period. The auto component industry has undergone major transformation with the entry of multinationals and restructuring

of existing suppliers that have opened newer plants with fewer and flexible employees. Since size may have different impact on multinationals and domestic firms, the sign on this coefficient is assumed to be ambiguous.

Labor productivity

Exports from developing countries are restricted to low/medium technology segments and products that involve labor- intensive processes. Thus, low labor cost is an important factor in influencing export competitiveness. Although it is productivity of labor that ultimately results in competitiveness; to some extent cheap labor would prove to be a comparative advantage for countries with abundant labor. However, in a capital-intensive, medium/high- technology industry, where material costs form the greatest proportion of total costs, it is labor costs in relation to productivity of that labor that should lead to increased competitiveness (Tendulkar and Bhavani, 2003). That is, it is not just cheap labor in terms of low wage rate per worker that leads to comparative cost advantage but low wage *in relation to* productivity of that labor. This is seen from the following:

$$W/P = (W/L)/ (P/L);$$

where W = Wage bill, L = no. of employees, P = value of production. Average wage is skill composition adjusted wage rate, while productivity reflects choice of technology. So, given the high material intensity in the industry, lower the wage share lower is the wage rate in relation to labor productivity and higher is its competitiveness. Thus, wage share is expected to have a negative relationship with export intensity.

Multinational affiliation

Another important factor influencing export competitiveness is the presence of FDI, which leads to spillover of best practices and improved efficiency. While some studies argue that FDI in developing countries leads to technology transfer in an open economy regime, which encourages competition, other studies have pointed out to the contrary. MNEs now are locating different stages of production in different countries according to factor costs and capabilities or distributing similar production activities across their affiliates in various countries with similar capabilities to reap economies of scale. These strategies have shifted from market seeking to efficiency seeking export-oriented production.

This study asks whether the MNEs are taking advantage of the low cost base of the Indian industry to export to other countries. While some studies argue that multinational affiliates perform better than domestic firms in exports because of a better marketing network, studies in the Indian context in the pre-1990 period have shown that MNEs have the same and in some cases lower export intensities than domestic firms. Kumar and Agarwal (2000) distinguish between two types of ownership: significant foreign equity ownership versus foreign affiliation. She finds that foreign equity ownership is insignificant across all industry types whereas foreign affiliation is significant only at the 10 percent level, suggesting that the relationship is not strong enough to suggest efficiency seeking FDI on a significant scale.

Import Intensity

Import liberalization is an important policy variable that can affect the export competitiveness of the industry. Earlier studies (Narayana, 1998) have shown that in a liberalized policy regime import of capital goods positively influenced the growth of the automobile industry in the latter half of nineties. Similarly, import of raw materials (Lal 1985; Kumar and Agarwal, 2000) also has a positive impact on the export intensity of the industry because of availability of higher quality inputs, which would enable the firm to compete on the basis of superior quality in markets where consumers are quality conscious. Relaxing of internal supply constraints should result in increased profitability as well as improved marketing ability. To capture the influence of a liberalized policy regime, import of raw materials as a proportion of total value of sales is used as a proxy for import intensity as another explanatory factor. Reduction of import duties and pressure from multinationals to source raw material from abroad can have the effect of increasing the import intensity of firms. Sourcing raw materials in bulk and lower duties should make the cost of raw material cheaper as well, with a positive influence on export intensity.

Royalty and technical fees

Other important variables that have been discussed in the literature include Royalty and advertising expenditures as proportion of sales value. Royalty and technical licensing as a percentage of sales has been used as an indicator of disembodied technology transfer. According to Narayana (2001), they influence exports positively by enabling technology transfer. However, they could also have a negative influence on profitability and thus the ability to export profitably.

Advertisement and Distribution expenses

Advertisement and distribution expenses intensity assume importance in industry studies with monopolistic competition. In the case of Indian automobile industry, with the entry of numerous multinationals focusing on the domestic market, advertisement expenditures may be negatively related to export intensity. However, distribution expenses may be positively related to export intensity because of the growing logistics capability of the domestic firms.

In the light of the above discussion, this study assumes that export intensity is a function of certain industry, firm technology and policy specific variables. Industry characteristics include industrial organization variables that reflect product differentiation strategies like advertisement/distribution intensity. Firm specific variables include size, nature of ownership, efficiency of input use; a technology transfer variable is reflected in the royalty paid by firms for the use of technology; and policy variables include the import of raw materials, which reflects the extent of import liberalization.

Export intensity = F (Size, ownership, input use, import liberalization, product differentiation, technology transfer)

Sales are taken as proxy for size. The expected sign of this coefficient is assumed to be positive. Dummy variables are introduced for reflecting the ownership characteristics. A firm is considered a Multinational Joint venture (MJV) if ownership greater than or equal to 25%; Domestic Joint venture (DJV) if foreign ownership <25% and Technical (T) if it is only a licensing agreement.

Wages and material cost as a percentage of total exports is expected to reflect the input use. As domestic firms are more labor intensive, additional labor should impact their performance positively compared to MNCs, only if productivity increases more than the labor content, which means that they are able to leverage human resources better than MNCs in an industry that is relatively labor intensive compared to the west. The expected sign of the coefficient of wage intensity is expected to be negative for both the kind of firms.

Import intensity of raw materials should have a positive impact on both domestic and multinational firms. But, given the superior financial capability of multinationals, import intensity is expected to be higher; moreover the marginal impact of import intensity is assumed to be higher for multinational firms. MNCs may be importing higher also because of higher and consistent quality products, which they may not be so sure of getting in the domestic market until they can find a reliable joint venture or an independent supplier. Since material intensity and import intensity have high degree of correlation, material intensity is dropped from the regression analysis.

Advertising and distribution expenses are used as proxy for the firm's product differentiation strategy. The paper assumes the sign of this variable to be ambiguous. Royalty fees as percentage of exports is used as a proxy for technology transfer variable. In technical licensing agreements, royalty and technical fees are expected to reduce profitability and thus have adverse influence on export intensity. The expected sign of royalty and technical fees as a percent of sales is assumed to be ambiguous.

III. Data and Methodology

The study analyses the determinants of export behavior of firms in the automobile ancillary industry for the year 2003-04. Data from the Capitaline database covering 179 exporting and non-exporting firms is used for the automobile component industry. This was supplemented by data on ownership of firms obtained from icicidirect.com. The variables used include export intensity, import intensity, wage intensity, royalty and technical fees, sales, advertising and distribution intensity. Since the sample consists of firms with zero exports, a Tobit model is used to find the elasticities for export intensity. Before getting into Tobit, analysis of variance is carried out for the sample of firms. The sample consists of a diverse group of firms—most of them having technical licensing agreements, others are joint ventures and others are fully owned subsidiaries. Amongst joint ventures, the presence of foreign equity greater than or equal to 25 percent is taken as multinational enterprise. Amongst the domestic firms, there are some with technical licensing agreements as well as some with minority equity stake by MNEs.

Tables 1.4 and 1.5 give the break down of the sample characteristics. A breakdown of sample characteristics shows that on an average, Multinationals have the highest import intensity, sales, royalty intensity and raw material intensity but lowest wage intensity in the sample. Domestic joint ventures have the highest export intensity (0.11) and advertisement intensity but lowest distribution intensity. Purely domestic firms on an average show the highest distribution expenses intensity and wage intensity but lowest advertisement intensity, sales, royalty intensity and raw material intensity.

There are six component subtypes: engine, electrical, drive transmission, equipment, suspension and steering and finally others. According to the ICRA report, amongst the six component types, Engine components are the most labor intensive, followed by equipment. Components for suspension and drive transmission are considered material intensive with less manual labor. The descriptive statistics in table 1.5 support this finding. The table shows that components in the equipment category have the highest export as well as the highest import intensities on an average. Furthermore, components in the equipment and engine category have the highest wage intensities.

III a. ANOVA

Analysis of variance (ANOVA) was carried out for two criteria: ownership groups and component group, which is shown in tables 1.6 and 1.7. The objective was to see whether there were any significant differences in average values of export intensity, labor intensity and import intensity across ownership types as well as component subtypes. For the purpose of analysis of variance, the ownership criteria were divided into three: technical licensees including purely domestic firms; domestic joint ventures where foreign equity is less than 25%; and multinational joint ventures including wholly owned subsidiaries.

ANOVA by component type suggests that there is significant difference in export intensity of different types of components as well as their import intensities, but no significant difference in the average labor intensity. The results for ownership type show that there is no significant difference in export intensity but there is significant difference

in average import intensity and labor intensity. This is puzzling, given that one would expect MNC affiliates with better distribution and marketing network to export more than the domestic firms. A plausible reason could be that many multinational suppliers are follow sources and part of the global supply chain rather than independent exporters, and their exports are 'deemed exports', not showing up as exports in their accounts, but rather appearing as sales to their local OEM. However, given the different backgrounds of domestic and multinational firms with respect to their capabilities, access to capital and human resources, one would still expect some differences in their export behavior. Therefore, one needs to understand the impact of these variables on the different types of firms.

III b. Tobit Analysis

The equation estimated is as follows:

Y = á0 + â0Sales + â1FDI + â2Wage intensity + â3Impint+ â4Distint +â5Adint +â6Royint

Where EXPINT= Value of Export/Sales, Wage share = Wage bill /Sales,

FDI = 3 Dummy variables: Multinational Joint venture (MJV) if ownership greater than or equal to 25%; Domestic Joint venture (DJV) if foreign ownership <25% and Technical (T) if it is only a licensing agreement.

IMPINT = Import of raw materials / Sales,

DISTINT = Distribution expenses / Sales.

ADINT = Advertising exp/Sales

Sales = Sales Turnover

Royint = Royalty & technical fees /Sales

To understand the differences between domestic and multinational firms, a series of interaction terms are introduced in the regression.

DJV * X_i = Series of interaction terms with the joint venture dummy variable

MJV * X_i = Series of interaction terms with multinational dummy variable

Correction for Heteroskedasticity

To deal with cross section heteroskedasticity inherent in non-linear estimation, variance of the error term is modeled as the following. Var (u|x) = $ó^2$ h(x), where the form of function h(x) is unknown. For simplicity, it is assumed that

Var (u|x) = $ó_i^2$ = $ó^2$ exp ^{áXi}

A likelihood ratio test was performed to test for the presence of heteroskedasticity and it was found significant. The test statistic is calculated as the following.

LR = 2 * (LLF1 – LLF2). The test value is reported at the end of the table on results.

The correlations among all the variables are given at the end of this section. Among the variables that show significant positive correlations with export intensity are the import intensity of raw materials, and the intensity of advertisement and distribution expenses. Wage intensity and sales and royalty/sales ratios show negative correlation. Wage intensity shows strong negative correlation with raw material import intensity, whereas royalty expenditure as proportion of sale shows no significant correlations with any variable.

IV. Discussion of results

The results show significant differences among (i) firms that have licensing agreements (ii) domestic firms that are joint ventures and (iii) multinational firms. The constant is positive and significant for licensing firms and multinationals, suggesting a higher level of export intensity compared to the joint venture firms.

The coefficient on wage intensity is negative and significant for the multinationals, supporting the wage-productivity argument discussed in the previous section. Labor productivity is an important determinant of export intensity of multinationals as compared to the domestic firms. An important conclusion that needs to be highlighted is that the wage-productivity relationship as an important determinant of the export competitiveness of the firms, holds only for the multinationals as opposed to the domestic firms. The coefficient on wage intensity is negative and significant for multinationals, implying that growth in exports is achieved through increase in productivity of labor more than increase in the wage share. This in turn means that the marginal impact of an increase in the coefficient of wage intensity negatively influences the export intensity. This may be so because of higher capital intensity of multinational firms, as opposed to domestic firms, which are more labor intensive. A positive coefficient would imply that increase in exports is achieved through increases in wage share (W/P) or, through additions to labor force more than increase in productivity of the labor force. However, this conceals the fact that domestic firms are using a variety of ways to improve the productivity of labor by investing in soft skills like total preventive maintenance and total quality management.

Another important reason behind the sign of the coefficient is the nature of component being exported which differs among the two types of firms. The proportion of drive transmission items in the multinational exports is very high as compared to the domestic firms that export more of engine and suspension items (see table 1.3b). The multinational firms are mostly exporting high value added items while the domestic firms are still exporting components on the lower end of the value chain.

Distribution-expense intensity is positive and an important determinant across all firms. Advertising-expense intensity affects the multinational firms negatively but it is positive for domestic licensing firms. This supports the earlier conjecture that multinationals are focusing on the domestic market, while the domestic firms on the overseas market, further corroborating the argument for market seeking foreign direct investment.

Sales turnover, an indicator of size, is positive and significant for multinationals, but negative for domestic licensing firms. Size is an advantage for multinational firms and offers scale economies in managing overseas operations, but is a disadvantage for domestic firms. It also reflects the fact that there is a thrust on small-scale industry to export more by giving them export incentives. Royalty is negative and significant only for multinational firms. It could imply that multinational firms that are joint ventures between domestic and foreign firms have to pay royalty for the use of technology, which is negatively affecting their export intensity.

The above results clearly indicate that there are two kinds of exporting firms. One is purely domestic, driven by government incentives and export incentives and exporting low-medium technology components. The strength of these firms is their ability to provide logistics by setting up wide sales and distribution network and warehouses abroad. The other kind of firm is the big multinational firm that is a tier-I suppliers to multinational car manufacturers and that exports to the operations of multinational sister concerns. There are, however, restrictive clauses built in their joint venture agreements, which may affect their export intensity adversely.

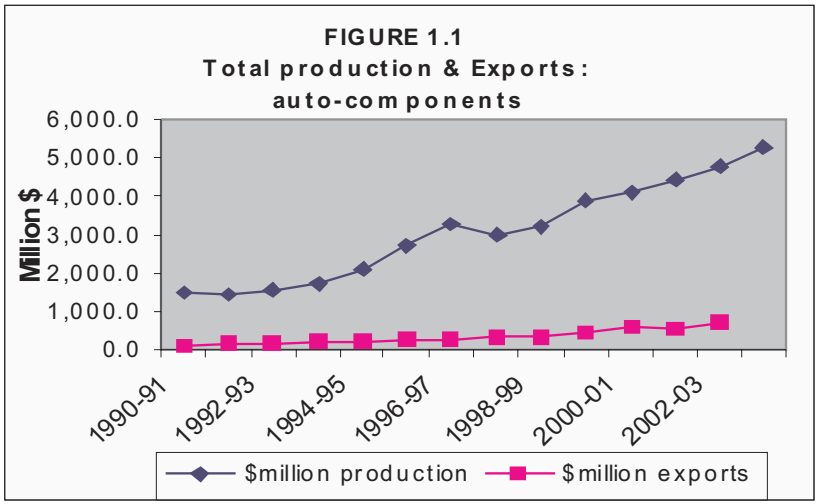
V. Conclusion

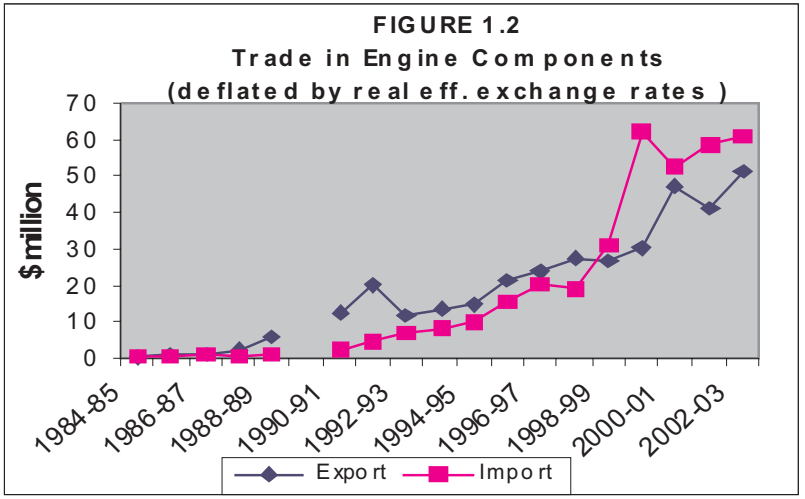
The discussion on the competitiveness in the Indian auto industry needs to be placed within the context of the restructuring taking place in the global automobile industry. This restructuring is brought about primarily by changes in demand and technology, which require different configuration of capabilities, and which result in organizational changes. The structure of the industry has evolved from vertically integrated in the 1920s and 30s to a less integrated structure in the post world war period. In the past decade, a similar change is taking place in technology as well as market demand, which is changing the contours of the global automobile industry. The changes are firstly, an overcapacity among global auto majors is leading to consolidations; secondly, customer tastes and preferences are changing; and finally, growth in emerging markets, coupled with technological changes with respect to material used and cost efficiency, are making it feasible to manufacture hybrid vehicles like light commercial vehicles made of

composite material and smaller cars with less emphasis on aesthetics in countries like China (Veloso and Fuchs, 2004).

These changes are resulting in standardization of product platforms by global manufacturers, who are aggressively focusing on the emerging markets, while giving rise to a "niche market" which gives opportunity for domestic manufacturers to gain market share. This is a systemic change, which is leading to a change in industrial structure, even though it may appear to be more concentrated with few manufacturers. Systemic change requires simultaneous coordinated adjustments in many different spheres of activity, which is easier under unified ownership. This is because the dynamic transaction costs of informing and persuading many independent agents is high. However, given the idiosyncratic nature of tastes and preferences, capabilities with respect to knowledge of local market are dispersed, and coordinating these capabilities under unified ownership will be costly. Under such circumstances, indigenous firms in emerging markets have a role to play, which will depend on how fast they are able to develop and match the capabilities that are necessary to enter the global value chain.

Figure I.1: Trends in Exports and Imports





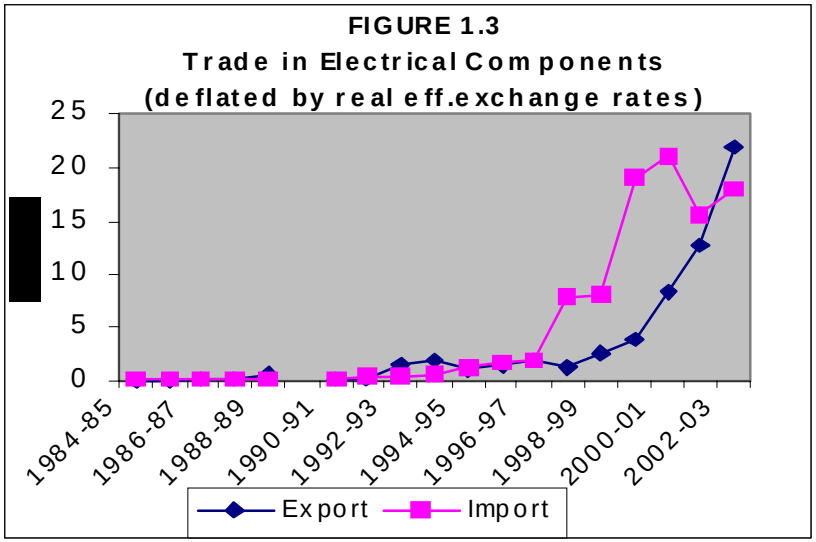


FIGURE 1.3
Trade in Electrical Components
(deflated by real eff.exchange rates)
25
20
15
10
5
0
1984-85
1986-87
1988-89
1990-91
1992-93
1994-95
1996-97
1998-99
2000-01
2002-03
Export
Import

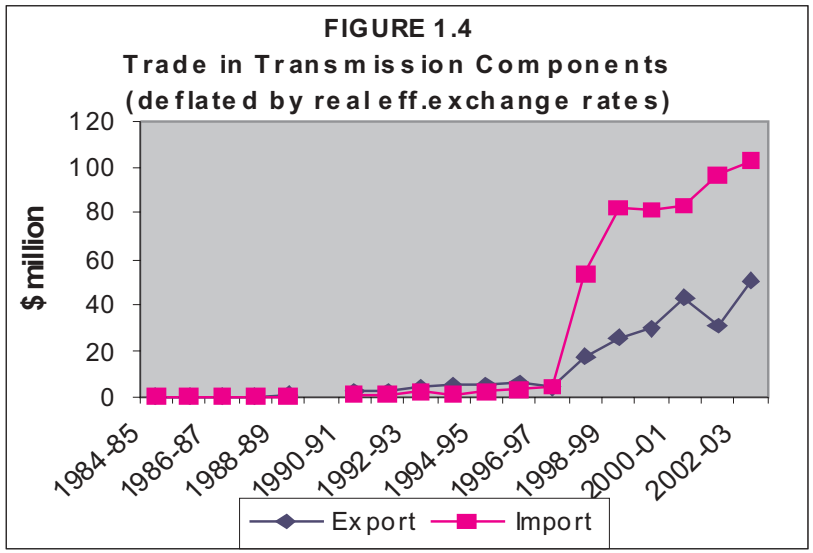


FIGURE 1.4
Trade in Transmission Components
(deflated by real eff.exchange rates)
$ million
120
100
80
60
40
20
0
1984-85
1986-87
1988-89
1990-91
1992-93
1994-95
1996-97
1998-99
2000-01
2002-03
Export
Import

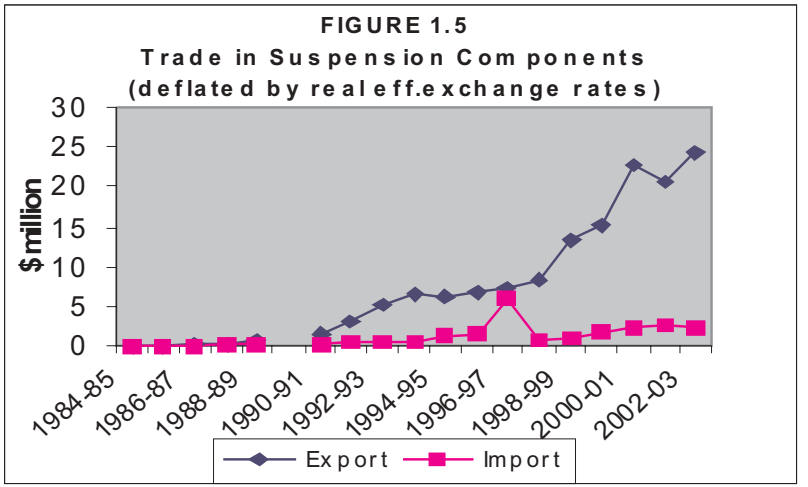


FIGURE 1.5
Trade in Suspension Components
(deflated by real eff.exchange rates)
$ million
30
25
20
15
10
5
0
1984-85
1986-87
1988-89
1990-91
1992-93
1994-95
1996-97
1998-99
2000-01
2002-03
Export
Import

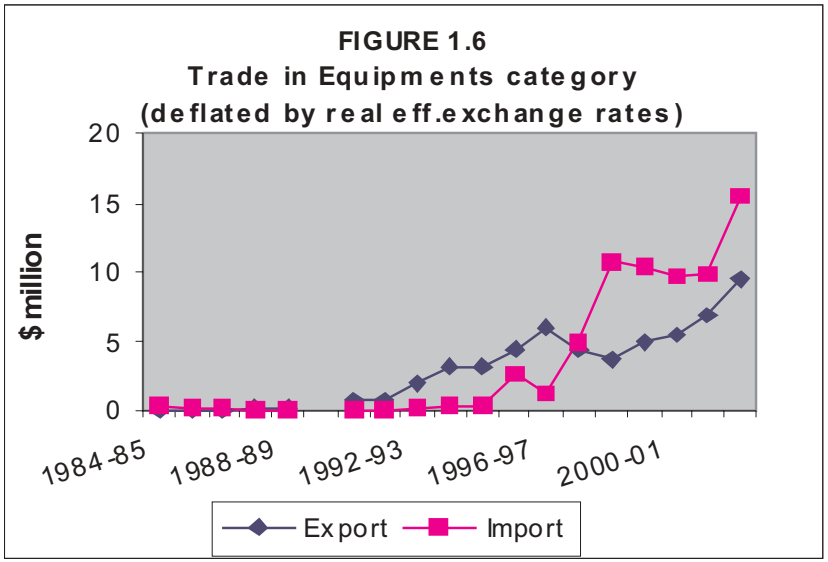


FIGURE 1.6
Trade in Equipments category
(deflated by real eff.exchange rates)
$ million
20
15
10
5
0
1984-85
1988-89
1992-93
1996-97
2000-01
Export
Import

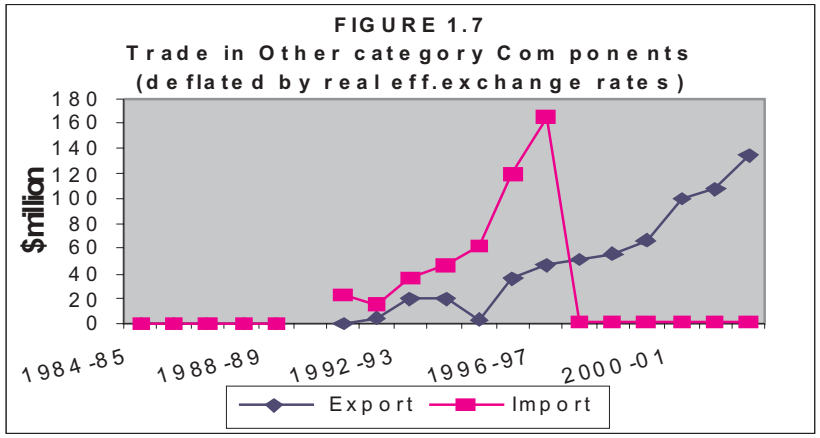


Table-1: Production, Exports and Imports in the Autocomponent Industry

	Production	exports	Imports	Exports share	Import share
	$ million	$ million	$ million	%	%
1990-91	1,490.00	124.5	279.2	8.36%	18.74%
1991-92	1,440.00	170.1	223	11.81%	15.49%
1992-93	1,537.90	189.1	265.9	12.30%	17.29%
1993-94	1,694.80	197.5	257.1	11.65%	15.17%
1994-95	2,126.20	209.9	323.2	9.87%	15.20%
1995-96	2730	279	232.97	10.22%	8.53%
1996-97	3278	290	443.38	8.85%	13.53%
1997-98	3008	330	653.79	10.97%	21.73%
1998-99	3249	350	582.89	10.77%	17.94%
1999-00	3894	456	790.74	11.71%	20.31%
2000-01	4100	625	681.81	15.24%	16.63%
2001-02	4470	578	670.86	12.93%	15.01%

Table 1.1: Growth rates for Imports of auto components:1985-2003

	1985-90		1991-2003	
	Real	Nominal	Real	Nominal
Engine	28.01	32.69	28.63	32.89
Electrical	44.7	49.33	43.98	48.18
Transmission	71.54	87.89	74.77	93.04
Suspension	18.84	23.54	20.67	24.95
Equipment	57.23	61.81	55.46	59.62
Others	-26.13	-21.28	-19.08	-14.66

Table 1.2: Growth rates of export of auto components 1985-2003

	1985-90		1991-2003	
	Real	Nominal	Real	Nominal
Engine	14.73	21.36	19.97	21.84
Electrical	36.07	40.72	35.63	39.86
Transmission	36.23	40.76	36.49	40.79
Suspension	23.99	28.68	25.97	30.24
Equipment	20.02	24.72	22.4	26.68
Others	40.95	45.59	42.66	46.88

Table 1.3a: Sample of Exporting and non-exporting firms

	Exporting	Non-Exporting	Total
Purely Domestic	4	4	8
Domestic Joint-ventures	34	9	43
Multinationals	43	11	54
Technical licensees	43	31	74
	124	55	179

Table 1.3b: Exporting firms

	Engine	Drive	Suspension transmission	Electrical	Equipment	Others	Total
Purely Domestic	2	1	0	0	0	1	4
Domestic JVs	10	6	8	2	3	5	34
Multinationals	11	13	3	4	2	10	43
Technical licensees	11	7	10	3	3	9	43
Total 34	27	21	9	8	25	124	

Table 1.4: Descriptive Statistics

	Mean	Stand. Dev.	Variance	Range	Min.	Max.	Count
Export intensity (full sample)	0.8100	0.1610	0.0260	1.1820	0.0000	1.1820	179.0000
Domestic Joint Ventures (DJV)	0.1110	0.1910	0.0370	0.7890	0.0000	0.7890	43.0000
Multinationals (MNC)	0.0850	0.1860	0.0340	1.1820	0.0000	1.1820	54.0000
Purely Domestic (Domestic)	0.0630	0.1210	0.0150	0.6180	0.0000	0.6180	82.0000
Import intensity (full sample)	0.0460	0.0900	0.0080	0.6700	0.0000	0.6700	179.0000
DJV	0.0560	0.1100	0.0100	0.5600	0.0000	0.5600	43.0000
MNC	0.0730	0.1200	0.0100	0.6700	0.0000	0.6700	54.0000
Domestic	0.0230	0.0400	0.0000	0.2100	0.0000	0.2100	82.0000
Wage intensity (full sample)	0.1050	0.0900	0.0090	0.8200	0.0130	0.8300	179.0000
DJV	0.0890	0.0500	0.0030	0.1900	0.0150	0.2100	43.0000
MNC	0.0860	0.0470	0.0020	0.2300	0.0240	0.2500	54.0000
Domestic	0.1260	0.1330	0.0180	0.8200	0.0140	0.8300	82.0000
Ad intensity (full sample)	0.0035	0.0100	0.0001	0.0900	0.0000	0.0900	179.0000
DJV	0.0050	0.0100	0.0000	0.0600	0.0000	0.0600	43.0000
MNC	0.0040	0.0100	0.0000	0.0900	0.0000	0.0900	54.0000
Domestic	0.0030	0.0000	0.0000	0.0300	0.0000	0.0300	82.0000
Distrib.intensity (full sample)	0.0330	0.0510	0.0020	0.5100	0.0000	0.5100	179.0000
DJV	0.0290	0.0230	0.0010	0.1000	0.0000	0.1000	43.0000
MNC	0.0300	0.0460	0.0020	0.3300	0.0000	0.3300	54.0000
Domestic	0.0370	0.0640	0.0040	0.5100	0.0000	0.5100	82.0000
Rawmat.int. (full sample)	0.4400	0.1690	0.0290	0.8100	0.0000	0.8100	179.0000
DJV	0.4500	0.1400	0.0210	0.7200	0.0650	0.7800	43.0000
MNC	0.4600	0.1500	0.0220	0.8100	0.0010	0.8100	54.0000
Domestic	0.4300	0.1900	0.0380	0.7900	0.0000	0.7900	82.0000
Sales (Rs.mill.) (full sample)	130.0900	220.5000	48632.0000	2101.0000	0.1900	2101.0000	179.0000
DJV	108.0400	141.7600	20097.0000	593.0000	2.7400	596.0000	43.0000
MNC	221.6400	344.1400	11843.0000	2092.0000	8.6700	2101.0000	54.0000
Domestic	81.3600	103.4600	10705.0000	553.0000	0.1900	553.0000	82.0000
Royalty int. (full sample)	0.0040	0.0070	0.0001	0.0500	0.0000	0.0500	179.0000
DJV	0.0020	0.0040	0.0000	0.0170	0.0000	0.0170	43.0000
MNC	0.0090	0.0110	0.0000	0.0500	0.0000	0.0500	54.0000
Domestic	0.0010	0.0050	0.0000	0.0360	0.0000	0.0360	82.0000

Table 1.5: Descriptive Statistics for component types

		N	Mean	Std.dev	Std.error	95% conf.interval		Min	Max
						L-Bound	U-Bound		
EXPINTD2	DriveTrans	36	0.107	0.226	0.038	0.031	0.183	0	1.18
	Electric	14	0.094	0.183	0.049	-0.012	0.200	0	0.58
	Engine	49	0.075	0.109	0.016	0.043	0.106	0	0.44
	Equip	12	0.172	0.266	0.077	0.003	0.341	0	0.79
	Others	44	0.026	0.051	0.008	0.010	0.042	0	0.18
	Suspen	24	0.103	0.170	0.035	0.031	0.175	0	0.77
	Total	179	0.081	0.161	0.012	0.057	0.105	0	1.18
IMPINTD2	DriveTrans	36	0.034	0.059	0.010	0.014	0.054	0	0.18
	Electric	14	0.043	0.069	0.019	0.003	0.083	0	0.22
	Engine	49	0.038	0.061	0.009	0.021	0.056	0	0.28
	Equip	12	0.181	0.225	0.065	0.038	0.324	0	0.68
	Others	44	0.040	0.082	0.012	0.015	0.065	0	0.43
	Suspen	24	0.025	0.033	0.007	0.011	0.039	0	0.1
	Total	179	0.046	0.091	0.007	0.033	0.059	0	0.68
WINTD2	DriveTrans	36	0.105	0.064	0.011	0.083	0.126	0.02	0.31
	Electric	14	0.086	0.038	0.010	0.064	0.108	0.04	0.15
	Engine	49	0.130	0.102	0.015	0.100	0.159	0.02	0.53
	Equip	12	0.144	0.221	0.064	0.004	0.285	0.05	0.84
	Others	44	0.079	0.094	0.014	0.050	0.107	0.01	0.56
	Suspen	24	0.098	0.059	0.012	0.073	0.123	0.04	0.25
	Total	179	0.106	0.099	0.007	0.091	0.120	0.01	0.84

Table 1.6: ANOVA by component type

		SS	df	MS	F	Sig
EXPINTD2	B/W groups	0.272	5	0.054	2.17	**0.06**
	Within Groups	4.339	173	0.025		
	Total	4.611	178			
IMPINTD2	B/W groups	0.238	5	0.048	6.662	**0**
	Within Groups	1.234	173	0.007		
	Total	1.472	178			
WINTD2	B/W groups	0.085	5	0.017	1.77	0.121
	Within Groups	1.659	173	0.01		
	Total	1.743	178			

Table 1.7: ANOVA by ownership type

		SS	df	MS	F	Sig
EXPINTD1	B/WGroups	0.068	2	0.034	1.313	0.272
	Within Groups	4.543	176	0.026		
	Total	4.611	178			
IMPINTD1	B/WGroups	0.087	2	0.043	5.518	**0.005**
	Within Groups	1.385	176	0.008		
	Total	1.472	178			
WINTD1	B/WGroups	0.067	2	0.034	3.531	**0.031**
	Within Groups	1.676	176	0.01		
	Total	1.743	178			

Table 1.8: Tobit Results

	Base Model				Domestic Joint-venture firms (DJV)				Multinational Firms (MJV)			
	Coeff.	Std.Error	t-stats	p-value	Coeff	Std.Error	t-stats	p-value	Coeff.	Std. Error	t-stats	p-value
Constnt	0.089	0.032	2.76	**0.005**	0.089	0.032	2.76	**0.005**	0.084	0.015	5.57	**0.00**
Wint	0.078	0.18	0.41	0.67	0.41	0.40	1.02	0.30	-0.28	0.099	-2.8	**0.004**
Impint	0.81	0.57	1.40	0.15	0.14	0.41	0.35	0.72	-0.11	0.1	-1.1	0.26
Adint	8.26	3.09	2.66	**0.007**	8.26	3.09	2.66	**0.007**	-6.06	0.77	-7.8	**0.00**
Distint	0.12	0.068	1.78	**0.074**	3.65	1.07	3.39	**0.00**	0.59	0.041	14.5	**0.00**
Sales	-0.14 E-03	0.46 E-04	-3.23	**0.001**	-0.14 E-03	0.46 E-04	-3.23	**0.001**	0.64 E-04	0.61 E-05	10.4	**0.00**
Royalty	3.48	5.05	0.68	0.49	-5.81	3.72	-1.6	0.11	-1.41	0.47	-3.0	**0.002**
Loglikelihood function= 90.23					Likelihood Ratio Test statistic = 164.72 p-value = 0.00							

Table 1.9: Quality certificates

QCs	No. of Cos.
ISO9001	337
ISO14001	41
QS9000	193
TS16949	25
Deming awards	4

Table 1.10: Foreign collaborations in the Indian auto component industry*

Origins of foreign collaborators	Indian firms in collaboration with foreign companies
Japan	145
Germany	86
USA	60
South Korea	47
Italy	39
United Kingdom	37
France	21
Spain	5
Taiwan	5
Others	37
Total	482

Table 1.11: Component Manufacturers in India

City	No. of auto component manufacturers
Delhi	148
Mumbai	98
Chennai	58
Bangalore	20
Total for the top four cities	324
Total**	447

* *Since some auto component manufacturers have developed multiple collaborations with companies from different countries, the total number of collaborations exceeds 401.Source: ACMA*

** *Alongside 420 companies that are currently members of the ACMA, 27 non-members are counted in this table. Source: ACMA*

Table 1.13: Correlations

	Exportint	Importint	Wageint	Adint	Distint	Rawmat.int	Sales	Royint
Exportint	1	0.169*	-0.019	0.161*	0.241**	-0.101	-0.017	-0.113
Importint	0.169*	1	-0.09	0.057	-0.021	0.168*	0.196**	0.084
Wageint	-0.019	-0.09	1	0.021	0.027	-0.21**	-0.108	-0.116
Adint	0.161*	0.057	0.021	1	0.13	-0.23**	-0.027	-0.066
Distint	0.241**	-0.021	0.027	0.13	1	-0.214**	0.106	-0.048
Rawmat.int	-0.101	0.168*	-0.21**	-0.23**	-0.214**	1	-0.019	-0.002
Sales	-0.017	0.196**	-0.108	-0.027	0.106	-0.019	1	0.1
Royint	-0.113	-0.084	-0.116	-0.066	-0.048	-0.002	0.1	1
N = 179	* = correlation significant at 5% level; ** = correlation sig. at 1 % level.							

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