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Why does China’s ICT (hardware and handset) industry has higher competitiveness than its Automotive?

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Introduction:

China has been know as the world's factory in the past decades. Its GDP became the second biggest after USA, and export contributed nearly 35% to the GDP growth(Li, 2013). But "Made in China" was regarded as cheap price with bad quality, since most of its export products were low value-added. As the global economy slowed down these years, this export-oriented economy would also be affected, and that is why China tried to develop high-tech industry to improve its international competitiveness, to transform its economic structure. ICT industry, specifically its hardware and handset, has achieved some international competitiveness. And this essay will compare Chinese ICT industry with its Automotive industry in terms of global competitiveness, and explain why ICT did better than Auto sector, which may give an inspiration about Chinese future high-tech development. ("ICT", used in the essay, is all about ICT hardware and handset.)

In the first part of the essay, the criteria of international competitiveness will be discussed and used to justify whose competitiveness is higher between ICT and Automotive industry in China. Comparison looks at three aspects of these two industries--- export and import, technological capabilities and industrial cluster. Data is collected and analysed to show the differences. Secondly, this essay will explain

what caused ICT sector stronger than Automotive through analysis of national institutional system. The institutions governing ICT and Automotive differ and also lead to different influences on these two sectors. Influences of institutional systems are discussed in three parts: corporate governance and finance, education and labor market, the role of culture---trust.

1.The comparison of competitiveness between China's ICT and Auto industry

Before discussing the international competitiveness of ICT and Auto in China, the criteria of competitiveness should be defined. According to Martin Srholec, export of high-tech products has limitation to reflect the level of technology-intensity activities. It cannot directly indicate technological capability which is an important factor to see the competitiveness of industries. So the perspective of cross-country production should be considered, which means the high-tech product exported may be part of the global production line and involves labor-intensity activities instead of tech intensity. Then the data of import including complete product and components should be used to help understand competitiveness. Another direct way to justify technological capabilities is to compare patents and R&D expenditure.(Srholec, 2007) With this methodology, the comparison of competitiveness of ICT and Auto will be analysed through the data of export and import, technological capabilities. And also, the size, economy scale will be compared in the industrial cluster. As Bill Russo said, who is an industry consultancy,"You have to achieve a certain size and scale at home before you can compete away".

1.1 Stronger ICT than Auto in export

In terms of export, China's ICT is more competitive than Automobile. According to graph1, the export of ICT goods has been increasing rapidly, grown into the biggest share (30% in 2012) in the world market since 2003, surpassing USA. And this export of ICT products accounted for nearly 27% of China's total export in 2012, which reflects how great ICT sector contributed to the economic growth (UNCTAD,2013). Compared with ICT, Automobile's export was not optimistic. The numbers of passenger cars and commercial vehicles present a slow increasing, and even declined in 2013 and 2014 (Figure2). Although Auto had great capacity in passenger vehicle production, producing 24% of the world's total passenger cars in 2014. But its export numbers only made up 2.66% of the total production (Figure3).

Secondly, data of import is used for better understand their competitiveness. It cannot be taken granted that the prosperous export of ICT represents higher technological capabilities in this sector. Seen in Figure4, from 1996 to 2005, ICT had an increasing trade deficit in electronic components, revealing the fact that China is also the biggest importer, 18% of world import of ICT goods (UNCTAD,2013). As for Auto, import grew much faster than export, and cars imported in 2014 exceeded the exported more than half (Figure5). As the price of imported cars is much higher, its total value overwhelmed the export a lot. Although the dependence on exported components means China's ICT lagged behind in some core technologies, there are more and more companies develop their own technology such as Lenovo, Xiaomi and Huawei. So

ICT still has higher competitiveness than Auto whose landscape of export is much weaker.

1.2 Stronger ICT than Auto in Technological capabilities

Technological capabilities is the key indicator of competitiveness (Srholec, 2007). And in this essay, it is justified through the patent records and R&D expenditure. The quantity of patents owned by each sector can be compared directly to see which one has higher innovation capabilities. Auto is among the most sophisticated industries which require more expenditure on research and development, and each year about 5000 automotive patents are granted in US (autoalliance, 2014). According to figure6, in 2013, China's application to EU automotive patent accounted for only 1 percent of the total applications where EU, Japan and US applied for more than 90%. This is not out of expectation since EU specially Germany, Japan and US have been known as countries producing gorgeous cars. It seems China's auto has very weak international competitiveness. In contrast with Auto, ICT catches up faster. From figure7, it can be seen that China's ICT-related patents (1999-2001) were less than most of countries, but increased to be the second place (2009-2011), even surpassing Korea.

In terms of R&D expenditure, China's ICT investment is high while Auto's is much lower than other countries. R&D expenditure of China's ICT reached 2% of GDP in 2011(figure7), and most of the investment was in the manufacturing sector (OECD,2013). Huawei and ZTE has invested more than 10% of their venue into R&D

(Simon,2014). When looking at Auto's, R&D investment was dismal. Compared with North America, EU and Japan whose R&D investment account for 4% of their revenue respectively, China's is about 2%, increasing slowly since 2005(figure8). However, if looking at the exact number of spending, there has been a significant gap between China and Japan, 2.5 US billion and 39 US billion respectively in 2013(figure9). In conclude, these patent and R&D record demonstrate China's ICT has higher technological capabilities than Auto sector, and also reflect different technological strategies which will be discussed in second part of the essay.

1.3 Stronger ICT than Auto in industrial cluster

China's ICT has formed into mature industrial cluster, but Auto is on the way. International competitiveness is not only gained through improving technological capabilities, but helped by the competitive advantages from industrial cluster. Porter pointed out, in the cluster, domestic suppliers, financial institutes, rivals, customers, related industries ect. are integrated together so that both company and sector's competitiveness can be improved (Porter, 1990). China has three mature ICT industrial cluster: Yangtze River delta, Pearl River delta and Bolai-rim area. According to China's ICT Development report, Bolai-rim area is the strongest ICT R&D pool in China, Yangtze River delta is cluster of many manufacturing semiconductors, and PRD is telecommunication hardware cluster. These three clusters of ICT highly contribute to the national ICT's competitiveness including export, technological capabilities. As for Auto, many countries' auto industry develops in

clusters as it involves a long value chain of production, like Detroit in America, Toyota city in Japan. But in China, Automotive industry is fragmented. Unbalanced development in related sectors and different interests for local growth make it difficult for China's auto industries into cluster(?). It is predicted that six areas: Northeast, Beijin/Tianjin, Yangtze River delta, PRD, Mid area and Southwest area, have potentials to form auto cluster in the future. The reasons of no auto cluster can be found in the second part of essay where all the differences of competitiveness between ICT and Auto are explained.

2. Different influences of institutional system on ICT and Automotive in China

As mentioned in the first part, ICT in China has higher competitiveness than Automotive industries, from the perspective of institutional analysis, that is because of influences from institutions. Based on Scott's theory, institution is'regulative, normative, and cognitive structures and activities that provide stability and meaning to social behavior'. And institution can be divided into two types: formal and informal.

Institutions shape the form of companies, and their interactions with companies cause dynamic strategies of business, finally leading to different landscape of industry which has more obvious effect on emerging economies (Peng,Wang,Jiang, 2008). China, as one of the rapidly developing economies, its institutions play varied roles in industries. This essay chooses institutions, formal ones as corporate governance, finance, education, labor market, informal one as the culture of trust, to analyse how they influence ICT/Auto firm's type, industrial scale, technological strategies,

innovation capabilities and inter-firm relationship. And this can explain why ICT in China has higher international competitive than Auto.

2.1 Governance and finance

Governance answers the questions of who own and control company, how to control company, what are the objectives of finance providers (Gospel&Pendleton, 2005). And this finally influences the technological strategies companies exploit, which also partially lead to less competitiveness of Auto. According to figure3, China has a large production capacity of auto but that cannot simply make it competitive. When looking at figure10, it can be found that the top10 best-sale auto companies in China are all sino-foreign joint ventures (zhong-wai hezi), which make these SOE auto enterprise more like co-packers without their own brands. This phenomenon can be explained by the governance system of Auto industries. With some policy constraint, the entry barrier for auto start-ups is higher (Liu&Tylecote, 2009), so private-owned auto companies are far more less than state-owned companies. These SOE auto enterprises are under control by managers with official levels, and they pay more attention to their improving rank rather than company's development, so agency problems usually happen in SOE Auto enterprises. That is why SOE has more political objectives instead of improving technology. These managers have limited auto expertise knowledge, and they focus on presenting good self-performance, short-term profit or political shows, such as Shanghai Auto Industry Corporation tried to improve Hongqi brand which is meaningless and waste of money(Toutiao, 2015). Then the question is

how can these SOEs produce complex cars without core technologies. There is a way. In order to meet managers' short-termism, they choose the dependent strategy by relying on joint venture with foreign auto enterprises. And it makes a large profit from helping foreign autos to expand market shares while domestic brand is not well developed . The worst is that they depended on buying a bundle of technologies so core technologies like producing engines and transmission are hard to learned and limited by FFF cooperation (Liu&Tylecote, 2009).

The dependent strategy of technological capabilities also costs a lot, which needs sufficient financial support even though it helps little with increasing Auto's dynamic technological capabilities but the static. "China does not yet have a market-based financial system, and it is bank-centric, state dominated (Liu, J.)." As these big auto enterprises are state-owned, they enjoy a large amount of loans supported by state or local banks, but private-owned auto enterprise tend to have difficulties in financing to support its R&D investment. All of that cause the unfair and under-developed auto industry in China.

As for ICT, the governance system is different from auto's and also the finance. Foreign direct investment plays a primary role in forming ICT industry cluster in China. As ICT belongs to capital-intensity and labor-intensity industry, when foreign companies invested to build big factories in the east, domestic private-owned small companies gathered around FDI to produce low-end products along the value chain

(Li,2005). According to SSIC, China had more than 29332 ICT companies in 2006 most of which were private-owned small-medium companies. These ICT SME has direct owner control so that they are more likely to adapt to the change of market and have flexible management. At the initial stage, these SME were patriarchal or artisanal, who had no good access to finance, then they chose the technological strategies of domestic imitative. After surviving the market competition, some SME grow into paternalist with more rule-based control, and adopted international imitative tech strategy. Again, they are lack of access to finance. At last, many paternalists became isolated hierarchy with formal management, and companies in this stage engage not only expert, shareholders but can be self-financed to invest more on R&D with defensive strategy. In 2008, total investments from ICT POE accounted for 35 percent of the market, reaching 18.84 billion US dollars, which contributed significantly to China's ICT growth (Sina,2008). Even special examples such as Huawei and Xiaomi, they chose international imitative strategy to learn technology and catch up at first, and appeared more defensive or offensive in terms of R&D innovation and management innovation. Unlike auto SOEs, ICT POEs grow step by step with different tech strategies to build more dynamic technological capabilities, and thus ICT in China is more competitive than Auto.

2.2 Education and labor market

China's education system with bias on vocational education cause the shortage of skilled workers which has more bad impacts on Auto industry. University education

was regarded as a way to the top pyramid of society, while vocational education is for those fail in their teenager period. This prejudice dates bake to Chinese ancient culture “Xue Er You Ze Shi” and was reflected in the surging number of university students from one million (1998) to seven millions (2013) (Ziran, 2013). The goal of Chinese advanced education is to build a world-level academic university system so vocational school receive less attentions and funding from the state. But the fact of university education is not elite anymore but mass production with general theories. Even the students studying Engineer Machinery Management may do not know how to build a machine after graduation since the criteria of graduation is academic essay instead of a good operating machine. On the other hand, vocational education lacks a formal training system, as different schools may have different standards. These conditions of education is a big constraint for Auto development since the production of auto is among the most complicated. Main auto enterprises in the world have more than 40% of workers are advanced skilled workers while 4.3% in China. For example, as for the job of mobile repairing, the structure of schooling degrees(middle school, high school, college) is 4:5:1 in China, but 2:4:4 in developed country (CET, 2013). In terms of labor market, it reflects the shortage of four types of talents: 1. the talent of management with knowledge of auto, international trade, law and marketing, 2. the talent of R&D with advanced automotive skills, 3. the talent of after-sale with knowledge of different components, 4. the talent of advanced skilled worker (CET, 2013). Both systems of education and labor market results in the weak innovation ability, technological capability and low international competitiveness for China’s

auto industry.

As for ICT, the education and labor market system play a positive role in the sector development. Unlike complex automotive training, education for ICT is much easier. The formal education system in the university again is too general to provide enough skills for ICT innovation. However, ICT cluster help to establish a social training systems including enterprise training and agent training which can be found in many advertisements online. As ICT talents are highly demanded in these east area, and also high salary attract people to learn related skills to get ICT jobs. The average payment for ICT jobs per month increases from 2653Yuan to 8640Yuan after professional training (Jibangong, 2014)! In the labor market, ICT jobs become a priority among other choices, followed by real-estate, finance. So these ICT clusters can easily attract lots of talents from different provinces in China. That is another reason why ICT is more competitive in technological capabilities.

2.3 The culture of trust

The culture of trust also has more negative impacts on Auto industry in China than ICT. “Culture shapes business, economic and management behaviour, in general, and in Asia, in particular.(Liu,J)” As the legal system is not as complete as developed countries’, when conflicts between companies happen, the side with political support will win. Then there is risk for cooperation and this causes low trust between companies. But Chinese believe guanxi since China is a kinship-based community

(Greif&Tabellini). People are connected by family and they are regulated by moral doctrines, which means people tend to behave well in their community to improve reputation. That is, Chinese people do not believe strangers, the interpersonal trust is low and so is inter-firm's. With lower inter-firm trust, how can Chinese build a competitive industrial cluster. Unlike American arms-length contract, Japanese highly coordinated system, German good collaboration of firms, China's ICT clusters formed mainly because of the influence of FDI and government policy after China's reform and opening. Also, most of the ICT SOE are original local enterprises which agrees with the culture of Guanxi. However, as automotive industry involves a much longer value chain than ICT. Without a higher inter-institutional trust and integrated cooperation, it is difficult to integrate all the suppliers along the production line.

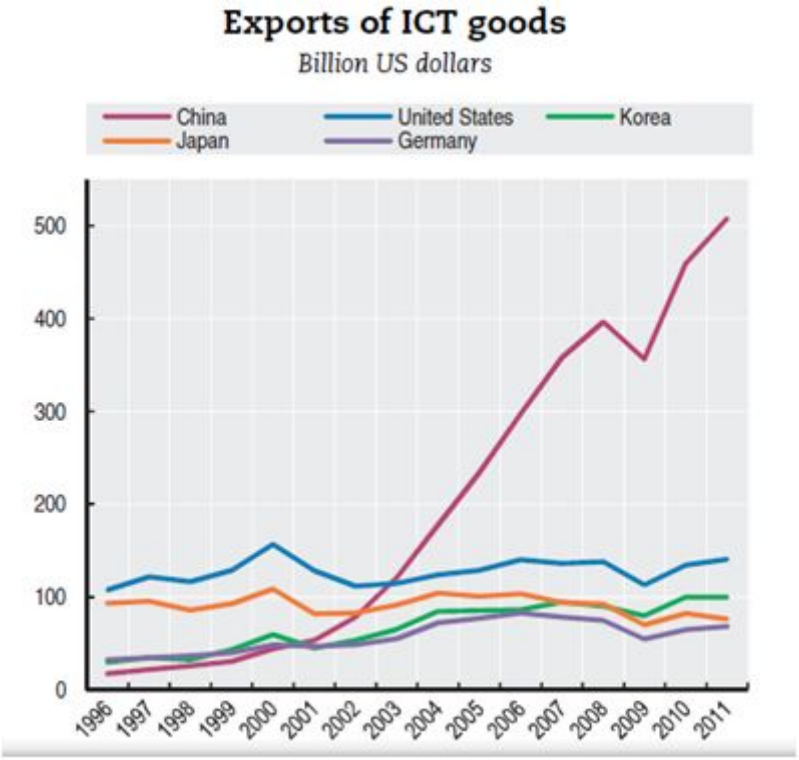
Conclusion

This essay draws conclusion that China's ICT industry has higher international competitive than its Automotive sector. China's ICT has become the world's biggest exporter, and it adopted dynamic technological strategy which has good outcome in the patent record. Also, the cluster of ICT sector provide advantages for ICT companies' expanding. However, Auto industry in China does not have these competitiveness. The reasons was explained with China's institutions. Auto SOE's dependent strategy mainly cause this industry lag behind, and the education system and labor market do not offer enough talents' support, also no cluster advantages help Auto to achieve economy of scale. To find out the reasons is to find better way to

solve it. Although Automotive industry is not as competitive as ICT in China, it is now trying to improve through encouraging more private-owned auto companies, building training system in vocational education, and developing the potential area into cluster in the future.

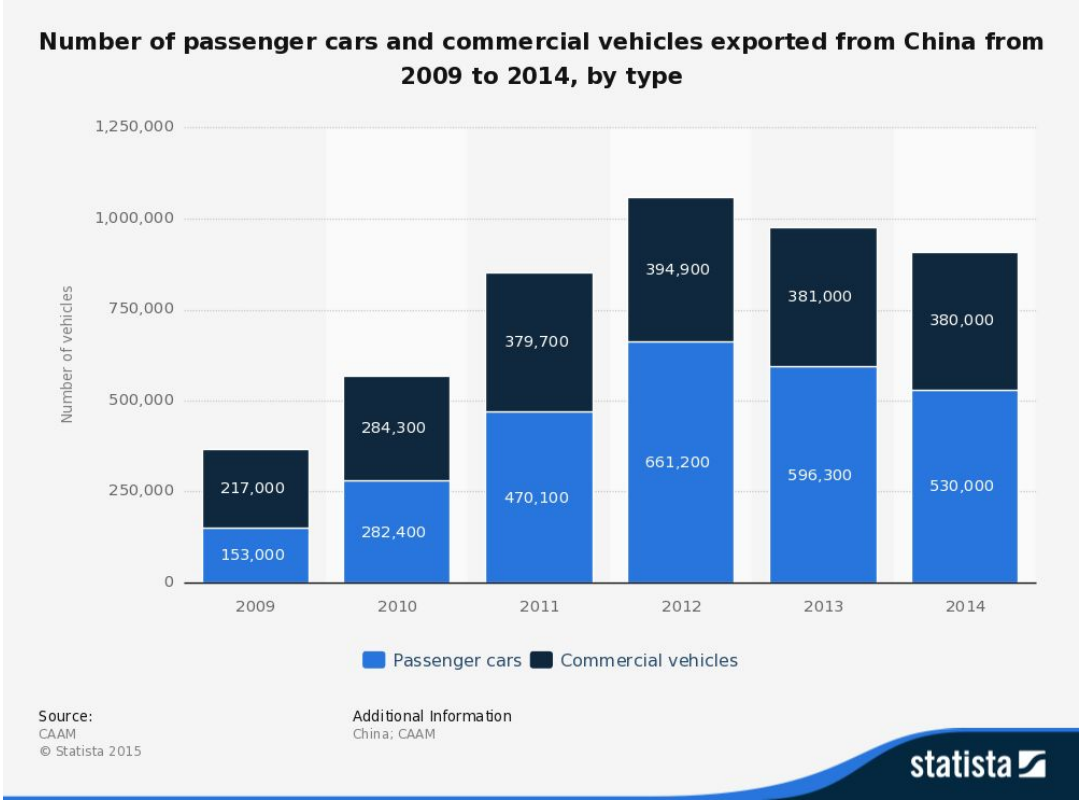
Appendix

1. Figure1

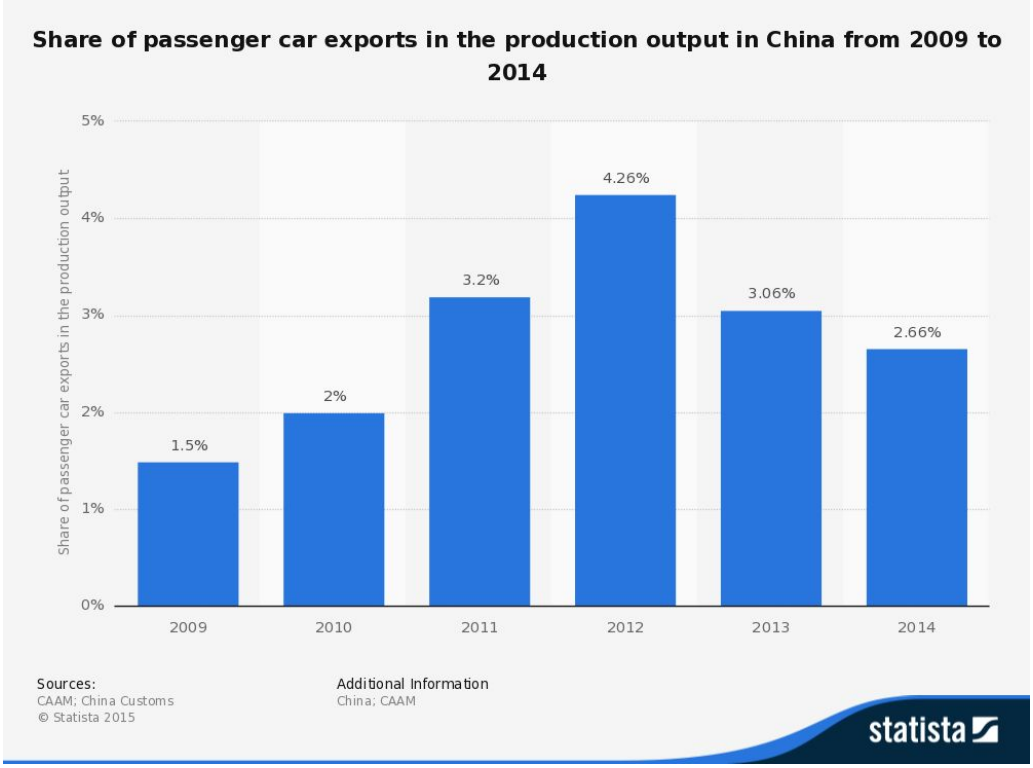


Source: OECD, 2013

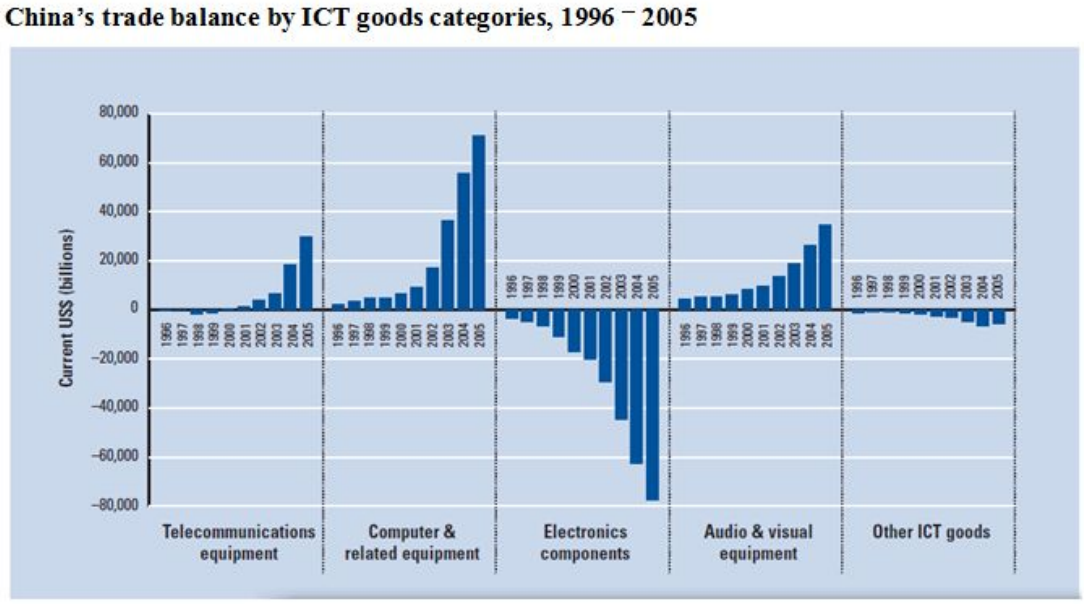
2. Figure2



3. Figure3



4. Figure4



5. Figure5

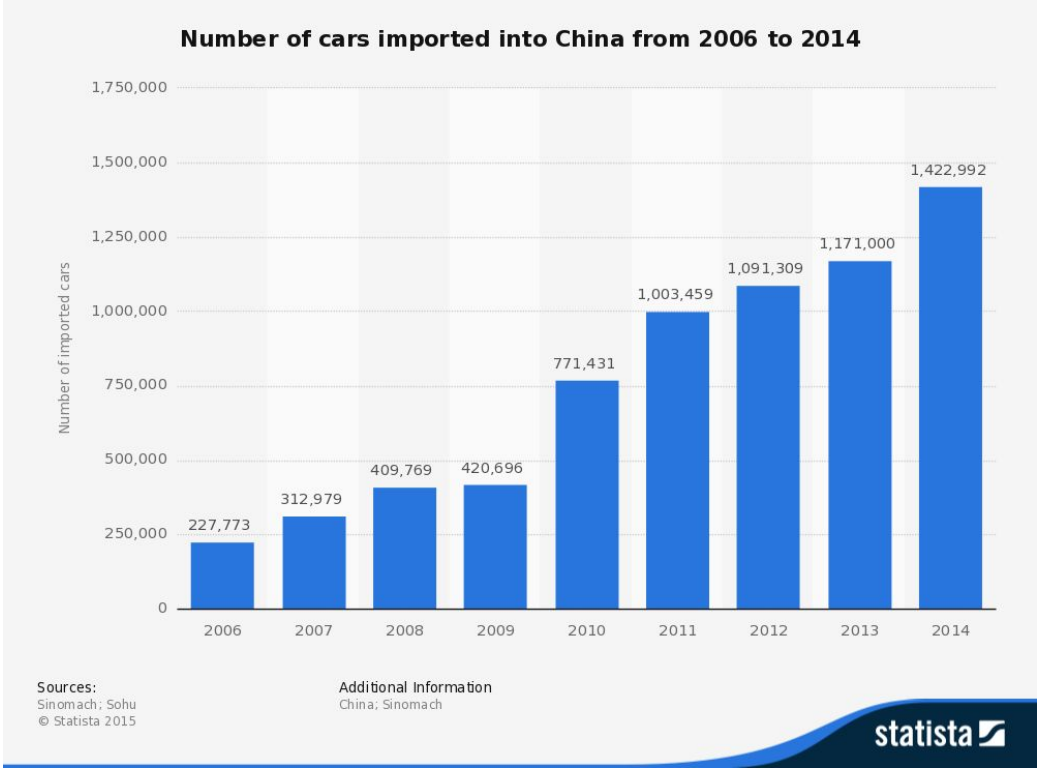


Figure 6

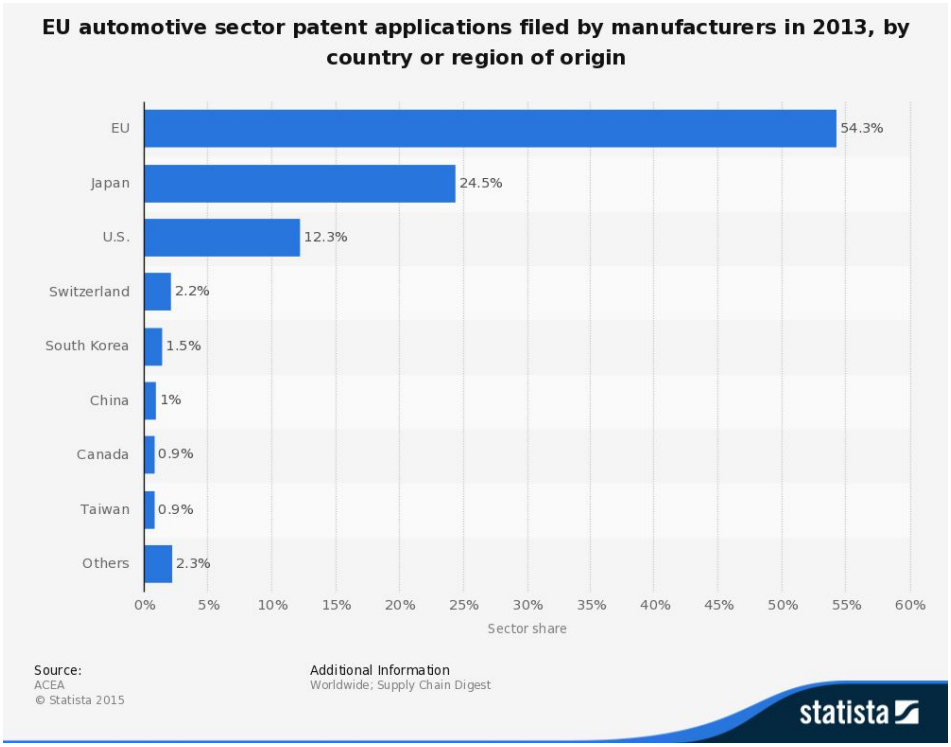
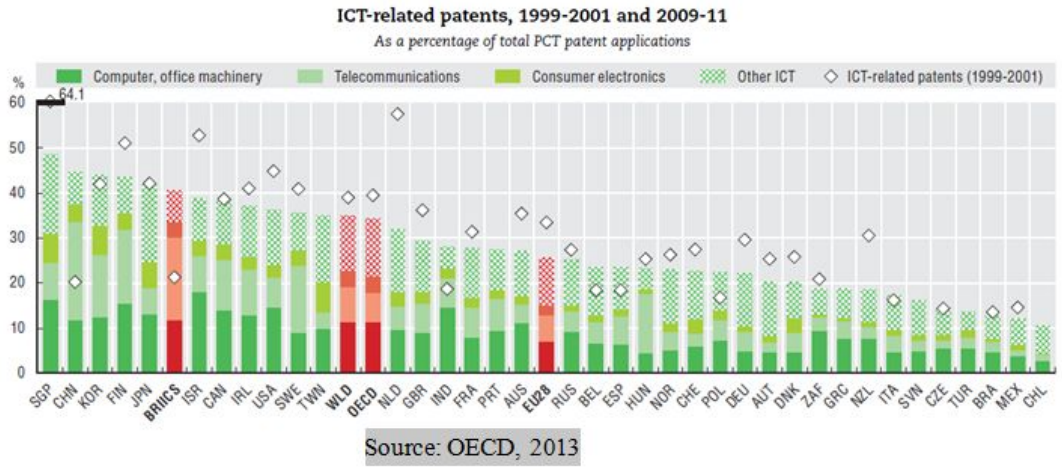
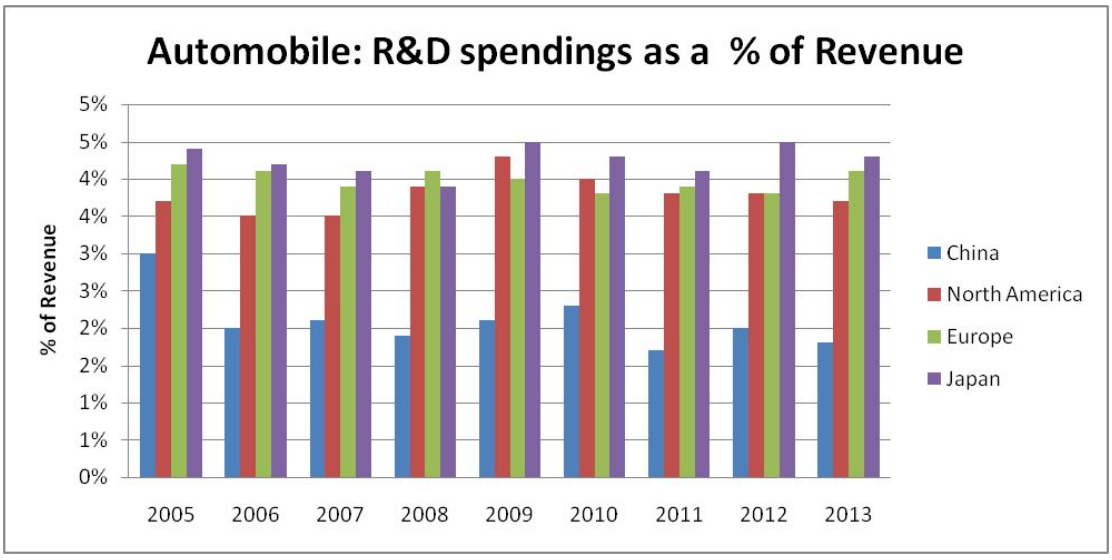


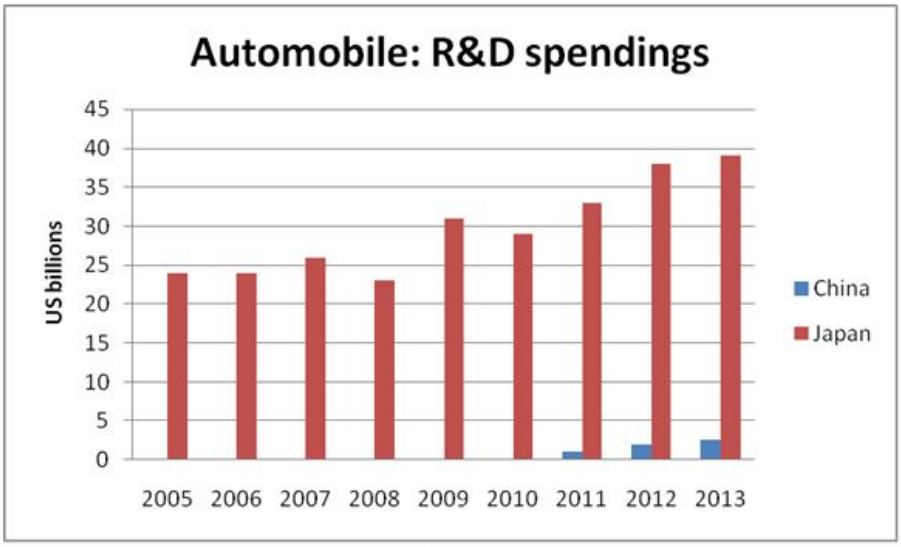
Figure7



Source: OECD, 2013

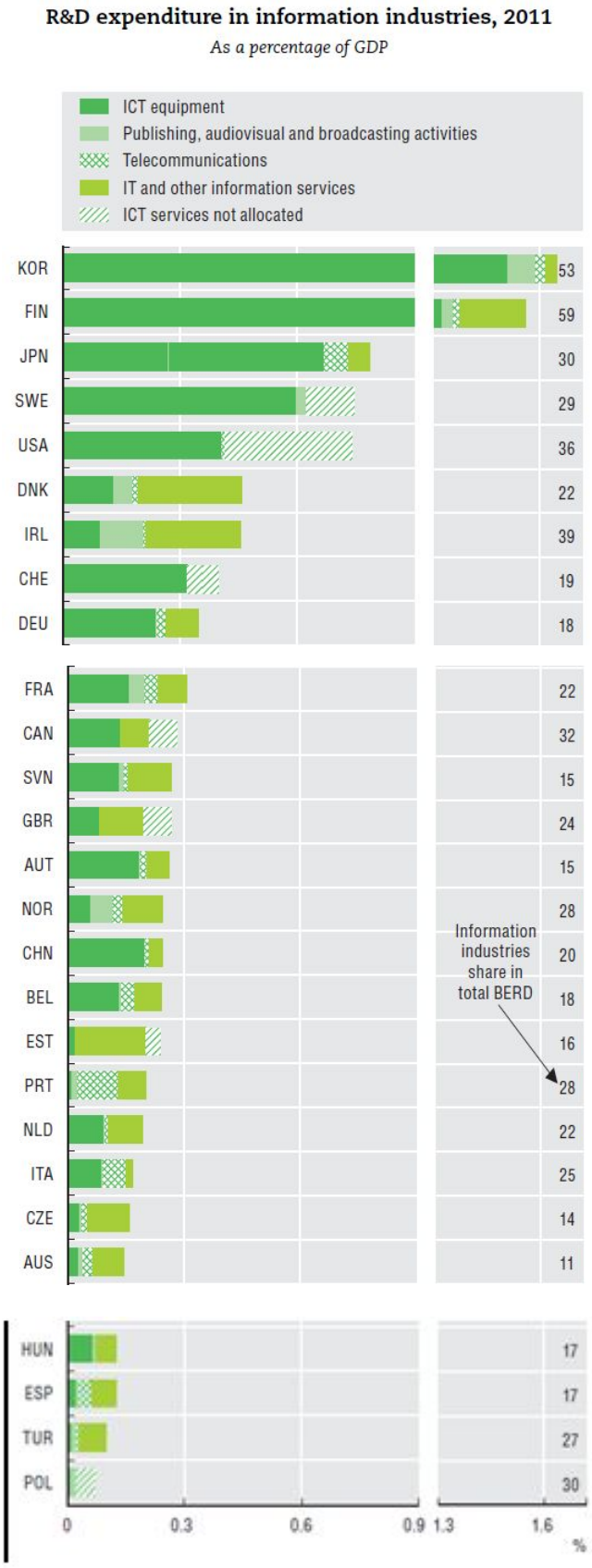
Figure8





Source:PWC,2015

Figure9



Source: OECD,2013

Figure10

2013年1-12月中国汽车厂商销量排行榜		
排名	厂商	1-12月累计
1	上海通用	1542559
2	上海大众	1525008
3	一汽大众	1513618
4	北京现代	1030808
5	东风日产	926229
6	长安福特	682686
7	上汽通用五菱	630550
8	长城汽车	627436
9	一汽丰田	554661
10	神龙汽车	552073

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