

Chapter 6

Automobile Industry in India: Emerging Conflicts between Scale and Scope¹

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1 Introduction

Automobile industry across the world is undergoing structural change and seems to be one of the hot beds of restructuring and reorganizing of the production structure in the present context. Because of its deep forward and backward linkages with various segments of the economy and large employment potential, changes in this sector largely affects the industrial development process of a country. The restructuring of automobile industry in the world is primarily a response to stagnating automobile demand in developed countries and rising costs and excess capacity therein. Besides, much of this is because of the imperfect nature of the market resulting in price-wars between large oligopolies. In other words, the global trend in relocating increasing share of the global manufacturing output to developing countries applies to automobile sector as well but the reorganizing perhaps appears to be much faster because of the existence of global players. The markets for automobiles in developing countries were earlier either protected by high tariffs, ban on imports of completely built vehicles or through conditions of local content use and as a result incursion of global players in the developing countries' markets was largely restricted. Liberal reforms in most of these developing countries in fact created opportunities for major players to produce and invest in the developing countries. One motivation has obviously been to produce at a lower labour cost and the other being catering to the rising demands of automobiles in these emerging markets. But this relocation has been happening in various ways, viz. through increasing mergers, equity participation and FDI as well as through bringing in local producers in the global value chain.

However such changes give rise to a different kind of dynamics in the global auto-industry. First it entails increasing consolidation in the industry that manifests itself in organizing the value chain in the global scale. Second looking for new

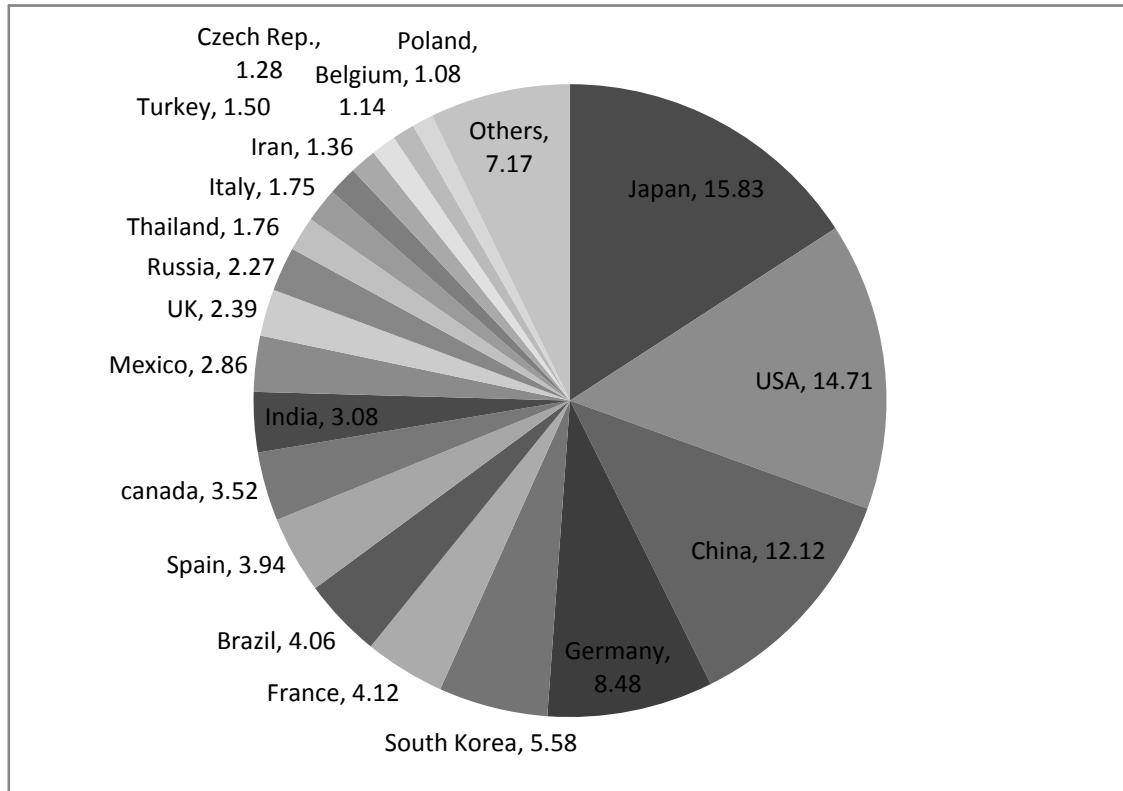
¹ This paper is largely drawn from the joint study undertaken by ISID, New Delhi and IDE-JETRO, Japan on 'Growth of Two-Wheeler industry in India through Development'. This is a revised version of the presentation made by the author at the workshop held at IDE, Japan. The author is indebted to Dr. Shimane Yoshie, IDE-JETRO for providing valuable insights in the study. The author would like to thank Prof. S.K. Goyal and Prof. M. R. Murthy ISID for coordinating the joint research.

markets makes it imperative to take note of the specifics in demand and initiates separate trajectories of innovation there from. Third, on the other hand for both the assemblers and component manufacturers reaping benefits of scale economies amidst shortening product life cycle requires greater standardization of designs and components. Hence there is an in-built tension within the restructuring process itself and that in a sense drives the apparent dynamism in the automobile industry. In this context this paper aims to look at automobile industry in India with special reference to two-wheeler industry. In the following section we would briefly identify the major trends in global automobile industry and then review the Indian scenario discussing issues related to growth in different segments, major players, changing patterns of demand as well as factors affecting demand for automobiles. In the next section drawing in from a case study done on firms located at Gurgaon and National Capital Region the paper brings in issues related to innovation both in terms of technology and organization as a response to changing patterns of demand and also discuss how conflicts arise in the way toward deriving both scale and scope economies in the automobile industry.

2 Identifying Global Trends

Global automobile industry accounts for more than five per cent of total manufacturing employment and in 2007 the total number of four-wheelers produced was more than 73 million. The total turnover of motor vehicles industry was in tune of 1.9 trillion Euros in 2007 which is equivalent to sixth largest economy in the world (Organisation Internationale des Constructeurs d'Automobiles 2007). In physical units Japan, USA, China and Germany are the first four four-wheeler producers and they alone accounts for 51.15 per cent of the total vehicles produced. India ranks tenth in the world and contributes around 3 per cent of the world output.

Table 1: Share of Countries in World Production of Four-wheelers in Physical Units, 2007 (%)



Source: International Organization of Motor Vehicle Manufacturers (OICA Website)

One of the most important trends over the last three decades in automobile industry however is the changing geography of incremental demand and output. The production of motor-vehicles have doubled every ten years or so in many Asian countries, as against a 2 to 5 per cent annual growth rate in Canada, the USA, the UK and Japan (Faiz et al. 1992). During the last decade global vehicle production rose by nearly 7 million units between 1990 and 1997, although the increase in sales over the same period lagged considerably behind this, at just under 4 million units. Much of this growth was concentrated in developing countries.

In the Triad regions (North America, Japan and Western Europe), the vehicles industry is mature and has been infested by unutilized capacity, rising costs and low profitability. Of the three Triad economies, only North America was buoyant at the end of the 1990s. This resulted from the long boom of the United States' economy, the substitution of imported Japanese cars by cars built in transplant factories, and because of the remarkable shift of consumer demand from passenger cars towards light trucks. In contrast, vehicle sales in both Western Europe and Japan were less in 1997 than they had been in 1990. Overall, vehicle sales in the three Triad regions rose by only 0.6 per cent between 1990 and 1997, and production rose by 4.2 per cent. While both production and sales of vehicles remained concentrated in the Triad

economies, which still accounted for more than 70 per cent of global vehicle sales in 1997, a remarkable feature of the period 1990-1997 was that in absolute terms the increases in production and sales of vehicles in the rest of the world far outstripped the increases in the Triad regions. In the Triad regions, vehicle sales rose by 230,000 units in this period. In the rest of the world (World total minus Triad countries), sales increased by 3.8 million units. For vehicle production, the respective figures were 1.7 million units and 5.1 million units (Humphrey and Memedovic 2003). These facts suggest that there had been significant relocation of production in the developing countries and that is primarily driven by rise in sales in those countries. However in the way to relocation, excess capacities in this sector are created both in developed and developing countries and this to a large extent drives fierce competition on export markets.

The increasing vehicles sales in developing economies and that stagnating in developed economies is not something specific to automobile sector, rather the increasing share of developing countries in manufacturing value-added is a distinguishing feature of the present context. The stagnation in world manufacturing growth is captured by the fact that the annual growth of global manufacturing value added (MVA) slowed from 4.3 per cent between 1995 and 2000 to 2.6 per cent between 2000 and 2005 (IDR 2009). However despite the fact that the growth of MVA in industrialized countries decelerated to virtual stagnation, growing at only 1.1 per cent during the period 2000 to 2005, compared with 3.7 per cent in the previous five years. Nevertheless, in developing countries MVA growth accelerated to 7 per cent from an already rapid 6.5 per cent. MVA in countries with economies in transition grew even faster at 7.2 per cent. Thus, the overall slowdown in global MVA growth masks an accelerating shift in the location of manufacturing growth from developed to developing countries.

In the context of automotive sector the unfolding of the international division of labour has wider ramifications and that has to do with increasing application of newer technologies. Computer aided designs have largely replaced physical prototypes and testing processes. This gives rise to greater scope for modularization and helps reducing the cost of production and reshapes the division of labour across the value chain. Major players largely concentrate on product design while responsibilities of designing appropriate components are increasingly shifted to the suppliers. Because of increased competition and increased frequency in change in demand patterns product development processes have been more significant than product architecture. As a result control and ownership upon the entire process of production became increasingly important.

This is precisely the reason that although production has been increasingly spread over the world nonetheless, concentration in production and sales remains high in developed countries. Participation of developing countries although increased in

the components segment and in the production of intermediate products as a result of modularisation based on tasks. This of course increases specialization and segmentation in the global auto manufacturing giving larger scope for developing countries in creating their niche in final products or components. For instance, China is specializing in components, India in two wheelers and small vehicles, Thailand in pick-up trucks and passenger cars and Indonesia in utility vehicles. Thailand is exporting to developed countries and strengthening its position in ASEAN. Indonesia is also increasing its trade relation with ASEAN. India is concentrating on Middle East and South Asia besides traditional developed country destinations.

However the geographical spread of vehicle output and sales in developing countries has not been accompanied by a spread of ownership in the assembly sector. Globally, the auto industry remains concentrated, with a small number of companies accounting for a significant share of production and sales. In 2001, 13 companies accounted for around 87 per cent of the world's vehicle production. In fact, the actual degree of concentration is even higher. This is because a number of leading companies have significant shareholdings in smaller vehicle producers, and over time this has led to increasing cooperation in both vehicle development and production. For example, General Motors has a 49 per cent stake in Isuzu and a holding in Fiat, and Renault owns nearly half of Nissan.

Therefore the global restructuring of automobile industry can be surmised as the following: a) Rising per capita income in low and middle income countries has increased the demand for automobiles in developing countries and created enough motivation for global players to target such emerging markets; b) Increased modularization and relocating sites at regions having low labour costs reduces costs of production c) In order to respond to local demands global players need to provide greater autonomy to developing country counterparts and it appeared wise to enter into equity participation and mergers instead of producing from one centre and selling across the world; And finally d) the evolving international division of labour has been presided over by a few handful of big players and the need for spreading costs of production across developing economies did not result in reduced concentration in ownership in the automobile sector.

These stylized facts characterize the context in which we would discuss the Indian scenario to see how policy reforms helped in integrating Indian manufacturers to the global value chain and also favoured increased demand for vehicles especially personalized vehicles.

3 Automobile Growth and Changing Vehicular Composition in India

Automobile sector in India is growing fast and the growth pattern seems to have a clear correlation with the reforms related policies those influenced both domestic demand pattern as well as trade. India is a global major in the two-wheeler industry producing motorcycles, scooters and mopeds principally of engine capacities below 200 cc. The two-wheeler industry in India has grown at a compounded annual growth rate of more than 10 per cent during the last five years and Indian two-wheelers comply with some of the most stringent emission and fuel efficiency standards maintained worldwide. In two-wheelers India is the second largest producer in the world and the world's number one producer is located in India. India is the largest tractor manufacturer, the fifth largest commercial vehicle manufacturer and the thirteenth largest producer of passenger cars in the world. It is estimated that the automotive industry provides employment to over 10 million people. For every additional commercial vehicle produced in the country thirteen new jobs are created, every additional car adds five jobs, every two two-wheelers about one job and a three wheeler around four jobs.

Besides assemblers the automotive component manufacturing sector consists of 500 firms in the organized sector and around 31000 enterprises in the unorganised sector. In the domestic market, the firms in this sector supply components to vehicle manufacturers, other component suppliers, state transport undertakings, defense establishments, railways and even replacement market. A variety of components are exported to Original Equipment Manufacturers (OEMs) abroad and after-markets worldwide. These component suppliers are obviously in the organised segment and supply directly to the OEMs in India and abroad or to tier-1 players abroad. Tier-2 and tier-3 auto-component manufacturers are relatively smaller players. Though some of the tier-2 players are in the organised sector, most of them are in the unorganised sector. Tier-3 manufacturers include all auto-component suppliers in the unorganised sector, including some Own Account Manufacturing Enterprises (OAMEs) wherein manufacturing involves use of a single machine such as the lathe.

The history of the Indian automobile industry comprises of three qualitatively distinct periods²: a) The first phase, 1928-1955 dominated by import and assembly activity. During the British regime, India had no auto industry to begin with and all the automobiles were imported from the global auto manufacturers such as General Motors and Ford Motors. In the 1940s, Hindustan Motors and Premier Motors were established by Indian entrepreneurs, by importing know-how from General Motors and Fiat respectively. b) The next phase, 1955-1974 should be characterized as the phase of import substitution and emergence of indigenous automobile manufacture

² For a detailed account see Bhakatavatsala (1993) and Piplai (2001).

and industry's maturity towards self-reliance. In the 1950s, a few other companies such as Mahindra and Mahindra, Ashok Motors (with Technical Collaboration with Leyland Motors) and Bajaj Auto entered the market for commercial vehicles and two-wheelers. Most of them either imported auto-components or produced them in-house. Later on as a result of the L.K. Jha Committee's recommendations in 1960 indigenous ancillaries sector evolved as a separate auto-component sector. c) The third period spans since the mid-70s and thereafter is marked by structural adjustments and liberalization. In 1991, India produced about 209,000 cars with very little investment from multinational firms. The early success came by Suzuki-Maruti Company that captured about 70 per cent of the passenger car market in India. By the end of the decade, eight firms accounted for almost all production of passenger cars in India. Six of the eight were multinational joint ventures, and these accounted for 85 per cent of the units sold. The post-reforms phase resulted in significant restructuring in the auto industry and competition between both within domestic producers as also from global players increased.

Table 2: Share of Different Modes of Transport in GDP at Factor Cost and Constant Prices

Sector	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Transport of which	5.8	6.0	5.9	6.2	6.3	6.6	6.5	6.4
Railways	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Road Transport	3.8	3.9	3.8	4.1	4.3	4.5	4.5	4.5
Water Transport	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Air Transport	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Services	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Source: National Accounts Statistics, CSO

In the last three decades the emerging growth pattern in India shows signs of greater mobility in the economy that gets reflected in the growth of transport sector. Transport sector accounts for a share of 6.4 per cent in India's Gross Domestic Product (GDP) in the year 2006-07. However, road transport has emerged as the dominant segment in India's transportation sector with a share of 4.5 per cent in India's GDP in comparison to railways that has a mere 1.2 per cent share of GDP in the same reference year. It may be noted that the entire increase in percentage share of transport in GDP since 1999-2000 has come from road transport sector only, with share of other modes remaining nearly constant. Second, over the last seven years (1999-2000 to 2006-07) the average annual growth in road transport sector at around 9.4 per cent was much higher than the overall annual average GDP growth of 6.9 per cent.

The relative high growth in the transport sector is further revealed in the growth of motor vehicles in different segments. In the year 2006, 89.6 million registered motor vehicles were on the road of which 72.2 per cent were two-wheelers and 12.9 per cent were cars, jeeps etc (Table 3). These are the two major components of personalized vehicles and their share taken together increased from 60.8 in 1951 to 85.1 per cent of the total number of motor vehicles. The share of buses remained same since 2002 and that of goods vehicle show a marginal fall. Therefore, the growth of the transport sector in India has been primarily driven by the growth of personalized vehicles and the share of buses in motor vehicles declined from 11.1 per cent in 1951 to 1.1 per cent in 2006.

Table 3: Composition of Vehicle Population in India (As per cent of total)

Year	Two-Wheelers	Cars, Jeeps etc	Buses	Goods vehicles	Others	Total (Million)
1951	8.8	52.0	11.1	26.8	1.3	0.31
1961	13.2	46.6	8.6	25.3	6.3	0.66
1971	30.9	36.6	5.0	18.4	9.1	1.86
1981	48.6	21.5	3.0	10.3	16.6	5.39
1991	66.4	13.8	1.5	6.3	11.9	21.37
2001	70.1	12.8	1.2	5.4	10.5	54.99
2002	70.6	12.9	1.1	5.0	10.4	58.92
2003	70.9	12.8	1.1	5.2	10.0	67.01
2004	71.4	13.0	1.1	5.2	9.4	72.72
2005	72.1	12.7	1.1	4.9	9.1	81.50
2006	72.2	12.9	1.1	4.9	8.8	89.61

Source: Road Transport Year Book 2006-07, Government of India, 2009

Table 4 shows the production figures of automobiles in units in different segment and Table 5 summarizes the data showing the changing pattern of the vehicular composition in terms of production. Data shows that in the year 2006-07 more than 11 million vehicles were produced in India and that is more than double of the production in 2001-02. The figures in Table 5 show that the share of passenger vehicles increased from 12.6 per cent in 2001-02 to 13.96 in 2006-07. Shares also marginally increased for commercial vehicles and three wheelers and declined in the case of two-wheelers. Looking into the passenger vehicles segment we find that the share of utility vehicles (UVs) and Multi-purpose vehicles (MPVs) declined while the share of passenger cars increased sharply.

Table 4: Production of Vehicles by Types (in nos.)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Passenger cars	500301	557410	782562	960487	1046133	1238032
UVs	105667	114479	146325	182018	196506	222111
MPVs	63751	51441	60673	67371	66661	84707
Total Passenger Vehicles	669719	723330	989560	1209876	1309300	1544850
Passenger carriers	20283	21156	27628	30419	28982	32828
Goods carriers	76469	99346	138495	184388	190313	261438
Total M&HCVs	96752	120502	166123	214807	219295	294266
Passenger carriers	14977	19821	20962	22619	25395	29443
Goods carriers	50779	63374	87955	116277	146393	196291
Total LCVs	65756	83195	108917	138896	171788	225734
Total Commercial Vehicles	162508	203697	275040	353703	391083	520000
Passenger carriers	170013	210454	245084	237413	286987	385443
Goods carriers	42735	66265	111139	137032	147436	170681
Total Three Wheelers	212748	276719	356223	374445	434423	556124
Scooter/Scooterette	937506	848434	935279	987498	1021013	943974
Motorcycles/Step-throughs	2906323	3876175	4355168	5193894	6207690	7112225
Mopeds	427498	351612	332294	348437	379994	379987
Electric two wheelers						7982
Total Two wheelers	4271327	5076221	5622741	6529829	7608697	8444168
Grand total	5316302	6279967	7243564	8467853	9743503	11065142

Source: Statistical Profile 2007-08, Society of Indian Automobile Manufacturers

Table 5: Changing Composition of Vehicular Population and within Passenger Vehicles Category

	2001-02	2006-07		2001-02	2006-07
Total Passenger Vehicles	12.60	13.96	Share within Passenger vehicles		
Total Commercial Vehicles	3.06	4.70	Passenger cars	74.70	80.14
Total Three Wheelers	4.00	5.03	UVs	15.78	14.38
Total Two wheelers	80.34	76.31	MPVs	9.52	5.48
Grand Total	100.00	100.00	Total Passenger Vehicles	100.00	100.00

Source: Computed from Table 4

Needless to say, that the current private vehicle ownership level in India is still low compared to the industrialized countries. The relationship between the growth of vehicle ownership and per-capita income is highly non-linear. Vehicle ownership

grows relatively slowly at the lowest levels of per capita income, then about twice as fast as income at middle-income levels (from \$3,000 to \$10,000 per capita), and finally, about as fast as income at higher income levels, before reaching saturation at the highest levels of income (Dargey et al. 2007).

It has been found in the more motorized countries that vehicle ownership growth rates do not begin to level out until ownership levels of about 500 vehicles per 1,000 populations or higher are achieved. Consequently, the experiences of the more motorized countries would suggest that, despite the rapid increases already being experienced in the developing regions, many countries are still at the bottom of the growth curve and have yet to enter the very steep “explosive” growth part of the vehicle ownership curve. Most developing countries are at the level below of 100 cars/1000 persons. It is generally held that from 100 to 300 cars per person is the range of explosive growth and from 500 per 1000 it stagnates. Hence India is yet to reach the explosive stage of growth.

Table 6 shows the vehicular penetration per 1000 persons in selected developed and developing countries and it is apparent that there is positive association between car/ total vehicle per 1000 person and the per capita income. Developed countries like Germany, France and USA have car penetration rates such as 565, 496 and 461 cars per 1000 persons respectively while that of India, China and Brazil are 10, 18 and 136 respectively. With rising per capita income in India the ratio is likely to increase rapidly in the coming years.

Table 6: Vehicular Penetration of Select Developed and Developing Countries

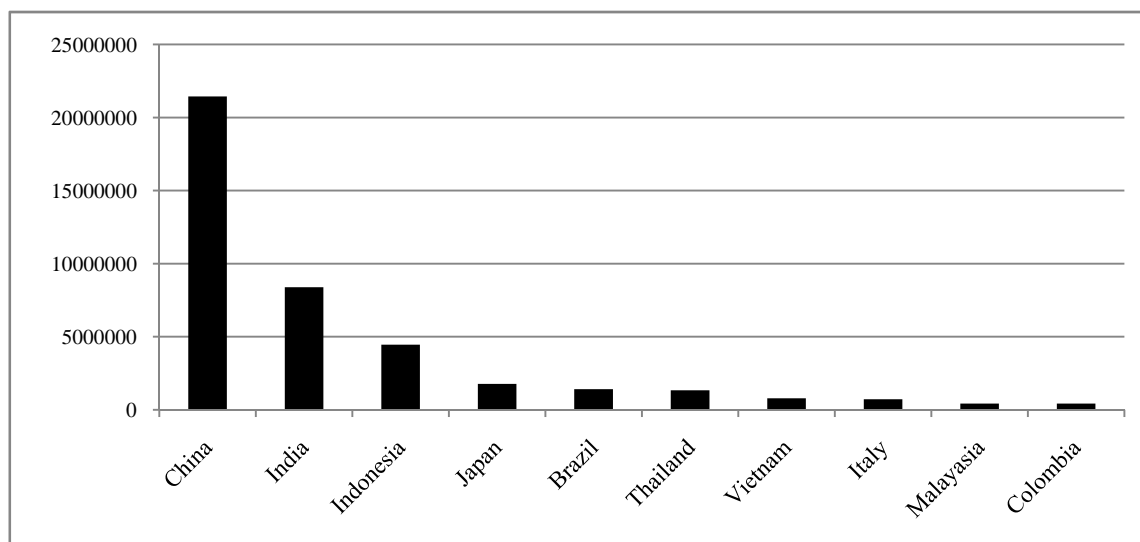
Country	GNI Per Capita In 2006 US\$	Per 1000 Persons		
		Passenger Cars	Total Vehicles	Two Wheelers
<i>Developed</i>				
U.S.A.	44710	461	675	21
U.K.	40560	457	517	20
Japan	38630	441	586	104
Germany	36810	565	598	48
France	36560	496	598	41
<i>Developing</i>				
Mexico	7830	147	222	7
Malaysia	5620	225	272	236
South Africa	5390	103	151	6
Brazil	4710	136	170	37
China P.R.	2000	18	28	62
India	820	10	22	58

Source: same as Table 3

On the contrary in the case of two wheelers penetration rate is likely to be higher in developing countries. This is for obvious reasons that at lower levels of income it is an affordable and cost effective means of personalized mobility. The penetration rate in India and China is 58 and 62 per thousand person respectively.

However two-wheeler penetration is much higher in Malaysia compared to other developing countries. This is precisely the reason also why two-wheelers are mostly produced in developing countries such as China, India, Indonesia, Brazil, Thailand and so on and also in developed countries such as Japan and Italy (Table 7).

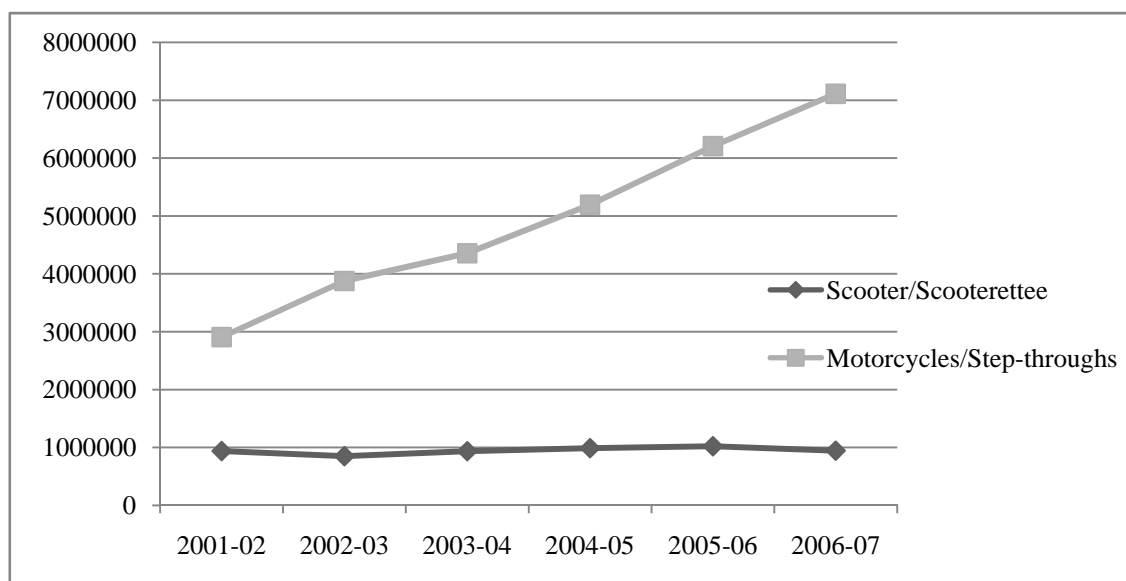
Table 7: Production of Two-Wheelers in Developing Countries



Source: same as Table 3

It is interesting to note that within the two-wheeler segment we find significant change in the demand pattern that has shifted largely in favour of motorcycles in place of scooters. This shift might be because of changing age distribution of population in India which has shifted in favour of younger age that prefers motorcycles compared to scooters. Table 8 shows that the production of motorcycles increased sharply during the period 2001-02 to 2006-07 while the production of scooters more or less stagnated. If we see at a more disaggregated level among the sub-segments of passenger cars we find some interesting results. The sales of compact and mid-size cars have grown 3.35 and 2.6 times from 2001-02 to 2006-07. During the same reference period sales of cars in executive/premium/luxury segment have grown more than eight-fold and the highest rise being in the executive segment.

Table 8: Production of motorcycles and scooters in the two-wheeler segment



Source: same as Table 4

In terms of market share the two-wheeler segment in India is highly concentrated within a few firms as shown in Table 9. In the case of motorcycles the major players are Hero Honda Motors Limited, Bajaj Auto Limited and TVS Motor company with their shares 48.2, 31.7 and 12.9 respectively.

Table 9: Market Share of Companies in two-wheeler Segment in 2006-07

Market Share in Two-Wheelers		Market Share in Motorcycles		Market Share in Scooters	
Hero Honda Motors	41.35	Royal Enfield Motors	0.46	TVS Motor company Ltd	26.59
Bajaj Auto	26.7	LML Ltd.	0	LML Ltd	0
TVS Motor Company	18.14	Kinetic engineering Ltd	0.06	Majestic Auto Ltd	0
Honda Motorcycle and Scooter	8.8	Kinetic motor company Ltd	0.02	Kinetic motor company Ltd	5.37
Yamaha Motor India	2.68	Honda motorcycle and Scooter	2.5	Kinetic engineering Ltd	0.16
Suzuki Motorcycle India	0.81	Hero Honda Motors Ltd	48.18	Honda motorcycle and Scooter	56.05
Kinetic Motor Company	0.69	Bajaj Auto Ltd	31.72	Hero Honda Motors Ltd	9.77
Royal Enfield	0.39	Yamaha Motor India Pvt Ltd	3.21	Bajaj Auto Ltd	2.06
Kinetic Engineering	0.25	Suzuki Motorcycle India Pvt ltd	0.97		
Electrotherm	0.09	TVS Motor company Ltd	12.88		
		Majestic Auto Ltd	0		

Source: Same as Table 4

In the case of scooters more than half of the share that is 56.05 per cent is being captured by Honda Motorcycle and Scooter and 26.6 per cent accounts for TVS Motor Company Limited.

Considering the two-wheeler segment altogether Hero Honda Motors account for 41.35 per cent followed by Bajaj Auto and TVS Motor Company with market shares of 26.7 per cent and 18.14 per cent respectively.

With the liberalization of the Indian economy and a relaxation of restrictions on FDI in the auto industry, leading multinational companies entered the market for the first time in the late 1990s. By 1997, ten companies had announced firm plans to begin production in India. The new capacity of these plants was 660,000 passenger cars a year, and yet total vehicle sales growth in five years from 1996-1997 to 2001-2002 was only 4.7 per cent. Total sales of passenger cars and utility vehicles in the latter year were less than 700,000 units.

In the automobile sector India's export orientation has been developed to tackle the overcapacity problem although the industry at all levels especially down the line in components is not prepared to meet global standards. The export growth figure reveals that vehicle export growth has been much higher than components and during 2000-04, average growth from this group was more than 42 per cent.

The overall export is much lower compared to China but unlike China, India's exports are more than its imports in most of the categories. India's major export destinations of automobiles are developed countries such as USA, UK, Germany, Middle East and SAARC countries. Also, India is making an effort to find out a South Asian market for its products which is evident as Sri Lanka, Bangladesh are among the major export destination of some product groups (Narayanan and Vashisht 2008). India's export basket is more diversified compared to China in full vehicles category. India significantly exports, motorcycles, passenger cars, tractors, vehicles for transporting more than 10 persons and vehicles for transportation of goods.

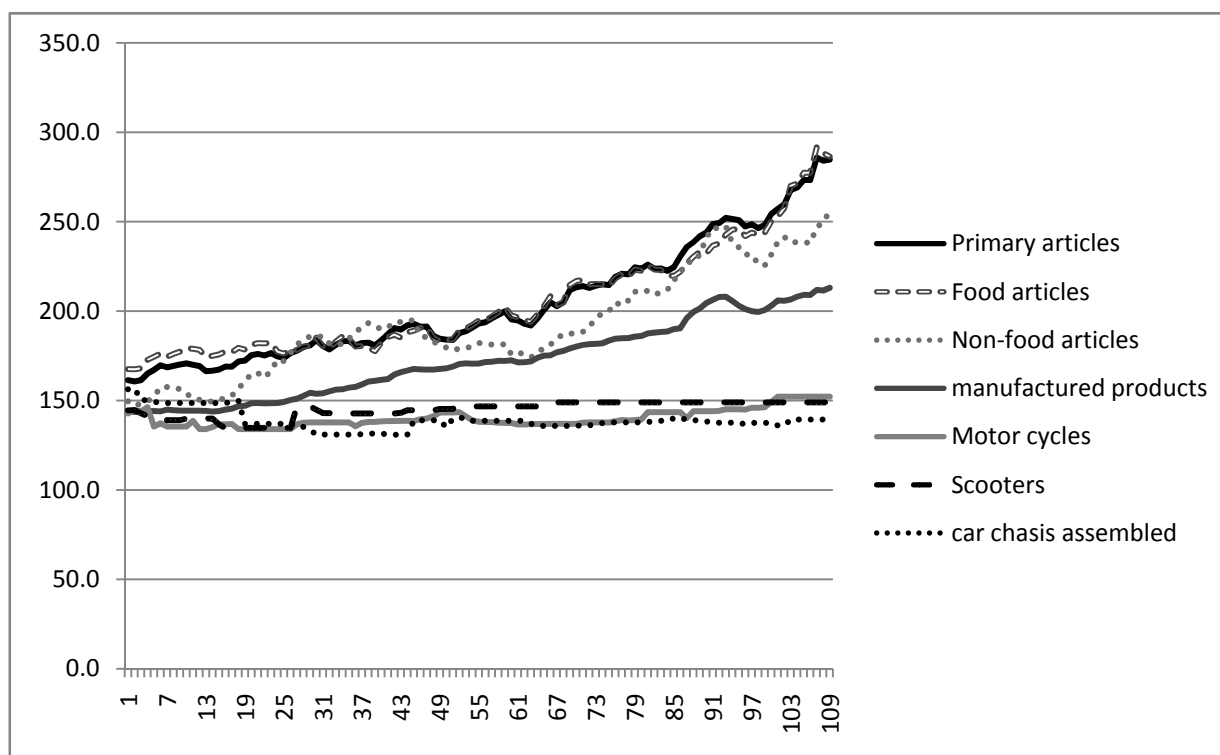
Though India is not heavily into component trading the country is gradually specializing in safety-components and engine parts. Also it is expected that due to capability in R&D India may be a right choice for sub-system and design development. In case of imports, Japan, USA, Germany, UK, Korea Republic are important sourcing countries. Highest import is observed in body parts and safety component category. Thailand also has come as a major sourcing country for brakes, clutches and some basic components. India-Thailand FTA has given emphasis on trade of auto components and in future India's imports from Thailand is expected to increase. Analysing the segment-wise growth rates of vehicle imports, it can be seen that all segments except Public Transport Vehicles and cars have experienced positive growth in imports. Massive decline in car imports in late the 1990s could be attributable to the setting up of new vehicle manufacturing facilities of global auto

majors in India, in this period. Growth in car imports from 2001-02 to 2005-06 could probably be due to the surge in demand of high-end cars in India, as a result of sustained per capita income growth in this period. On the other hand, import growth of most of the non-passenger vehicles has declined from 2001-02 to 2005-06, perhaps because of growing production capacities in the country.

The growth in automobile sector in India is largely linked to the growth of per capita income in recent periods. However in large countries the growth of the domestic market is largely determined by the expansion of the mass market and this draws in issues related to distribution. In the past two decades the share of wage income in India declined sharply while that of profits increased (Roy 2008). The sharp fall in wage income signifies a growth that is accompanied by a highly skewed distribution and even if the income of the profit earners increased significantly that would not in any case raise the demand to the extent enough of compensating the mass market. Moreover policies had been largely in favour of personalized vehicles and didn't facilitate public transportation. The increasing dependence on personalized vehicles for greater mobility although spurred growth in auto-industry but increasing inequality might have put strict constraints on the growth in demand. As a result although imports of luxury cars although increased but overcapacity for domestic firms coexist. The other issue is of course the imperfect nature of the market in the way of control over the market by a handful of players. These two facts together explain the existing excess capacity in automobile industry in India.

The growth of automobile demand has also been augmented by the government's tax policies that largely favoured automobile sector in India. This is further revealed by the fact the Wholesale Price Index (WPI) of commodity groups such as primary articles, food articles, non-food articles and manufactured products although show a rising trend during the period 2001 to 2009, the WPI for motorcycles, scooters and cars almost remained same or marginally declined. As shown in Table 10 the rising gap in WPI between food articles and that of automobiles manifests a highly regressive scenario.

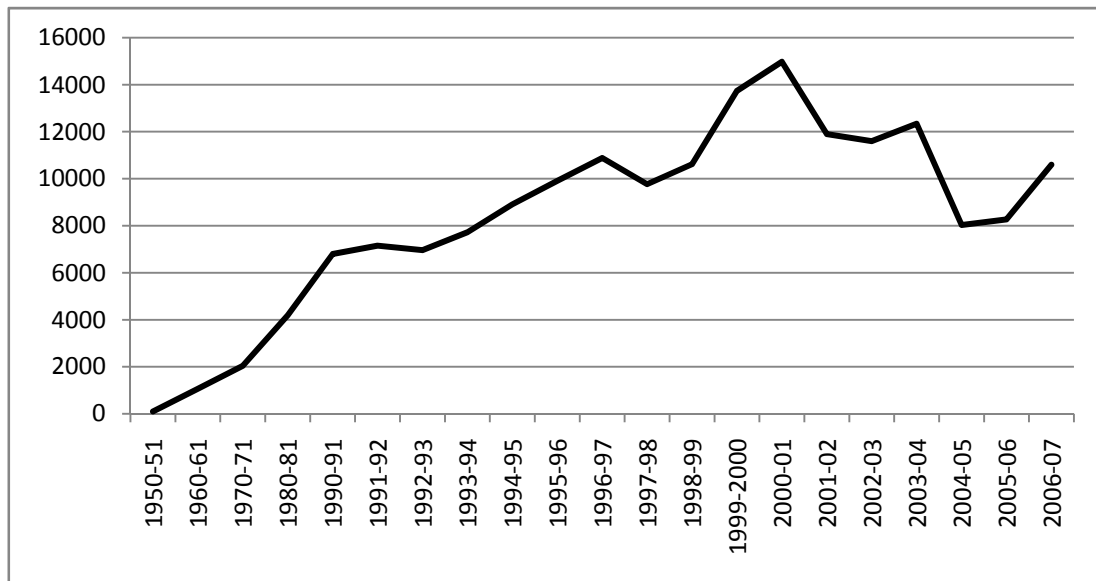
Table 10: Trends in WPI by major commodity groups during the period 2001 to 2009



Source: Office of the Economic Adviser to the Ministry of Commerce and industry, GOI; <http://eaindustry.nic.in/default.html>

In the present context it would be important to note that production of bicycles in India shows a declining trend since 2000-01. The fall can be the result of two effects: first there can be a substitution at the margin from bicycles to motorized two-wheelers with the rise in middle class income especially in the rural areas and secondly this might be the result of a declining real income especially those in the low wage segment who were the major purchasers of bicycles. And a lot of evidence related to rising inequality in India and erosion of public provisioning of utilities perhaps suggest that the latter effect would be the stronger reason for declining bicycle production. Hence the rising share of personalized vehicles in the production of automobiles and also in the number of registered motor vehicles on the one hand and fall in the production of bicycles is an outcome of the peculiar growth trajectory that India has been undergoing in the past two decades. This does not in any case rule out the fact that automobile producers in India are facing stiff competition from imports as well as from others in the domestic market and firms are undertaking innovations both in terms of technology and organization to keep up with the challenges so faced.

Table11: Production of bicycles during the period 1950-51 to 2006-07



Source: same as Table 3

In the context of these major trends in India's automobile industry in the following section we would look into some firm level issues related to changing patterns of innovation and organization in the two-wheeler industry based on some case studies of both OEMs and component manufacturers located in Gurgaon and NCR

4 Innovation and Organization: Some Reflections from Case Studies

Given the fact that the growth of the automobile industry depends upon the domestic demand pattern that evolve through the growth process of the economy at large the response of firms to this demand draws in issues related to innovation and organization. Assuming that the firm always produces the maximum output obtainable from a given mix of inputs that is it always operates on the production function and also assuming constant returns to scale leave no room for discussions on how organizational changes emerge and for what reasons. The behavior of the firm in opting for several forms of intra-firm co-ordinations apart from market transactions and the degree of scope economics possible could not be explained through the standard notions of the production function. The purpose of the case study undertaken was to look into issues such as how firms organize production through different tiers, the relationships between OEMs and component suppliers so to say and what are the causes and modes of such arrangements that increase competitiveness of firms. The study includes field visits to two OEMs and six component suppliers located at Gurgaon and National capital Region that is places in and around Delhi. The study

however did not intend to find some comparable parameters since it is difficult to do so in that way because there is large variability in the same component by quality or design across firms. For instance there are around three thousand components involved in the production of a motorcycle and each firm produces or uses a variety of combinations of such inputs. Hence, gross measurements of productivity would not be comparable in a meaningful way. Therefore, we chose to look into the more dynamic issues of how firms organize and innovate and how role structures have changed down the value chain.

An assembler or an OEM normally produces 2-5 new models with 10-15 variants of each model in a year. The competition in the two-wheeler segment is primarily driven by innovations in increasing the speed, 'look and feel' of the vehicle, accuracy in breaks and anti-skidding and after-sales support. Since most of the producers are capable to assure a certain standard of fuel efficiency, it no longer remains to be one of the main moments of competition. As reported by an MNC in Gurgaon that they work with about 174 component suppliers purchasing three types of inputs viz, 'bought in' completed parts, intermediate components those need processing and raw materials. Skin panels, that is, parts those visible from outside are all produced in-house because they primarily determine the marketability of the product and carries the unique features of the specific brand. Other components are mainly bought either fully or partially made by the suppliers of which some are proprietary components that is the designs of which are developed by the suppliers themselves. The important fact in this context is that variation in technology and so also difference in capital-intensity is less across firms in the production of the skin panels. This is because, customers could easily perceive the difference and would go for smooth textures, fine finish and uniformity. However in the cases of those components which are internal to the vehicle and not immediately visible by the user such as gears and exhausts what matters is not the look but quality, mechanical strength of each welded joint, as opposed to the visible smoothness or uniformity of the weld. This allows variance in technology and capital intensity across firms in producing internal components because one can achieve similar quality standards by using different types of machines although the look might vary.

The contract between the OEMs and the components suppliers at various levels is a complex process. As reported first step would be a visit on the side of the parent firm to the supplier's place to physically verify and assess whether the unit is capable enough to meet the required quality standards, would provide inputs those reduce costs and whether have a proper delivery mechanism put in place. Then, if satisfied, the purchase order with appropriate non-disclosure clause would be sent to the supplier and after several levels of negotiation between the assembler and supplier the final legal agreement of purchase is pushed through. The supplier is supposed to invest on buying or making the required tools and it takes about 6-8 weeks to produce

a small component and around three months to produce a larger one, of course depending upon the nature of the component. Furthermore designs of those components already in supply also change very frequently and the supplier has to make those changes accordingly. The suppliers expect that they could realize the return on new investment on tools by about 3 to 4 years and hence would like to engage in agreements those entail long term relations. In the course of production strict monitoring and quality auditing is undertaken from the assembler's side. The tier-I suppliers share the main burden of organizing the production down the line. Most of them produce components for a couple of OEMs and although they produce the different variants of same components for different assemblers, sticking to non-disclosure clause becomes important. Some big tier-I suppliers organize production in separate plants for each assembler's job. One such big supplier in Gurgaon has 31 manufacturing sites spread all over India and produces a large variety of components supplying to a wide portfolio of buyers.

In this context it is worth noting how scale economies become important for suppliers and the conflicts therein. More the frequency of changing designs the more it will be difficult to reap the benefits of scale. In reference to the global value chain the conflict between the scale and scope economics emerge as follows. In the modern auto industry economies of scale are no longer to be found predominantly in assembly rather it appears to be more important in the areas of components production and vehicle designs. For some components, economic production scales reach millions of units per year. As passenger vehicles become more complex, components become more sophisticated and complicated to produce. On the other hand engineering costs of designing new vehicles are substantial. As the design life cycle gets shortened realizing profits from huge investments requires a wider spread of demand. This in a way drives spreading platform design across various models that helps reduce costs, and this cost minimization depends on maximizing the number of common components between models. The logical extension of this process is to maximize the number of common models across all markets, including developing countries. This not only reduces design costs, but also increases the speed with which new models can be introduced in non-core markets. Global players like to work with known suppliers who would be able to produce and innovate according to the required quality standards. As a result of this suppliers relocate their firms following the assemblers and this is what is known to be 'follow source' movement. On the other hand in order to increase the spread of the demand a process of convergence is gradually unfolding where suppliers are increasingly minimizing differences between designs and seeking to produce common models those could meet the requirements at a wider scale.

For smaller players confined in the domestic market the component suppliers would try to increase their revenue primarily depending on the increasing variety they could offer and hence by catering to a wider portfolio of buyers. However once the

limits of scale become critical, domestic component suppliers try to increase their spread through exports. The tension between flexibility and standardization also manifests itself in striking out the appropriate balance between scope variety and scope integration. Scope economies flows in two ways: scope variety which arises by offering product ranges and hence negatively related to standardization; the other is scope integration that is based on possibilities of integrating complex phases and as a result positively related to standardization. Variety can be achieved more in producing two wheelers since more local contents in designs can be put into which is not so much in the case of four-wheelers where new models are usually based on standard platforms.

Innovation in design on the other hand presupposes greater autonomy and flexibility in accommodating value additions. For instance there need to be ample scope for encouraging value engineering and small improvisations suggested by suppliers. Rigid relations between buyers and suppliers suit well to a stable and standardized pattern of demand that it used to be earlier. But at present it has to be a two way process in the sense, not only tier-I suppliers but down the line there need to be faster communication of feed backs that would help improving the product continuously. In this context it is worth noting that foreign firms usually retain most of their R&D activities under strict control of the unit located in the source country. One issue of course is the non-availability of sophisticated testing facilities in the host country such as India that makes it difficult to decide upon new innovations. As a result any such proposals having been explicitly documented need to be sent to the research unit situated abroad and then finalized if endorsed after proper tests. As a result domestic firms with foreign equity participation would be likely to spend less in R&D as a percentage of their total expenditure compared to fully-owned domestic firms.

Possibilities of increasing gains through scope integration draws in issues related to organization of the production. First of all in India, as firms and associations reported, tier-I suppliers are capable of coping with new demands and could meet requisite quality standards but down the line smaller component producers are not yet prepared to meet the challenges of global quality standards. This fact of course puts a limit to scope integration. Moreover with increasing design intensity asset specificity increases that in any case favours arms-length transactions rather than market based coordination. But since lower tiers in the value chain are not prepared to perform at requisite quality standards there are fewer possibilities for modularization and outsourcing. In the automobile segment competition is largely based on maintaining quality and less on labour costs and this precisely be the reason why firms usually do not outsource jobs even if they could reduce costs by doing so. Assembler firms could reduce large part of the transaction costs by shifting the burden of organizing the rest of the value chain to tier-I suppliers but those costs could not be passed through to the

lower tiers. One response to the problem of achieving scope integration and meeting quality standards together is the old Indian pattern of building up networks of suppliers based on familial trust. One OEM largely outsources jobs to component suppliers who were brought up within family ties.

Some smaller supplier firms those exporting pistons and gearboxes to USA are not only innovating in terms of products through latest technologies but also have undergone radical changes in intra-firm organization. By producing 'just-in-time' and also by introducing single piece floor, firms could reduce inventory from three months level to that of six weeks, reduce lead time drastically and also increase productivity by at least two and half times. Introducing Kaizen on the other hand reduces supervision costs and proper incentives put in place makes the worker more responsible to the production process. But one significant trend found in the changing production and organization technology is the minute division of the work process and development of technologies those standardize those details. As a result it requires a few days training to make an unskilled worker capable to work in the assembly line. This process of gradual deskilling of the work serves the following purposes: given the fact of relatively less supply of skilled workers the owner could easily get through with such technologies by employing workers who are migrant and unskilled and could be put to work only after a very brief training. This helps in containing the rise in wage costs and also in keeping hold of a docile and obedient work force.

5 Conclusion

Automobile industry in India has grown faster in the post-liberalisation period. This is particularly attributable to the rising middle class income in the recent past and consequent rise of the demand for personalized vehicles. The inflow of FDI in this segment as well as equity participation by foreign firms also could happen because of the reforms and Indian producers both assemblers and component manufacturers are increasingly pulled into the global value chain. Despite the fact that the recent surge in automobile sales is largely because of the release of pent up demand put hold during pre-reform regime and of the swelling of the middle class, nonetheless large excess capacities exist in the segment primarily because of the following reasons. First, the demand for automobiles is driven by a growth trajectory that combines together rising per capita income on the one hand and increasing inequality on the other. The second reason being the imperfect nature of the market that dominated by a few oligopolies. As a result we find overcapacities for domestic firms together with rising imports of luxury cars in the recent past. This paper argues that the growth of automobile

industry in India is largely policy driven and likely to face constraints in demand at least in the domestic market if the current trajectory of growth continues.

On the basis of case studies this paper also argues that firms once exposed to global competition are striving hard to meet the challenges of global quality standards. Innovations are taking place both in terms of technology and organization primarily to put together local contents in global standards. Auto assemblers could largely reduce transaction costs by shifting the burden of organizing the production chain to tier-I suppliers but lower tiers are still not capable enough to cater to the changing needs. This in a way limits the possibility of scope integration after a point. The paper also draws attention to the kind of conflict between scale and scope economics in the course of innovation. On the one hand firms need to offer frequent variations in designs and derive returns from scope variety, on the other hand with rising engineering costs in creating designs it requires some convergence in component models to spread the costs and reap benefits from scale economics. Firms confined to domestic market could of course make out up to a point by offering variations. But there are limits to scope variety and given the fact of a highly skewed demand firms could not remain buoyant amidst global competition without addressing scale issues.

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