

Global Value Chains: Indian Automobile Industry

Term 4 CCS Mid-term Report

Agrim Gupta¹; Sagnik Choudhury²

Submitted to Prof. Rupa Chanda on 6 August 2016

Keywords: GVC, Automobile, India

Executive Summary	3
1 GVC and Automobile Industry	4
2 Indian Automobile Industry History	5
2.1 History.....	5
2.2 India's Position in GVCs	8
3 Competitiveness of other emerging economies	9
3.1 Thailand	10
3.2 Mexico	10
3.3 Summary	11
4 Automotive Mission Plan 2006-16	11
4.1 Objectives of AMP 2006-16	11
4.2 Analysis of Recommendations for AMP 2006-16.....	12
5 Data Analysis	14
5.1 Export Data	14
5.2 Import Data	16
6 The Way Forward	17
6.1 Participation in Global Value Chains	17
6.2 Leveraging Free Trade Agreements and Mega-Regionals	18
6.3 Liberalizing FDI.....	18
6.4 Investing in human capital and skill development.....	19
6.5 Sustainability initiatives	20
7 Synergy with Make in India.....	20
8 Bibliography	22
9 Appendix.....	24
9.1 Data Analysis Charts.....	24
9.2 Global Value Addition Analysis – TiVA.....	29
9.3 Exports and Imports – WITS	31

¹ Agrim Gupta is a PGP student at IIM Bangalore. Email: agrim.gupta15@iimb.ernet.in

² Sagnik Choudhury is a PGP student at IIM Bangalore. Email: sagnik.choudhury15@iimb.ernet.in

9.4 Exports – ComTrade33

9.5 Imports – ComTrade38

9.6 Export Competitiveness of Emerging Economies43

9.7 Competitiveness analysis (contd.)47

Executive Summary

This treatise tries to understand where India is positioned today in the automotive global value chain and identify gaps. The logic here is intuitive, from an export competitiveness standpoint the next step for India is not only to identify new markets and try and broker agreements that facilitate trade with these countries, a viable step is also to move up the value chain in current ongoing trade. We look at both of these aspects, namely, the identification of new markets and exploiting and growing capabilities along the value chain from a policy standpoint. Our recommendations apropos of a long-term vision and policy document can be talked about under the following seven broad heads:

- a) Establishing specialized R&D centers for automobile industry. The focus areas could be very specific like improving design and performance of electric vehicles or could be more generic like improving impact of sustainability initiatives in the industry or crossover research to help leverage electronic expertise in auto.
- b) Government collaborating with top academic institutions and universities in the country could provide significant benefits in the future. The importance and value of industry relevant research must be communicated clearly to upcoming students and future parents so they can join research as a career option. In a country like India, such support usually comes when people see financial and career benefits at the end of the tunnel.
- c) Incorporating some industry growth drivers in the Startup India plan could be beneficial. For instance, Startup India mandates that PSU's should source a percentage of inputs from competitive and quality startups. If specific mandates for sourcing electric and traditional vehicles are put in place, it will be a boost to MSME and other larger players. Since automobile manufacturing is capital heavy, providing financial incentives to MSMEs and startups could be an additional measure to catalyze growth.
- d) Developing the very-significant after-sales market in the country could give a very dramatic push to the auto-components sector. Exploiting this opportunity in India and its neighboring countries like China, Bangladesh etc. could be pivotal to long-term sustained growth in this sector in the future.
- e) Liberalizing FDI further, is a good move in automobiles. But it must be accompanied with mandates that a certain portion of the investment be targeted towards strong industry relevant R&D that is necessary to move India up in the value chain.
- f) Skill development should be focused also towards improvements in process technology rather than only product innovation. Further, building a specialized job portal to match potential employers and employees specifically in the automobile industry could work. In order to set the ball rolling for developing the job portals, the government can take various steps. For example, mandate a portion of intake through the portals as a minimum. If companies see value in the portal, they will take it up fully.
- g) Developing partnerships between associations related to the auto industry could provide synergies with far reaching benefits (an example of how Canada does this well follows later in this treatise).

1 GVC and Automobile Industry

In the last few decades, or more like the last century – we have seen a complete transformation of the way businesses and industries function. Much of this change has been brought about due to increasing population and their increasing requirements. Products needed to be manufactured in larger quantities and with better quality and in lesser time. At the same time, customers also started needing customization and variety. During this period of paradigm shifts – different manufacturing concepts and technologies were developed to arrive at where we are at today. A single important concept that lends sense to these paradigm shifts is the analysis of value chains.

A product's existence is split into multiple activities – to name a few – design & development, product engineering, manufacturing, distribution, sales, and service. This chain of activities encapsulates a product's production life-cycle and the effort spent at each step converts to value added in the product. Hence this series of activities is also called as a value-chain. A more formal definition for value chains is provided as *'the process by which technology is combined with material and labor inputs, and then processed inputs are assembled, marketed, and distributed. A single firm may consist of only one link in this process, or it may be extensively vertically integrated . . .'* [1].

One of the aspects of industrial development in the last century has been the development of such value chains across the globe. Companies have specialized in specific value addition activities and have started relying more on other companies to do the other value chain tasks. In turn, countries have incubated and developed certain portions of value chains that are in the best interest for the welfare of their population. Each entity across the world now participates in different value addition activities and constitute global value chains or GVCs.

Let us now look at the automobile industry from a GVC perspective. This industry (vehicles and components combined) has been a capital intensive industry. It is one of the industries that bears the merit of having a mature supply chain & value chain – as well as a mature consumer base. Changes in this industry happen over the course of decades and disruptions happen even farther apart. There have been 3 major disruptions in the last 3 centuries. The first being the assembly line, the second being unbundling due to steam-powered transportation, and the third being another unbundling due to communication technology.

Due to the assembly line – we were able to manufacture vehicles in far greater number and with better quality. This also reduced costs and expanded the market for cars since they could now be sold at much lower prices than before. This combined with improved machine tools gave way to high quality mass production. This industry was now flourishing wherever they could manufacture. Then came steam transport – and it brought along with it low-cost long-distance heavy industrial goods transport. This enabled a wave of industrial unbundling. Companies were now able to manufacture cars in parts and components form and then transport them across the ocean to assemble somewhere else. Furthermore, finished automobiles could also now be transported across the world. This unbundling enhanced the cost structures of the industry and also opened up new markets as products reached far and wide. With growing concern for better quality and lower cost – more emphasis started coming on operations strategy and technological innovation. With the advent of networks and computers, countries and companies were able to share knowledge about technology. This promoted standardization of products across the globe and one of the major gainers from this unbundling was China.

Going forward – a renewal cycle in this industry is expected. Whether it comes from operations technology, strategic direction, or simply a shift in the consumption cycle – is yet to be seen. But there are certain trends that are heading in specific directions. Electric

automobiles are on the rise, fuel prices are low, per capita income is growing in developing nations giving rise to new markets, ridesharing services are increasing in ride-volume by the day, driverless car technologies are being developed by multiple companies, emission norms are becoming stricter due to concerns on global warming, component manufacturing is seeing a new phenomenon with the advent of 3D printing, mass customization in cars has just begun, improvement in leasing models across the world have brought down ownership costs, tolerances in manufacturing have been constantly improving and car-design has now become a highly analytical industry with CAD. With so many interventions happening one can witness some big movements in the industry with new players like Tesla, Google, and Uber.

2 Indian Automobile Industry History

The story of the automobile industry in India is slightly different from the overall industry trajectory in the rest of the world. During the colonialization phase, much of the production was cottage industry based. There was little demand for automobiles and components. Most cars that were being used were either imported as-is or just assembled from kits. There was no 'Indian' car brand in existence. Only 4000 vehicles were made in the country back in 1950 – compared to nearly 24 million vehicles in 2015-16 [2] with over 3.5 million vehicles exported. This massive improvement can seem slow across 65 years and it was indeed – at least till 1980. But momentum picked up post 1980, jumped up post the 1990s liberalization – and reached new heights of growth in the 2000s – before global recession hit in and undid some of the progress in the early 2010s. In absolute terms – the biggest growth has been witnessed in the 2006-2012 period – and one of the reasons can be attributed to the release of India's Automotive Mission Plan (AMP) 2006-16 [3] by the joint effort of the Society of Indian Automobile Manufacturers and the Government of India. This document outlined some ambitious objectives for the 10-year period and there is a new document now in place for the next 10-years till 2026. Before we jump on to understanding the AMP – we should understand the history and present of the Indian Automobile Industry in detail.

2.1 History

Over the last 65 years, the various policies by the government of India have transformed the landscape of all industries in the country. Let us look at how these policies have resulted in the transformation. This will help us in developing an understanding of what worked and what didn't – and will consequently provide us the right vision for suggesting interventions for future growth. The issue with India is that seemingly unrelated policies can generate impact in imaginative ways – and hence makes this analysis difficult. The policies that have had most effect are based around price control, industry development, licensing etc. More often than not – policies are merely effected based on simple government decisions – policy documents are just a legalization of the decision in most cases. Let us look at the policies and their analysis in chronological order and see how they impacted the Indian automobile industry.

1. **Completely Built Units (CBU):** To initiate the industry and protect from foreign firms, CBUs were made prohibitively expensive. In the meantime, companies could bring in part-pieces and develop assembly operations in the country. This policy is in force even today and has helped (albeit artificially) protect the industry from foreign attack.
2. **Industries Development and Regulation Act (1951):** This act was the defining moment that spelt out the government's intentions to establish control on the development of the auto-industry. It laid out the regulatory and licensing framework that would be used for an automobile company in the country. The Act enforced licensing requirements for companies willing to start, expand, or operate in the country. The direct negative impact

of this act was that the potential number of players was reduced since, every company could not afford to comply with all possible regulations at all points in time. But the long-term positive impact of this policy was that because there were fewer players – the competitive pressure was low and each of the players could proliferate with relative comfort with better economies of scale (except 2-wheelers). A long-term negative impact was that due to low competition, the companies focused little on development efforts, and more on just piecing a car together – leading to lackadaisical design and technology growth. This slack stuck with the industry for a long time until it was opened up in the 90s' liberalization. Going in-line with the India's primarily socialistic agenda in the early years after independence, there were further regulations on capacity and production. Although this did not constrain most companies on how much they can produce – it sure made them declare the information upfront. This put a cap on the growth of the largest firms in the market like Bajaj and Escorts [4]. With increasing size over the years, several other companies and the industry overall felt the restrictive nature of this policy [5] and their victory came in the 90s' liberalization.

- 3. Indigenization Obligation (1953) and Ancillary Development (1960):** This was done to ensure that manufacturers progressively improve their internal production capabilities and not rely on foreign components. This policy had a big effect on the structure of the industry as a whole. The outlay of the policy was just a simple decision on the foreign exchange amount allocation for the companies. The international players closed shop immediately and domestic players were left in the lurch to provide for the industry. The domestic players frantically developed internal capacity for auto components, and collaborated with foreign players for assembling vehicles in India. What this led to was an increase in the vertical integration of the industry as indigenization improved by 30% points to 80% by 1960s – and also increased total costs for the companies in the initial phase [6]. So, even though the industry was preparing to become independent in production capability, it could not fetch enough market due to increased prices and consumption growth remained slow until a critical mass increase of per-capita income [4]. This also led to the development of the auto-component/ancillary industry in the country. To enable this growth – the government provided support and protection to small factories by reserving ~80 components just for them, and then provided minimum-tariff support. Even though this policy enabled the auto-component industry to grow, it led to a very fragmented and low quality supply due to lack of knowledge sharing – today the industry still suffers from this problem [5].
- 4. Foreign Collaborations:** In support to indigenization, the government implemented a negative approach on foreign participation in the country's industry. In part it was a societal pressure on the government to discourage using imported goods and encourage home-grown industries. This was implemented by ensuring difficult and right controls on foreign players vying for Indian collaboration and technology transfer. It can be believed that the industry did actually develop and major domestic companies like Bajaj ended up creating self-designed vehicles [4]. This policy during the 1960s helped the industry create a sound market share base to ensure that they could sustain competition when the industry was opened up in the later decades.
- 5. Promoting 2-wheelers:** As the purchasing power of the population started increasing – so did their changing in consumption behavior. By the early 70s – the percentage of population that warranted personal transportation was increasing. Mass transit and transport infrastructure was not adequate to support the increased demands. But at the

same time, the average income of the people was not sufficient to sustain the initial and running costs of 4-wheeled vehicles. Hence, the government devised a series of steps to develop 2-wheeler production capacity in the country. This decision led to proliferation of many automobile players in the market [4] and has led to India becoming the second largest 2-wheeler market in the world. In light of the 4 major policy decisions outlined above, emphasis was kept on 2-wheelers. In the first 3 decades of independence – the protectionist policies of the government led to autonomy and slow-rate development of the industry. The issue was that the policy did not consider a time-frame on implementation of the protection. If the protection was laid out in a planned manner for various stages of implementation – it would have laid out the industry foundation much more quickly and effectively.

- 6. Modernization in the 1980s:** Some major policy decisions came in this decade regarding modernization of the automobile industry – under the ‘modernization program’. This program had on its agenda, relaxation norms for industry proliferation, allowance of foreign player collaboration for faster development, and inclusion of advanced technology [4]. Since Japanese companies wanted to expand to new markets and countries in this decade – the modernization program acted as a catalyst for joint ventures of Indian companies with Japanese companies [7]. As a result of this ‘modernization’ – the number of car models available in the market saw a sharp rise. With advent of new technology from Japanese companies, came new materials, new production technology, better product quality, and hence more efficient vehicles in the country [8]. There was a process of establishment of large congregation of production units in the form of vendor parks [7] – since having the supply in close proximity inherently reduces costs and increases efficiency. However, as feared – changing the paradigm of operations in an industry in a snap – affects its structure and operability. In this case as well – the automobile industry saw a turnaround of market share towards foreign collaborations very quickly – since the domestic producer were not competitive enough owing to laxity in policy implementation in the previous decades as discussed previously. Even though sales started picking up in the passenger car segment – there was a lack of demand in commercial vehicles since due to sustained lack of infrastructure that would generate demand for such vehicles. Overall, the modernization program finally kick-started the process of development of a competitive automobile industry – poised to flourish in the coming decades.
- 7. Exporting Automobiles:** Up until now, there was very little in the Indian automobile industry that went out of the country as exports. Components, technology, machinery, and semi-built parts were all either imported, or built indigenously or manufactured from foreign collaborative knowledge. Further, the sales in India were not picking speed in the early 80s due to purchasing capacity and lack of proper financing establishments. As a result, to give a demand push to the industry – the government decided to promote exports. The benefits were manifold – higher capacity utilization, better forex balance, larger scale for economics, higher pressure for innovation & quality improvement, and a proof of concept to the world that India was ready for providing supply in this industry. The policy method was simplification of exports and simplification of exports manufacturing facilities [9]. As a result of this, India’s exports increased by 100% in just 5 years – to 0.1% of global supply, which was still tiny [7]. More needed to happen in this industry.

- 8. Broad-banding policy:** This policy enabled the match-making between production capacity, supply, and demand. The policy implemented this by allowing companies to easily expand to multiple segments with single licenses. This enabled choice selection of products which match customer expectations more than before – and hence with the increase in demand the companies could match with better capacity utilization. This policy lowered internal competition within the country – and enabled players to leverage the larger market sizes in each of their specialty segments that they would choose. But an increase in competition was warranted. To do that and further enhance the industry’s capabilities as part of broad-banding – the government further relaxed foreign collaborations to enable faster and better technology transfer. Thus the late-80s experienced very high growth in both demand and supply. One explanation for the growth is also the fact that the Indian middle-class was just starting to expand rapidly [7].
- 9. Liberalization:** This is the perhaps single-handedly the largest policy change – not just for the automobile industry but for all industries and the country as we know it. The removal of restrictions and regulations led to sharp increase in the industry’s growth. Much has been said and done on analysis of liberalization policies so we will just look at it in a cursory way. Foreign investment, licensing removal, ease of imports, among other decisions – made sure that the industry went under further restructuring and soon the competitiveness increased dramatically. This, coupled with improved demand – converted into a positive feedback cycle and the snowball was set rolling. Most of the new companies that came up – were for car manufacturing [10]. The oligopoly enjoyed by protected companies was up in the air with heavy competition from advanced players from around the world. However – like in the 80s – the sudden change in policy resulted in an immediate mismatch between demand, supply and capacity [6]. As other industries, especially technology sector kept on developing, the tech transfer in automobiles kept on becoming better and better and this trend continues today as well. Instead of mandating indigenous product requirements, the government now encouraged exports commitments for foreign collaborators for maintaining trade balance. This was where the foreign players really started to take notice of India as a production destination [11].
- 10. Auto Policy 2002:** In this policy the government really stepped on the gas for India’s foray as a global provider of automobiles. There were several decisions that together comprised the auto-policy. 100% Foreign Direct Investment was now allowed and trade balance restrictions were lifted. Government’s direct control of the industry was relinquished and focus was put on design and manufacturing of small cars since it was most relevant for a market like India. As a result of all this – companies like VW and BMW initiated commitments to build facilities in the country. Foreign companies started looking for establishing R&D centers as well – to enhance their value chain while keeping costs low. Even though these moves did initiate more foreign equipment and technology input as imports – it also led to increase in exports due to the high rate of growth that occurred from 2004 to 2008 [6].

2.2 India’s Position in GVCs

Presently, India’s automobile industry has global scale participation mainly in component manufacturing and assembly. Domestic car makers are the only major source of full inland production. Companies like Tata, Mahindra, and Maruti also contribute immensely to exports. In recent times, companies Ford, Mercedes, Chrysler, and BMW have announced plans to open up unit-based and engine manufacturing facilities. Companies like Renault are coming to India

to transform their production ideologies with cars like Renault Kwid. It is a car that has been specifically designed for the Indian market's requirements and majorly uses indigenously manufactured components. A similar story happened with Nissan Micra.

The Renault Kwid is a perfect example of a foreign company, coming in to India, modifying their strategy for an India specific focus, creating a product that is practical for the Indian market, and then compete head to head with the established players in the country [12]. Both Maruti and Hyundai (#1 and #2 in small cars in India) are now facing pressure because the Kwid is outselling many of their models. At this point, one cannot say that the Kwid is not an Indian car. It is built specifically for the country and is succeeding at that. Coming up with a successful small car idea took more than 5-years for a top-tier company like Renault. Thus it is difficult to assume that future adaptations would be quicker.

Perhaps the only way to make sure such new and improved products come from within the country and not outside is to improve India's infrastructure in other parts of the value-chain. By deeply focusing on rapidly building competent industry focused research facilities, India can close the gap on technological advancement with other developed nations. This will reduce costs and cycle time for manufacturers. It will also attract many car manufacturers into a snow-balling effect. With lower costs also comes the prospect of better markets and the growth of after-sales industry. Better technology opens up prospects looking for cleaner, more efficient vehicles. Thus, all in all there will be a positive feedback cycle on the value added services in the country just by focusing on research.

3 Competitiveness of other emerging economies

In this section we look at the export competitiveness of some other emerging economies with respect to the auto sector. We look at where various regions of the world import auto and auto components from and try and discuss some observation from a political perspective.

Consider Appendix 7.6 which shows a distribution of export competitiveness of Mexico, Malaysia, Thailand and Brazil to various regions of the world. 3 observations are made here:

- a) Thailand's competitiveness in the sector has been increasing over the years. This is conspicuous especially in imports by Asia, Oceania and even Africa.
- b) Mexico and Thailand are highly competitive in regions close to these countries, a trend fueled primarily by logistics. Mexico for instance is competitive in North and South America, whereas Thailand does well in Oceanian and Asian imports.
- c) In EU, these countries account for a very small share of overall imports. This turns out to be the case because most of EU imports happen within, Germany for instance is a major powerhouse.

An analysis of the primary export markets could also be relevant here. This is easier done with respect to a certain time frame, for our analysis we use the year 2014. This is best done with the 4 level HS classification, we use Cars (HS2 8703) and auto parts (HS 8708). Figures 58 and 59 show this analysis, these are basically the importance breakdown of countries in world exports in these two sub-sectors. We can also look at Figure 57 in this context, it would seem that Mexico's trade with the US comprises of the majority of exports to US, US, Germany and China. Another facet of this is from the import perspective, Figures 60 and 61 summarize this (essentially lists import origins for these two sectors for all world imports).

From the import origins we note that Mexico and Thailand are fairly competitive, Mexico by a much larger margin. Also note from the export destinations analysis that EU, the US and China are significant importers here. Essentially, any efforts at boosting trade/ competitiveness

in this sector could be better directed if focused at these destinations. The next step here would be obviously to discuss why Mexico and Thailand have so far done well in the sector with respect to export competitiveness.

3.1 Thailand

We could start by looking at Thailand's export destinations in say HS 8708 (still using 2014 as a reference). Figure 62 shows this data. It is clear that Thailand majorly exports to other Asian countries, Australia and has also captured a large share of the US market. Note that this is consistent with our findings in Figures 51 and 56 which show export competitiveness to Oceania and Asia respectively. However, there is no doubt that the Thai government has done a great job of developing the automobile industry in their country from ground-up by focusing on local content use and increasing foreign investment. In fact for a longer term view, the Thai government's ambition for its auto industry is as follows – *“Thailand is a global green automotive production base with strong domestic supply chains which create high value added for the country.* [13]”

In Section 4, we will be looking at the Automotive Mission Plan – a document by SIAM and Govt. of India to strengthen India's automobile industry in the modern age. Very similarly, the Thai government has also published a similar document called as “Master Plan for Automotive Industry” [13]. The detailed document takes a comprehensive note of the automobile industry conditions and critically analyses the competitiveness of Thailand's automobile industry as well. The document also lays out a 4-year future path for the industry's growth.

The key challenges for Thailand currently are 1) Improving participation in higher value adding activities, 2) Increased tightening of emission and safety standards globally, 3) Standard harmonization in mega-regionals like ASEAN, and 4) Competition within mega-regionals.

The most direct way to overcome these hurdles and gain places in the global supply chain is through increasing value-participation. In order to do this, their four key focus areas are 1) Appropriate Government Policy, 2) Preparation for Technology Advancement, 3) Domestic Value Creation, 4) Preparation of Human Resource for Future Expansion and Development of Thailand Automotive Industry

3.2 Mexico

We start here too by looking at Mexico's export destinations in the auto parts market (HS2 8708) for 2014. Figure 63 has this data. It is clear here that Mexico focuses on the US market, and also has a significant presence in the import baskets of South America and Germany, again in line with our findings in Figures 53 and 56 which show competitiveness to North America and Europe respectively.

An interesting trend with Mexico is that most of its production growth has come from export requirements – with a supply push towards USA [14]. The domestic market has not grown much and hence Mexico is highly exposed to global shocks. This became very clear in the 2008 financial crisis when Mexico's exports and imports both dipped by almost 25%. This poses serious questions that should production capacity be expanded for the sake of producing more? Or should there be more focus on development of internal market first, which then lays the necessity for increase in production capacities. We believe this is a chicken-and-egg problem.

Key factors in Mexico's growth as USA's supplier is due to the low-labour costs, close proximity to USA, and Mexico's history of trade policies [15]. US Automobile companies have been manufacturing vehicles in Mexico since the early 1930s where most of the production was at an assembly level from kits. Thus, similar to India and Thailand, Mexico also implemented protectionist policies for its domestic manufacturers and helped them grow

competitively in a sandbox environment. Post-protection, Mexico decided to take advantage of its proximity to USA and went for exports push with NAFTA (North American Free Trade Agreement). Currently, similar to India, Mexico's focus is shifting to light vehicle and small passenger cars to allow the domestic market to stretch and grow.

3.3 Summary

This analysis lends its application to understanding which markets India could look at in the future for future exports in these sectors and what steps India could consider taking.

- a) It would make good sense for India to first try and fully exploit neighboring markets in Asia and Oceania as there are significant opportunities here.
- b) India could also look at moving up the value chain to appeal to markets in EU and the US, this is relevant because these markets are the largest in terms of value and capturing a piece of the pie here could be relevant.
- c) India, Thailand, and Mexico all stand at similar pedestals from a policy standpoint. All 3 countries started out with meagre industries that would have otherwise not survived in the global scenario.
- d) Thailand and India currently focus on manufacturing and assembly in industries as a means for employment generation and the total value addition is still low. Hence the objective is to move up into high-value adding activities and for that the focus needs to be technology, research, and skilling.

4 Automotive Mission Plan 2006-16

In order to supplement the Auto Policy by charting out the correct growth path metrics – the Government, along with the Society of Indian Automobile Manufacturers (SIAM) – came up with the first Automotive Mission Plan in 2006. This was a 10-year objective document that defined the future expected values of industry metrics that the government wanted to target [3]. SIAM also published a document following the AMP that outlined the interventions that the industry thought were cogent for achieving the AMP objectives. The AMP document contains coverage on the growth of the Indian automobile industry and has a comprehensive analysis on the global scenario of this industry as of 2006.

4.1 Objectives of AMP 2006-16

The plan recognizes India's global leadership in tractors, 3-wheelers, and 2-wheelers [3]. We lag behind in passenger cars and commercial vehicles – which is linked to the industry's genesis itself as we have discussed in detail above. The AMP targeted that India will move up to 7th position (from 11th) in manufacturing passenger cars, while retaining its position in all other vehicle segments. Consequently, the contribution of the automobile industry to India's GDP was expected to increase to 10% from 5% in 2006. In order to enable this huge increase in manufacturing – the estimated \$40Bn of investment is expected to mainly come in through the FDI route. Besides this – the increase in manufacturing is expected to increase jobs in the country by 25 million. The validity of this number is questionable – considering that with improving technology, the human capital requirement decreases. The AMP document envisages the government to play a facilitating role in developing infrastructure and policy ecosystem that enables the industry to flourish as per plan. The route for achieving the appropriate demand from capacity enhancements is by lowering cost-structures, improving quality along global standards, developing strong R&D channels, increasing productivity and at the same time – marketing Brand India well.

4.2 Analysis of Recommendations for AMP 2006-16

Overall, between 2006 and 2014, the automobile industry grew faster than the country's GDP (~10% vs 7.4%) [16]. When split into two periods however (pre and post 2011 is the split the analysis uses), the impact of the global economic slowdown is seen as well. The auto industry grew at ~15% in the period 2005-11 whereas it has actually declined each year since 2011 till 2014 (except the two wheeler segment which even with 4.6% growth is below AMP estimates). An interesting facet of the analysis is that it details what the AMP estimates and actual figure for each segment were. Some of the analysis is reproduced below:

- 1. Passenger Vehicles:** Passenger vehicles production levels were above AMP estimates for each year except 2013-14. Technological advancements in safety technology and cost reduction measures, efforts in policy stabilization for incentivizing small vehicle production are some factors mentioned.
- 2. Commercial Vehicles:** Commercial vehicle production has been above AMP estimates with two notable exceptions, 2008-09 when the global recession hit, and more recently in 2012-14 when the industry as a whole has been slowing. Creation of a new category that has a huge market in India, the sub-one-ton payload small commercial vehicle, is felt to be a primary growth driver. Modernization of buses which led to proliferation of inter-city and low floor buses is also considered to be a major factor as to why this segment has generally outperformed estimates.
- 3. Three Wheelers:** Three wheeler growth trends are identical to trends in the commercial vehicle segment. This proves that while the three wheeler segment is a vital component of India's auto industry, it certainly isn't as important as say passenger vehicles. The analysis discusses an increasing dependence of the populace on three wheelers for daily commute (the report mentions 20% which is an incredibly high figure) and cannibalism from the sub-one-ton commercial vehicle segment whose importance is reiterated.
- 4. Two Wheelers:** The report mentions that two wheelers are a symbol of affordability to the typical middle class Indian household, and also talks about the importance of this segment in developing economies. The report mentions that active support from government and increasing demand for gearless scooters have been key growth drivers. For all its importance though, production in the two wheeler segment has actually been growing at below estimates since 2007. This seems to indicate that policy measures had less than the desired impact and inefficiencies exist in the system. Worse, these inefficiencies seem to be persistent and are also hidden so far.
- 5. Auto Components:** The largest segment follows a trend that mirrors the industry as whole. A blip in 2008-09 and declining production growth in 2012-13 and 2013-14 are visible. Slowdown in sale of automobiles is felt to have caused the decline in the recent years. The report mention that India is the second largest manufacturer of sub-2000cc engines after Europe which seems to indicate where the industry thinks the market is headed.

The government has also published an analysis study of its achievements in the automobile industry from 2006 to 2014 [16]. From the list of recommended interventions, ~16 have been implemented successfully and ~8 are yet to be started up. 7 more interventions were underway as of 2015 and we can expect them to be implemented quite soon. Let us look at the interventions along broad areas of implementation and try to understand how much impact they have had on the industry.

1. **Tariff & Fiscal Policy:** In order to push companies into going for investment in India, the tariff policy has been kept such that bringing in CBUs is always more expensive than producing in India. On tariff policy, the govt. made an informed choice to support investments that lead to local value addition and employment. It also ensured that key auto CBUs and a subset of systems and parts have not been included in FTA/RTAs. The intention is to attract FDI and manufacture in the country and not rely on importing CBUs as is. Moving on to fiscal and promotional policies, the govt. continues to provide support for small cars and two wheelers through reduction in excise duties. Cars and MUVs which run for taxi services get government support too.
2. **Infrastructure:** Most of the hidden inefficiencies in the system are probably infrastructural. Be it transportation, logistics fragmentation, land availability, utilities etc.
 - Improvements and expansions in road networks have helped play a major role in automobile demand creation
 - Development of auto wagon rakes helps the industry from a logistics perspective
 - Creation of few specialized ports in the private sector have helped trade
3. **Research & Development:** The report mentions that some R&D initiatives were successful in increasing global competitiveness.
 - Setting up NATRIP to support testing and certification. This involved upgradation of existing centers and setting up new centers across North and South India.
 - To stimulate R&D spending the govt. allows for weighted deduction to up to 200% of expenditure on R&D for calculation of Corporate Tax.
 - 100% grants for fundamental research, 75% for pre-competitive technology/application research and 50% for product development research were also commissioned by the government.
 - 50% investment grants were given to alternative fuel technology departments to encourage research in that area.
4. **Market:** The domestic market was also a consideration for the Indian govt. and specific steps were taken to initiate its expansion. Basic excise duty rates were slashed to 12% from 16%. Additional benefits were introduced from time to time to incentivize domestic sales, for instance excise duties were further cut during the recession, the establishment of JNNURM schemes etc.
5. **Taxation:** The preceding decade has seen many small adjustments into the taxation structure for vehicles to make it simpler. Reduction in excise duty (16% to 12%) has pushed production up, but inconsistent changes in taxation overall have not signaled any specific direction from the government. However, with the latest Rajya Sabha nod on GST, taxation reform is expected to bring much more fluidity in manufacturing as consumption states would benefit more now – leading to higher demand.
6. **Exports:** Through various foreign trade policies and FTAs, the government has been able to push the exports of automobile industry with significant growth. There is detailed coverage on exports in another section of the report.
7. **Environment:** In order to promote the uptake of hybrid-fuel cars and electric cars – the government has started the NEMM Plan (National Electric Mobility Mission). The Power Minister Piyush Goyal has targeted 100% vehicle electrification by 2030 – and that too without additional financing requirements from government or public [17]. Even though the thought of moving to 100% electric cars is highly ambitious, individual industry voices have charted out emission projections for up to 25 years into the future considering the phased implementations of progressively stricter Bharat Stage X emission norms [18,

- 19]. Regarding implementation of Compressed Natural Gas (CNG) as recommended in the AMP – the government has been able to setup CNG stations in only 40 towns vs the 200 number mandated in the AMP. However, with the increasing thrust on electric vehicles as seen above, it seems that CNG might not really take off for vehicles.
8. **Regulatory:** A National Automotive Board has been setup based on AMP recommendations to provide end-to-end regulatory activities including monitoring and coordination. Along with this, the NAB is also responsible for coordinating with international bodies on regulatory issues. Further, the AMP had recommended setting up of a “Mandatory Inspection & Certification System”. Although no on-ground progress seems to have taken place till now – but there have been many studies on the structure under which such a system can operate. Furthermore, new technologies are planned for enforcement through and upgradation of BHARAT safety norms – leading to quality improvements of indigenous manufacturers.
 9. **Institutes:** Companies and manufacturers have started taking notice of the numerous Industrial Training Institutes across India and have been able to bring in trained and skilled talent into the production processes. The AMP had mandated setting up an institute to look at organizing this skilled manpower and in this regard the government has enabled the setting up of the ASDC – Automotive Skill Development Council.
 10. **Digitization:** The government has set up a digitized network of communication by leveraging strong IT capabilities and has been able to connect the Road Transport Offices across the country through a simple web-based portal called VAHAN. This flagship project under the National Transport Project allows the RTO to operate across the country in a unified manner, and cuts down huge amount of paper-work and document inconsistencies by allowing “*computerized vehicle registration, taxation, enforcement, permit and fitness and all other related activities*” [20].

5 Data Analysis

Methodology: The UN ComTrade database was the primary source of data here. Region-wise grouping was done manually and groups of country codes were made. The discussion here is about export and import data. The idea is to identify and determine trends in the data, and try and understand which countries/regions are our major partners for trade in the automotive sector.

5.1 Export Data

To kick things off, we look at a broad level characterization of export in the Machinery and Transport equipment in Figure 1. No particular recent trends leap to the eye as such. The decline in the early 90s of exports was because of the dissolution of the USSR which had a detrimental effect for exports to constituent countries. A more granular treatment in Figure 2 also fails to reveal any surprising trends. It is perhaps logical to say that the decline in exports to the USSR increased the relative weight of exports to all other region, perhaps benefiting North America and the US in particular.

An analysis of distribution of exports among developed and developing economies reveals some interesting results (Figure 3). The share of exports to developed countries increased in the early to mid-90s before being stable till late 2000s. The global recession which impacted the developed countries more than developing countries explains the dip in share of exports to developed countries since.

The above analysis is based on the SITC classification. To delve a level deeper into the discussion in search of patterns, we look at the Harmonized System classification, specifically the distribution of HS2-87, vehicles other than railway, tramway and associated parts. Two things can be said about Figure 4, that the Americas have been slowly increasing in importance as an export destination and that there is a discernible dip in exports to the Americas in 2008-09, a fallout of the global recession.

Figure 5 is a country wise division of HS2 data, this includes all major export partners for India in this segment. Emergence of Mexico as an export destination and declining importance of neighboring destinations like Sri Lanka and Bangladesh is evident. The lack of clear patterns forced us to probe further. The HS 4-digit classification sequesters 15 different sub industries and is charted out in Figure 20-Figure 35. Trends in each of these are discussed below.

- **8701: Tractors:** EU hasn't been a strong market for Indian tractors and accounts for a sliver of the total. Exports to Asia has been about constant. There has been a fall in tractor exports to the Americas post 2008. Exports to Oceania have also been consistent since the early 2000s though it is in relative terms a small number.
- **8702: Motor Vehicles for the transport of 10+ people:** Most of our recent exports in this segment has been to Africa and other Asian countries. Exports to the EU and the Americas are negligible.
- **8703: Motor Cars:** Much of the exports in this segment was to the EU till about 2008-09 since when exports to Africa, Asia and the Americas have picked up.
- **8704: Motor Vehicles for the transport of goods:** Asia and Africa are significant importers in recent times. EU was a big importer till the early 2000s since when exports to EU have tapered away.
- **8705: Special Purpose Motor Vehicles like breakdown lorries, fire-fighting lorries, concrete mixers etc.:** Africa and Asia have been the major importers here too. Because the industry is small, no further trends are discernible.
- **8706: Chassis plus Engines for 8701 to 8705:** Asia holds an overwhelmingly large degree of importance for these exports. Africa has a significant chunk as well, and exports to the Americas have also been on the rise.
- **8707: Bodies for 8701 to 8705:** This is similar to 8706 (which is perhaps to be expected) with Asia being the primary destination.
- **8708: Parts and Accessories for 8701 to 8705:** Significant, almost equal chunks go to the Americas, EU and Asia. Africa's importance here has been waning. Exports to the Americas have been rising slowly over the years and are now the biggest chunk.
- **8709: Works Trucks:** No discernible patterns are visible here, exports are distributed among EU, the Americas and Asia mostly.
- **8710: Tanks and other armored motor equipment:** A surprise inclusion and expectedly a minor market. Discussing trends here does not really make sense.
- **8711: Motorcycles and Mopeds:** Since ~2007, exports to Africa have jumped significantly to about 30% from 5-10% levels earlier. Exports to the Americas has been consistent while Asia's importance is decreasing (being eaten away by Africa).
- **8712: Bicycles and other cycles:** Africa is the major destination for bikes, accounts for about 50% in the recent years and was about 80% of the exports in 2002.
- **8713: For the disabled:** Segment is too small and random to talk about patterns here.
- **8714: Parts and Accessories for 8711 to 8713:** All regions form significant chunks here. The importance of developing nations in Asia and Africa is evident here.

- **8715: Baby Carriages and parts:** Data here is too random and erratic to find patterns with, besides the market itself isn't very significant.
- **8716: Trailers:** Data is fairly consistent with each region maintaining a somewhat constant market share since the early 2000s.

5.2 Import Data

We now do a similar analysis for imports. Starting of course with a broad level region wise segregation of imports as per the SITC-7 classification. Figure 6 shows that Asia's relevance in imports in the sector has been growing steadily and is now around 70%. More analysis here will show what exactly is being imported and from where. Figure 7 for instance displays regions at a more granular level. Two observations are made, one, that Eastern Asia is a major source of imports for us and two, the importance of imports from developed regions like North America and Western Europe are declining. Figure 8 further below shows imports from a few major countries. The importance of China and Korea in India's imports is evident.

An analysis of imports split among those from developed and developing economies is the next step (Figure 9). Because East Asia is classified as a developing region, the results are somewhat expected but still surprising. Imports from developing countries have been increasing sharply and overtook imports from developed countries in 2009 and has been following that trend since. The global recession is in part to blame as it hit developed countries harder. Figure 10 is a split between developed countries, developing countries less China and Korea, and China plus Korea.

The HS2 87 classification reinforces these findings (Figure 11). A country wise split (Figure 12) shows some interesting results as well. China's contribution here has been steadily growing over the recent years but the highlight has been the decline of relative importance of Japan and the rise of Korea. Figure 13 shows relative imports from Japan and Korea. The HS 4-digit classification reveals some further insights; these are discussed below.

- **8701: Tractors:** Import of tractors has shifted from being concentrated in the EU to being concentrated in Asia.
- **8702: Motor Vehicles for the transport of 10+ people:** Asia is yet again highlighted as the largest source of India's imports.
- **8703: Motor Cars:** Surprisingly enough imports from the EU have increased significantly and the level now dwarfs imports from Asia.
- **8704: Motor Vehicles for the transport of goods:** A major chunk of these vehicles are imported from the EU, though Asia and the Americas also feature prominently in recent years.
- **8705: Special Purpose Motor Vehicles like breakdown lorries, fire-fighting lorries, concrete mixers etc.:** EU is yet again where we get majority of our imports from, the Americas have had a significant share too in recent years.
- **8706: Chassis plus Engines for 8701 to 8705:** No trends spotted here, fairly random distribution among various regions.
- **8707: Bodies for 8701 to 8705:** This is similar to 8706 and like in 8706 no trends leap to the eye.
- **8708: Parts and Accessories for 8701 to 8705:** The recent surge in imports from the EU impacts this sector as well, Asia still is the major source of imports here.
- **8709: Works Trucks:** EU yet again is the major source of our imports here.

- **8711: Motorcycles and Mopeds:** Asia's dominance in this segment is symbolic of developing economies and two wheelers.
- **8712: Bicycles and other cycles:** Asia is major source of our bicycle imports as well.
- **8713: For the disabled:** Segment is small but Asia's dominance in similar segments is mirrored here.
- **8714: Parts and Accessories for 8711 to 8713:** Asian countries are the dominant exporter to India in this segment as well. A sliver of total imports come from the EU.
- **8715: Baby Carriages and parts:** Asia is dominant here again, but the segment is small in size relatively.
- **8716: Trailers:** Asia is the dominant exporter to India here too, and its importance has been growing in recent years. EU is an important exporter too, though to a much less degree than Asia.

6 The Way Forward

6.1 Participation in Global Value Chains

India's position in GVC participation in automobiles is tricky. The automobile industry needs to be a job-engine for India, and simultaneously, India must upgrade its existing contribution in the automobile GVC to reap higher economic benefits. In general, high-value activities are skill intensive and low-value activities are labor intensive. Since bulk of India's thrust till now has been sustenance for its people – much of our GVC participation in automobiles is along labor intensive assembly, components, and basic manufacturing. High-value activities like R&D, design, standards-development, specifications, and market development are not yet performed in India at scales comparable to developed nations. The viciousness of the cycle is that upgrading India's GVC contribution will lead to a developed India, and a developed India will attract upgradation of GVC contribution. Thus, the path for a 15-year vision is quite clear – India must improve its position in high-value activities. Suggestions are given below:

- One of the steps could be the inception of research facilities with well-defined objectives. They would be responsible for coming up with new automobile technology along defined standards and requirements (like Bharat Stages 4, 5, 6). By these constraints, one can expect more focused research that is industry ready, thereby reducing time-to-market. More fuel efficient & powerful engines, lightweight & cheap car-body materials, glass alternatives for windshields, safer structural chassis designs, anti-rust components, are just some of the examples.
- With new research like fully-electric cars and self-driving cars & trucks – the research gauntlet has moved from automobile companies to technology companies. Attracting automobile research centers for companies like Tesla, Google, Uber, nuTonomy, Volvo, and even Apple – would be a great step forward for sustained increase in GVC participation over the next 15-years. The digitalization of the auto industry offers significant growth opportunities to develop domestic expertise in applications of electronics to the auto industry. Leveraging electronic expertise to auto by way of organizing say a yearly conference where experts/students/researchers are invited and can share knowledge could be one of the steps that might help in this regard. As part of the Startup India plan, startups in this space could be further encouraged by way of offering them additional financial incentives. Introducing research centers focused on this facet of the auto industry in top universities might also be considered.

- Because of rising automobile sales in emerging countries (about 60% of total industry profits in recent years have come from emerging countries), a significant opportunity exists in after sales markets, of which a large share is from China. Being able to exploit this opportunity could be a healthy commercial endeavor, especially because OEMs globally are still focusing on new car sales rather than after sales. Though it is unclear how exactly this opportunity could be exploited, mainly because of the dearth of formal after sales service providers in India, this could potentially be a great business opportunity. Perhaps the Startup India plan could be extended to cover this too, financial incentives for innovative startups in this field could be a growth driver.
- NATRIP, which is an initiative by the govt. to help develop auto testing facilities in India, is certainly a step in the right direction. What remains though is to hone testing expertise at the seven testing centers and to sign MRAs with countries so that the testing facilities add significant value.

6.2 Leveraging Free Trade Agreements and Mega-Regionals

FTAs are a country's tool to catalyze trade flow with other nations. Mega-regionals work similarly, but provide geo-proximity advantages for trade-costs. The key lever in FTAs is tariff barriers that can help reduce EXIM costs. This allows countries to specialize their production capabilities. It also helps feed the global freight industry which is facing some tough times.

In the current state of globalized trade, it is impractical to create exclusive trade partnerships with countries purely on the basis of costs and then stay complacent. Disruptive innovation is a big threat to such FTAs by coming up with cheaper and better innovations. Thus tariff barriers can improve trade flow only incrementally and temporarily. Eventually, goods with higher value will be the winner. Thus, unless India has competitive products on offer – FTAs won't really make dramatic sense in the long run. So, what can really be leveraged from FTAs is technology transfer. With developed nations, India can barter export tariffs against technology import. This imported technology can be used to fast-track R&D across India. It can also enable India to become a high-quality, low-cost provider for less-developed nations.

Recently, India has developed credibility as a small-car hub. Hyundai and Nissan make and export small-cars from India in large quantities. With this benefit to the companies, they should be mandated to give back by matching the trade with equivalently valued better technology that will eventually also help make the car production better than before.

6.3 Liberalizing FDI

This is not a means to an end – but only a small checklist item in building a growth-friendly atmosphere. Merely allowing FDI is not enough. In order to develop a particular industry – all the ecological elements for that industry need to be in place. Plus, given the current slump & uncertainty in world economy – liberalizing FDI is like turning the tap on full in a tank that's running empty – it won't give you much significant increase in investments. In the case of automobile industry, the FDI value chain is at least 5-10 years long. The many steps involved are: inflow of funds, transfer of knowledge, R&D suited to Indian consumption and Indian manufacturing, establishment of manufacturing facility, and supply & break-even. Apart from the inflow of funds, every other step is unrelated to FDI.

Thus, FDI should not be about just fund infusion and establishment of production facilities. FDI should be about a more holistic investment approach by encompassing knowledge and R&D transfer. Companies & countries coming in should be mandated to establish knowledge facilities that not only develop skill in Indian citizens but also generates future research output. Further, to give automobile research a push, the industry should be mandated to utilize research

output from these ‘knowledge centers’ for their vehicles. This will ensure inclusion and positive feedback on the growth of the knowledge centers. This will be a very important step for a 15-year objective with returns that can increase exponentially as time goes on.

6.4 Investing in human capital and skill development

Canada, surprisingly enough, has a great model to mobilize and upgrade human capital specifically for the auto industry (also Canada has similarities with India in terms of large labor availability with a low fraction of skilled labor etc.). Key here is the role of the Automotive Parts Manufacturer’s Association (APMA), which brings together OEM producers of parts, equipment, services, tools etc. for the global automotive industry.

Some key factors which helps APMA be a great facilitator:

- **Skill Development focused on process technology:** It is felt that research and training initiatives in India, especially in the auto sector, are focused on improving product technology. No less important is improving process technology, something which training in India has not been directed towards so far. Equipping Indian bodies like ACMA with the know-how to help impart this knowledge to its members, or directly providing financial incentives (Canada for instance has a loan deferral system, where principal and interest payments can be deferred up to 3 years, provided the money is specifically used for training in process technology) can be steps that the government of India could consider. APMA for instance provides an Operational Effectiveness in Manufacturing Program (OEMP) aimed specifically at improving processes for auto component suppliers. This program is heavily subsidized by the Canadian govt.
- **A centralized repository of talent in the industry:** APMA maintains a job board, which helps match employers and employees through a streamlined and verified process. Implementation of such a portal of sorts is difficult in India primarily due to the lower skill of workers and managers on the average. While skilling people to attain a level that exceeds or is at least at par with the standards of the industry is a critical issue and needs looking into, the idea here is that often people who are skilled enough (for instance, mechanical engineers from lower rung engineering colleges) are unable to find employment commensurate to their skillset. Investing in a job portal and publicizing it, while also appointing a full-time committee of a few people to ensure authenticity of candidates could be a significant step towards providing much needed skilled labor to the industry.
- **Partnerships:** APMA has multiple partnerships aimed towards improving the overall effectiveness of its auto manufacturing and services. Some of these are aimed towards aiding OEMs source auto parts by accessing a centralized database of verified and trusted parts suppliers, access to market research and intelligence by way of collaboration with a business intelligence and forecasting software company, and even focused on sustainability measures by helping members reducing emissions and energy costs by providing access to research from Natural Resources Canada (NRCAN). Such collaborations, specifically directed towards the auto industry are few and far between in India (searching the ACMA website for instance draws a blank). Facilitating such partnerships should be the prerogative of the govt. of India, which could appoint a sub-committee for this purpose.

6.5 Sustainability initiatives

Regulations against auto industry emissions will only increase given the state of air pollution in India. In a WHO report for instance, four Indian cities feature in the top ten most polluted cities in the world (of a total of around 3000 cities). In the next decade or so, the movement to control air pollution might gain traction, especially if the situation worsens. The govt. would do well to help the industry prepare for this inevitable shift. R&D initiatives directed towards improving engines and improving processes have already been mentioned, perhaps these improvements could encompass a sustainability perspective as well. The following three points of focus are felt to be more directed and more important from this standpoint,

- a) The development of electric vehicles: The market for electric vehicles in India is abysmal. Not only are available vehicles in the category sub-standard, public perception has suffered too. The govt. could choose to take steps to spread awareness about these vehicles. A series of well thought out ad campaigns, which market these vehicles by telling the people about the economic and environmental benefits of using these cars could be considered.
- b) The fact remains that electric vehicles are mostly inferior in terms of design and technology. One way to aid research in this field is to leverage academic institutions, allocating a fixed budget each year to a few top universities in India, perhaps considering setting up centers that specifically target research on electric vehicles could be considered.

The centers mentioned above could also have a broader mandate of reducing the environmental impact of the auto industry as a whole. Such research is already carried out in pockets but is mostly disjoint and often non-implementable. Formalizing the process could reap significant dividends in the future, breakthroughs in this field could be shared with the world and offer long term commercial and environmental benefits.

7 Synergy with Make in India

The push to move up the value chain essentially, has significant exploitable synergies with other policy initiatives taken up the India government like Start-up India, Skill India and primarily Make in India. The idea that most barriers to Indian trade are infrastructural in nature is probably the single most important factor that makes these synergies ever so critical.

- The focus on ‘Zero Defect Zero Effect’ with respect to Make in India should help drive the move towards better quality, something which could be well applied to auto sector. Better quality could mean lower costs in the longer term and also superior value addition in the short term. This should also help boost India’s competitiveness in the sector and help it leverage existing trade agreements to the fullest.
- Certification and establishing standards is yet another area where India can look to build its competitiveness. This will help drive the need for skilled labour and would also help in easy certification of Indian exports. The setting up of the NATRIP like mentioned earlier is a great step in this regard.
- The setting up of Japan Plus and Korea Plus management teams by Dept. of Industrial Policy and Promotion is something that could be leveraged to segregate investments to certain focus areas, like R&D in the auto sector for auto investments for instance. To get Japanese/Korean investors to be willing to do this is another matter altogether and will need more efforts and time, primarily the goal should be drive up long term

investor confidence in the Indian market to begin with. Such specialised teams, could be formed for other major FDI partners in this space like EU majors or the US.

- Infrastructural changes, for instance the setting up of National Investment and Manufacturing Zones within and without the DMIC are positives also from a signalling point of view. This should aid bring more investment to the country and should help boost the auto sector in general.
- The development of skilled labour could be a great addition to the auto sector industry. The focus of this education will also be key, we feel that focusing on process improvements and R&D should be useful in the long run.
- It is felt that there is somewhat a gap in govt. policies when it comes to looking at cross-policy/ cross-sector opportunities to exploit. For auto in particular, the integration with electronics and digital is key, leaving it to private players could be a mistake especially as private investment still views India as a low-value addition source of labour and assembly.
- Not enough focus is given to tie ups with academic institutions, though this perspective is changing in recent times. Using available talent pool to help solve solutions should certainly be a positive step toward being more competitive in the global value chain.
- Focus on the after sales industry, particularly with reference to the growing need for spare parts in India and China, is an opportunity for Make in India. The govt. could look at extending existing policy tools and initiatives to this space, specifically by driving private investments by way of incentives.

There are obvious synergies hence across various existing government initiatives and growth in the auto sector. Specialised sub-units of the govt. that look at sectoral narratives as well as the big picture could help tie in all initiatives together as well as drive consistency.

8 Bibliography

- [1] B. Kogut, "Designing global strategies: Comparative and competitive value-added chains.," *Sloan management review*, pp. 15-28, 1985.
- [2] SIAM - Society of Automobile Manufacturers, "Statistics Overview," 2016. [Online]. Available: <http://www.siamindia.com/statistics.aspx?mpgid=8&pgidtrail=9>.
- [3] SIAM - Society of Indian Automobile Manufacturers, "Automotive Mission Plan 2006-16," 2006. [Online]. Available: <http://www.siamindia.com/uploads/filemanager/20AMP-2006-16.pdf>. [Accessed 5 Jul 2016].
- [4] D. Narayana, *The motor vehicle industry in India (Growth within a regulatory policy environment)*, New Delhi and Trivandrum: Oxford & IBH Publishing Co. Pvt. Ltd. and Centre for Development Studies, 1989.
- [5] V. Pínglé, *Rethinking the developmental state*, New York: St. Martin's Press.
- [6] N. Singh, "Strategic approach to strengthening the international competitiveness in knowledge based industries: The case of Indian automotive industry," RIS, New Delhi, 2004.
- [7] A. D'Costa, "The restructuring of the Indian automobile industry: Indian State and Japanese capital," *World Development*, vol. 23, no. 3, pp. 485-502, 1995.
- [8] K. Narayanan, "Technology acquisition, de-regulation and competitiveness: a study of Indian automobile industry," *Research Policy*, vol. 27, pp. 215-228, 1998.
- [9] G. -. G. o. India, "India's industrial policies from 1948 to 1991," Government of India, New Delhi, 2008.
- [10] GoI - Government of India, "Auto Policy," Government of India, New Delhi, 2002.
- [11] UNCTAD, "Foreign direct investment and performance requirements: New evidence from selected countries," United Nations, New York and Geneva, 2003.
- [12] Livemint, "Renault Kwid shakes up the big boys of India's small car market," 30 Aug 2016. [Online]. Available: <http://www.livemint.com/Companies/oA4SEmnDKhMkiybYiy0SoL/Renault-Kwid-shakes-up-the-big-boys-of-Indias-small-car-mar.html>. [Accessed 1 Sep 2016].
- [13] Thailand Automotive Industry, "Master Plan for Automotive Industry 2012-16," Ministry of Industry, Thailand, 2012.
- [14] METI, "Automotive policies in Mexico, Thailand, and India," Japan, METI, 2014, pp. 372-386.

- [15] The Federal Reserve Bank of Chicago, "The growing importance of Mexico in North America's auto production," *Chicago Fed Letter*, no. 310, May 2013.
- [16] SIAM - Society of Indian Automobile Manufacturers, "Review of Automotive Mission Plan 2006-16," Government of India.
- [17] The Economic Times, "India aims to become 100% e-vehicle nation by 2030: Piyush Goyal," 25 Mar 2016. [Online]. Available: <http://economictimes.indiatimes.com/industry/auto/news/industry/india-aims-to-become-100-e-vehicle-nation-by-2030-piyush-goyal/articleshow/51551706.cms>. [Accessed 15 Jul 2016].
- [18] Ecotat India, "Perspective on emissions standards roadmap for India and the industry preparedness to leapfrog to Euro VI emissions standards," 12 Mar 2015. [Online]. Available: <http://www.cseindia.org/docs/aad2015/alok-trigunayat.pdf>. [Accessed 30 Jul 2016].
- [19] The International Council on Clean Transportation, "Overview Of India's Vehicle Emissions Control Program Past Successes And Future Prospects," 2013. [Online]. Available: http://www.theicct.org/sites/default/files/publications/ICCT_IndiaRetrospective_2013.pdf. [Accessed 31 Jul 2016].
- [20] Government of India, "e-VAHAN," National Informatics Center, [Online]. Available: <https://parivahan.gov.in/vahan/vahan/ui/login/login.xhtml>. [Accessed 28 Jul 2016].

9 Appendix

9.1 Data Analysis Charts

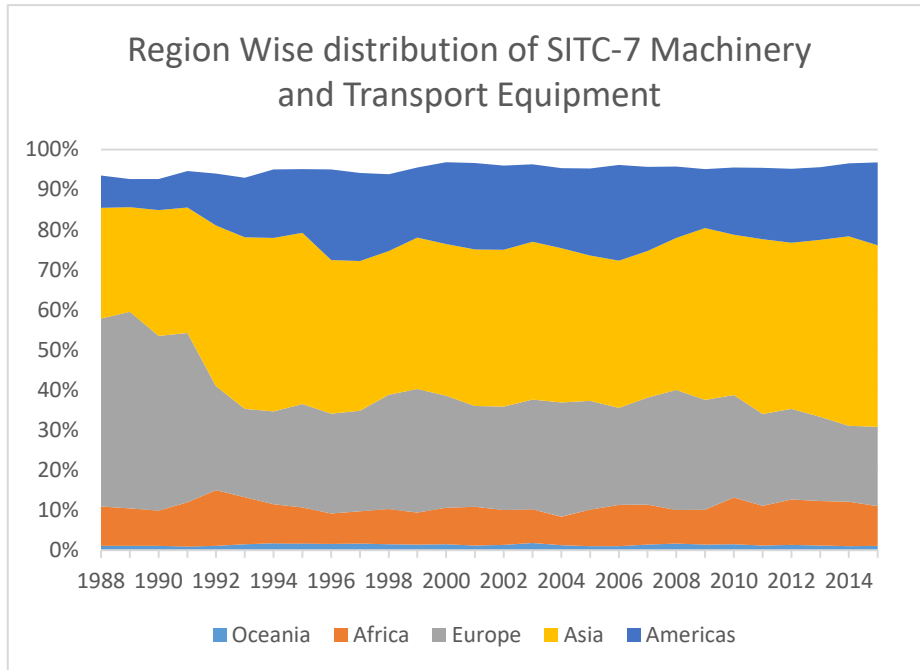


Figure 1 Region Wise distribution of SITC-7 Machinery and Transport Equipment

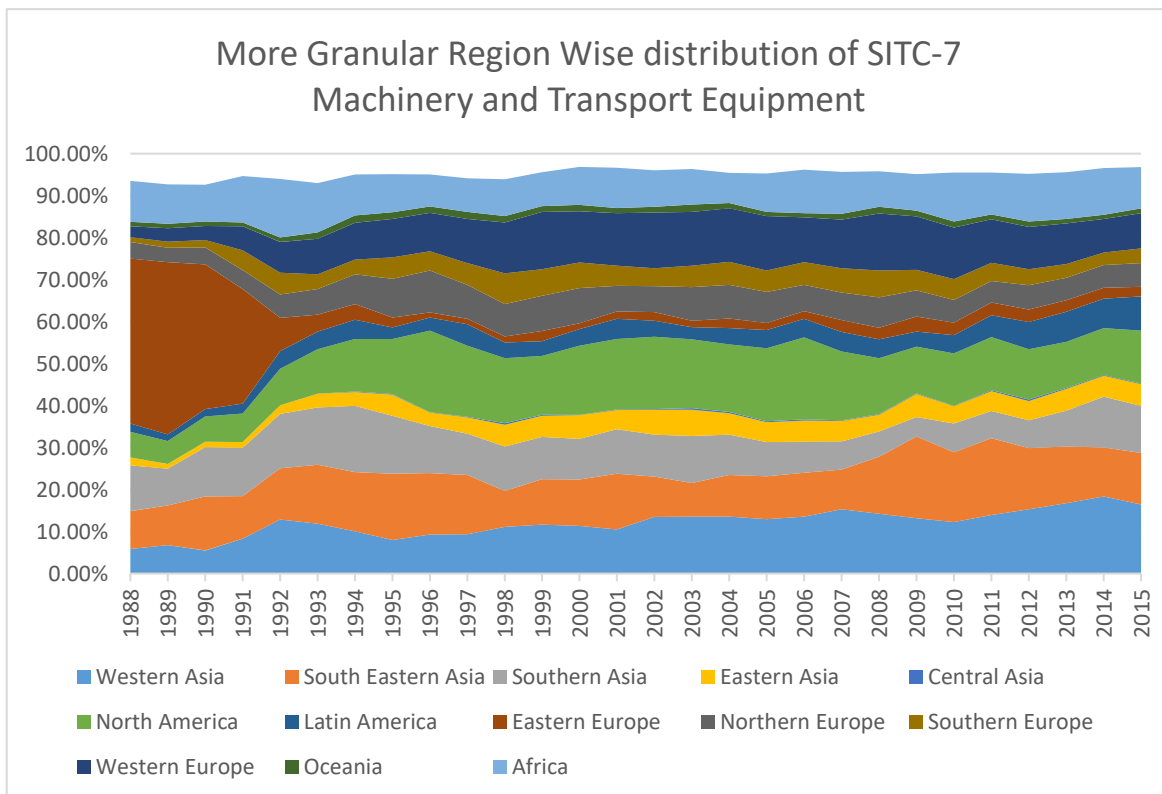


Figure 2 More Granular Region Wise distribution of SITC-7 Machinery and Transport Equipment

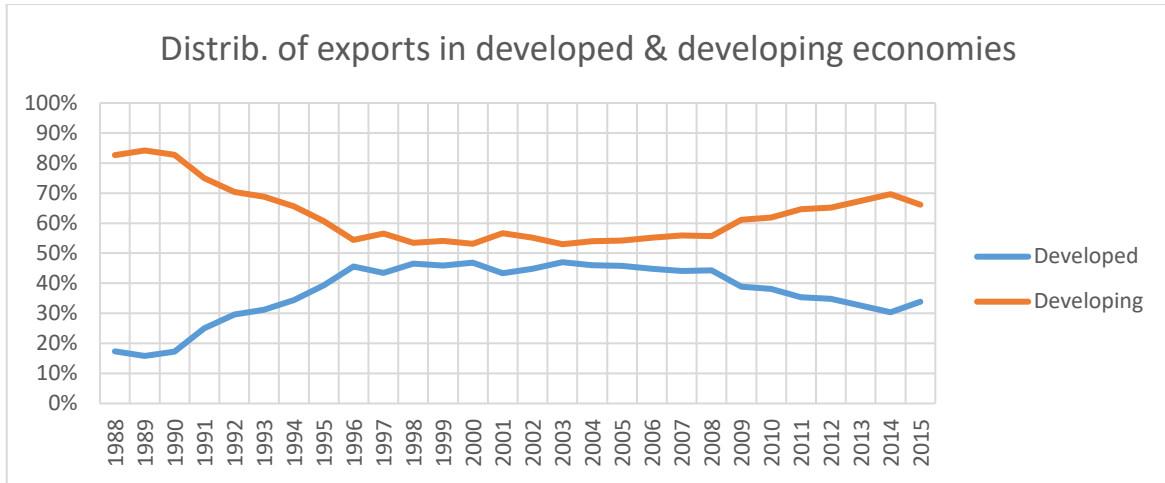


Figure 3: Distribution of exports in developed & developing economies

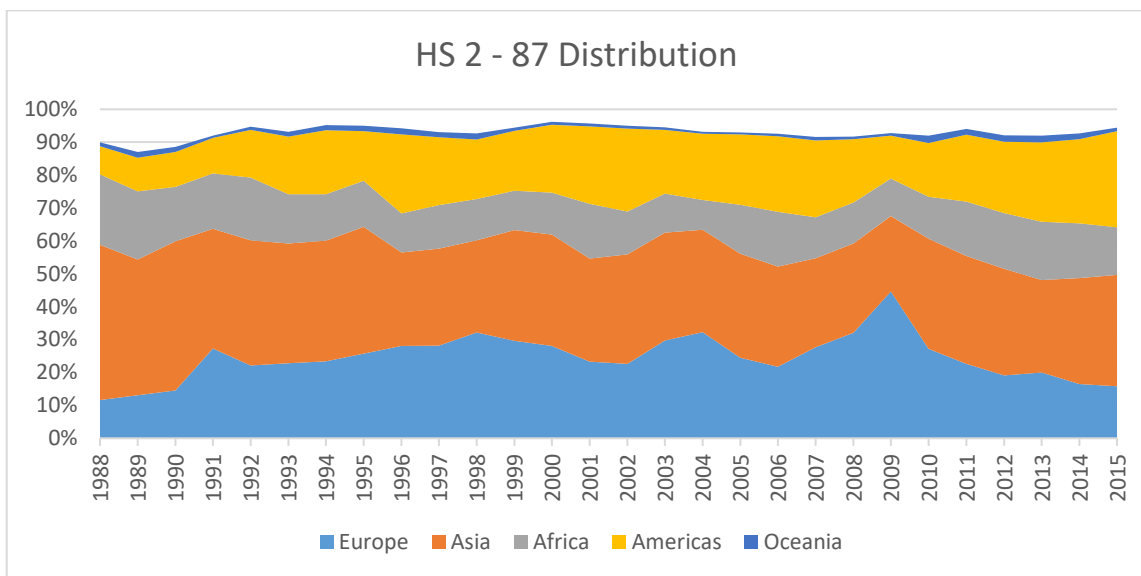


Figure 4: HS 2 - 87 Distribution

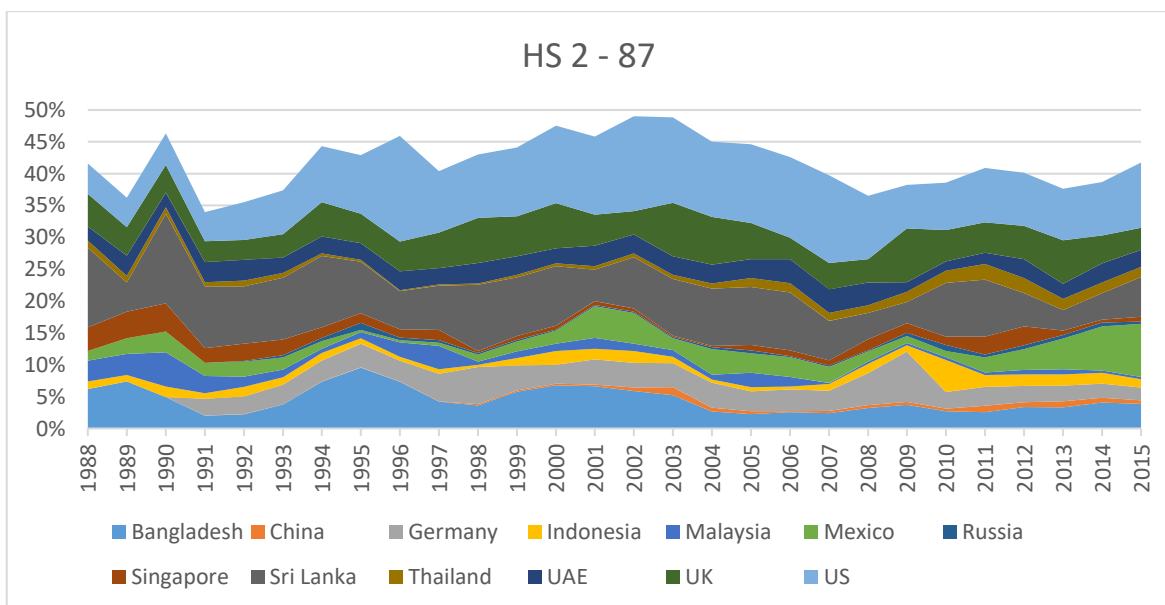


Figure 5: HS2 - 87

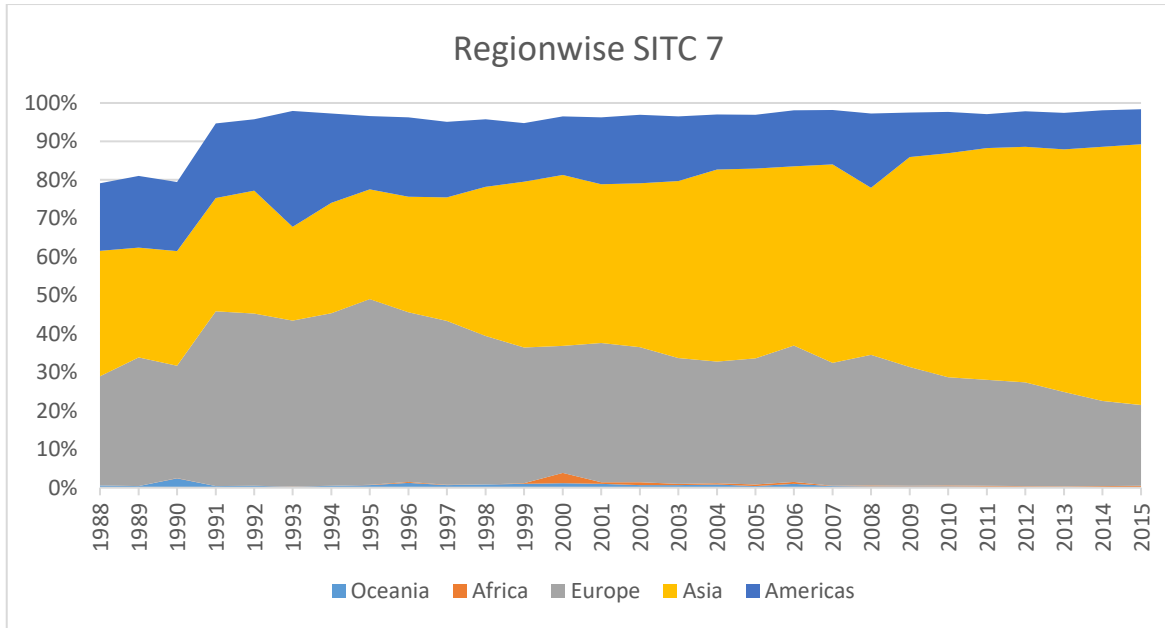


Figure 6: Region wise SITC 7

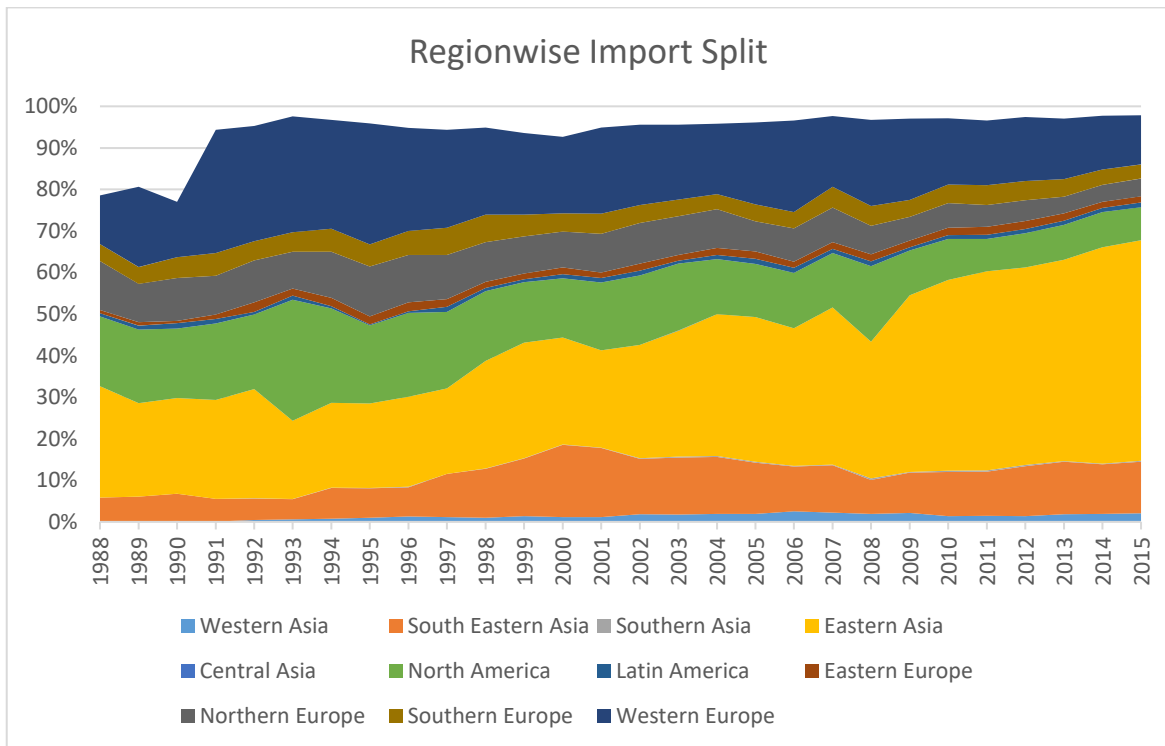


Figure 7: Region wise Import Split

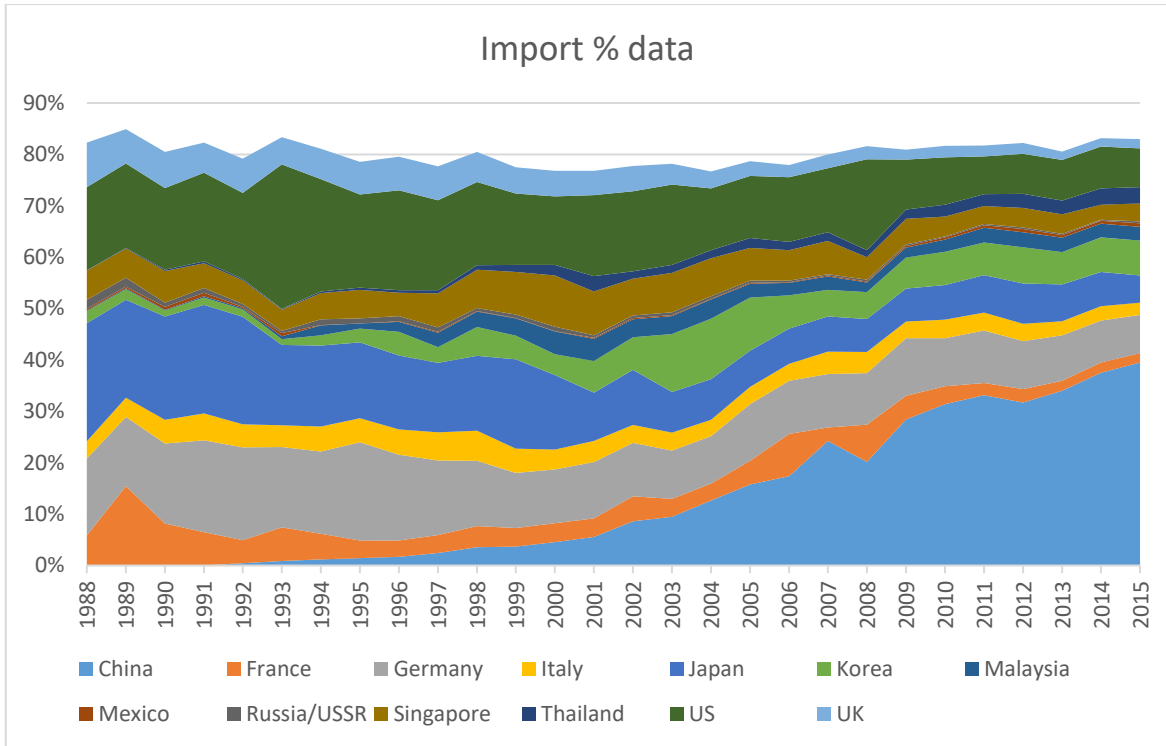


Figure 8: Import % data

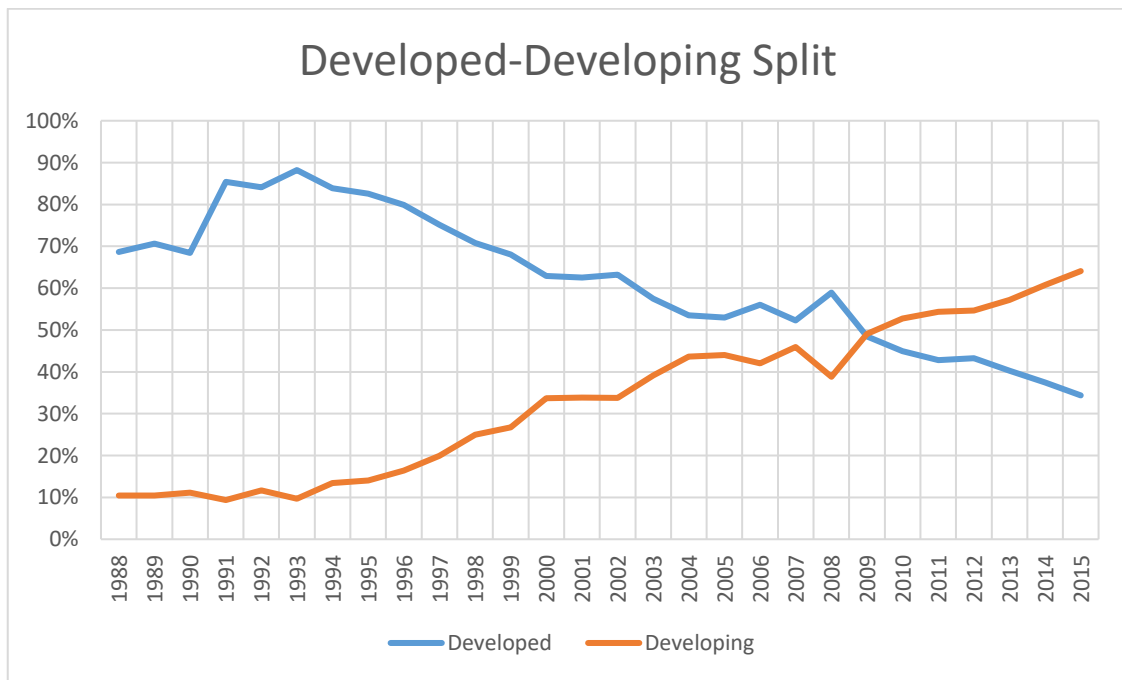


Figure 9: Developed-Developing Split

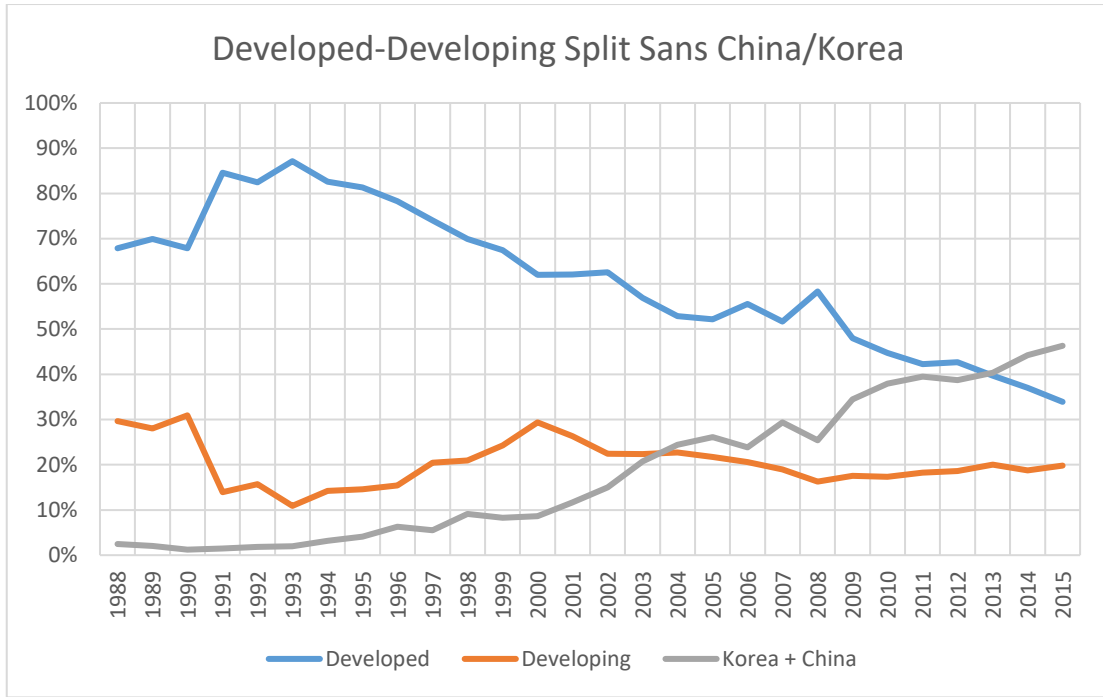


Figure 10: Developed-Developing Split Sans China/Korea

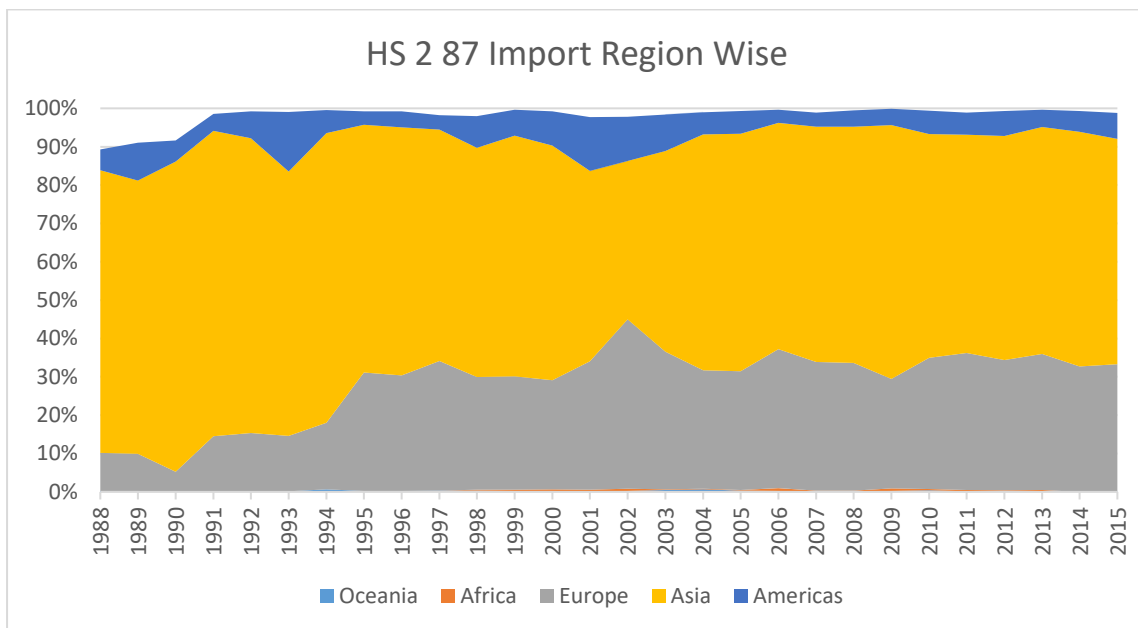


Figure 11: HS 2 87 Import Region Wise

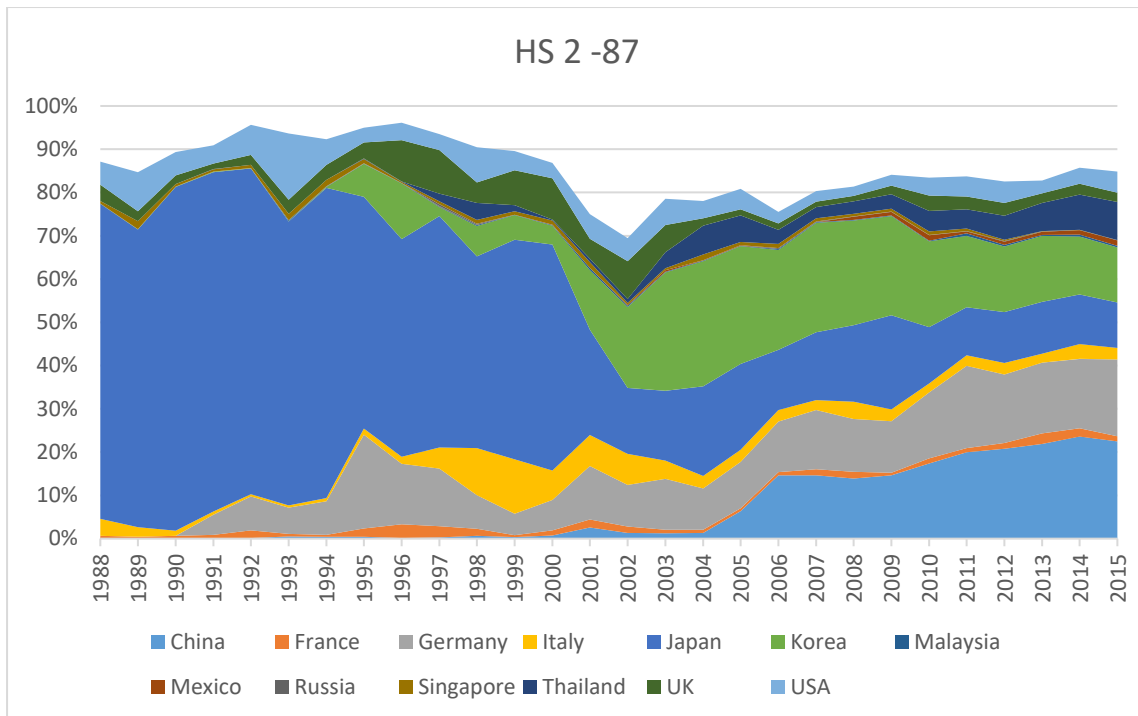


Figure 12: HS 2 -87

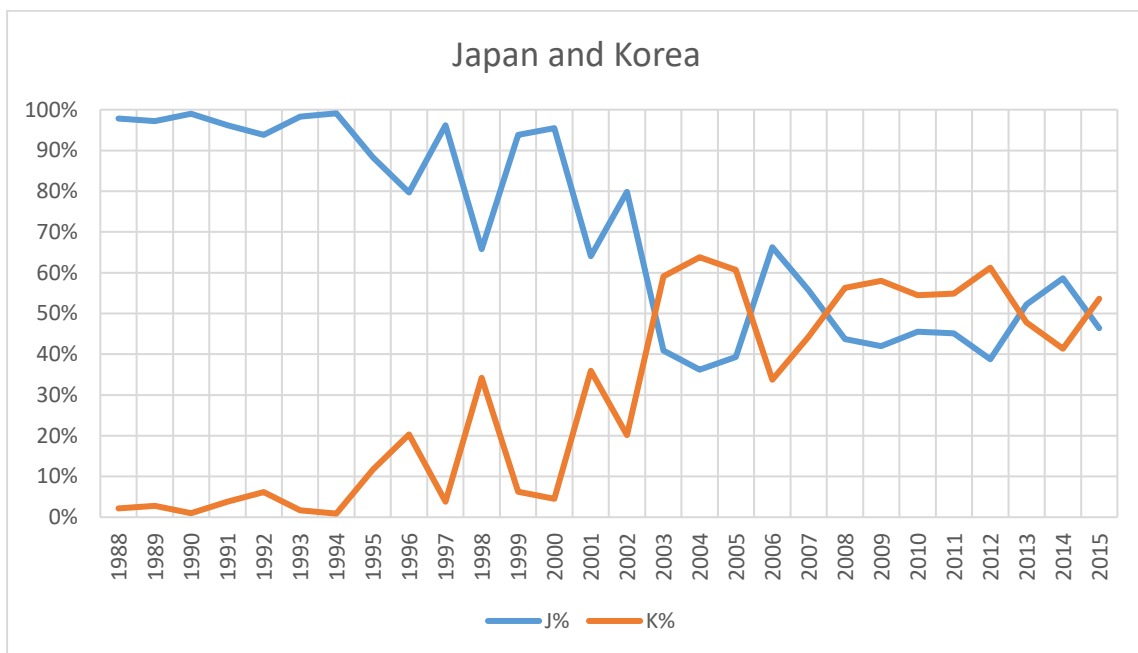


Figure 13: Japan and Korea

9.2 Global Value Addition Analysis – TiVA

The TiVA dataset is extensive and the following observations were made:

- a) Figure 14 plots forward linkages which is essentially how much of domestic value added from all sectors in India go into final foreign demand for Transport Equipment. It also plots backward linkages, which is the % contribution of foreign countries in value added terms to India’s Transport Equipment exports.

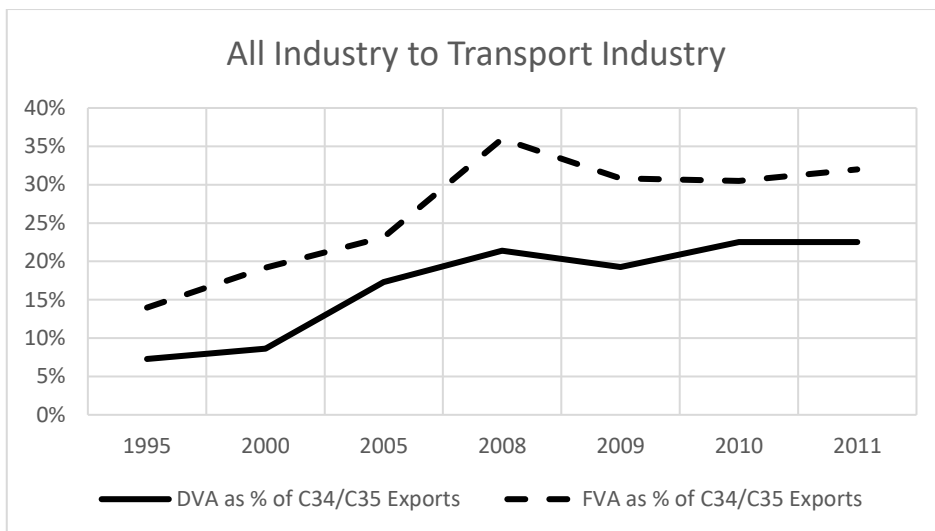


Figure 14 Forward and Backward linkages as %

b) Figure 15 charts contribution of India’s services sectors to gross exports in the Transport Equipment sector. It also plots the contribution of foreign services sectors to India’s exports in the Transport Equipment industry.

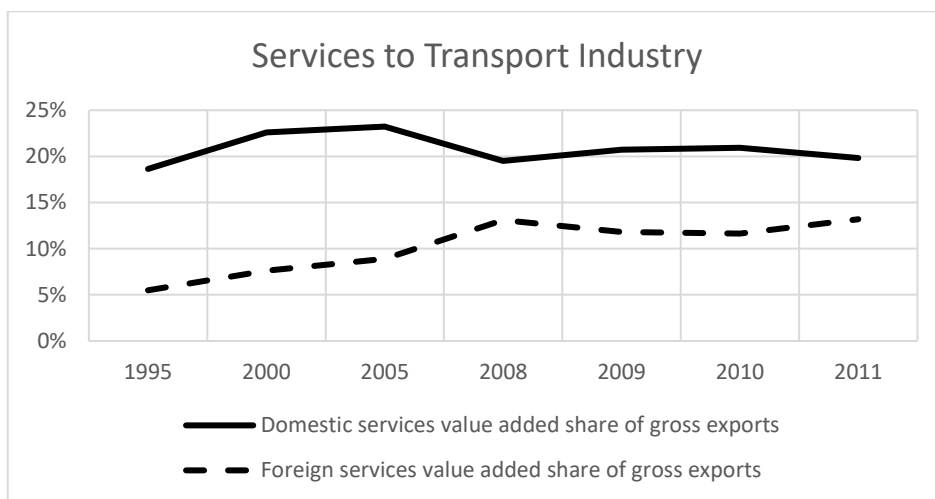


Figure 15 Service sector contribution in value added terms

c) India’s value add in exports to the world has seen a meteoric rise shown in Figure 16

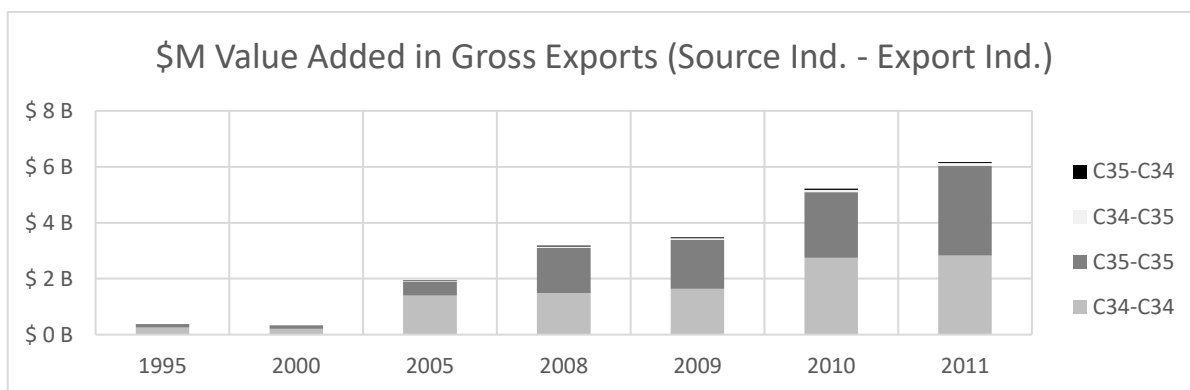


Figure 16 India’s Value added in gross exports

d) Domestic Value Added embedded in Foreign Final Demand: We observe that since 1995 – the top 8 value adding nations have been contributing only a total of 70% of the global DVA. It has been played out like a zero sum game and the key gainers are China and Korea – while key losers are USA and Japan. This signifies that developing industrial markets of China and Korea have matured and reached more advanced stages of development besides merely supply increase. It also signifies that the countries in remaining 30% have not been able to shift the balance of global value add. On the other hand – Germany has management to hold on to its strong industrial base in terms of value addition capability. This is a strong indicator to the fact that the current “Make in India” program may suffice us in the beginning in terms of increase in total exports – but in order to improve our value addition to the world – we must develop the skill and knowledge capacities as well. We can use the information from this graph and study specific country policies to understand the Do’s and Don’ts as far as foreign trade and value addition production is concerned.

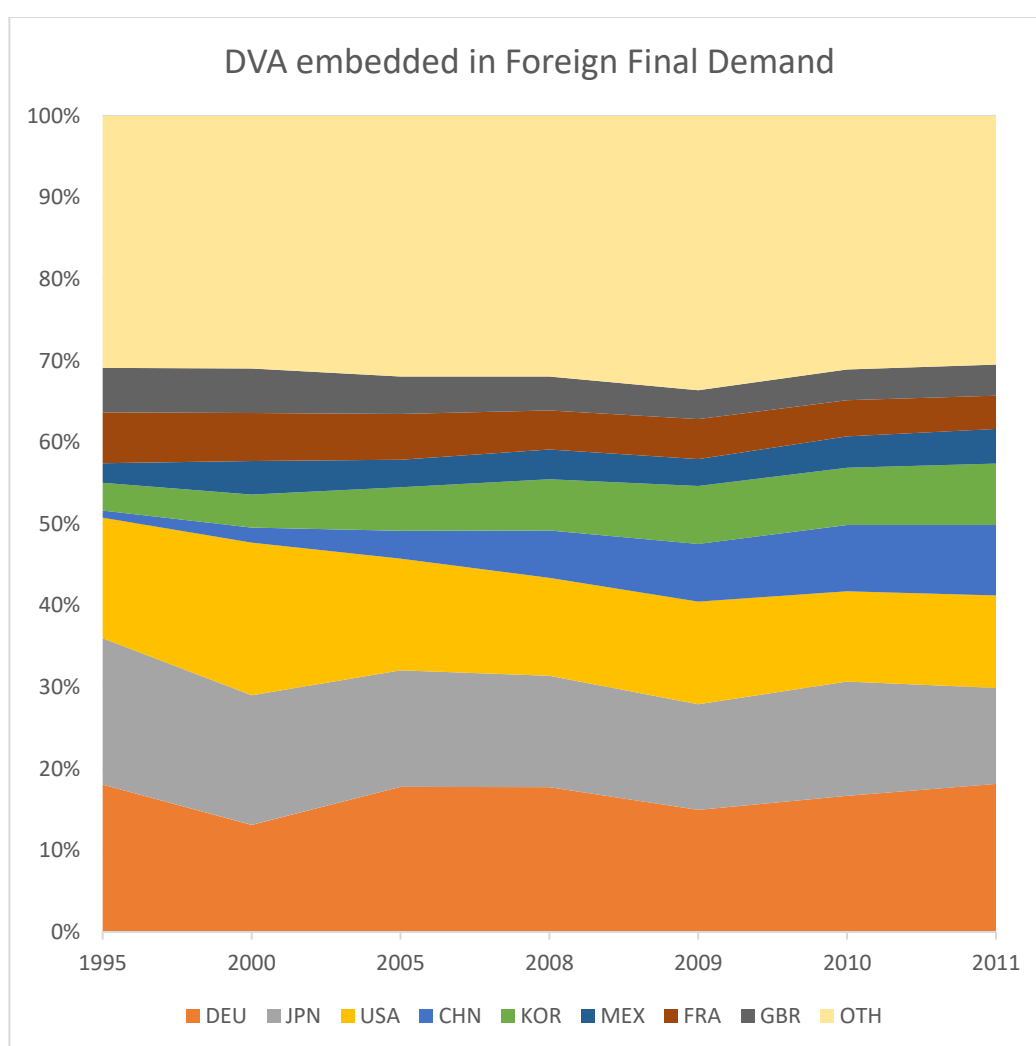


Figure 17 DVA embedded in Foreign Final Demand

9.3 Exports and Imports – WITS

The WITS dataset is good for comparative analyses across countries. A sample analysis is presented in exhibits 3 and 4. These try and map trends in forward and backward linkage value additions as a % of exports for BRICS countries and the USA.

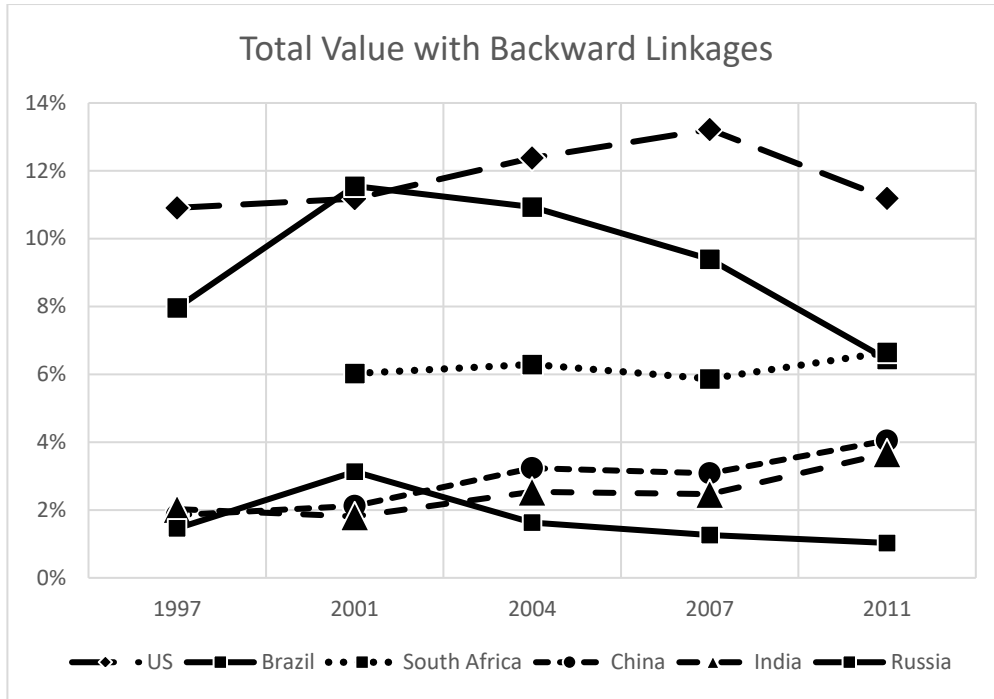


Figure 18 Total Value Added (% of exports, with Backward Linkages)

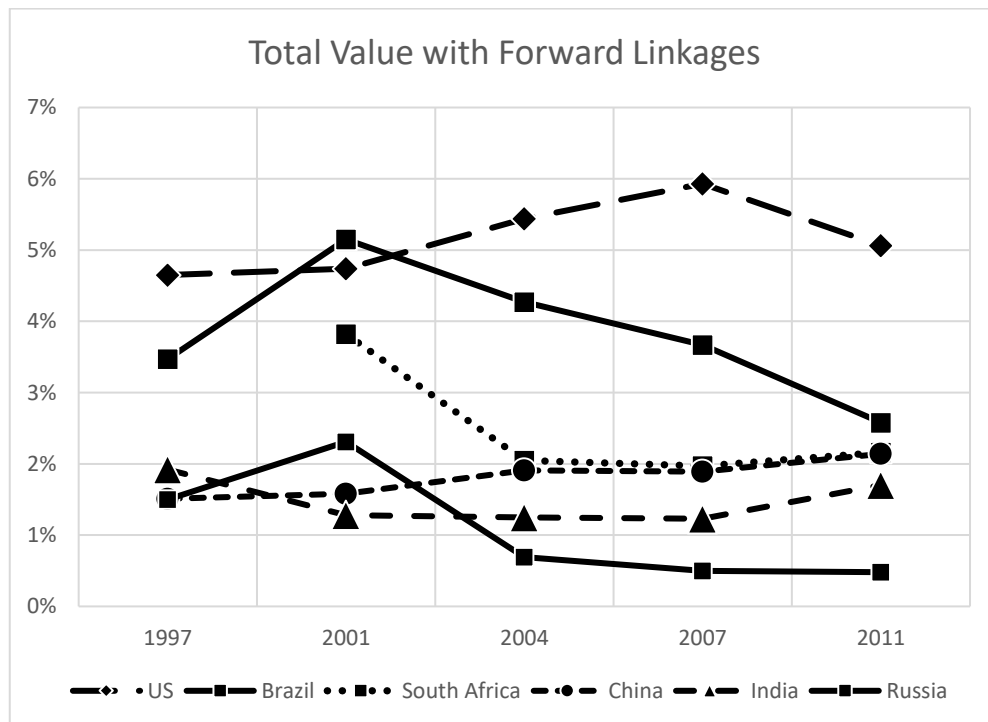


Figure 19 Total Value Added (% of exports, with Forward Linkages)

9.4 Exports – ComTrade

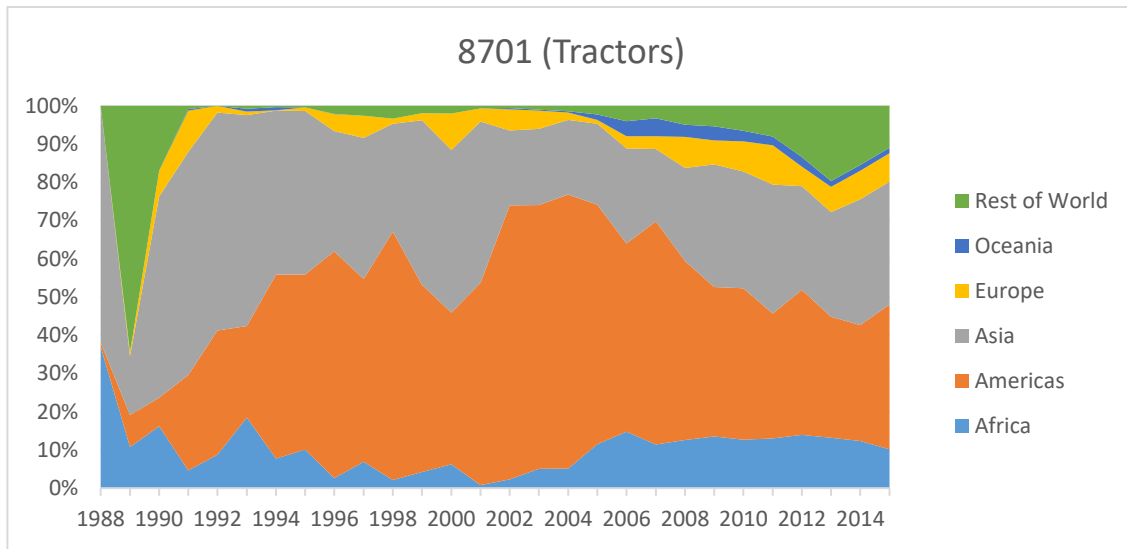


Figure 20 Regional Distribution of Exports of Tractors

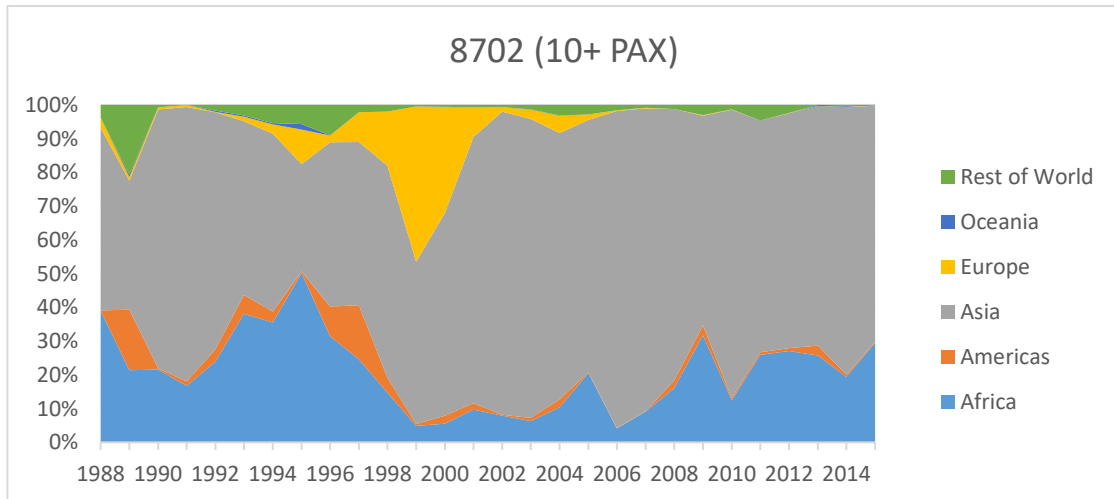


Figure 21 Regional Distribution of Exports of Vehicles that carry more than 10 people

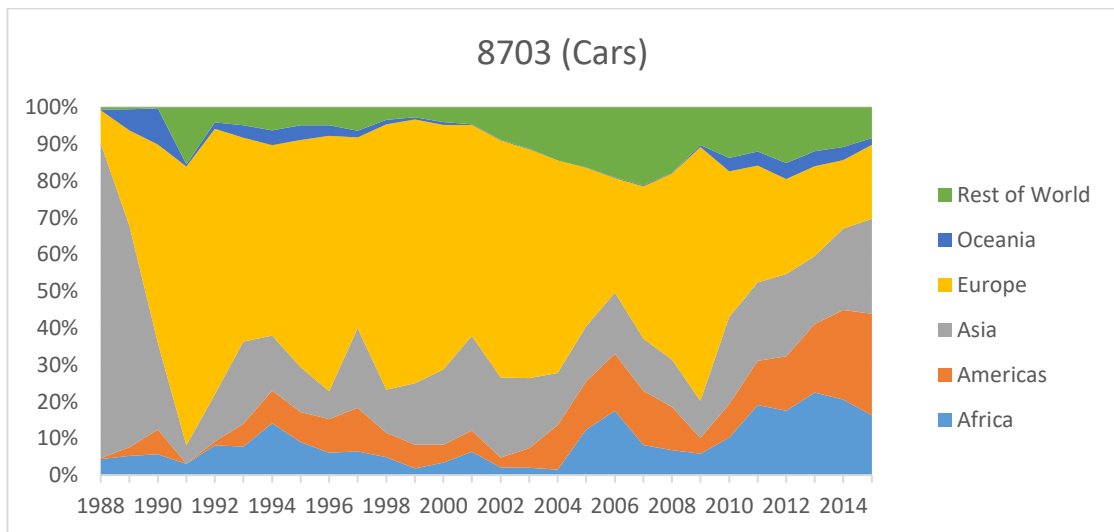


Figure 22 Regional Distribution of Exports of Motor Cars

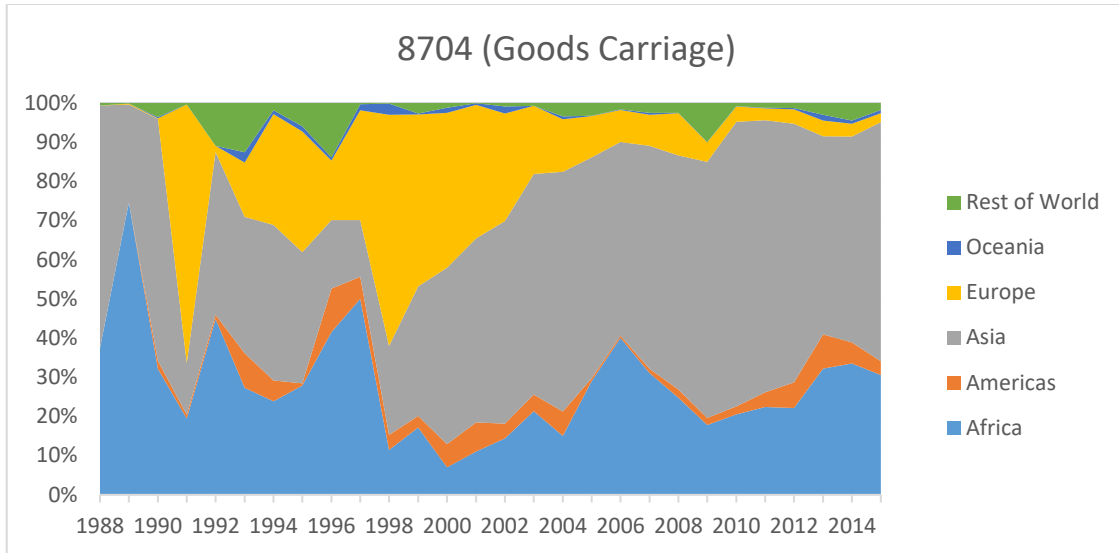


Figure 23 Regional Distribution of Exports of Goods Carriages

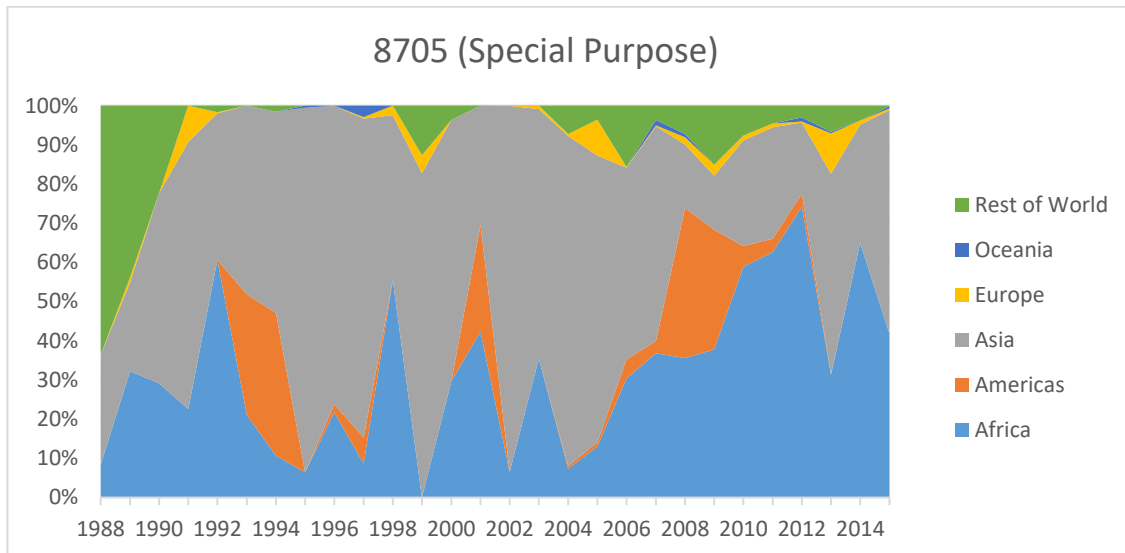


Figure 24 Regional Distribution of Exports of Special Purpose utility vehicles

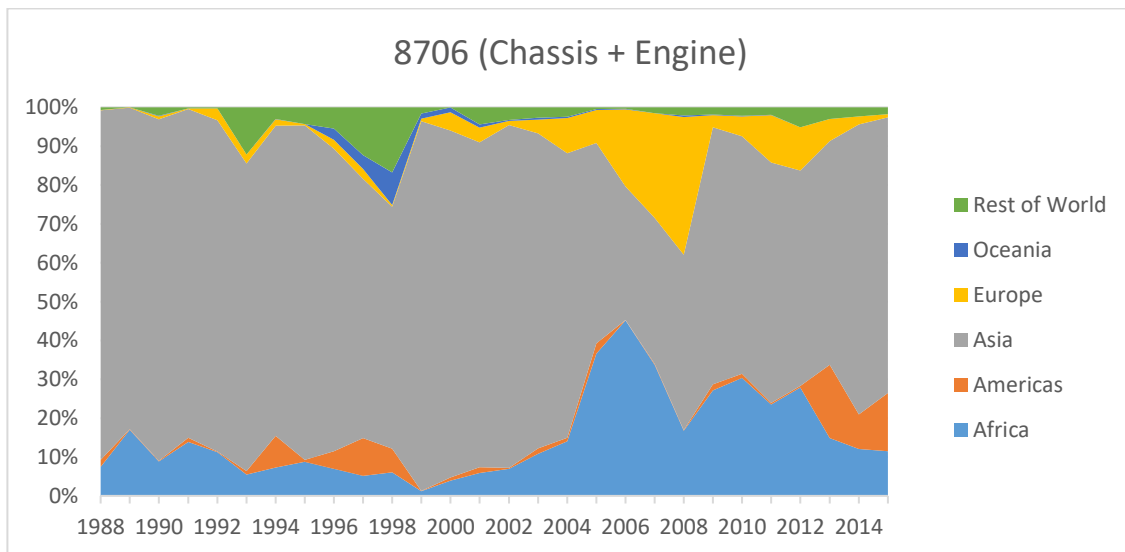


Figure 25 Regional Distribution of Exports of Chassis + Engines

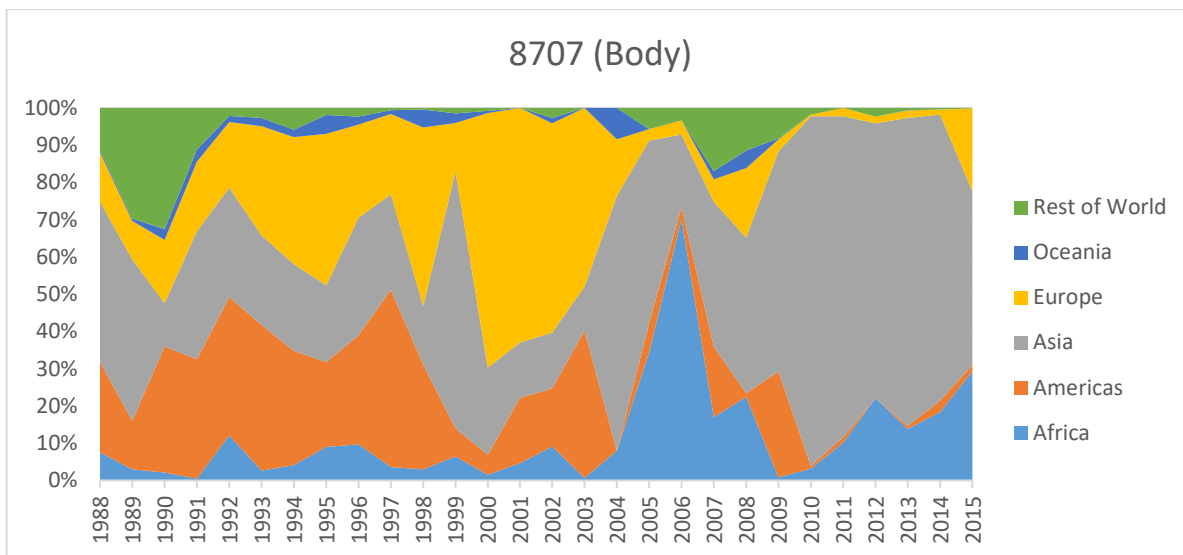


Figure 26 Regional Distribution of Exports of Bodies for Motor Cars

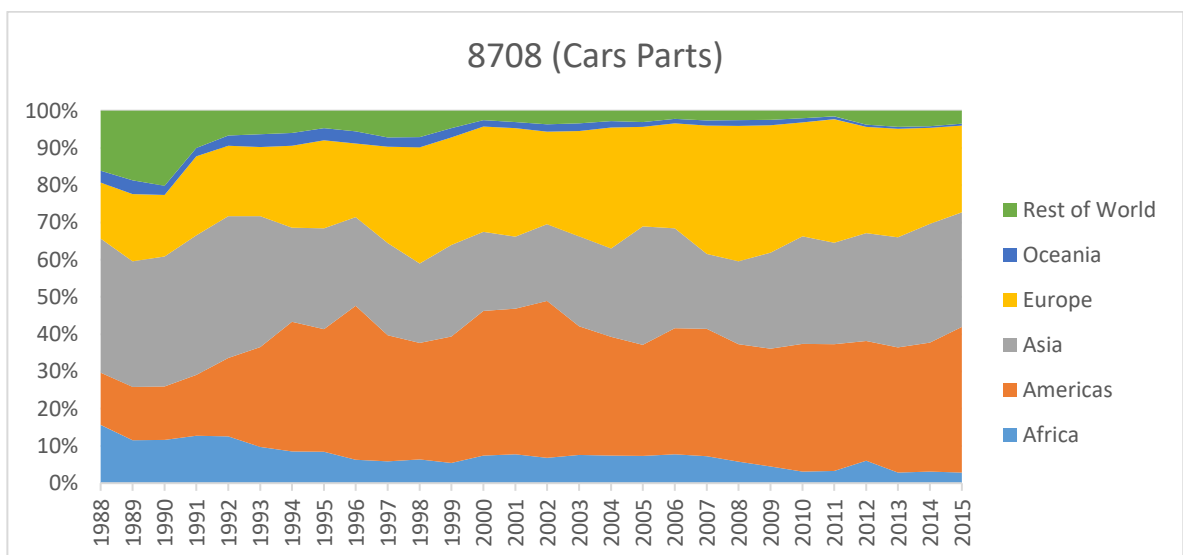


Figure 27 Regional Distribution of Exports of Car Parts

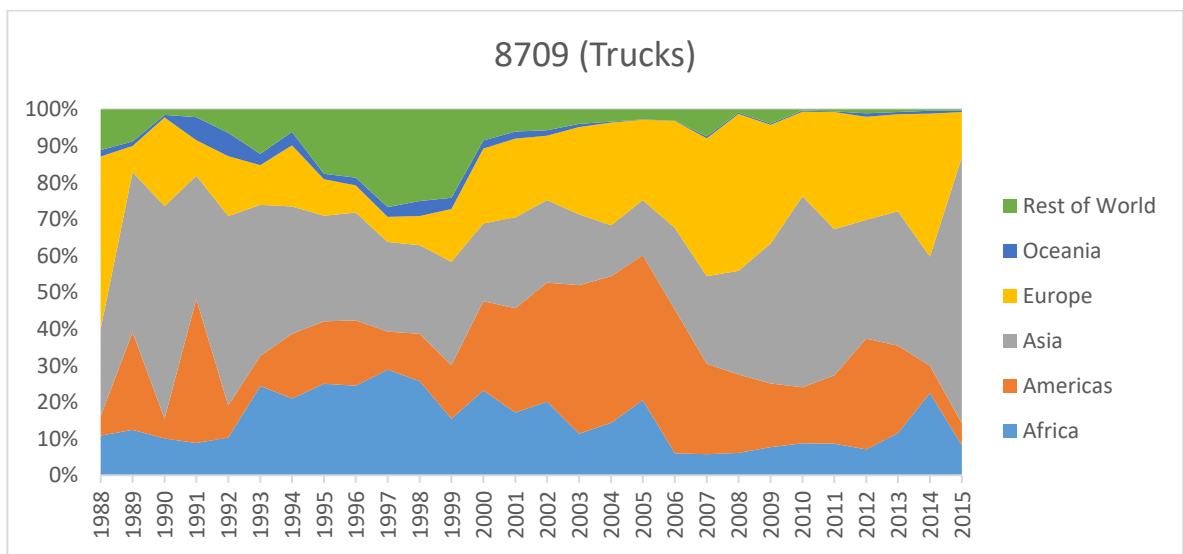


Figure 28 Regional Distribution of Exports of Trucks

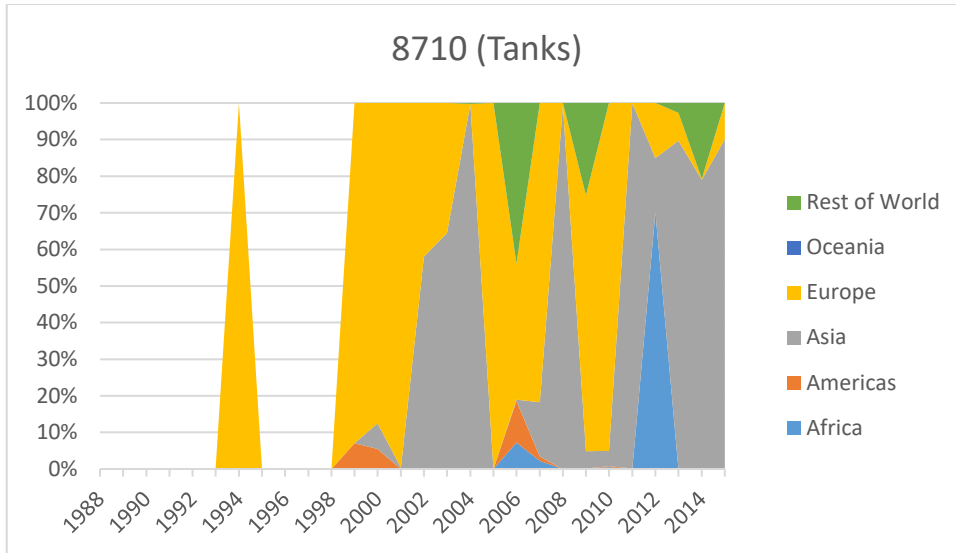


Figure 29 Regional Distribution of Exports of Tanks and other armored vehicles

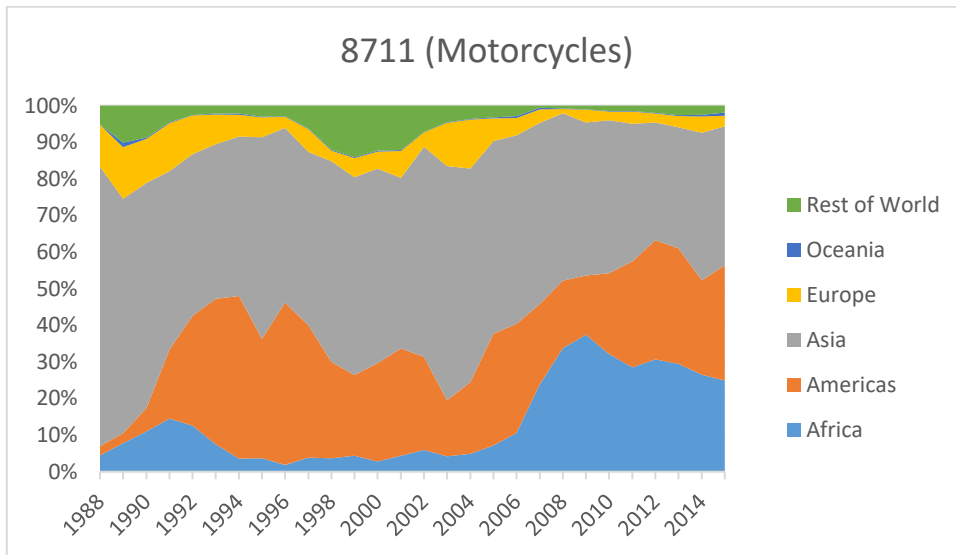


Figure 30 Regional Distribution of Exports of Motor Cycles

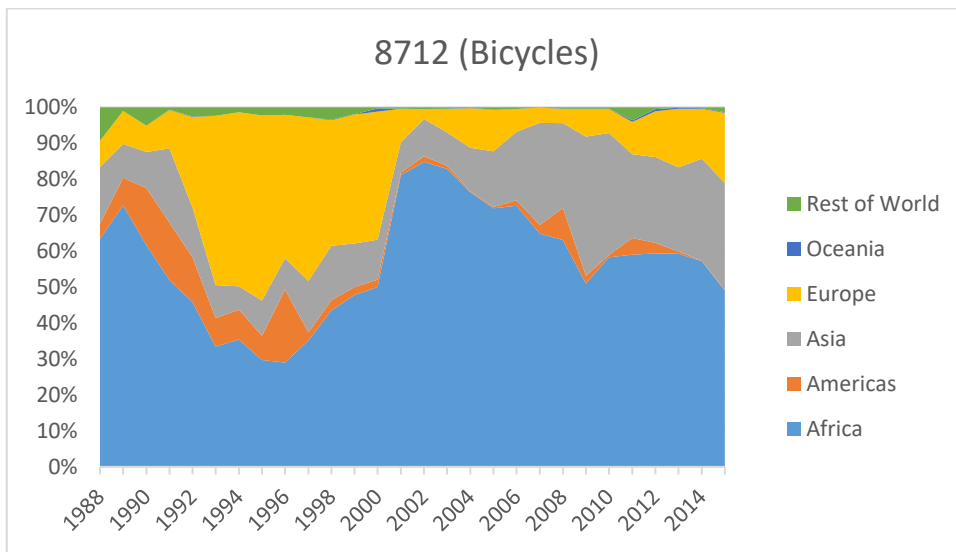


Figure 31 Regional Distribution of Exports of Bicycles

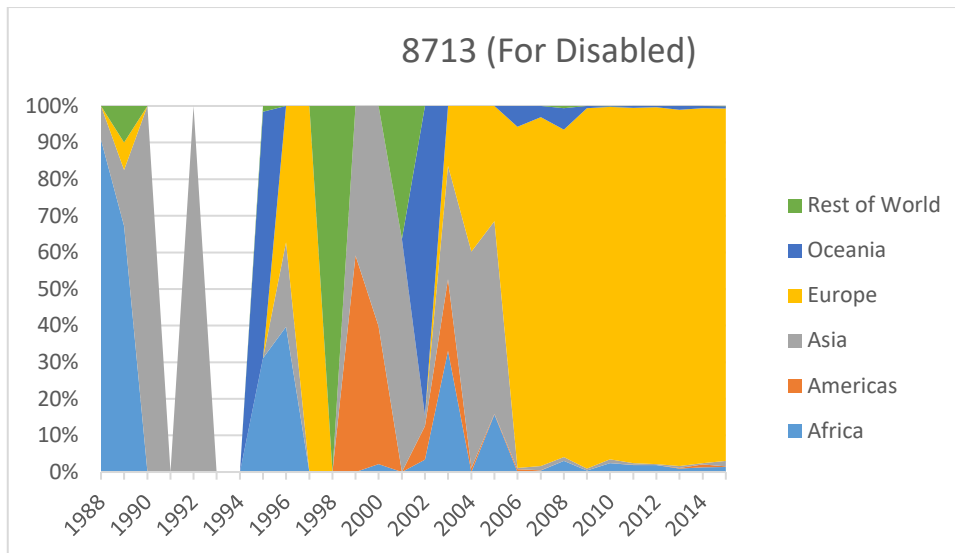


Figure 32 Regional Distribution of Exports of Vehicles for the Disabled

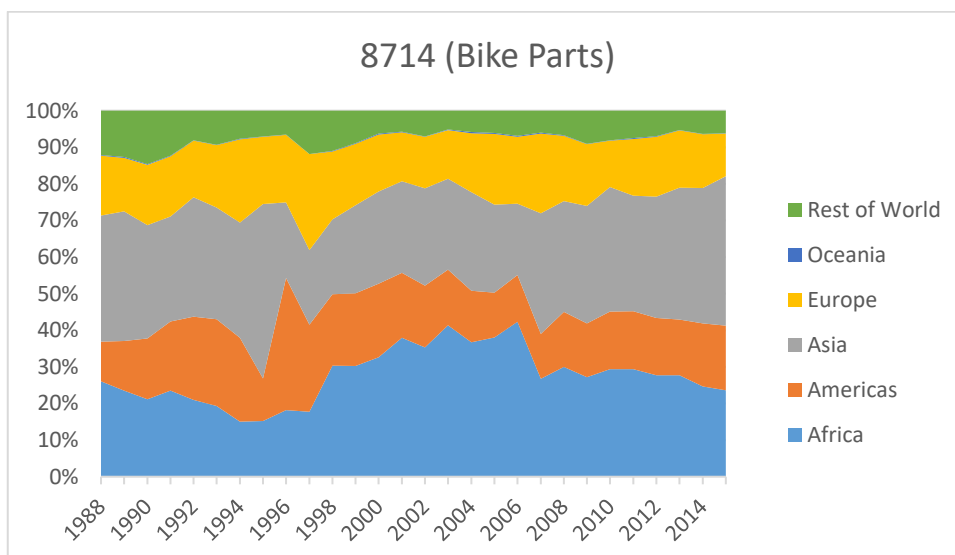


Figure 33 Regional Distribution of Exports of Bike Parts

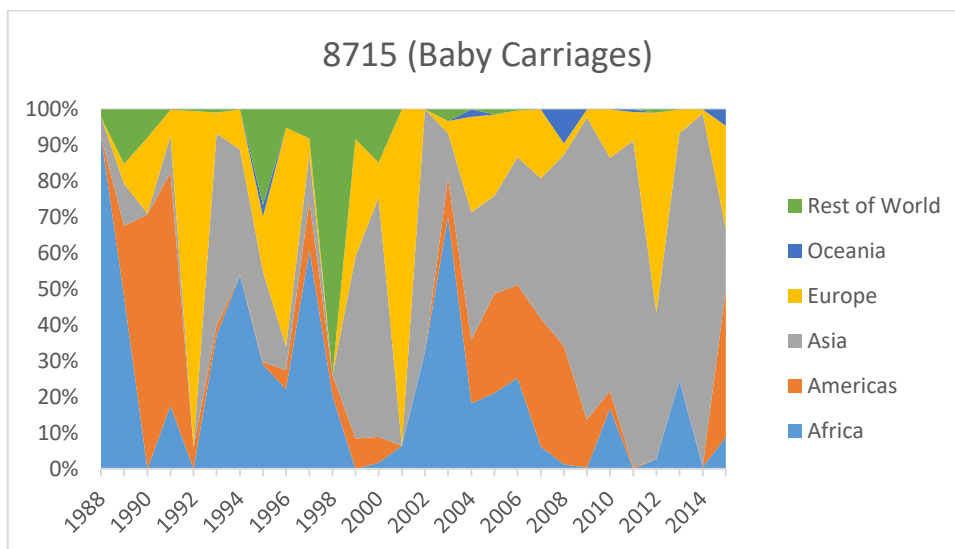


Figure 34 Regional Distribution of Exports of Baby Carriages

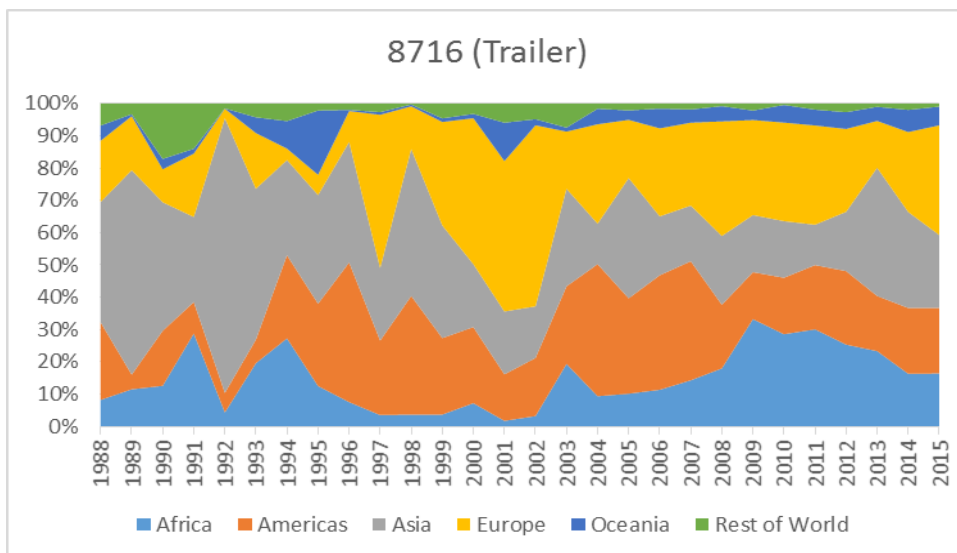


Figure 35 Regional Distribution of Exports of Trailers

9.5 Imports – ComTrade

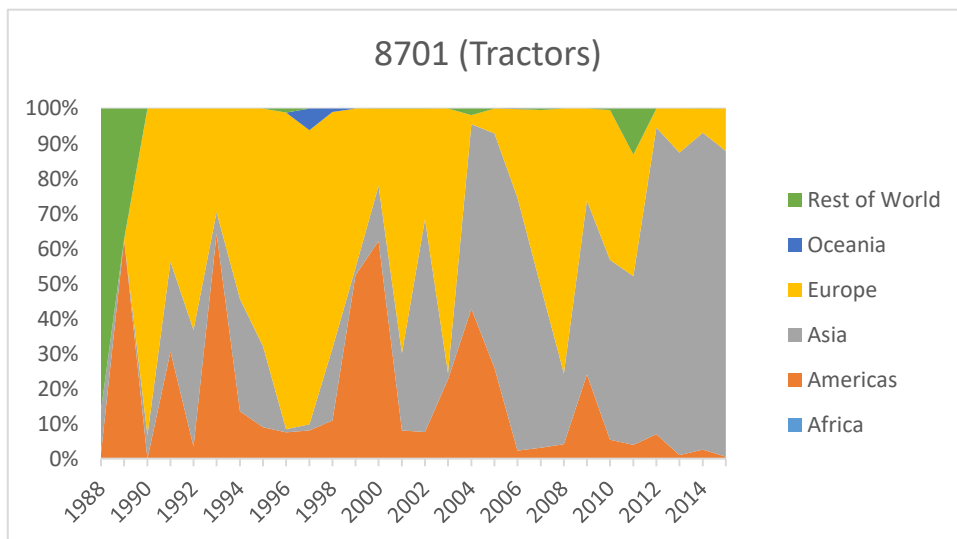


Figure 36 Regional Distribution of Imports of Tractors

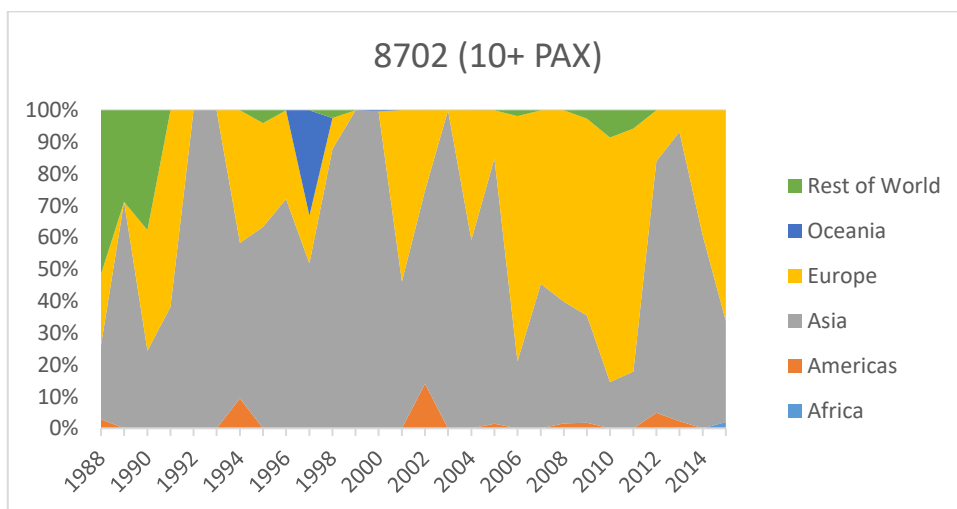


Figure 37 Regional Distribution of Imports of vehicles used to carry more than 10 people

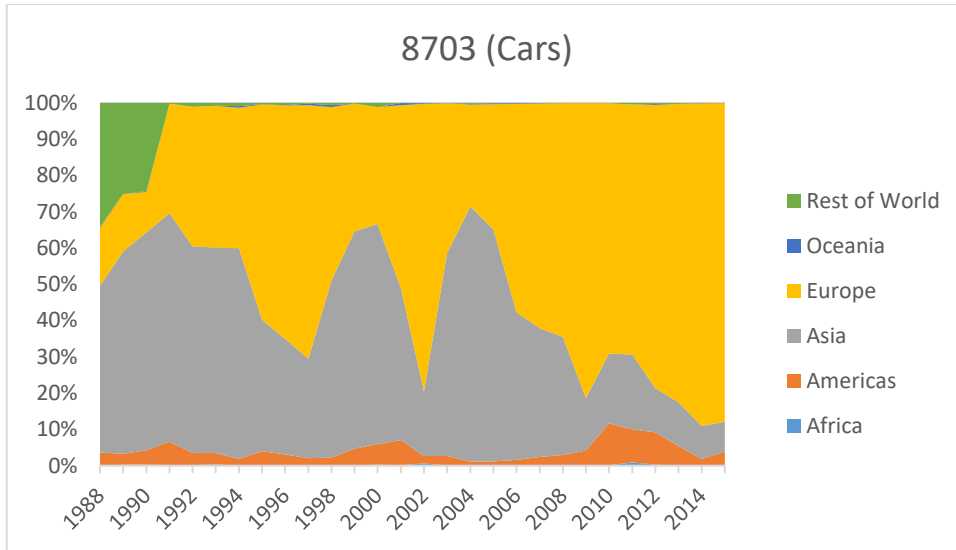


Figure 38 Regional Distribution of Imports of Motor Cars

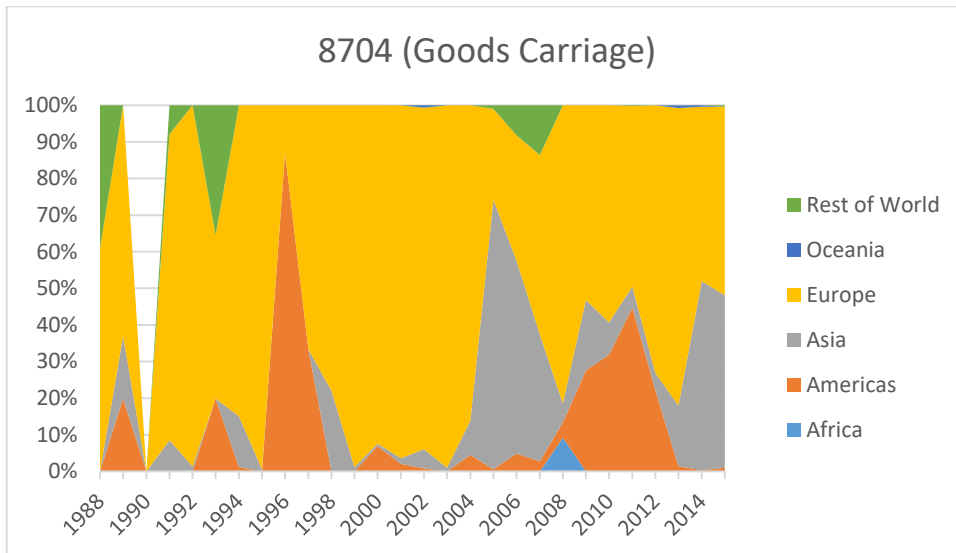


Figure 39 Regional Distribution of Imports of Goods Carriers

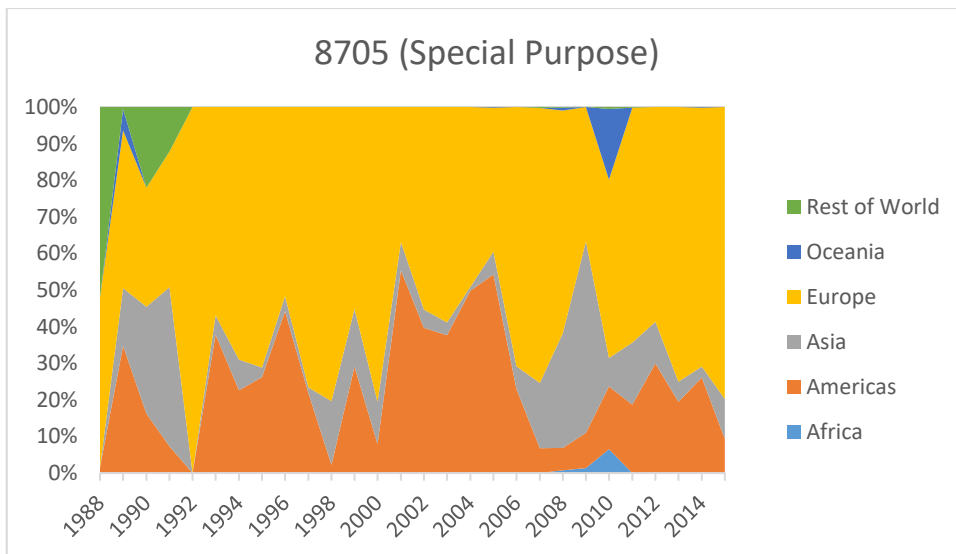


Figure 40 Regional Distribution of Imports of Special Purpose Utility Vehicles

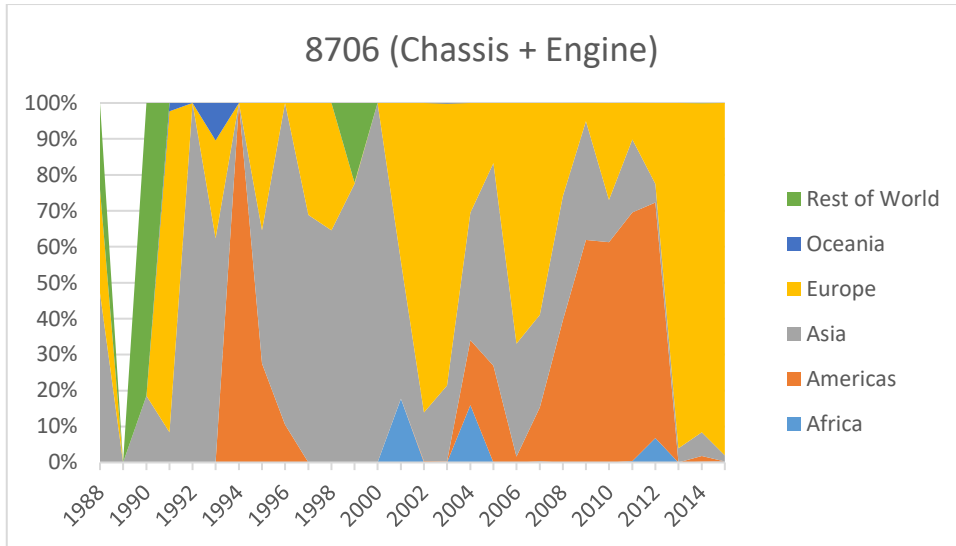


Figure 41 Regional Distribution of Imports of Chassis + Engines for Motor Cars

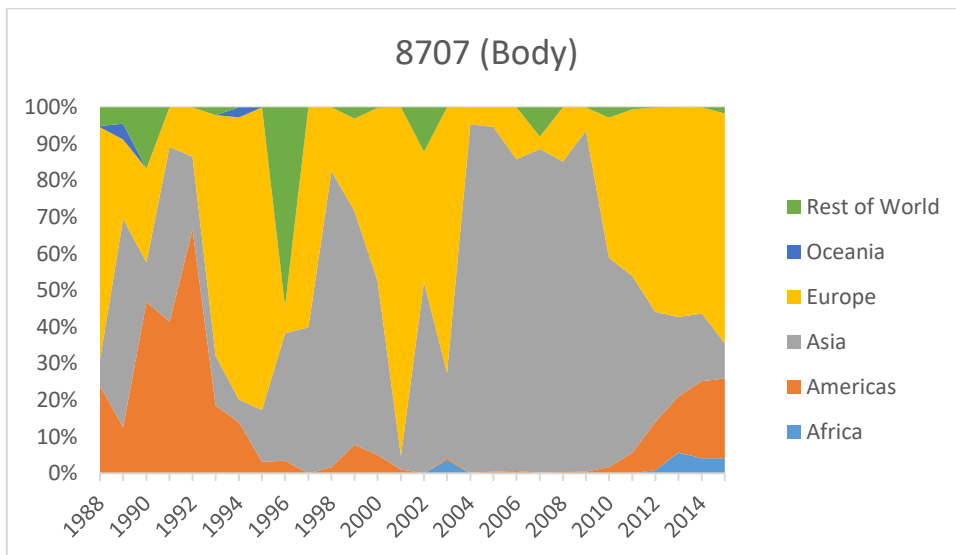


Figure 42 Regional Distribution of Imports of Bodies for Motor Cars

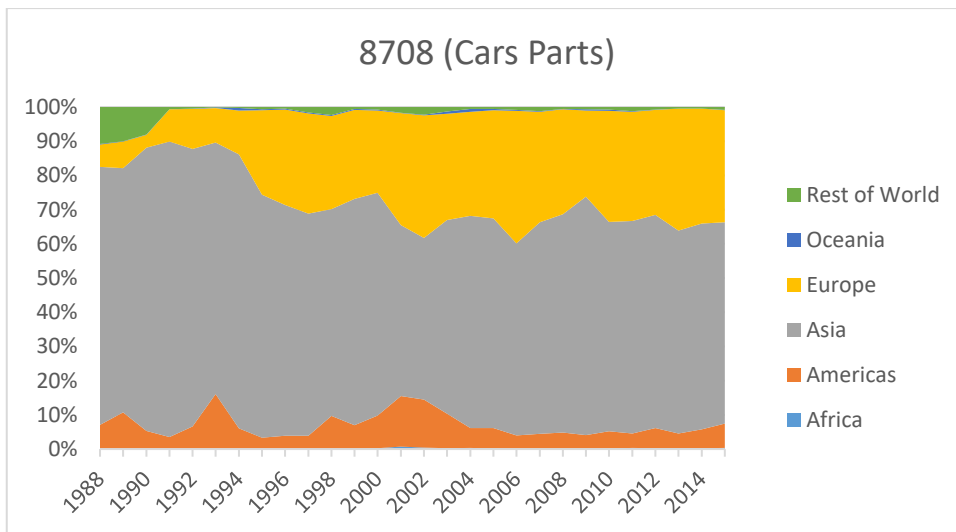


Figure 43 Regional Distribution of Imports of Car Parts

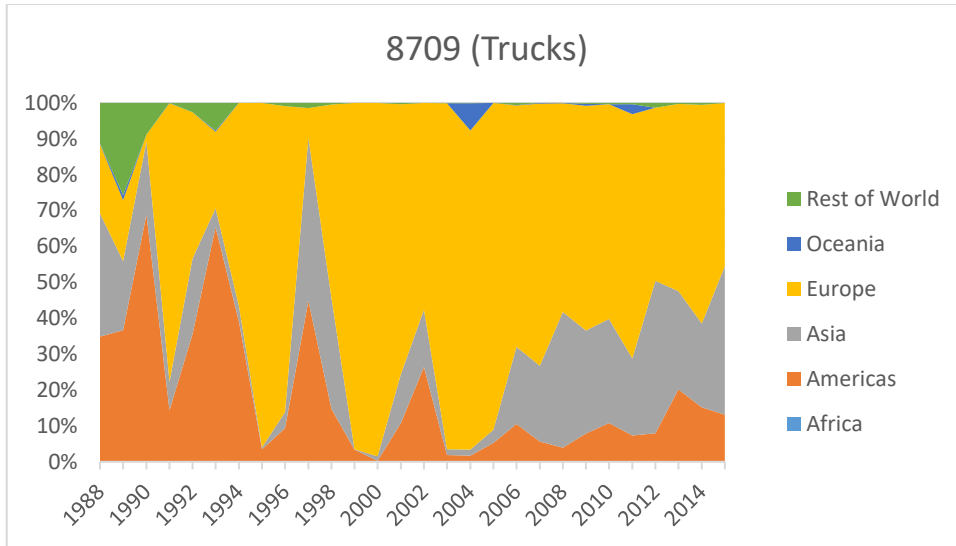


Figure 44 Regional Distribution of Imports of Trucks

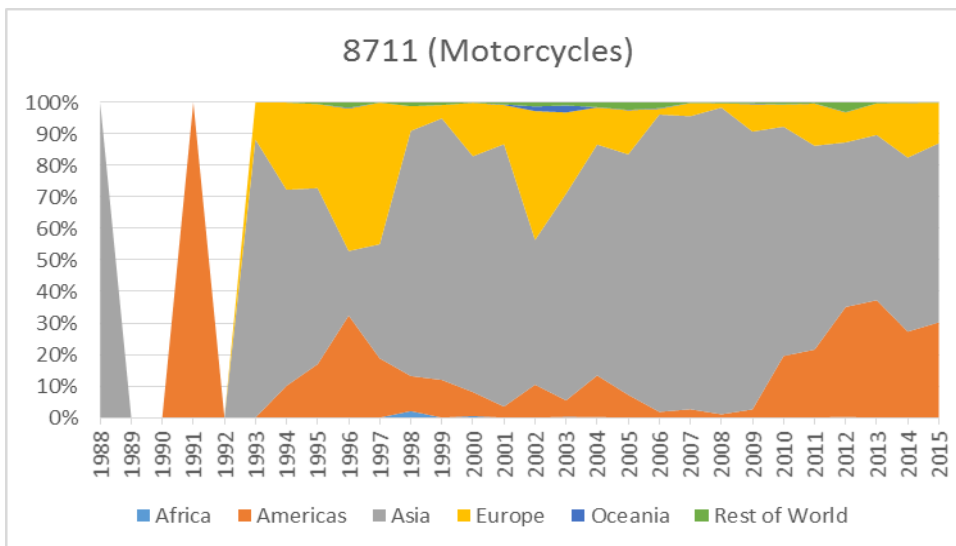


Figure 45 Regional Distribution of Imports of Motor Cycles

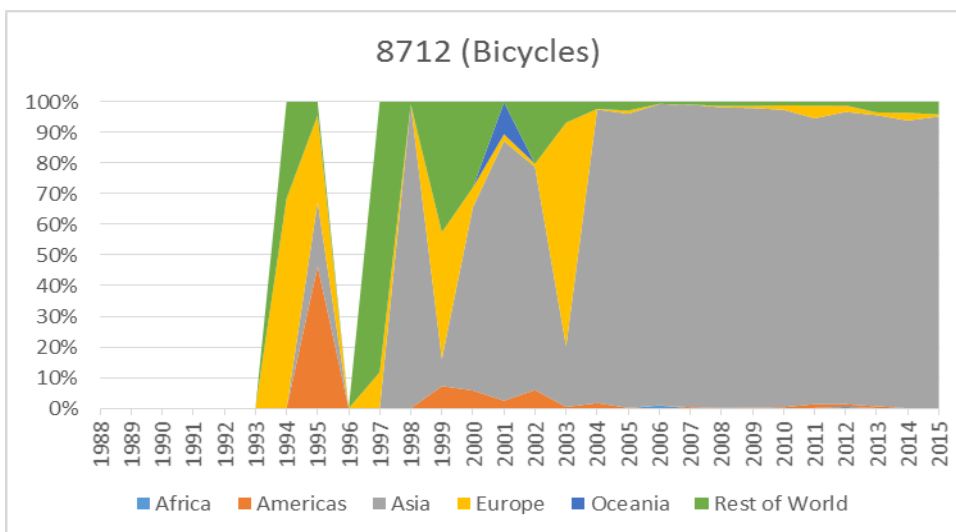


Figure 46 Regional Distribution of Imports of Bicycles

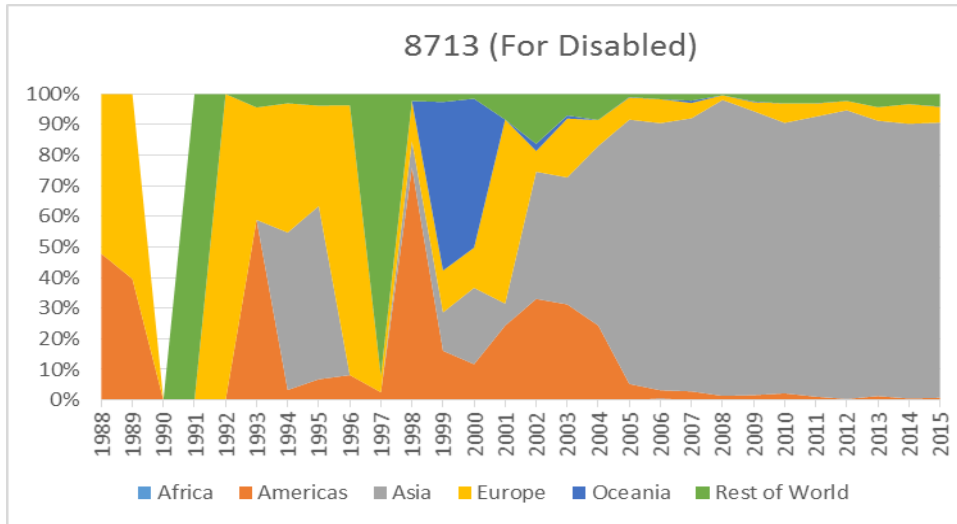


Figure 47 Regional Distribution of Imports of Vehicles for the disabled

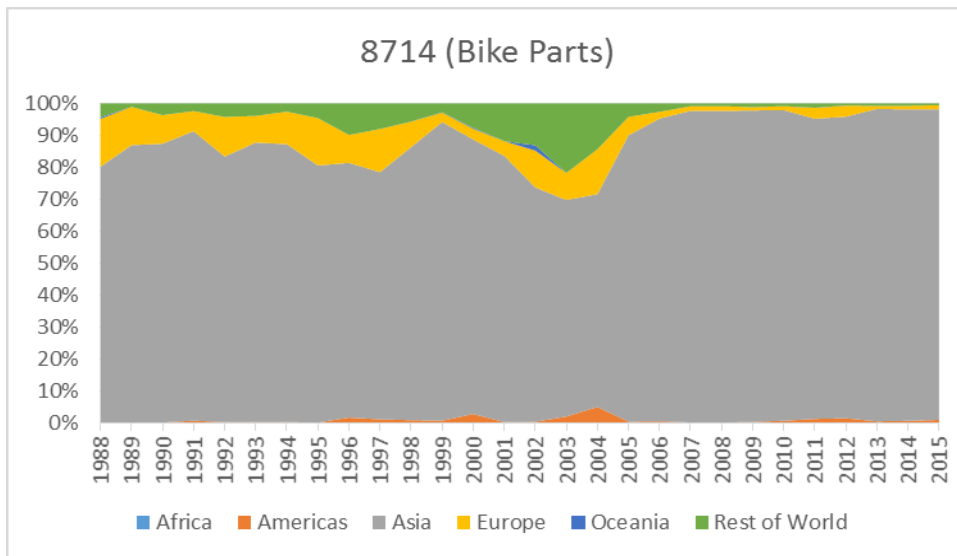


Figure 48 Regional Distribution of Two Wheeler Parts

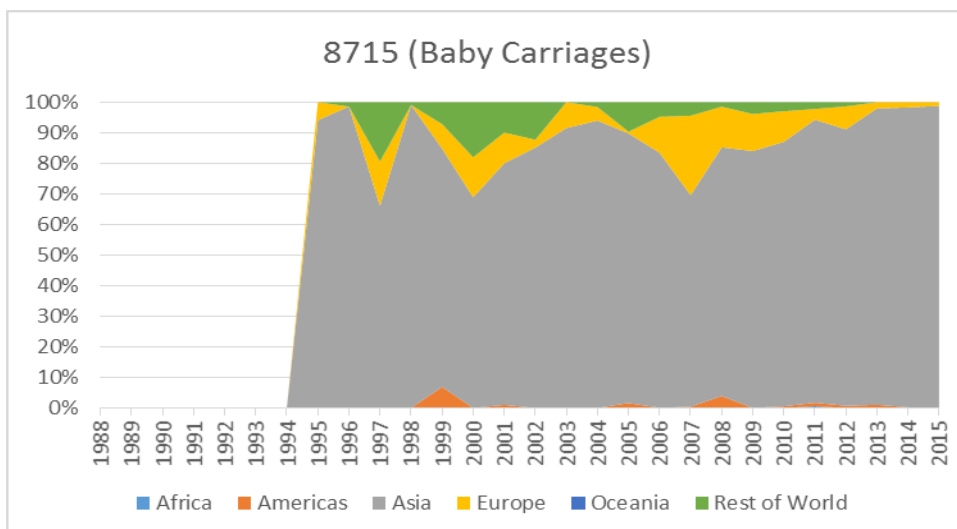


Figure 49 Regional Distribution of Baby Carriage imports

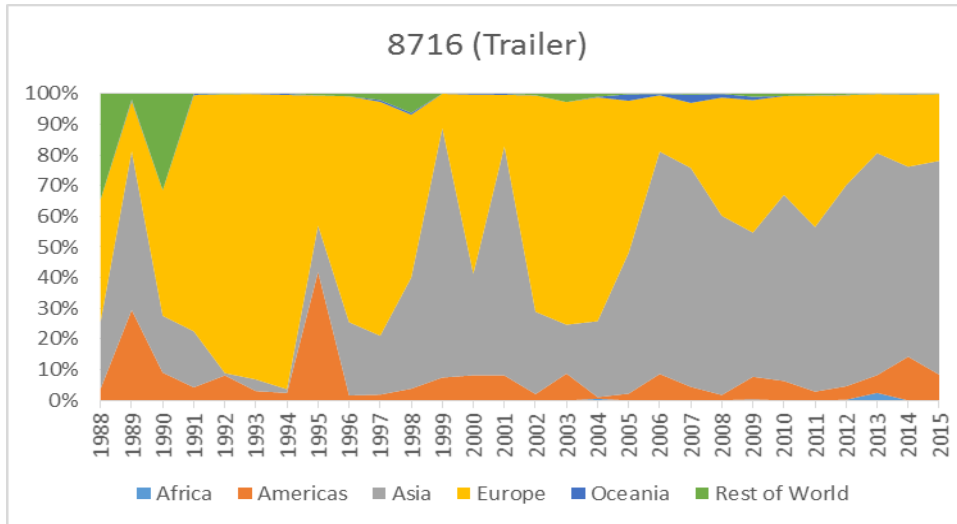


Figure 50 Regional distribution of trailer imports

9.6 Export Competitiveness of Emerging Economies

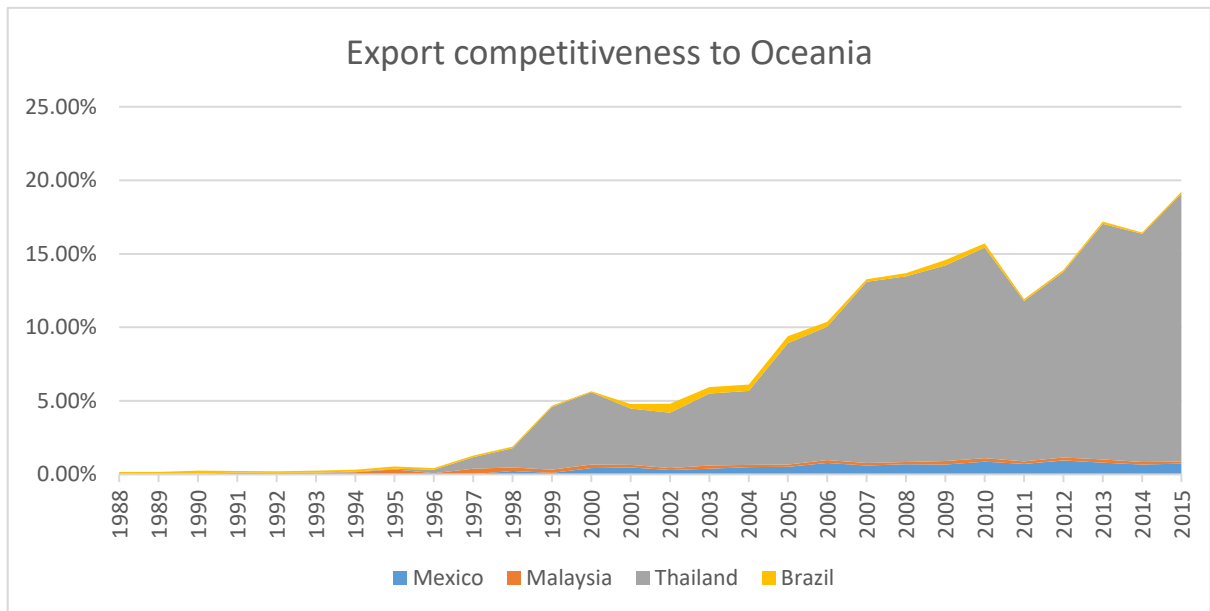


Figure 51 Export competitiveness to Oceania

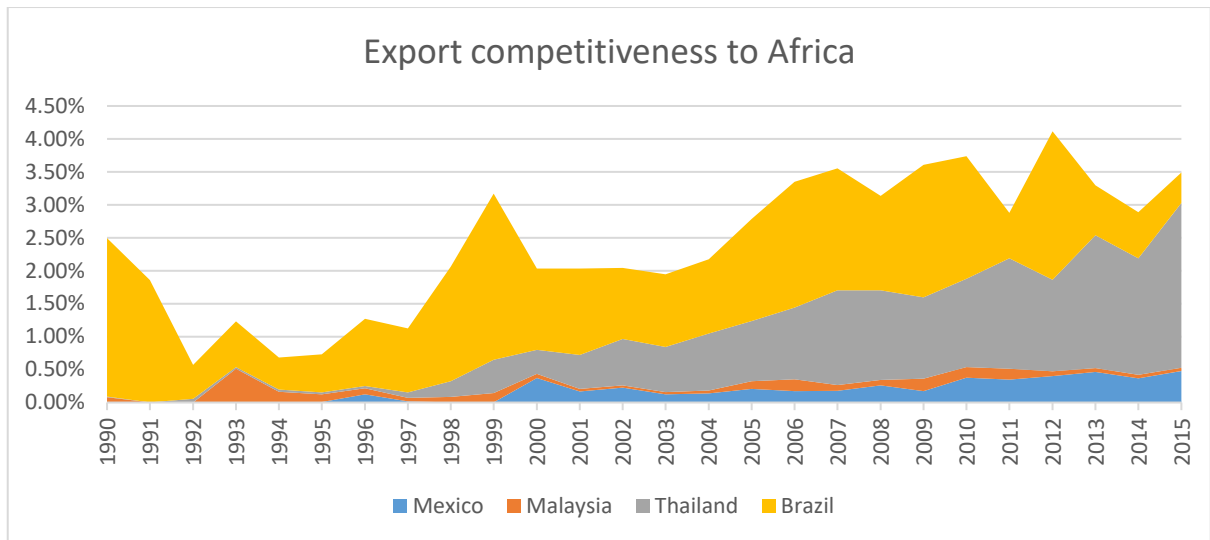


Figure 52 Export competitiveness to Africa

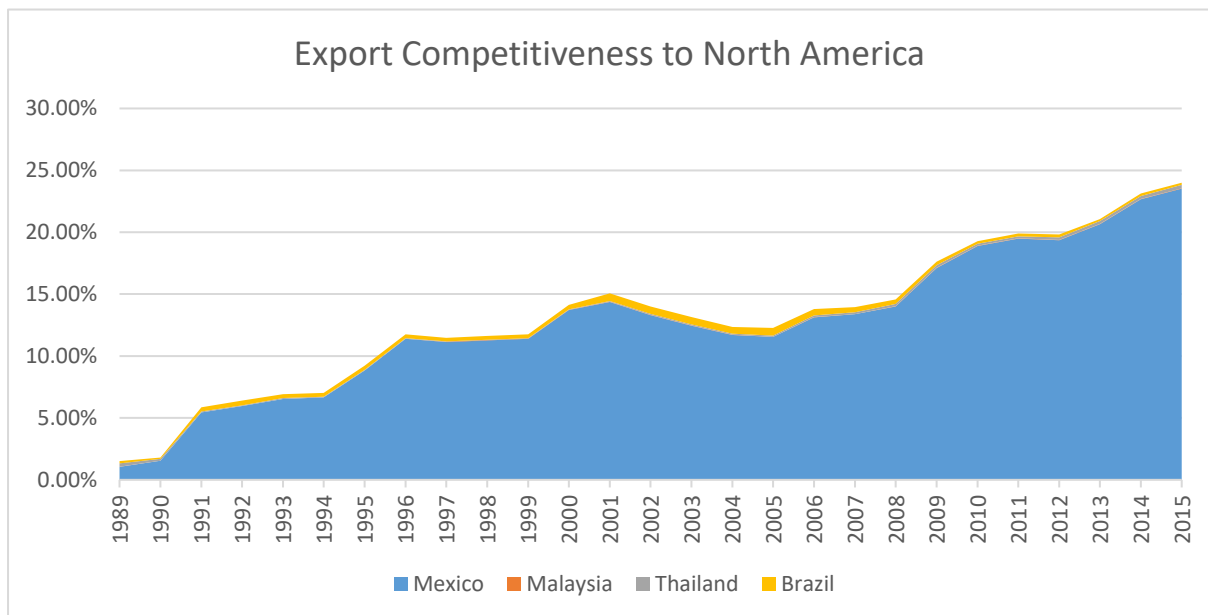


Figure 53 Export competitiveness to North America

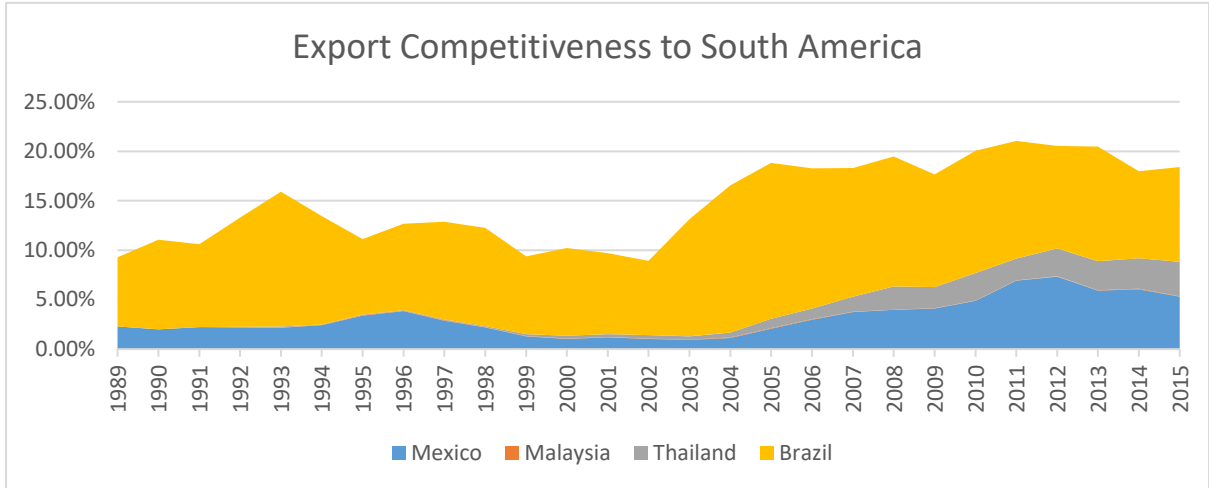


Figure 54 Export competitiveness to South America

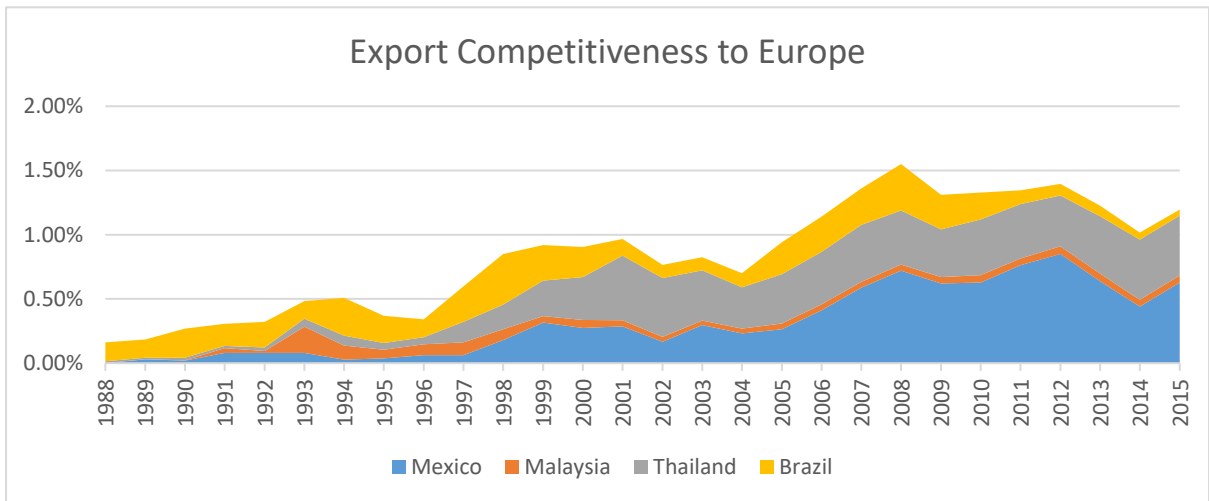


Figure 55 Export competitiveness to Europe

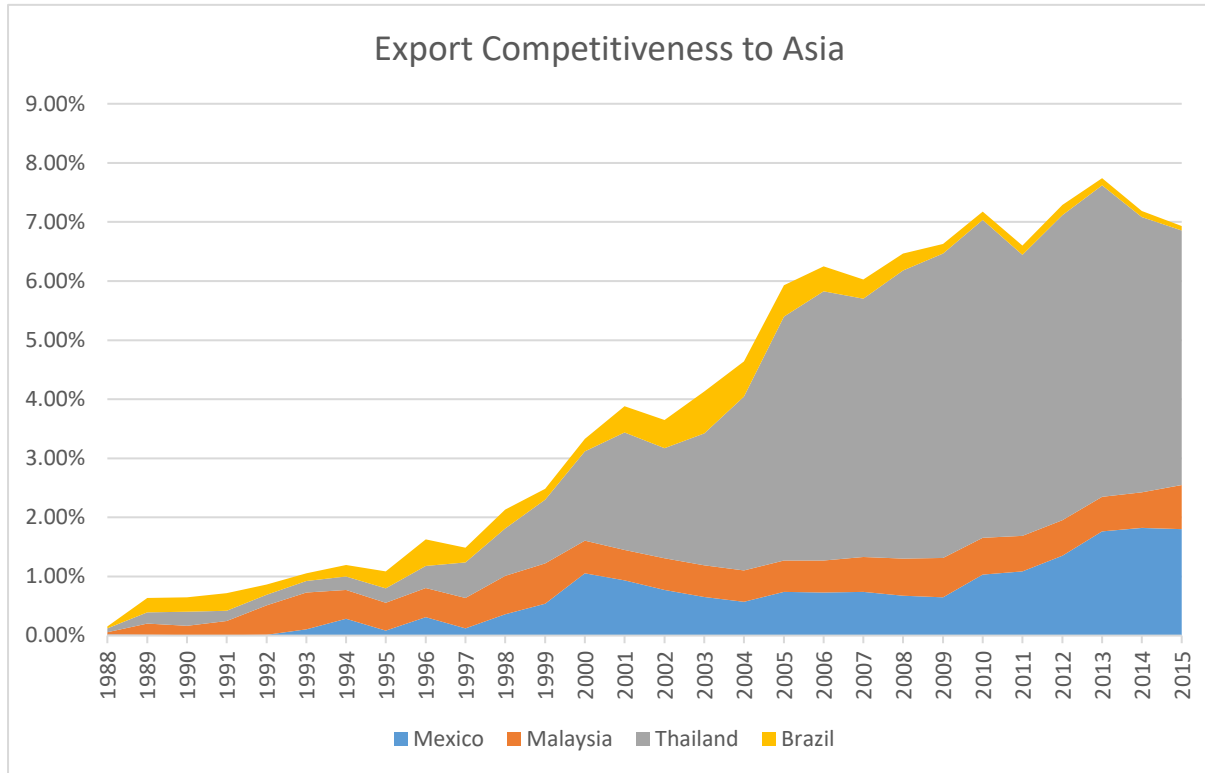


Figure 56 Export competitiveness to Asia

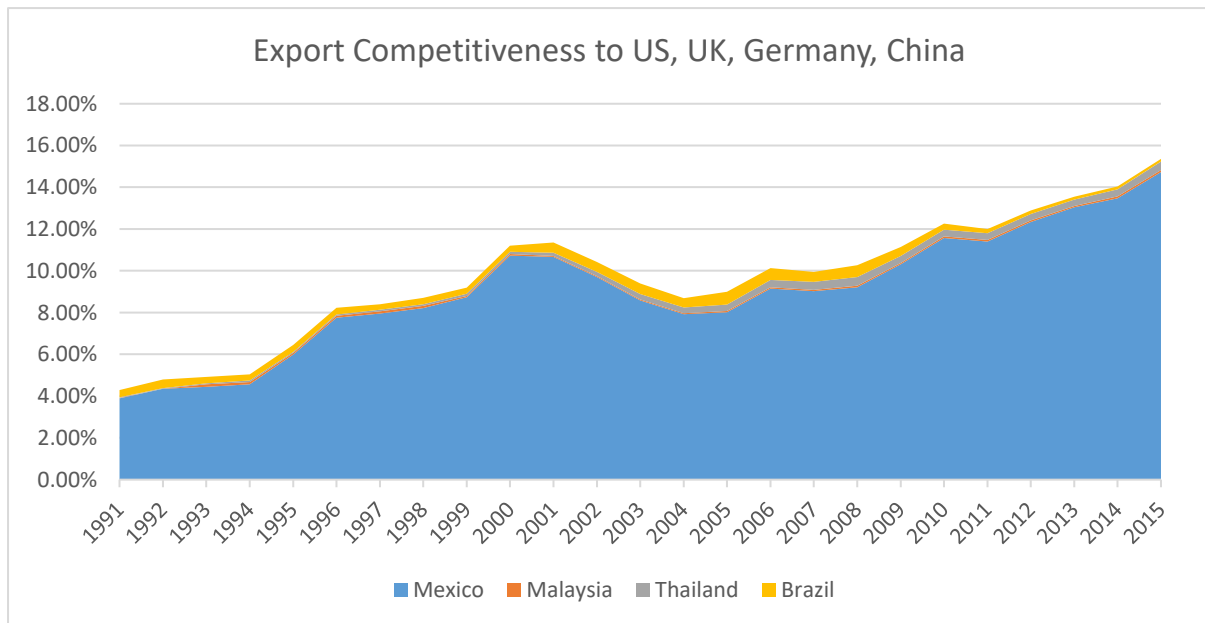


Figure 57 Export competitiveness to US, UK, Germany and China

9.7 Competitiveness analysis (contd.)

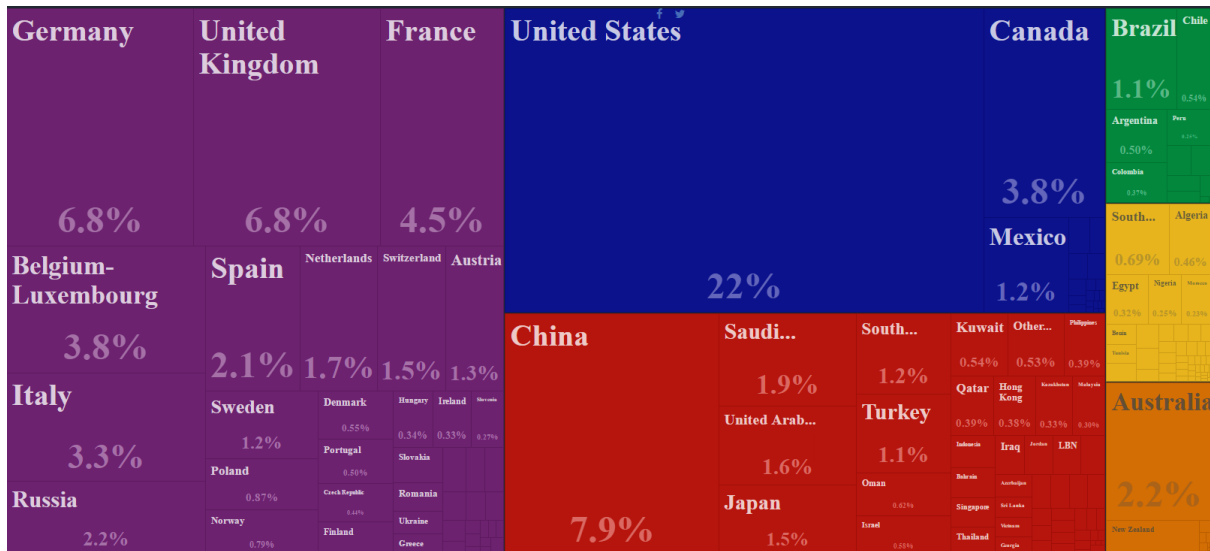


Figure 58 Export destinations for Cars (HS 8703) in 2014

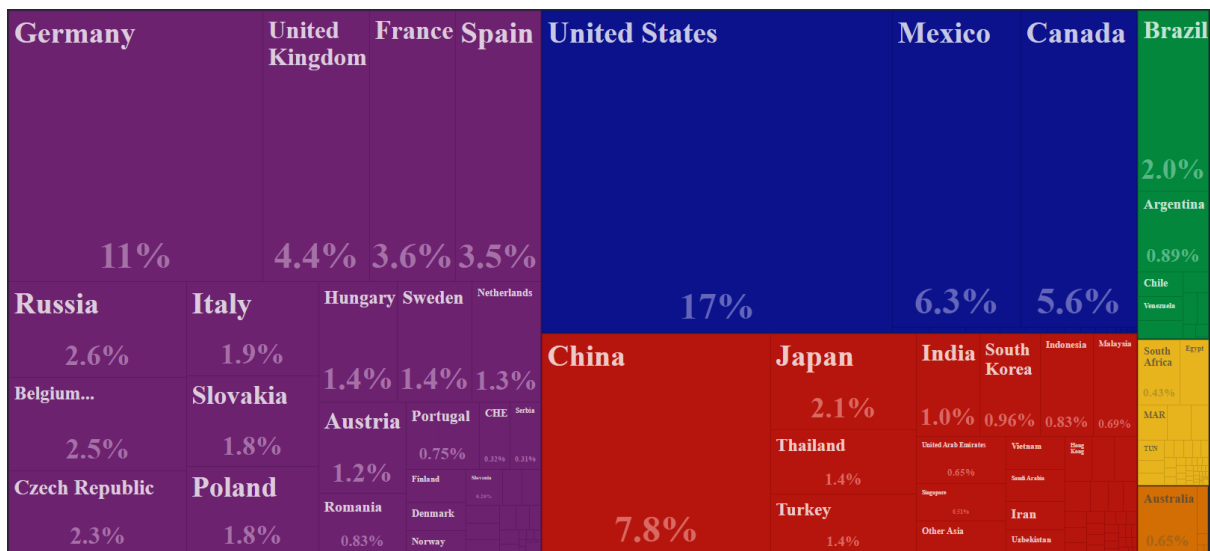


Figure 59 Export destinations for Auto Parts (HS 8708) in 2014

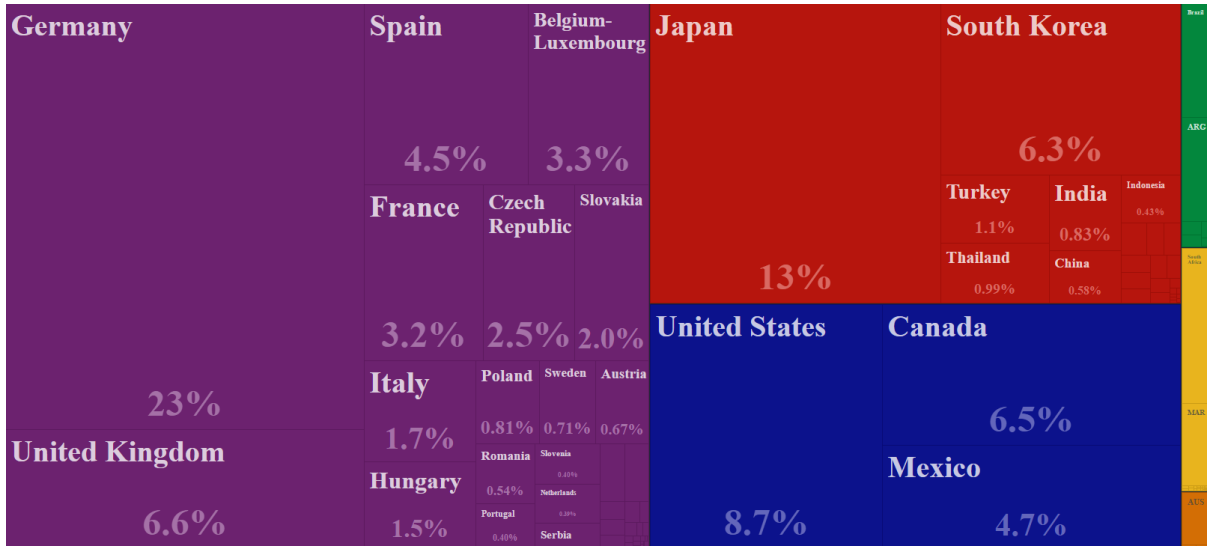


Figure 60 Import Origins for Cars (HS 8703) in 2014

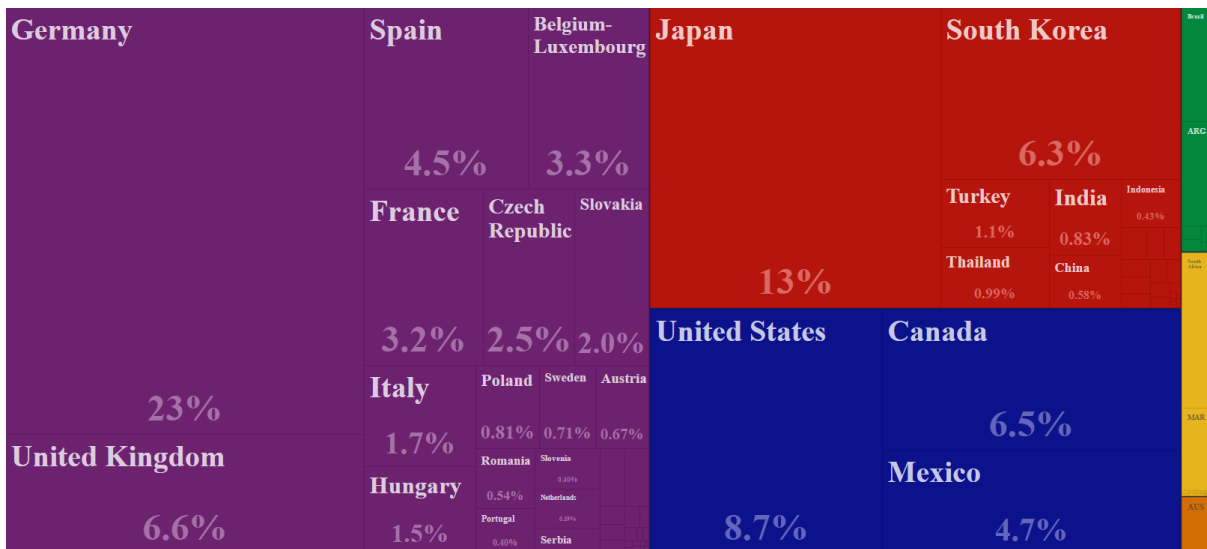


Figure 61 Import Origins for Auto Parts (HS 8708) in 2014

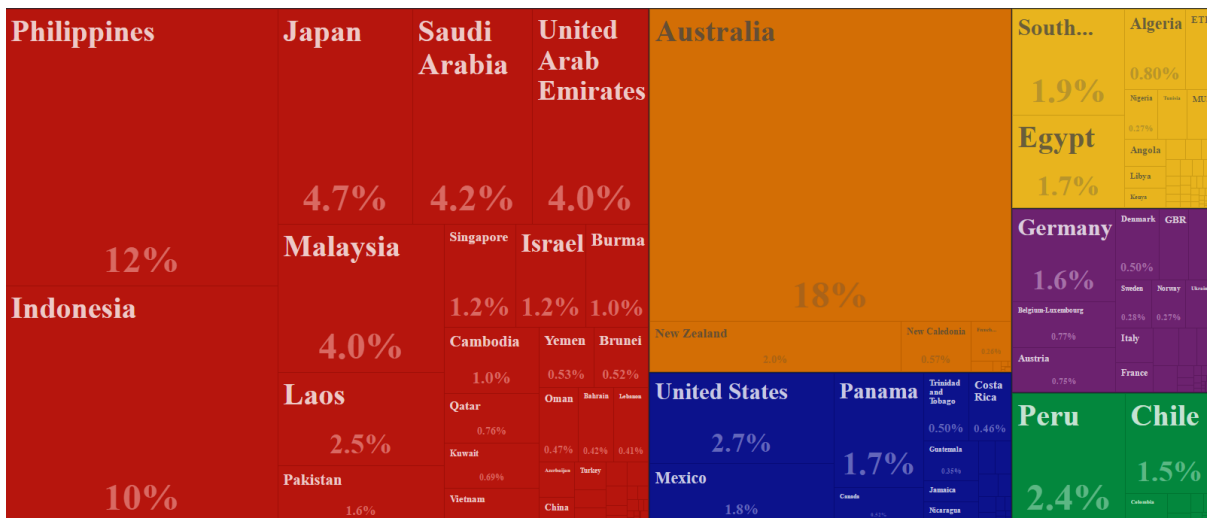


Figure 62 Thailand's export destinations for Auto Parts (HS2 8708) in 2014

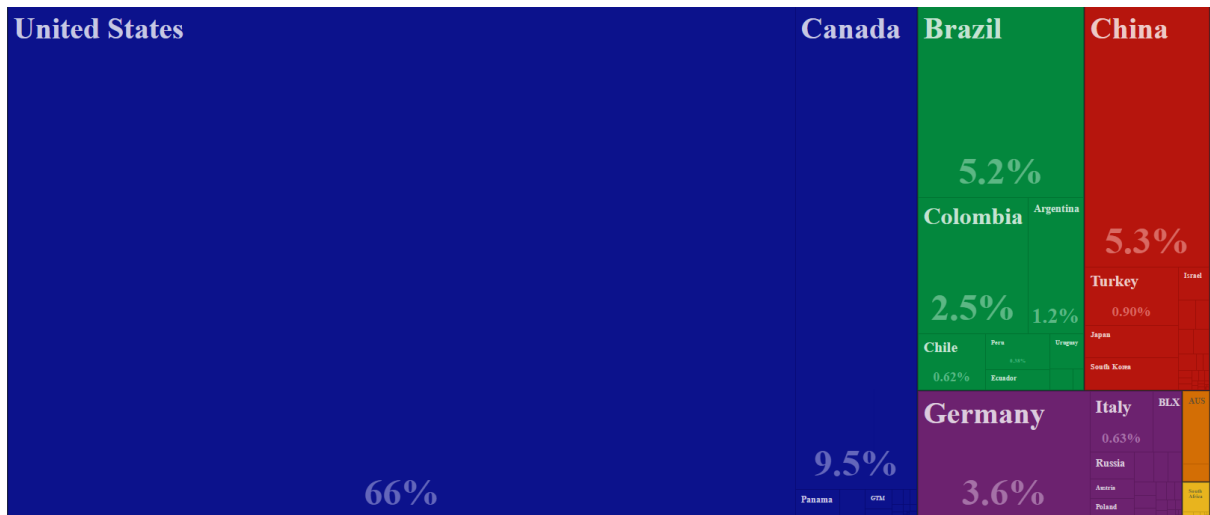


Figure 63 Mexico's export destinations for Auto Parts (HS2 8708) in 2014