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A comparison of the development process of industrial structure between Mainland China Guangdong and Taiwan

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Abstract: As China's Guangdong Province has been in the forefront of Chinese growth, and it is one of the biggest contributions to Chinese economy, this paper compares the development process of industrial structure between Mainland China Guangdong province and one of Asian four tigers' Taiwan. This paper is aim to see if the structure components are similar or difference during the growth process. Taking a broader view in the more descriptive parts like GDP per capita, composition of GDP by industry, productivity of each industry, gross output value of each industry and each industry output and the composition of the employed population. Then applying the shift-share analysis to examine employment and productivity for three sectors primary industry (agriculture), secondary industry (industry) and tertiary industry (service). The results are that Guangdong started about 1980 from the same level as Taiwan about 1960, and despite fast growth in Taiwan (tiger economy), Guangdong caught-up with Taiwan and before 2010 was at about the same level. The GDP per capita of Guangdong exceeded Taiwan in 2008. In Guangdong, the high proportion of net output and low proportion of secondary employment population in secondary industry may caused by high-intense overtime working. The result of shift share analysis shows that the annual rate of change of GDP per capita of Taiwan is lower than Guangdong.

Key words: Structural change, industry, and shift-share analysis

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1 Introduction

A country's sustainability, stability and healthy economic development cannot exist without reasonable industrial structure adjustments and necessary industrial upgrading. Industrial structure is one of the determinants of economic growth. Since China's reform and opening up, the rapid growth of national economy realized continuous high-speed growth and scored remarkable achievements. With the huge population, China is the second largest economy in global economy (World Bank, 2015). Taiwan implemented a series of political reform, system reform and economic construction between 1950 and 1990, because of the result of reform was very successful, made the development of Taiwan by leaps and bound, became a model for many developing countries. In the increasing competition today, countries have constantly sought the motive power to maintain domestic economic growth, speed up the pace of development of science and technology in order to have a place in the competition. Since China is a relative huge country compare to Taiwan, and the economy of China's Guangdong province has been in the forefront of Chinese growth, it is one of the biggest contribution to Chinese economy. According to the Guangdong Statistic bureau (2014), Guangdong's economy (GDP), in the provincial administration region of People's Republic of China, it ranked the fifth in 1978, while since 1989 Guangdong has been ranking the first place till now. Through a series policies and measures to promote its upgrading of industrial structure. Since the 1980s, Guangdong absorbed large amount of Foreign Direct Investment, especially in the early 1990s, there was a high-speed development in industry, it has well developed manufacturing industry. Thus, in this paper I choose Guangdong to compare with Taiwan, these two rapid development regions,

1.1 Aim and Outline

In addition to the excellent performance of overall economy, for the past 55 years,

there is a considerable change in terms of the Taiwan structural change, including import substitution in 1950s, export-oriented in 1960s, high-tech industry began in 1980s and the development of service industry in the late 1980s. Guangdong also achieved excellent result in aspect of economic development. It applied the policy of “ three processing and one compensation” and the export-oriented; the structural change got a certain achievement.

The aim of this thesis is to see the similarity and difference of each industry in these two regions during the growth process, compare the change trend of three strata industry and the role of industrial policy in the process of industry evolution between Guangdong and Taiwan. To explore which stage of industrial structure that Guangdong and Taiwan has entered now.

The general outline of this thesis is first with descriptive method and then estimating with shift-share. Introducing the basic condition of Guangdong and Taiwan, Then taking a broader view in the more descriptive parts like comparing the two regions' GDP per capita, composition of GDP by industry, gross output value of each industry and each industry output, the composition of the employed population and the contribution rate of each industry to GDP growth. Usually the GDP per capita between 747 Dollar and 3033 Dollar (1990 benchmark¹PPP) is the period of rapid structure change. At the time of the level of GDP per capita were high (generally exceed 4232 Dollar), the proportion of manufacturing industry was sustained growth, but the speed of growth slow down. According to this indicator to find in which period that the structure change of Guangdong and Taiwan is rapid change. The relative productivity can roughly and objectively reflect the labor productivity of each industry, thus there is a comparison of the relative productivity between Guangdong and Taiwan. Last, choosing the period at about the same GDP per capita level for two regions Guangdong (1980-2005) and Taiwan (1960-2005), then applying the shift-share analysis to examine employment and productivity for three sectors primary industry (agriculture), secondary industry (industry) and tertiary industry (service) in this period.

¹ Benchmark recalculated from 1975 or 1990 on the basis of Maddison Project Database.

1.2 The basic condition of Taiwan and Guangdong

1.2.1 Guangdong

China's reform and opening up has undergone over 30 years, the economic growth at an average annual rate of 10%, it is the world's main source of low-cost manufacturing and regarded as "world factory". In 2009, China overtook Germany become the world's largest exporter, and overtook Japan in 2010, become the second largest economy after the United States. China's outstanding performance have created economic miracle in the last quarter century. Its economy developed rapidly, what is more important, this growth helped millions people get rid of deep poverty and also improved education, health and so on (Rodrik, 2006). Since the policy of open door and reform began in 1978, the gross domestic product in China has been growing more than 9 percent at an average annual rate (Douglas, 2011). There were three phases in China's modern development; the first phase was local rural organizations created in the Maoist period; the second was agriculture-led growth represented by the town and village enterprises (TVEs) in 1980s; the third phase was the technology growth in 1980s (Zhao, 2011). FDI also plays an important role in China's structure change, In the period of 1978 and 1998, China became the largest Foreign Direct Investment (FDI) receiver among all the developing countries and second recipient in the world, just after The United States (UNCTAD, 1999). Hong Kong is the largest investor in China in 1990s, and Taiwan is the second (Hou, 2007). In the 30 years of reform and opening up, Guangdong province has always been the "vanguard" of economic development in China, the achievements are exciting, According to World bank (2011), Guangdong's GDP (both current US\$ and PPP) surpass newly industrialized economies of Taiwan and Hong Kong and Singapore in 2008. Since 1980s, Guangdong province attracted a large amount of foreign investment. Especially in the early 90 s, the industry development was in a very high speed (Lin Zhao, 2011). In the period of 1985 -1993, the annual growth of industrial

added value was 28.5% (Lin Zhao, 2011).

From 1949 to 1978, China implemented the development strategy of import substitution with strong planned economy. In the full stage of the import substitution industrialization, influenced by the Soviet Union and Eastern European socialist countries, China set up the planned economy mode, which power is highly centralized, and achieved rapid economic growth, while this kind of growth is at expense of large amount of resource after all. This mainly manifests in following aspects: (1) Because of the department of import substitution are based on capital-intensive heavy industry, to provide capital goods for heavy industry, the planning management departments have to use price scissors artificially cheap agricultural products and the price of raw materials, the heavy industry sector has accumulated a lot of capital, the development of light industry was slow due to the lack of capital a serious shortage of consumer goods, and the heavy industry sector is a large number of idle capital assets. (2) Labor force was replaced in the import substitution department, which based in capital-intensive heavy industry, this caused the comparative advantage of labor did not play. (3) Under the planned economy the closed import substitution strategy cut of the link with international market, made China have to away from world economy and the trend of technology progress, eventually led to the slow development of the economy. After 1979, with the implementation of the reform and opening up, China began to change the import substitution to export-oriented policy (Ma and Li, 2007).

Since the reform and opening up, Guangdong mainly carried out the “three-processing and one compensation” and import substitution policy. The policy of “three-processing and one compensation” is a kind of trade forms that Guangdong province tried to set up in the beginning of reform and opening up. The “three processing” refers to processing materials supplied by clients, processing with client-supplied designs, and assembling, while “one compensation” refers to the compensation trade. The main structure of “three-processing and one compensation” enterprise is: equipment, raw materials, samples provide by foreign merchant, and it is responsible for the sales of all products, and Guangdong enterprises provide land,

plant and labor force. With the gradual development of Guangdong's manufacturing sector, after 2000, due to the policy of “three-processing and one compensation” has not changed and have not been able to lead the interests of enterprise structure change, so the policy shows more and more problem like: 1 The majority of the “three-processing and one compensation” enterprises depend more on the Chinese government export rebates while not lay emphasis on obtain export earnings. 2 Many of Chinese shareholders in “three-processing and one compensation” enterprises gradually pass the management right to foreign shareholders, and lack of impetus to create its own brand and localization. 3 Enterprises hire employees with lower price that violate Chinese labor policy, more companies can't even provide basic labor protection. 4 Serious damage to the environment. The “three-processing and one compensation” policy has made crucial contribution to the economic and social development, and reached the peak between 2001-2002, the number of employees was more than 3.5 million, the average annual export was 30 billion dollars (Chen, 2009).

Guangdong with favorable conditions of superior geographical advantage and policy advantage, foreign trade situation in Guangdong province has always been in a good momentum of development. Guangdong has been at the leading level in aspects of scale, structure and so on, at the time of Guangdong developed foreign trade, it also pay attention to the absorption of foreign advanced technology and management experience and further utilization, so as to take advantage of the export-oriented economy to improve the economic level of the province and economic structure, export-oriented have played an important role in terms of the success of economy in Guangdong. The rapid industrialization derived the economic takeoff occurred in Guangdong, thus leads to a prosperous manufacturing industry, and conduces economic wealth in Guangdong (Yu, 2014). But most of the export-oriented enterprises in Guangdong province are still in the early stages of export-oriented economy, it mainly performed as: main products are primary manufacturing products, while lack of intellectual property content and core competitiveness. Industrial structure of Guangdong has been adjusted according to a series of policies. The

proportion of primary industry in GDP gradually decreased, tertiary industry gradually increased since 1979.

1.2.2 Taiwan

East Asia created an economic miracle in the past five decades and the quality of life has seen a lot of improvement, especially in the newly industrialized countries (NICs) such as Taiwan. After Second World War, the whole East Asia took the road of independent development, and broke the highest economic growth record set up by western world from the industrial revolution. Before the Second World War, Japan colonized Taiwan made the land development, and the productivity of land was high. The labor productivity and per capita income were low, and the emerging market was slow. Taiwan's Gini coefficients was 0.289 in 1978, it has almost been the world's lowest income inequality region (Kuznets, 1988). Taiwan was very poor around 1960, after that per capita income in Taiwan experienced a rising trend (Rodrik, 1994). Taiwan adopted the policy of the traditional import substitution, with the multiple exchange rates, the trade protection was high, and it restrained financial markets. Taiwan had frazzled import substitution's "easy stage" in late 1950s (Rodrik, 1994). The extreme poverty was almost abolished in this region by the attractive improvement of life quality that accompanied this fantastic economic transformation. At the same time, the United States and other advanced countries were relegated the labor intensive to offshoring, in order to attract outside investment, policy makers decided to adopt the policy of freedom and open and promoted exports, thereby exports drive production. As a result of it, Taiwan became the processing base of both the United States and Japan, and the investment of two countries to Taiwan account for more than 60% of total amount of investment. In 1963, the average economic growth rate exceeded 9%. Taiwan gradually changed from an agriculture society to an industry society; and the electrical applicant, textile, plastic and other light industry was rapid growth (Rodrik, 1994).

Import substitution promoted rapid economic growth in Taiwan in the 1950s. During

the period of 1949-1957, Taiwan implemented import substitution strategy for local market. In order to establish the local manufacturing industry and other industries, Taiwan's authority adopted protection measure to import substitute industries. It has following several aspects: (1) actively developing the import substitution industries that center on durable consumer goods, especially the development of light industry for the internal market, at this stage local industrial system have been initial established. (2) Put import control and high tariff protection into practice (3) Adopting fiscal policy to cooperate import substitution. Export rebate is the most representative measures of this aspect. Export rebate refers to return tax payment of raw materials or semi-finished products imported which export product used. (4) Taiwan developed and implemented a set of complicated financial policy suitable for the development of import substitution. It mainly developed light industry like labor-intensive, import substitution industry during the period of 1949-1957, the import substitution mainly focused on textile, fertilizer, cement, glass, artificial fiber, etc. The industrial structure mainly concentrated on agriculture, industry was relative weak (Ma and Li, 2007).

In 1958-1960, it is the transition period that Taiwan first time from import substitution to export orientation, in more than two years, a series of sweeping policies were implemented. The measures mainly included: (1) Taiwan's financial sector in 1960 drew up the reward investment regulations, adopted a policy of tax reduction, the scope of the reward including planting, animal husbandry, forestry, mining, manufacturing, utilities, transportation, tourist hotels, etc. (2) In terms of trade policy, it phased out import quotas and gradually relaxed restriction on the import and export since 1958. The reason for this action is that Taiwan was to vigorously promote the development of export processing industry, because many raw materials demand by this industry imported for the sake of processing and export, coupled with Taiwan is lack of natural resources, so adopt more liberal imports policy become more imperative. In 1960s, Japan focused on developing the capital-intensive industry that give priority to heavy industry, the original light textile industry, assembly industry and the like labor intensive industry transfer to abroad one after another. Taiwan took

advantage of this opportunity began the development of the Japanese industrial gradient shift's labor-intensive industries (Ma and Li, 2007).

Although some export-oriented measures in the late 50's in Taiwan were promulgated and implemented, taken as a whole, Taiwan fully implemented export-oriented trade strategy started in the middle of the 1960's. Policies and measures promulgated and implemented during 1960-1981 were: (1) in aspect of industry policy, it first developed light industry which relatively small investment while quick returns industry, accumulated funds through large export light industry product especially labor intensive production, then promoted the development of heavy industry. (2) In terms of trade policy, it relaxed trade protection and changed the restriction on import to the policy of encourage export - of which including continue to implement the measures such as export tax rebates and relax import control. Since the mid 1960s, the booming developments of important export processing industry such as textile, plywood, metal products, electrical equipment, and the needed raw materials were almost depend on import. At the same time, in order to reduce export costs, machinery and equipment also needed to constantly updated, policies and measures could no longer be confined to relax restrictions on imports; as a result, eased restrictions on imports of trade policy in the end comprehensively transform to encourage exports. 3) Set up processing export zones, Taiwan took more preferential measures in order to attract foreign investors to invest in Taiwan, in 1965, the authorities announced the "regulations on the administration of export processing zones ". Under the impetus of the export-oriented strategy, the export industry got rapid development in Taiwan. During the period of 1960-1970, the average annual growth of export trade as high as 20.4%, during 1970-1981 was 14.5% (Ma and Li, 2007). However, the export oriented strategy caused problems of one-sided export processing industry development, industry proportion was unbalanced and the economy relying more on the international market. After the 1980s, Taiwanese authority implemented new trade policy, at the same time of improved degrees of trade liberalization, the key point of the policy from the past promote rapid economic growth change to the industrial structure improvement towards the direction of the

high and new technology. During the period of 1981-1990, was the period of modern service industry rapid development period. The first half 1980s, the structure of industrial structure was relatively stable, in the middle and late period there was a significant change, industrial growth was slow and service industry expanded rapidly, it replaced the leading role of industry in the economic activity. In the 1980s, Taiwan again realized the upgrade of industry structure, gradually developed emerging pillar industry- electronic information industry. In the tertiary industry, business, finance and insurance accounted for 1/4 and 1/3 of the service industry (Zhu, 2006). From 1990 to 2000, it is the period of the rapid development of high tech industry. The service industry developed sustainably, according to the Taiwan statistic data book, the service industry output value of GDP in 1996 was more than 60%, it become one of the symbol that Taiwan entered to developed society (Zhu, 2006). At the same time, the technology-intensive industry rise rapidly, its percentage share of output value accounted for 24% in 1986, there is an increased by 10% in 1995 in manufacturing industry. As a result, Taiwan's economy entered the new stage that drive industrial structure upgrading through high and new technology.

2 Literature review

2.1 Petty-Clark laws

In the 17th century British economist William petty in his masterwork political arithmetic pointed out: manufacturing industry can get more income than agriculture, and business will be able to get more income than manufacturing. For example, he said, farmers could earn four shillings a week in England, so a seafarer's income is three times as much as a farmer. Petty also noted that, for the Dutch, as most of the population engaged in the manufacturing industry, so the per capita net income of the Netherlands was much higher than other European countries. Petty's description of each industry income, explains the regularity of the income's relative differences between industries, and is called the Petty's theory (Li, 2014).

Colin Clark collected and organized the statistical material of a number of countries, he published *The Conditions of Economic Progress* in 1957, in accordance with passing decade the transfer of labor force among primary, secondary and tertiary industry, and got the conclusion: with the development of economy, the increase of per capita national income level, labor force from the primary industry to secondary industry first, when the per capita national income rises further, labor force moves to the third industry. Clark believes that this is due to in the economic development each industry appears relative difference in income (including additional value). And this point has already explained by Petty, thus, people later took Clark's finding to be the Petty-Clark law (Li, 2014).

Petty-Clark law suggests that the higher per capita national income level, the lower the proportion of the labor force in primary industry, and the proportion of labor force in secondary, tertiary industry are relatively high. Compare with it, the country with low per capita national income, the proportion of primary industry labor force is relatively high, and the secondary and tertiary industry labor force is relatively small.

2.2 Kuznets industrial structure transformation theory

American economist Kuznets further collected and organized a giant data of over 20 countries on the basis of Clark, according to this, from two aspects of national income and the distribution of labor force between different industries, he made an analysis and research in terms of industrial structure with the economic development. Kuznets refers to the primary, secondary and tertiary industry as agriculture industry (include agriculture, forestry and fishery, etc.), industrial sector (include mining, manufacturing, construction, gas, water supply) and services industry (including business, bank, transportation, post and telecommunications, real estate, government agencies, defense and other service industries) respectively (Li, 2014). His main content of the theory of industrial structure transformation is as follow:

First: From the angle of longitudinal studies, Kuznets analyzed each industry's change trend of output value and labor force proportion in total amount. He argues that for developed countries, the gross national product (GNP) distribution trend is similar in the three industries—a significant reduction in the sector of agriculture's share, considerably increase in the share of the industrial sector, the share of service sector rise slightly, but there are a few countries such as France and the United States is an exception that appeared more obvious rise. The trend of labor distribution in the three industries and the change tendency of the distribution of gross national product (GNP) is roughly same, just the rising trend of labor proportion in secondary industry not obviously, and the significant increase of the labor proportion in the tertiary industry. For catch-up countries and underdeveloped countries, the change trend of the industrial structure is the same as developed countries.

Second: From the perspective of cross-sectional compared the distribution of different countries in three industries in aspects of the proportion of output value and total labor force, and got the same conclusion as the longitudinal analysis. This is to say, in general, the lower the proportion of GNP per capita and total labor, the higher the proportion of the industry sector and service sector, and vice versa.

Third: He reveals the change trend of proportional relation between output value and labor occupied that the three sectors have created. Kuznets pointed out that the lower the per capita national income level, the larger gap among comparative labor productivity of agriculture sector, industrial sector and services sector. The reason is that underdeveloped countries mostly are agricultural countries; the proportion of agriculture labor is high, while developed countries mostly are industrial countries, and the proportion of agriculture labor is low. So if a poor country changes to a rich country, it has to vigorously develop non-agricultural industries, and accelerate the transformation of agricultural labor to non-agricultural fields (Li, 2014).

2.3 Shift- share analysis

From Chenery, Robinson and Syrquin (1986), economic growth is considered to be one aspect of the product structure transformation that is needed to satisfy changing demand and more efficient use of technology. From the perspective of imperfect prospect and the limitation of factor mobility, structure changes are most probably occurring in the case of disequilibrium; in factor markets it is specifically true. As a result, labor and capital shift from the sectors of less productive to more productive can lead to growth spurt. In spite of this, structure analysis has not got a strict formulation the same as general equilibrium theory, but it offers a foundation to empirical study.

In the method of shift-share analysis, a region can be broke into its sectorial parts. By means of resolving small sectors existed in a region, we can know a region by a course of resolving its crucial components. A varieties of economic dynamic's measurement has been applied this method, such as productivity and employment change (Haynes and Parajuli, 2012).

Fabricant (1942) first used the shift-share method in terms of measured labor requirements per unit of output. The shift share analysis is more comprehensive and dynamic compares with other methods, it can reveal the extent and reasons of the region and the city industrial structure change, and determine the direction of future development. Shift-share analysis has been applied for describing the economic growth of industry and regional and inspecting regional and industrial competitiveness and structural effect emphasizing changes along with time (Sirakaya, 1995). Shift share analysis regards the change of regional economy as a dynamic process; taking its region or the country's economic development as a frame of reference. Decomposing its own regional economy in a period of change into three components.

From industrial structure and competitiveness two aspects shift-share analysis explain the difference of regional economic growth. If an area, each industry growth rate was

exactly the same as the same industry throughout the country, then exclude the growth rate difference caused by each region the same industry while competitiveness is different, so a regional economic growth and the economic growth of the nation's difference is formed by structural factors. If a regional industrial structure and national was exactly the same, the difference between economic growths can only be explained by the regional competitiveness. Therefore, shift-share analysis is a kind of method both can explain the determinants of regional growth, that is the calculation of the degree of the structure factors and competitive factors' effects, and at the same time also the compare method of structure determinant factor difference of regional economic growth.

Wang and Sizrmai (2008) researched the structure change's dedication to the industrial productivity and aggregate manufacturing in China. They applied the method of shift-share analysis to verify three forms of structure change: the transformations in production's sectorial structure, the ownership structure transformations, and the transformations in production's regional sectorial structure. They detected proof of a structural change dividend. And in the early 1980s the dedication of ownership structure was negative to productivity growth, it turned positive after 1985. The comprehensive dedication of sectorial and ownership shifts are higher than the dedication of regional shifts.

3 method and data

3.1 Framework for the comparison

The industrial structure was divided according to the order of social production activity and historical development, the sector's product that comes directly from the nature is called primary sector, primary product after reprocessed is called secondary sector and tertiary sector providing various services for production and consumption. It is the general classification of industrial structure in the world, but the division is not the same in different countries. The division of three industry sectors is:

Primary sector: agriculture (including planting, forestry, animal husbandry and fishery)
Secondary sector: industry (including mining, manufacturing, water, electricity, steam, hot water, gas and other supplies industry) and the construction industry. Tertiary sector: Other industries except primary and secondary sector's industries.

According to the general pattern of the evolution of the structure change, any country (or region) in the early stage of economic development would focus on agricultural development. Typically, from the perspective of the change of three sectors GDP proportion, in the starting point of the industrialization, the proportion of primary industry is higher; the proportion of secondary industry is relatively low. Because of the market economy country (or region) has been made great progress in marketization at the beginning of the industrialization. The proportion of tertiary industry on the basis of business and service is high. With the development of economy and advancement of industrialization, the proportion of primary industry continued to decline, the proportion of secondary industry rapidly rising, and the proportion of the tertiary industry is slowly increased. When the proportion of primary industry dropped to below 20%, the proportion of secondary industry increase to higher than tertiary industry and accounted for the largest proportion in the GDP structure, industrialization entered into intermediate stage. Industrial sector increases will lead to the extension demand for tertiary industry, making the proportion of tertiary industry continue to increase and eventually make the tertiary industry become the main force of economic development (Chen, 2000). As a rule, when the proportion of primary industry dropped to below 10%, and the proportion of the third industry exceeds the second industry and become the main force in the three major industries, and then the industrialization reached the advanced stage.

3.2 The model of shift-share analysis

In order to evaluate how much the structural change dedicates to productivity growth, it is important to differentiate between the dedication of the productivity growth within sectors and the dedication of shifts between sectors. When analyze the

structural change's influence, it is desirable that analyze the shifts' influence according to both capital and labor on TFP (total factor productivity). Nevertheless, in most conditions due to the insufficient data the analysis has concentrated on the shift of labor (Wang and Szirmai, 2008).

The method of shift-share analysis has been widely used in the decomposition of productivity growth. The shift-share models from the supply side highlight the effect of shifts of factor inputs. There are three terms in the standard shift-share model (Timmer and Szirmai, 2000).

$$\frac{P^t - P^0}{P^0} = \frac{\sum_{i=1}^n (P_i^t - P_i^0) S_i^0}{P^0} + \frac{\sum_{i=1}^n (S_i^t - S_i^0) P_i^0}{P^0} + \frac{\sum_{i=1}^n (S_i^t - S_i^0) (P_i^t - P_i^0)}{P^0}$$

Where

P^t is the aggregate labor productivity at year t;

P^0 is the aggregate labor productivity at year 0;

P_i^t is the labor productivity of branch i at year t;

P_i^0 is the labor productivity of branch i at year 0;

S_i^t is the employment share of branch i at year t;

S_i^0 is the employment share of branch i at year 0.

There are three terms in the right side of the equation; the first one denotes the impact of the productivity growth within branches. The second term is the static effect of reallocation of labor among branches with differing levels of labor productivity. The last one is an interaction effect of labor shifts and productivity growth. It can be seen as the dynamic effect of shifts towards sectors with higher or lower than average level of productivity growth. The last term will have a positive influence on productivity growth if labor moves to branches where is increasing more quickly than the average

level sectors. It will have a negative effect if labor moves to sectors where productivity is improving slower than average productivity growth. (Wang and Zirmai, 2008).

Much research in terms of growth and structural change used this shift-share method. It is inevitable that this method has some disadvantages; first, the character of the demand in structural change cannot show in this technique. Second, the labor productivity confined this analysis; since aggregate total factor productivity can be decomposed only under the condition of there is adequate data of sectorial capital stocks (Timmer and Szirmai, 2000). Third, shift-share techniques neglect the size of economy (Wang and Szirmai, 2008).

3.3 Data

The data used in this article all come from the official websites and administrative records. For the first part, GDP per capita of Guangdong, the data for Guangdong from Guangdong Statistic Yearbook and Maddison Project Database, the data for Guangdong is calculated according to Guangdong constant GDP per capita and China GDP per capita in 1990, since for Guangdong case the problem is that only value added in Chinese Yuan are available, by assuming that the price level (and PPP) in Guangdong has been the same as for China to examine the Guangdong series in 1990 PPP dollars. Thus, by comparing the GDP per capita figures in Yuan for Guangdong and China in year 1990, I found that the level of GDP per capita was 50.2% higher than in China as a whole, then I recalculate the Guangdong volume series of GDP per capita from Yuan to 1990 PPP dollars. The data of composition of gross domestic product and the sector's data for Guangdong are from Guangdong government statistic information network. Last, for the shift-share analysis database, the data used on employment of each industry and value added in constant prices. The data of employed persons of each industry derived from Guangdong government statistic

information network .The data of gross value added index volumes is derived from Guangdong government statistic information network

The data of GDP per capita of Taiwan derives from the Maddison Project Database. The data of composition of gross domestic product and the sector's data for Taiwan are from statistics of R.O.C. For the shift share database, Taiwan also used on employment of each industry and value added in constant prices. The data of employed persons of each industry derived from Groningen Growth and Development Centre Research Memorandum (Timmer, Vries, & Vries2014). Since the labor forces were in the condition of high-insensitive work long hours in Guangdong just as the most media have been reports (Chan, 2008). Employment is number of employed, then worked hours may make a difference between countries. The data of gross value added index volumes is derived from 10-sector database from Groningen Growth and Development Centre Research Memorandum. For both Guangdong and Taiwan the dataset is only defined as: primary industry, secondary industry and tertiary industry. The volume data in constant prices were used in this analysis; otherwise inflation would distort the results. The dataset for the shift-share analysis is constructed like this, following the method mentioned above.

4 Comparison

4.1 The comparison of GDP per capita of Guangdong and Taiwan

In economic growth, there typically exists a certain regular relationship between economic growth and industrial structure. When the level of economic development was low (the Gross Domestic Product per capita was low), industry (manufacturing) as a share of GDP per capita was small. After GDP per capita entered medium level, the speed of structure change become rapidly. Usually the GDP per capita between 747 Dollar and 3033 Dollar (1990 benchmark² dollar) is the period of rapid structure

² According to Madison Project database, change the benchmark from 1975 to 1990.

change. At the time the level of GDP per capita was high (generally exceed 2010 Dollar), the proportion of manufacturing industry is sustained growth, but the speed of growth slows down. As the economy continues to grow and mature, the light industry as a share of industry sector decreases, while the heavy industry as a share of industry sector increases.

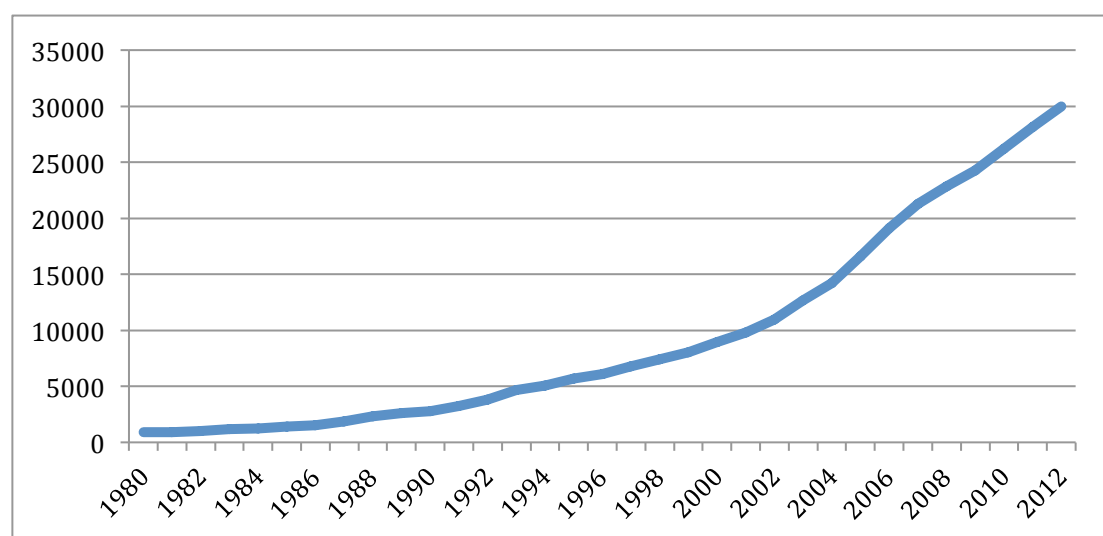


Figure 1: The Gross Domestic Production per capita (in 1990 PPP dollars) 1980-2012 Guangdong

Source: Own estimation on Guangdong Statistical Yearbook 2012

Figure 1 shows the GDP per capita during the period of 1980-2012, GDP per capita (1990 PPP) in Guangdong experienced an upward trend since 1980. In 1980, Guangdong's GDP per capita was 910 dollars, it took 14 years to reach 5000 dollars in 1994, and in 2001 the GDP per capita of Guangdong exceeded 10000 dollars. On the basis of the threshold levels mentioned before, between 1980 and 1990, the GDP per capita of Guangdong is in the interval of 747 dollars and 3033 dollars, thus the structure change of Guangdong is in the period of rapid transformation between 1980 and 1990. Since 1993 the proportion of manufacturing industry was consistently growing.

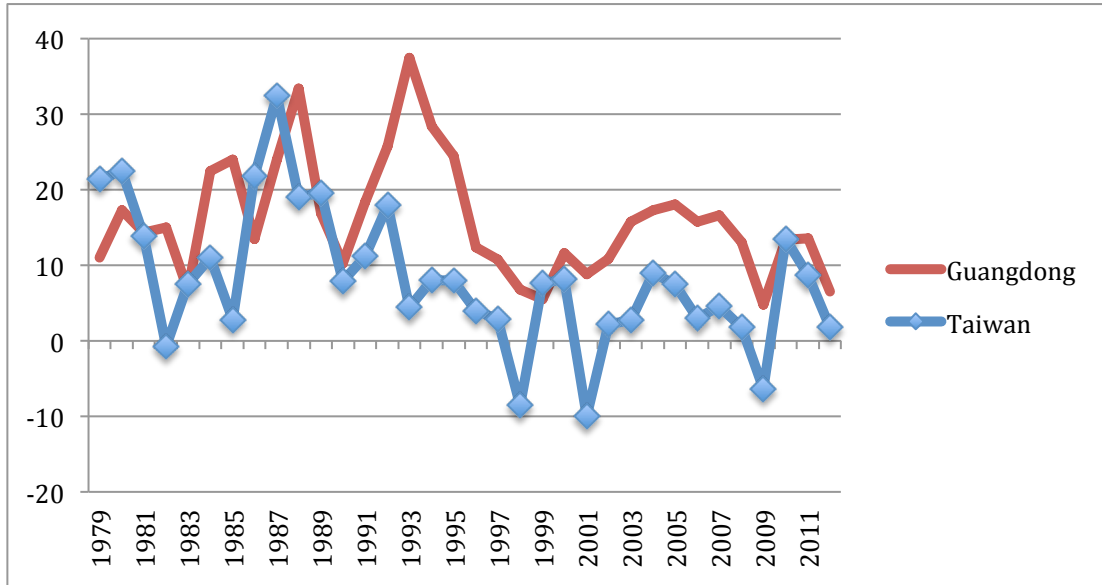


Figure 2: GDP per capita growth (annual %), Guangdong and Taiwan, 1979-2011

Source: Data for Guangdong are derived from International Monetary Fund; data for Taiwan are derived from National Statistics, R.O.C (Taiwan),

Figure 2 shows GDP per capita growth for Guangdong and Taiwan respectively; GDP per capita annual growth in Guangdong experienced four times dramatically rising, the first time is in 1984, the growth peaked in 1993, which achieved 37.5%. After that, it started decline after reached the bottom 5.3% in 1999 then fluctuated around 10% from 2000. The most difference of GDP per capita of Taiwan from Guangdong is that Taiwan has negative growth. The first peak was 32% in 1987, and second peaked was 15% in 1993. After 1990, GDP per capita growth in Taiwan was lower than Guangdong.

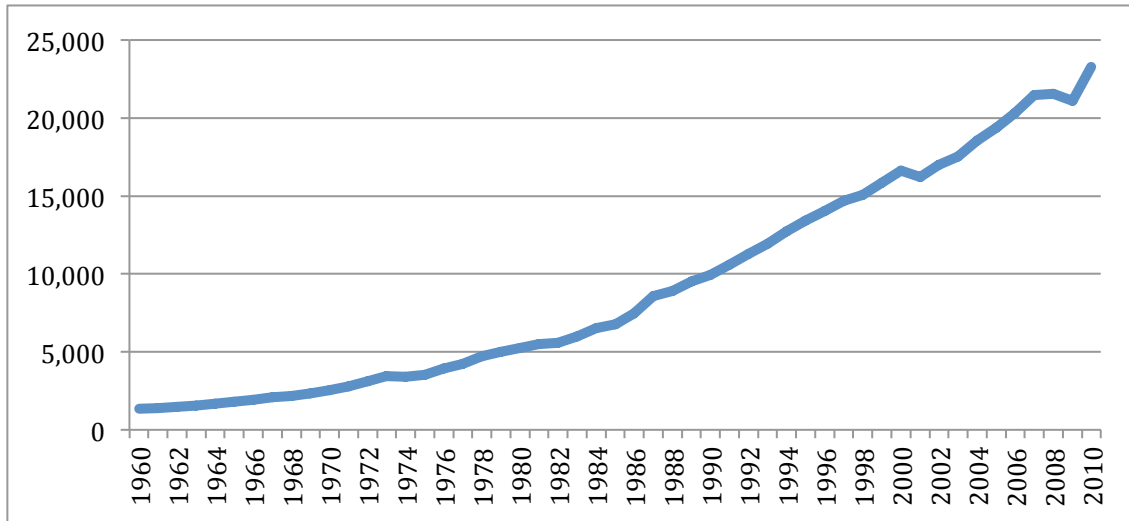


Figure 3: The Gross Domestic Production per capita (in 1990 PPP dollar) 1960-2010, Taiwan

Source: Maddison Project Database, January 2013.

Figure 3 shows the trend of the GDP per capita for Taiwan; GDP per capita in Taiwan also gradually increase during the period of 1960 and 2012. Taiwan’s GDP per capita was 1353 dollars in 1960, 2537 dollars in 1970 and it exceeded 5000 dollars in 1980. In 1991 GDP per capita was 10610 dollars. Also in the light of the threshold level that measures the period of rapid structure change mentioned above, during the period of 1950 and 1971, GDP per capita of Taiwan was in the interval of the period of rapid structure change. The growth of the share of manufacturing industry was sustained since 1977.

Table 1: The Gross Domestic Production per capita (in 1990 PPP dollar), Guangdong and Taiwan, selected years.

Year	1980	1994	2002	2008	2010
Guangdong	910	5089	10966	22844	26186
Year	1960	1980	1991	2008	2010
Taiwan	1353	5260	10610	21554	23292

Sources: Own estimation on Guangdong Statistical Yearbook 2012 and Maddison Project Database, January 2013.

Compare figure 1 with 3, just as table 1 showed, in the beginning of both figures, the GDP per capita was almost in the same level between Guangdong in 1980 and Taiwan in 1960, since 1980 Guangdong took 14 years reached 5000 dollar in 1994, while Taiwan took 30 years in 1980 to reach this level. Guangdong spent half the time of Taiwan reach almost the same GDP per capita level of Taiwan. Since 1994, the GDP per capita of Guangdong again took 8 years since 1994 exceeded 10000 dollars; it takes Taiwan 11 years to reach 10000 dollars. Under the condition of the data of GDP per capita for Guangdong and Taiwan are all from the reliable sources: Guangdong Statistical Yearbook 2012 and Maddison Project Database respectively, and I convinced the calculation for Guangdong's GDP per capita is correct. There is an interesting finding that the GDP per capita of Guangdong exceeded Taiwan in the year of 2008, which means Guangdong is richer than Taiwan after 2008. Since Guangdong's GDP per capita exceed 10000 dollars in 2002, it reached the World Bank standard of developed city (Liu, 2015), and has become developed city since 2002. This may because of the globalization cause large difference between the measurements of a country's income and the measurement of its production. The first mention of two is more related to the living standards of people since some residents spent the income they got from the production on the aboard, and some income the residents earn from foreign country (Stiglitz, Sen and Fitoussi, 2009). Take Ireland for example: according to World Bank GDP per capita in this country is higher than the United States since 1999, Stiglitz, Sen and Fitoussi (2009) found that when it comes to the net national disposable income as percentage of gross domestic product since 1999, it much lower than the United States. From my point of view, the same case maybe also happened on Guangdong and Taiwan. If the difference of GNI-GDP is the same for Guangdong as for Ireland, maybe Guangdong is at a lower level than Taiwan.

Since 1978 FDI (foreign direct investment) is one of the important reasons for the rapid economic development in Guangdong. Because of the advantage of geography and policy, Guangdong vigorously introduced FDI, the investments mainly focus on secondary industry, and the light textile industrial project dominated the main part in the internal of the secondary industry. Taiwan was the second largest investment region in terms of FDI to China in 1990s (Hou, 2007). According to Guangdong Statistical yearbook 2012, in terms of FDI, the number of the contracts signed (unit), Hong Kong is the largest region that signed the most contracts with Guangdong as 11634 between 1979-2012. Taiwan signed second most contracts with Guangdong with a number of 10862 during the same period. And the majority of the FDI in China were flow into Guangdong province (Tian, 2013). According to Deutsche Bank Research (2015), the percentage of utilized FDI of Guangdong accounted for 25% of China in 2001. FDI as a percentage of GDP reached 17.54% in 1994, GDP per capita first time exceeded 5000 US dollars in that year. There was a significantly increase of FDI from 1993. The average FDI as percentage of GDP was 7%. Compare with Guangdong, during the period of 1970-2003, the average inflow of Foreign Direct Investment, as a share of GDP was 4% in Taiwan (Leung, 2007). A large number of research found that GDP could be increased by FDI, thus this maybe the reason that why GDP per capita of Guangdong increased while Taiwan's GDP per capita did not grow as fast as before due to FDI.

Table 2: FDI as a percentage of GDP, Guangdong, 1980-2003

Year	FDI as a percentage of GDP	Year	FDI as a percentage of GDP
1980	0.71	1992	8.03
1981	0.97	1993	12.47
1982	0.93	1994	17.54
1983	1.32	1995	14.33
1984	2.83	1996	14.14

1985	2.66	1997	12.49
1986	3.42	1998	11.67
1987	2.71	1999	10.92
1988	3.03	2000	9.43
1989	3.23	2001	8.92
1990	4.53	2002	8.04
1991	5.25	2003	8.14

Source: Guangdong Statistical Bureau

4.2 The comparison of GDP by industry between Guangdong and Taiwan

Since China's reform and opening up, the economy of the Guangdong province has achieved remarkable results; it constant increases in economic aggregate and industrial structure continuously adjustment and upgrading. In recent years, the proportion of tertiary industry significantly improved, while the proportion of secondary industry dropped.

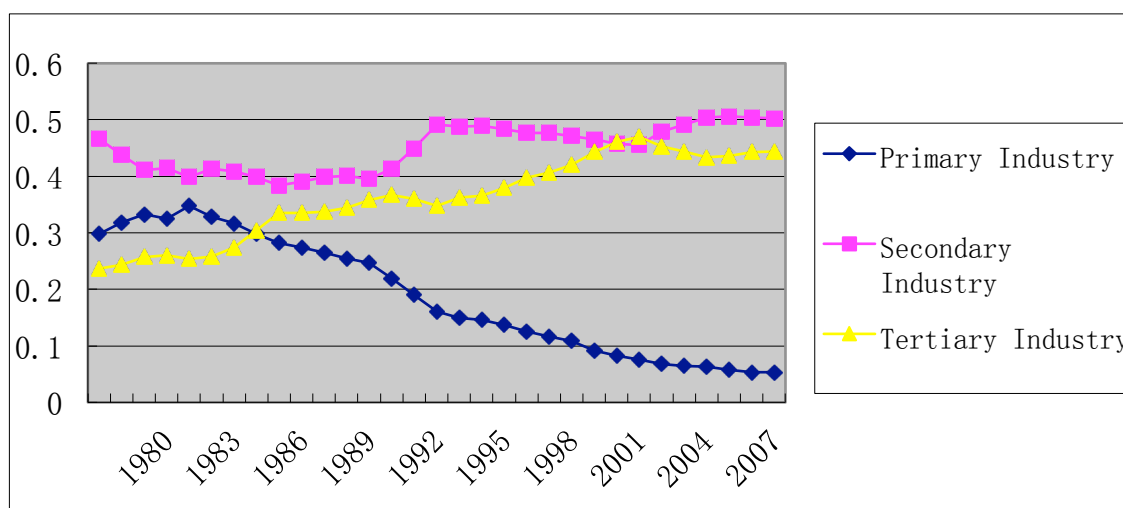


Figure 4: Composition of Gross Domestic Product by industry (percentage share), 1978-2009 Guangdong

Source: Guangdong government statistic information network. Guangdong statistical yearbook, 2010.

Figure 4 shows that the composition of Gross Domestic Product by industry in Guangdong from 1978 to 2009. It is clear to see that primary industry experienced a downward trend and reached the lowest point in 2009. The GDP of secondary industry fluctuated around 45% all the time and almost always the highest among these three industry. Only the tertiary industry shows an upward trend and exceeded secondary industry in 2002 then again less than it.

Guangdong's primary industry as a share of GDP only showed a recovery increase in a few years after China's reform and opening up, generally experienced a downward trend, which decreases by 8.5% in 80s, and completed the percentage 'transposition' with tertiary industry in 1990: from the original percentage share of 7.5% higher than the tertiary industry to about the same level as the tertiary industry. But the real drop of the primary industry proportion was in 90s, there was around 15% decline between 1990 and 2001. The amount of variation in 90s much higher than 80s', and only 5 years from 1990 to 1994, the primary industry decreased by 9.6%, compare with the secondary industry in the same period, we can found that this five years was the period that the most intense changes of industrial structure in Guangdong.

After the reform and opening up, Guangdong entered to the period of industrialization-accelerated development. Unlike the general imagination, in terms of the industrial structure of Guangdong's secondary industry as a share of GDP, the trend was slightly decline in 80s, then from 41% in 1980 decreased to 40% in 1990, it is almost stable. Throughout the 80s, the secondary industry as a share of GDP basically hovers around 40%. After entering to the 90s, the proportion of secondary industry in Guangdong province began to rise sharply.

In terms of the proportion of tertiary industry as a share of GDP, except some individual years decline, there exists steady growth all the time. The percentage points had increased by 10% in 80s, from 26% in 1980 increased to 36% in 1990, annual increased more than 1% in average. While when enter to 90s, the growth rate of

tertiary industry became slow, the proportion of tertiary industry increase by 5%, annual growth rate only more than 0.4%.

Throughout the structure change of Taiwan region's three industries from 1950 to 2010, it can clearly see that Taiwan has experienced from agriculture as foundation to industry as main part, and then with the change of the service industry as the leading industry.

Industry in Taiwan went from a predominantly agricultural structure to the modern structure of the tertiary industry as main part and its economic form also from the agricultural economy developed to the present service economy. Upon completion of the industrialization process of Taiwan and after among the emerging industrial area, with its successful experience of develop processing import and export economy, vigorously expand tertiary industry, promote industrial upgrading, so as to promote the modern economic society towards a post-industrial era.

Taiwan's industrial structure can be roughly divided into three phases: the first stage (the beginning of 1950 s and early 60 s): dominated by agriculture industry. The second phase (in the early 1960 s to the mid - 80 - s): through the economic development of "export-oriented" strategy, implemented the industrial policy of "drive peasant and worker by trade and peasant and worker promote trade", industry began to develop rapidly. The third stage (the end of 1980s till now): service industry developed dramatically. Service industry replaced the dominant position of industry in economy, gradually becoming the society and economic center in Taiwan.

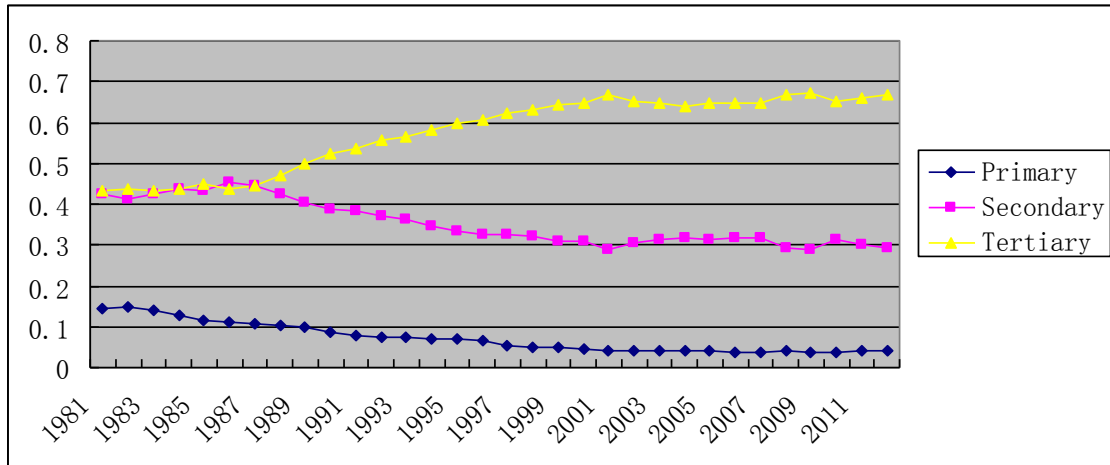


Figure 5: Composition of Gross Domestic Product by industry (percentage point), 1981-2011 Taiwan

Source: National Statistics, R.O.C (Taiwan)

From figure 5 we can see the trend of each industry's composition of GDP from 1981 to 2013. The primary industry shows a downward trend and reached the lowest point in 2011. For secondary and tertiary industry, from 1981 to 1988, the GDP of these two industries were almost in the same level, after that, the secondary industry shows a downward trend reached the lowest point in 2013 and tertiary industry shows an upward trend, reached the highest point in 2013. Both of secondary and tertiary industry's GDP are higher than primary industry.

From 1952 to 1962, Taiwan's industrial structure mainly focuses on agriculture, industry was relatively weak, and the tertiary industry kept steady. Before 1962, agriculture dominated Taiwan's economy; productivity level was backward agricultural society productivity. The development of industry in Taiwan was rapid in the late 1950s, thus drive the change in industrial structure significantly. Agriculture accounting for 36% in 1952 then dropped to 27% in 1963. Industry accounting for 18% in 1952, then rapidly increased to 28% in 1963. Industry exceeds the proportion of agriculture's share in GDP. While in terms of tertiary industry, it kept the low value at that time. When it comes to the product export structure, in the period of 1952 and 1959, the average annual proportion of Taiwan industrial product

export accounted for the total export was 13%. While agriculture products and agriculture processed products accounted for 87% in total (Zhang, 2000). This indicates that Taiwan belonged to the capital accumulation period of pre-industrial.

In the period of 1963 and 1987, Taiwan's industry gradually replaced the status of agriculture in overall economic activity, became the leading industry, but the tertiary industry still remained steady.

Between 1989 and 1998, there were significant change in Taiwan industrial structure, service industry replace the dominant position of industry in economy, economy society gradually moving towards to the era of service industry as the main part. According to National Statistics, Taiwan (2014), the proportion of secondary industry account for the GDP peaked in the year of 1986 and 1987, reached 45%, ranked the first among three major industries. As the opening of the financial, insurance industry and the booming market of real estate, the output value of service industry in Taiwan increased rapidly. In 1988, the national product of tertiary industry exceeded the secondary industry and ranked the first, the proportion of the tertiary industry as a share of GDP was 47%, and reached 53% in 1990, it was the first time surpasses the sum of primary and secondary industry. Since then, the tertiary industry in Taiwan growth with a very strong momentum, it was the first time that the proportion of the tertiary industry account for the GDP exceed 60%, and one of two people was engaged in service industry, the tertiary industry gradually became the main part of Taiwan society and economy.

From 2000 until now, Taiwan was moving from the late stage of industrialization towards to post-industrial society. During this period, the leading role of service industry in Taiwan's economy has been further strengthened, high-tech industry has developed rapidly and agricultural shrink further. In 2000, the proportion of Taiwan's three industrial structures is 4.41:30.8:64.8, the primary industry only accounts for a little proportion; the status of the industry declined further, while the status of service industry is very strong. Only from the perspective of industrial structure, compare

with The U.S., Japan and other developed countries, the proportion of Taiwan's three industries structure has no obvious difference compared with these countries. At the same time, Taiwan's manufacturing industry achieved high added value and high value-added, high tech industry was growing rapidly. High-tech industry, especially electronic information industry in Taiwan rise rapidly, just experienced more than 10 years, became the most dazzling star industry in Taiwan, and became the main driving force of Taiwan's industrial upgrading, economic transformation and keep external competitive power.

4.3 The comparison of relative productivity between Guangdong and Taiwan

Relative labor productivity is one of the most important indicators that measure a country or a region's development efficiency. Relative labor productivity roughly can objectively reflect the labor productivity of a department, which means (aggregate) GDP per capita = 1 and if the relative contribution, by a sector, to GDP, is lower than its relative share of employment, its relative productivity must be lower than 1. And the reverse, (aggregate) GDP per capita = 1 and if the relative contribution, by a sector, to GDP, is higher than its relative share of employment, its relative productivity must be higher than 1. Usually the relative labor productivity of primary industry is lower than 1, while the relative labor productivity of secondary and tertiary industry is higher than 1. The higher the relative labor productivity, the bigger the ratio of output value and labor force in the industry.

Table 3: The productivity of each industry for Guangdong and Taiwan

Guangdong	Primary	Secondary	Tertiary	Taiwan	Primary	Secondary	Tertiary
1978	0.4	3.33	1.82	1952	0.64	1.06	1.7
1980	0.47	2.42	2.14	1963	0.54	1.32	1.54
1985	0.5	1.73	1.79	1972	0.43	1.27	1.3

1990	0.47	1.47	1.79	1980	0.47	1.05	1.2
1995	0.39	1.69	1.07	1982	0.49	1.04	1.21
2000	0.22	1.79	1.34	1984	0.43	1.07	1.18
2001	0.21	1.69	1.4	1986	0.38	1.13	1.13
2002	0.18	1.69	1.38	1988	0.45	1.08	1.09
2003	0.18	1.71	1.33	1990	0.43	1.05	1.11

Source: Guangdong government statistic information network National Statistics, Taiwan

The relative productivity of primary industry in Guangdong shows a downward trend, it decreased from 0.4 in 1978 to 0.22 in 2004. The secondary industry productivity was high during 1978 and 1980, and as high as 3.33 and 2.42 respectively, from 1985 and 2004, it kept in the interval of 1.8 and 1.3. The productivity of tertiary industry was 1.82 in 1978 and it stayed around 1.7 since 1995. Before 1995 although the productivity of tertiary industry was almost as high as secondary industry, from 1995 the productivity of secondary industry exceeded tertiary industry again in Guangdong until 2003. The secondary industry is still the main industry to absorb labor force, but its capacity has been declining year by year, tertiary industry will replace the secondary industry become the main industry of absorbing the labor force.

Taiwan's relative productivity of agriculture industry was 0.64 in 1952, since then the productivity declined to 0.31 in 1999, it was lower than Guangdong in 1995. Except 1986, the productivity of secondary industry in Taiwan was lower than tertiary industry during the period of 1952 and 1990. After 1995 there is a fall off in the productivity of tertiary industry. In Taiwan case, tertiary industry is the main industry to absorb labor force; its capacity also has been declining year by year. According to the National Statistic, R.O.C (Taiwan), and the GDP per capita growth rate of service industry from 4% in 1995 reduced to 1.07% in 2001. Service industry labor productivity growth rate fell sharply after 1995 is the main reason of overall industry productivity decline. The reason will clearly explain in the tertiary industry sector.

4.4 The comparison of the contribution of three industries to GDP growth

The contribution rate of primary industry to GDP growth in Guangdong was 5.2% in 1980, which is the highest contribution rate since 1979, from then on, the contribution rate in Guangdong had fallen all the way, and in recent year the contribution rate of primary to GDP growth was only around 0.3%. The contribution rate of Guangdong secondary industry and industry to GDP growth was 1.4 % and 2% in 1979 respectively, and they are the lowest rate between 1979 and 2010. The highest contribution rate of second industry was 16.5 % in 1993, for industry was 15.3% in 1993. In 2010, the contribution rate of secondary industry and industry was 7.7% and 7.3% respectively. The secondary industry is main impetus of economic growth among three industries. The contribution rate of tertiary industry to GDP growth was relative steady from 1979 to 2010. It almost kept around 4.5% during this period, except 2.9% in 1981 and 2.1% in 1989. Among all the three industries, the contribution of secondary industry to GDP growth is the highest since 1988, and tertiary is the second. This implied that secondary industry is the main force to promote economic growth in Guangdong, but it has high volatility.

Table 4: The contribution of three industries to GDP growth, 1979-2010, Guangdong (percentage point)

Year	Primary industry	Secondary industry	Tertiary industry
1979	2.6	1.4	4.5
1980	5.2	5.3	6.1
1981	2	4.1	2.9
1982	4.5	3.8	3.7
1983	1.4	3.3	2.6
1984	4.5	6.3	4.7
1985	2.2	7.2	8.6
1986	1.8	2.8	8.1
1987	2.9	9.3	7.6
1988	1.8	9	5
1989	1.8	3.3	2.1
1990	1.9	5	4.7
1991	1.3	9.4	7
1992	1.2	14	6.9
1993	0.5	16.5	6

1994	0.5	13	6.2
1995	0.8	9.9	4.9
1996	0.6	6.9	3.8
1997	0.6	7.1	3.5
1998	0.4	7	3.4
1999	0.4	6	3.7
2000	0.2	6.9	4.4
2001	0.2	5	5.3
2002	0.4	6.4	5.6
2003	0.2	9.5	5.1
2004	0.3	9.3	5.2
2005	0.3	7.8	6
2006	0.3	8.6	5.9
2007	0.2	8.8	5.9
2008	0.3	6	4.2
2009	0.2	4.9	4.6
2010	0.2	7.7	4.5

Source: Guangdong government statistic information network.

Compare with Guangdong, according to Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Taiwan, the contribution rate of agriculture industry to GDP growth was negative from 2003 to 2007, except 2006 as a rate of 6.09%. The contribution rate of industry to GDP growth was 4% and increased to 9.31% in 2007 (National Statistics, Taiwan). The contribution rate of manufacturing industry was 5.34% in 2003 and rise to 10.29% in 2007. The contribution rates of tertiary industry to GDP growth also relatively steady, from 2003 to 2007 it almost kept around 4%, from 3.39% in 2003 increased to 4.3% in 2007 (National Statistics, Taiwan). The condition in Taiwan is almost the same with Guangdong, secondary industry is the main driving force of economic growth.

4.5 Primary industry: agriculture

Agriculture is the basic industry of national economy; it mainly provides food and other basic material for people's daily life, which is the foundation of the economic development. As one of the three major industry categories and belonging to the

primary industry, agriculture is the primary industry of the national economy; it is the social product department that base on land as mean of production, using the physiological functions of plants and animals, through artificial cultivation to get the production. As the development of economy, the share of agriculture should be decreased.

4.5.1 Guangdong

In 1950s, through the socialism cooperative, peasants' land from individual ownership change to socialism collective ownership, thus the farmers in China were on the way to collective labor from then on. People's commune system set up with ideal and enthusiasm existed serious disadvantage of property right, it discourages the farmers' incentive to produce, thereby leading to a long-term stagnation of agricultural production. In 1978 the rural reformed first, with household contract responsibility system replace the commune system. The household contract responsibility system adapted to the farmers' requirement of property right, it reshape family operating system and main body position of peasants, and release the farmer's repressed enthusiasm, promote the unprecedented growth of agricultural production (Li and Li 1991) .

Household contract responsibility system is a kind of production responsibility system that farmers contracted plot of land and other means of production as family unit. It is an important reform and open up regime that promoted by China rural area and an important transition of rural land system, and it is also a basic economic system of China rural area now (Li and Li, 1991). The government gives a quota of merchandise to peasant produce, when they fulfill the quota they can get compensation for it. The contractor sign contract with collective economic organizations. Contract responsibility system is a basic economic system that China must insist for a long time.

4.5.2 Taiwan

Half a century ago, Taiwan had similar agriculture production condition and economy condition with Mainland China, low productivity, low per capita income, and high concentration of land. The total area of Taiwan province (and its affiliated islands) is 36 thousand square kilometers, of which arable area accounted for a quarter. In the 1950s, Taiwan had a population of 8 million. Although in Japanese colonial period had built water conservancy facilities, introduced chemical fertilizer and good varieties, before Japan's surrender in World War II, many facilities have been destroyed. Agricultural production declined sharply before the Second World War. At that time, the level of economic development was low; the GDP per capita was in price of 136 US dollar (PPP). Dollars, the phenomenon of the rich and poor polarization was very serious. The primary industry accounted for a large proportion of the Taiwan economy; about 80% population was farmers, a third of GDP derived from agricultural products (He, 1982).

In order to alleviate increasingly tense agricultural supplies, change the condition of wide gap between rich and poor and develop agriculture labor force, in the late 1940s, with the support of the United States, Taiwan authorities started a large scale of land reform (Mathews, 1997). Taiwan's land reform occurred between 1949 and 1953 experienced three phases, the first phase is reduce the level of rent rate, thus make the employer's enthusiasm for production high, crop yield increase, land prices fall, and lays the foundation for further diversification of land ownership reform. The second phase was sale a large amount of public land, Taiwan government sale the land took over from Japan to landless farmer, and restricted each household can buy a hectare paddy field and dozens of hectare dry farmland. The third phase implement the law of land to tillers, forcing landlords to sell the land which is exceed their farming level to government, and the government paid the bond and government enterprise stock to the landlord, the government sold the land bought from the landlord to the cottiers. Land reform makes about half of the farmers buy private land become subsistence

farmers. Farmers put more work time to land, and the fertilizer, construction of basic farmland also increased dramatically, as a result of it, effectively improved the agricultural labor productivity, developed the agriculture production, increased farmers' income. The increase of the agriculture production, besides realized self-efficient, also export to obtain gain, the fund get form landlord sale their land turn to industrial investment, also lays important foundation for Taiwan's later sustainable development (Chen, 2003).

Early after the Second World War, agriculture is the main pillar of Taiwan's economy. Before 1960s, the growth rate of the Taiwan's agriculture was rapid. Before the 1960s the growth rate of Taiwan's agriculture industry was rapid, after that, the growth rate gradually deceased. After the mid of 1960s, with the rapid development of the industry and the guiding role of the Taiwan official focus on the industry policy of develop export processing industry. Taiwan's agriculture was deep in long-term slowly development, even the status of recession. The growth rate of agriculture decreased dramatically, the proportion of agriculture as share of national economy also decline.

The overall trend of the change of Taiwan's agricultural production structure is planting, forestry output value proportion fell, fisheries, animal husbandry output value proportion rising. There are several reasons for Taiwan's agricultural production structure change, one of the main reason is the guide of the Taiwan authorities policy; Second, the change of Taiwan people's consumption level and consumption structure; Taiwan's agriculture is affected by the overall market (Jiang and Shi, 2006).

4.6 Secondary industry :Industry

In the process of the industrialization most countries or regions roughly experienced three stages: the first stage is 'early industrialization', industrial structure from focus on traditional industrial (mainly agriculture, animal husbandry) changes to focus on industry (mainly labor-intensive textile industry). The second stage is 'heavy

industrialization', the industrial structure from centered on textile industry run to centered on the heavy industry, electricity, steel, chemical, plastic and machinery manufacturing and other funds and capital-intensive industries began to play a leading role. This phase in different countries and regions roughly divided into raw materials, basic industries as the center of the processing and assembling industry two periods. But overall, the second stage is high processing stage, including focus on the general processing industry (resource intensive processing industry) and technology intensive processing industry two periods. The third stage is technology intensive stage, including focus on general technology intensive industry and innovative and high technology intensive industry two periods (Gao and Zhang, 1991). The above three industrial structure are connect with each other and partly overlapped. Looking from the experience of newly industrializing countries or regions, these three stages both exist the order of evolution and influenced by the strategy of national or regional industrial development staggered together. Under normal circumstances, when the industrial structure in the first period of heavy industrialization stage, (centered on the raw material basic industry) is the early stage of industrialization. When industrial structure from the stage of heavy industrialization runs to the high processing industry (for processing and assembling industry center of gravity), industrialization enters into middle term; And when the industrial structure from high processing run to the technology intensive phase (focus on technology intensive industry), technical innovation and technical progress play an important role on industry growth, industrialization entered into the late stage.

4.6.1 Guangdong

Guangdong has given priority to the light industry, the light industry plays a dominant role in Guangdong all the time, even in the age of one-sided developed heavy industry, and the light industry still accounted for more than a half of the industry. Since China's reform and opening up, the development of light industry has sped up. In 1987, in industry output value, the light industry accounted for 68% and the heavy

industry accounted for only 32%. From 1995 to 1999, the change of the light and heavy industrial structure in the gross industrial output value is not big in Guangdong, and the ratio of light and heavy industry from 61: 86 in 1995 to 65:36 in 1999, while it changed in 2009 (Duan, Yan, & Xu, 2002). In the heavy industry, the extractive industry only account for a small amount of the proportion, most are processing property industry.

The light industry is not only growing faster but also the internal structure is increasingly modernization. The traditional department: including food, beverages, textiles, sewing, leather, furniture, early know, printing, recreational supplies and crafts, etc. The rural products are most of their processing object. The modern department, including electric and mechanical equipment, electronics, metal products, chemical fiber etc. their processing object is metal and chemical products, and the development of this department vigorous later.

The main character of the Guangdong industry is that the modern light industry dominate the main status, the status has enhanced rapidly in recent years. Among them, the electrical machinery equipment and two electronic industries (such as household appliances, radio cassette recorder account for the most part), the proportion of these two industries in the industry was insignificant in 1978, but accounted for the 18.2% in 1987, become the pillar industry in Guangdong province (Gao and Zhang, 1991).

The development process of the Guangdong's industrial structure can be divided into three stages: 1979-1984, at the stage of consumer goods industry mainly focus on food, textile, clothing and other light industrial products. Food, beverage, textile garments and light industry have developed rapidly and become the pillar industry. Durable consumer goods represented by the color TV, refrigerator, and air conditioner three home appliance products, which grew rapidly as the leading industry. Setting up the industrial structure characteristic as light and export-oriented. After the 90's, electrical machinery, petroleum and chemical industry had become the economic growth leading industry; enter the stage of the high processing industry (Chen, 2009).

Behind the development of Guangdong's heavy industry, there are two factors at work. One is the natural resources factors, Guangdong lack of energy and metal materials, it is difficult to develop metallurgical industry, therefore metallurgical industry and consumed a lot of metal material and energy mechanical equipment manufacturing and the basic chemical and other heavy industry is difficult to develop. It is an important reason of industrial growth lag behind the nationwide in the period of Guangdong focus on the development of heavy industry.

History shows that in the developed countries, a national light industrial finished, it inevitable starts heavy industrialization. Heavy industry mainly has three-service direction: light industry, personal consumption (mainly live and transportation) and heavy industry itself. The development of heavy industry greatly relies on steel products. Guangdong is one of the provinces that famous for light industry, since China's reform and opening up, Guangdong started with light industry development, after 20 years development; Guangdong development mode of light industry has quite mature. In aspect of light industry of export-oriented mode, it mainly concentrated on processing trade drives economic development such as processing materials supplied by clients; the demand of economic growth for steel was relatively small (Baosteel news center, 23 April 2008).

In recent years, Guangdong has changed gradually from light industry to heavy industry. First, electronic and communication equipment manufacturing industry account for the percentage share of gross industry output value from 18% in 1995 to 26% in 1999, became the largest industry sector in Guangdong. Second, Japan's Honda, Nissan, Toyota three big car factory have their own factory in Guangzhou, the development of petrochemical industry has developed rapidly such as Nanhai petrochemical project and petroleum reserve storage etc. Guangdong heavy industry maintain a good development speed, and in the proportion of industrial output become higher and higher. Since 2001, the growth rate of added value of heavy industry is higher than light industry, and the proportion of heavy industry and light industry from 1.2 in 2001 increased to 1.6 in 2007 (Baosteel news center, 23 April 2008). Guangdong accelerated the development of heavy industry through the way of

industrial park, harbor-related heavy industry projects; the development of heavy industry cannot without the support of steel products. As the current situation of Guangdong's steel industry, if Guangdong did not establish new steel projects, the development of Guangdong heavy industry will pay more cost (Baosteel news center, 23 April 2008).

In the early reform and opening up, Guangdong started from light industry, entering the new century the pace of heavy industry accelerated, the development pattern give priority to light industry gradually change to heavy industry, the ratio of light and heavy industry from 53:47 in 2000 to 39:61 in 2009 (Duan, Yan, & Xu 2002). Since 2002, in order to solve structural contradictions in the economic operation, Guangdong adjusted processing in the industrial structure. Gradually confirming the industrial structure pattern as three major emerging pillars industries, three major traditional pillar industries, three major potential industries and four major high-tech industries. The heavy industry accounted for most part of the nine pillar industries (i.e. electronic information, electrical machinery and special equipment, petrochemical industry for three new industry, textile and garment, food and beverages, building materials three traditional pillar industry paper making, medicine, automobile three potential industries). A large number of heavy industry projects went into operation as the industry transformed and upgraded, the growth of heavy industry in Guangdong had lagged behind the light industry has been rewritten last year. Guangdong province Bureau of Statistics released data show that last year Guangdong's heavy industry was faster than light, and the growth gap has a tendency of expand. Statistics show that the equipment manufacturing industry and petrochemical industry has become an important engine to promote the development of heavy industry in Guangdong. In recent years, the development strategy of equipment manufacturing industry of Guangdong achieved results, the development of general equipment manufacturing, special equipment manufacturing, automobile and electrical machinery industry was rapid, which enhanced Guangdong industrial supporting ability and the overall industrial competitiveness.

4.6.2 Taiwan

In the period of the early 1950s and the late 1950s, from a poverty and backward agricultural region Taiwan become a region that achieving mature industrialized "emerging industrial economy", regarded as one of the Asian four tigers. Taiwan is often cited as the success case of developing economy to realize leaping development. The rapid development of Taiwan's economy is closely related to the orderly evolution of the industrial structure industrial process moves forward. It is industrial structure continued orderly upgrading, transformation drove Taiwan's economy continue develop at a high speed.

Nearly half a century, Taiwan started from 'agriculture cultivates industry', on the basis of steady the development of agriculture, from light industry to heavy industry, from labor-intensive industries to capital and technology intensive industry is the basic process of Taiwan's industrial war. Throughout Taiwan's industrial development, the industrial development pattern can be roughly summarized as: labor-intensive (before the mid-1980s), light industry-capital-intensive (mid 1980s), heavy industry-technology-intensive strategy industry (since 1990) (Chen, 2003).

Before the 1950s, Taiwan's economy was mainly focus on the agriculture industry, agriculture holds the dominant position in national economy, agriculture production and agricultural employment become the main economic entity, exports of agricultural products was a major source of foreign exchange earning. In the period of 1949 and 1953, Taiwan successively implemented the modified land reform. On the basis of land reform effectively change the production relationship of feudatories rural, promote agricultural production development and provide primitive accumulation of capital for the development of industry and a large number of labor force, from 1953, Taiwan started on the way to industrialization, and strive to develop the industry can make used of raw material and increase export, the industries make use of self-produced or imported raw material substitute import like cement, glass, wood ,paper, these kind of industries need not too much capital and complex

technology, through short-term training the ordinary labor force can be qualified the work, it is typical labor intensive light industry, became the backbone industry at that time. By the early 1960s, Taiwan's market was saturated, in order to make use of the international comparative advantage of low wage, Taiwan authorities timely generated the strategy of vigorously developed the labor-intensive light industry and expanded export (Chen, 2003). From 1965, successively export processing zone, introduced foreign capital, technology, imported machine, equipment and raw materials, the main processing production of food, textile, plastic and other labor-intensive export products mainly sold to European and American markets (Chen, 2003). In 1954-1961, Taiwan's food industry developed rapidly, mainly due to under the condition of Taiwan's industrial base was weak at that time, and the level of technology was low, food industry actually is the extension of agriculture, the only resources can Taiwan directly use at that time was agriculture resources. With the development of economy and the preliminary establishment of basic industrial technology, the food industry was gradually replaced by the textile industry from the mid 1960s. But in the late 1960s, with foreign capital invested in Taiwan and the establishment and development of export processing zone, the proportion of electronic industry mainly base on household electrical appliances and other consumer electronics products account for the Taiwan's industry was continually increased, and soon become Taiwan's industrial new 'star industry'. In the late 50s and 60s, because of the food, textile and household appliances and the like, these kinds of labor intensive industry played a leading role in the development of Taiwan's industry, make Taiwan realize industry sustained rapid growth. From 1952 to 1973, Taiwan's industrial average annual growth reached up to 15%, the proportion of industrial output value as a share of island's GDP increased from 17% in 1952 to 32% in 1972, thereby lead to Taiwan's economy began to thrive (Chen, 2003).

By the early 1970s, Taiwan's industry had established preliminary basis after 20 years of development, the national income were constantly increasing, capital supply capacity and investment capacity greatly enhanced, large enterprises with strong

economic and technical strength have been the initial development. In order to fundamentally ease the urgent transport, electricity and other infrastructure bottlenecks, set up Taiwan's own industrial base and improve the raw materials, auxiliary materials, parts and components industry supporting industry and industry's own ability, Taiwan began to adjust the industrial development strategy, focus on developing the iron and steel, shipbuilding, plastic and petroleum chemical and other heavy industries. The Taiwanese authority began to carry out the construction of the highways, airports, ports, railways and other infrastructure, and the construction of the steel, shipbuilding, petrochemical and other heavy industries. From the early 1970s to late 1980s, Taiwan invested a lot to heavy industry, the basic industry and raw material industry, making Taiwan's industry structure change, the proportion of light textile industry in the whole industry in Taiwan has fallen dramatically, some capital and capital intensive industries such as petrochemical, steel, plastic raw materials and machinery industry improved obviously. The characteristics of Taiwan's industrial structure transformation is that from 1961 to 1987 as the stage of rapid industrialization, in that period laid the foundation for industrial structure that is based on manufacturing industry, and established a solid manufacturing capabilities, while the proportion of manufacturing industry began to drop in the period of post-industrialization, but its industrial structure continuously upgraded. In 1986, the electronic and electric machinery (including computer communications and audiovisual electronic components industry, electronic components industry, electronics industry and electronic machinery and equipment manufacturing and replacement industry) weight in manufacturing output is only 8.69%, till 2005 it has greatly increased to 35.92% and became the leading industries in manufacturing industry (Lin and Zhuang, 2007). At the same time the traditional industry like textiles and clothing apparel industry from 11% and 9% reduced to 3% and 0.9% respectively (Lin and Zhuang, 2007). From 1973 to 1980, the growth rate of Taiwan overall industry was 12%, the proportion of industrial output in the island's gross domestic product from 39% in 1972 to 45% in 1980 (Chen, 2003). Taiwan's industry especially the establishment of a large number of basic industries and heavy industry,

make Taiwan initially formed a relatively complete industrial system, and also laid a good foundation for Taiwan's later industrial upgrading and high-tech industry.

After the late 1970s, on one hand, with the development of the economic, the islands labor's wages increase lead to the cost of labor intensive and capital intensive industry increase, comparative advantage loss and the reduction of market competition. On the other hand, under the shock of international oil crisis, because of the impact of oil price increase dramatically, oil chemical industry mainly depended on processing imported crude oil refining and cracking became large energy consumption, high cost and low profits' "hard industry". And at the same time, the world's revolution of science and technology lead by the Unites States developed rapidly, high-tech production represented by electronic information also developed rapidly. Under this condition, Taiwan authority began to change the strategy of continues developing heavy industry; turn to pay attention to the development of the science and technology strategy industry (Mathews, 1997). Since then, the development of technology has become the most crucial part in Taiwan industrial development. The proportion of technology-intensive exports increased from 22% in 1986 to 55% in 1997 (Hsu and Chiang, 2000). Taiwan's most successful experience in terms of high-tech industry development is the establishment and development of HsinChu Science Park. Since Hsinchu Science Park found in the 1980s, it gets the sustained and rapid development. Until 2000, Taiwan had integrated circuits, computer and peripheral equipment, photovoltaic industry and so on 8 kinds of high-tech industries and had established 289 high-tech enterprises (Chen, 2003).

In 1990s especially late 1990s, although the development of Taiwan's high-tech industry was quick, the structure of industry, manufacture industry optimized further, with the shrunk of the traditional industry and including electronic information, communications and other a large number of industries transferred to investment in the mainland China, make the status of Taiwan industry reduced in the overall economy, the proportion of industry and manufacture industry in islands' GDP also

declined gradually, its economic growth contribution rate lower than the service industry in the same period. From 1986 to 1995, the industries, which the proportion of output value declined in the manufacture industry, mostly belong to the traditional labor-intensive industries, mainly are food manufacturing, tobacco, textile, garment and clothing industry, etc.

4.7 Tertiary industry

Most of the countries' (regions) economic development experiences show that the order of industrial development starts from agriculture, and then industry drives the development of service industry, especially when the economic development achieves mature stage, the service industry then become the main body of economic development. Since the reform and opening up, the development of Guangdong tertiary industry is rapid and become one of the power of national economic growth, and at the same time it is also the employment of the fastest growing industry. But after the 1990, the development of the tertiary industry obviously fell behind manufacturing industry, according to Guangdong Statistics Bureau of Guangdong province (2005) from 1990 to 2003, the percentage points of tertiary industry account for GDP from 36% increased to 39%, only rise by 3% in 14 years, while at the same period the manufacture secondary industry account for GDP from 40% rise to 54%, increase by 14%. Taiwan is in the midst of the transition period towards a service industry society, the percentage points of service industry in industrial structure is has been as high as 68%, close to the developed countries. But in fact, the OEM (original equipment manufacturer) as main mode in manufacturing industry is still the most important power that drives Taiwan economic growth; service industry growth rate is lower than industry and the overall economic growth rate (Xiong, 2013).

4.7.1 Guangdong

The output value proportion of Guangdong tertiary industry grows in the fluctuations, but still below the level of economic development requires. Since 1978, the tertiary

industry output value proportion present the trend of obvious fluctuates growth, and between 1978-1984 in the weak fluctuation growth; presents the fast growth in the period of 1984-1984; and again the weak growth in 1986-1991. In 1995, the proportion fell to 32.8%, although slightly exceed the national average level (31.6%), still below the requirement of economic development in Guangdong. The structure of three-industry output value structure from 30:46:24 in 1978 to 16:52:32 in 1995. That is from the type of “2, 1, 3”(secondary industry accounted for the most part among three industries and primary industry is the second) change to the type of “2, 3, 1”(secondary industry accounted for the most part among three industries and tertiary industry is the second) (Li and Li, 1991).

Table 5: The proportion of each sector in net output, the composition of employed population, Guangdong

Year Category	The proportion of each sector in net output (%)			The proportion of each sector in employment population (%)		
	Agriculture	Industry	Service Industry	Agriculture	Industry	Service Industry
1978	29.8	46.6	23.6	74	14	13
1980	33.2	41.1	25.7	71	17	12
1985	29.8	39.8	30.4	60	23	17
1990	24.7	39.5	35.8	53	27	20
1995	14.6	48.9	36.5	37	29	34
2000	9.2	46.5	44.3	41	26	33
2001	8.2	45.7	46.1	40	27	33
2002	7.5	45.5	47.0	40	27	34
2003	6.8	47.9	45.3	38	28	34

Source: Guangdong information statistic website; National statistic bureau

According to the general developed regions, the agriculture proportion of output and employment decreased the most. From table 5, the proportion of primary industry in net output of Guangdong was continuously declined. Although there was a sustained growth in terms of the proportion of tertiary industry in net output, the secondary industry still accounted the largest proportion among three industries. Guangdong

tertiary industry employment proportion increased from 13% in 1978 to 34% in 1995, besides a small decline in 1990, it has been in a state of steady growth. But the proportion of Guangdong only slightly higher than the national average level, and it exceed the proportion of secondary industry in Guangdong. Compared with a national employment proportion of the tertiary industry has been exceeded the second industry in 1995; this shows that Guangdong secondary industrial employment absorption effect is very low. Three big industry of employment structure from 73:14:13 in 1978 to 37:29:34 in 1995 (Li and Li 1991).

Table 5 shows that the proportion of secondary industry in net output increased from 1990, and accounted for the largest proportion from 1978 to 2004 except the year of 2001 and 2002. Just like mentioned above, Employment is number of employed, then worked hours may make a difference between countries. Besides the electrical machinery equipment and electronic industries were the pillar industries in Guangdong, the high proportion of secondary industry net output and low proportion of its employment population in Guangdong may because the labor forces were in the condition of high-intensity long working hours in Guangdong just as the most media have been reports (Chan, 2008). And there is an evidence to prove, FIH Mobile Limited, also known as Foxconn, which is a largest electronic manufacturing factory and it is the main supplier of Apple. It had hit the headlines because of series incidents of their worker's suicide, and has been accused that the laborious and high pressure working environment. Beijing News reported that the Foxconn compelled their employees to work overtime, thus lead to some of their employees' karoshi (overwork death) and suicide. There are one million employees in Foxconn of Mainland China, due to the working pressure, in the first half-year of 2010, there were 9 people had tried to commit suicide, and 7 of them were dead (Zhang, 2015). In order to make it clear what happened in the factory, a reporter of Southern Weekend (a famous newspaper based in Guangdong) named Liu Zhiyi disguised as a worker latent into the factory, trying to find out the truth of suicide (Pai, 2012). He found that, all of them would sign a special agreement before they work, the content of agreement indicates that they volunteer to work overtime, and the factory does not

responsible for the overtime. However, they still have public holiday. Liu Zhiyi said: in addition to eat and sleep, the workers of Foxconn rarely stop working (Lai, 2010). China Labor Watch based in New York claimed that Foxconn adopted the “ militarization management” and the working condition is very grim. The survey (2011) said that workers need to work on the high strength production line continuously for 12 hours every day, and sometimes the factory even forced workers to work overtime in weekend. While Foxconn is not a particular case, Pegaron Corporation is another manufacturing company that has the same problem with Foxconn. According to the survey (2011) of China Labor Watch, 87% of factories in Guangdong exist the problem of overtime working; working 100 hours of overtime per month is normal. Working overtime is a common, many companies learned from these two famous corporations to gain more profit, and the reason of caused the illegal working overtime is short of investigation and light punishment (Zhang, 2015). Thus, this maybe the reason of the productivity of Guangdong’s secondary industry is the highest among the three industries.

Since the 1990s, in the tertiary industry, the industry of the real estate, post, warehousing and transportation are developed faster than other industries. From 1991 to 2003 ,the annual growth rate of these three industries reached 18%、 18% and 13% respectively, all of them were higher than the average annual growth rate of the tertiary industry, until 2003, these three industry as a share of GDP were 1.2%, 14% and 23.1%, respectively, compare with 1990 increase by 0.51, 6 and 3.2 percent. Although the financial insurance industry, education, culture, art and radio, film, television industry, scientific research and comprehensive technical services and other industries have been developed, due to the momentum of development not being strong enough, its as a share of GDP has declined. Despite the average annual growth rate of financial insurance industry was 7%, the percentage point of GDP fell by 5.6%. In addition, the social service sector remained stable growth, the proportion of GDP increased by 2%. Health, sports and social welfare industries as a share of GDP were changed a little. The scale of Guangdong service industry has grown and the industry position has been continuously prominent, but still not become the main economic

driving force of Guangdong. From the service industry structure comparison, no matter the value added, and the unit of legal person, Guangdong traditional service industry still account for a large proportion of service industry, the proportion of modern industry is still small, it indicated that the development of the internal of Guangdong service industry has not yet mature (Zheng and Yuan, 2009).

Over the past 20 years, the electronic information products manufacturing industry and software industry of Guangdong province have maintain the rapid growth trend, and became one of three major electronic information manufacturing base in China. Although the situation of electronic information industry has long been in the condition of the low added value, and lack of core competitiveness of deficiencies is gradually reversed. Some large enterprises like Huawei constantly breakthrough core technology. It has formed the independent intellectual rights with international competitive (Ma, 2010). Guangdong province still exists some problems in aspect of the development of electronic information industry. First, the material processing enterprises still takes a leading, the development of independent enterprises is insufficient. Second, it lacks of the capacity of independent innovation and intellectual property rights technology. Third, enterprise scale is obvious disadvantage in the international competition, and the industrial value added is low (Ma, 2010).

Overall, the industry internal structure of Guangdong tertiary get a certain optimization, as the rapid growth of wholesale, retail, transportation, storage, post and telecommunications, in the meanwhile the emerging industry like real estate, social services are constant growing, they play an important role for the adjustment and optimization of industrial structure in Guangdong province. But traditional industries still account for the main body status and proportion of emerging industries were relatively low and developed slow (Statistic Bureau of Guangdong, 2005)

4.7.2 Taiwan

Early stage of development (before the mid 1980s)

Since the period of Japan occupying, the industry of administration, trade, business, finance, insurance and traffic transportation in service sector have its elementary scale,

Because at that time, Taiwan's economy was given priority to with the primary industry, such as agriculture, forestry, industry foundation was weak, the service sector was the most important industrial sectors except agriculture. After 1949, Taiwan implemented a series of policy of import substitution, export expansion. During the period of 1950s and 1980s, the development of industry made significant progress, the population of employment from 17% increased to 42% (Xiong, 2003). There was a steady growth in consumer service, plus auxiliary manufacturing producer services such as finance and insurance, science and technology service industry also has a certain degree of development, the proportion of service industry in industrial structure have always stayed at around 47%-50%, at least 3% higher than industry share of GDP. The share of service industry employment from 31% in 1961 increased to 41% in 1986 (Xiong, 2003).

The rapid development stage (1986-1995)

In the mid and late of 1980s, Taiwan promoted liberalization, marketization and internationalization, while it promoted industrial upgrading and other financial measures, providing a good environment for the service industries rapid development. Since the rapid development of service industry, Taiwan's manufacturing industry was facing huge pressure of competition, it started expand or transform to service sector, market open to foreign investment in the island, in order to promote Taiwan's service industry structure from the traditional service industry to modern service industry. In 1986 Taiwanese authority implemented a program to promote strategic services industry development. The period of 1986 and 1995 is the golden ten years of Taiwan's service industry development, the output of service industry from 1.3 trillion (NTD) increased to 4.6 trillion (NTD), the average annual growth rate was high as 14%.

Adjustment and transformation stage (1996 until now)

After 10 years of rapid development, Taiwan's service industry growth appeared a certain degree of slowing down, between 1996 and 2000 the average annual growth rate dropped to 8%. The service industry enter into an adjustment and transformation period, the island's market was narrow, the outward flow of production, and

competition of service trade export is weak, the island's market was narrow, the outward flow of production, and competition of service trade exports is weak and other problems gradually become the important factor that restrict the development of service industry. Taiwan's authorities launched a series of policy measures to promote transformation and upgrading of service sector.

This can be seen from table 6, the proportion of each sector in net output and the proportion of each sector in employment population are 6.5%, 46.8%, 46.7% and 17%, 41.46%, 41.5% respectively in 1986, the proportion of industry and service industry net output and the employment population basically the same, the difference is not obvious. In 1988, in the three major industries, the proportion service industry net output was 47.7% first time exceed the proportion of industry net output, became the biggest industry department in terms of the proportion of net output. As mentioned before, during the period of 1981 and 1990, Capital and labor were flowing to the secondary and tertiary industry one after another, thus lead to the output value of service industry exceed the sum of industry and agriculture first time in 1990. The percentage point of the employment population was 47% surpass industry's 43% became the largest employed population department. In the late 1980 s, especially since the early 1990 s, because of the strong support of the Taiwan authorities and internal changes of industrial structure of Taiwan, Taiwan's service industry have been developing steadily. In 1986, Taiwan developed and implemented the "accelerate strategic service industry development plan", in order to match the proportion of the employed population in service industry increasingly high, effectively assist in modern service industry, to create a good environment for the development of the services industry (Chen, 2003).

From the situation of the growth of each industry in service industry and the change of output proportion in Taiwan, from 1987 to 1999, the total output of Taiwan's service industry from 1554.4 billion new Taiwan dollars increase to 5987.4 billion new Taiwan dollars, thus there is an increase with 285 percent. Compare with the value of industrial output from 1510.9 billion increase to 3075.5 billion new Taiwan

dollars, it has only increase by a factor of 1.03. The growth of service industry output significantly higher than that of industrial output growth; service industry has become the leader of Taiwan's economic growth

Table 6: The proportion of each sector in net output and the composition of the employed population, Taiwan

Year Category	The proportion of each sector in net output (%)			The proportion of each sector in employment population (%)		
	Agricultur	Industry	Service	Agriculture	Industry	Service
1952	35.7	17.9	46.4	56.1	16.9	27.8
1963	26.8	28.1	45.1	49.4	21.3	29.3
1972	14.2	40.3	45.5	33.0	31.8	35.2
1980	9.2	44.7	46.1	19.5	42.4	38.1
1982	9.2	42.7	48.1	18.9	41.2	39.9
1984	7.6	45.2	47.2	17.6	42.3	40.1
1986	6.5	46.8	46.7	17	41.46	41.5
1988	6.1	46.2	47.7	13.7	42.6	43.7
1990	5.5	43.1	51.4	12.8	40.90	46.3
1992	3.6	40.08	56.32	12.32	39.80	47.87
1994	3.51	37.71	58.78	10.92	39.22	44.85
1996	3.19	35.72	61.09	10.12	37.49	52.39
1998	2.5	34.4	63.1	8.85	37.93	53.22
1999	2.56	33.2	64.2	8.27	37.21	54.52

Source: Taiwan statistic data book 1989; Taiwan national economic trends statistical quarterly, 1999,Oct; Taiwan statistic yearbook, 2000.

There is an increase in both the proportion of net output and employment population of tertiary industry. While as the previous sector found that the productivity and GDP per capita growth rate of tertiary industry was decline since 1995. In early 1990s, before Taiwan industrial structure began transformed, manufacturing industry released many low labor force workers, in the transition to the service industry, the contribution of their productivity of service industry is almost the same with their previous productivity in manufacturing industry. However, after enter the 2000, the transformation of manufacturing industry accelerated, it released more high

productivity labor force, at the time of these labor force transfer to service industry, there is no big change in terms of the service industry they can choose compare with before, that is to say, the productivity of service industry has not relatively risen (Lin and Zhuang, 2007). From another perspective, in the process of industrial structure adjustment of the Taiwan service industry, its output and employment capacity had increased, while the adjustment of service industry structure itself is still not enough. Thus make the increase of labor force of service industry can not catch up the increase of productivity brings by the rapid transformation of manufacturing industry. It is also the main reason that Taiwan economic growth rate dropped in recent years (Li and Zhuang, 2007).

Since the late 1980s, with the electronic computer, communication technology and the rapid development of biotechnology has brought the development of high-tech industry, the development of automation, electronic data processing, robot, nuclear power, management consulting, technology research center and other modern service industry are rapid, makes the rapid changes in the internal structure of service industry, it began the transformation from traditional service industry to modern service industry. Among Taiwan's service industry, the development of modern service industry represent by finance, insurance, securities, e-commerce, management consulting, technology research and real estate are the quickest. Among all of these, the development of the high-tech industry developed rapidly and got significant achievement, especially in the sector of the electronic information industry; it has become the most important pillar industry of Taiwan, and plays a more and more important role in the economy. This is because of the further development of the strategy industry in the 1980s in Taiwan, its development focus on high value added and low energy intensive industry, established Taiwan Hsinchu Science Park and developed hi-tech enterprises like semiconductor and computer. The competent department of Taiwan's economy published the development of industry program in 2011, it put forward the prospect of future transition and the upgrade of manufacture industry is to keep the industry value added steady growth..

5 Results of shift-share analysis

This analysis applies the model of shift-share mentioned above (equation showed above). Applying this model to examine employment and productivity for three sectors primary industry (agriculture), secondary industry (industry) and tertiary industry (service). The period was chosen of 1980-2005 for Guangdong and 1960-2005 for Taiwan that the level of GDP per capita in Guangdong was similar with Taiwan. The data for the proportion of each sector in employment population was presented in table 7, and the benchmark of gross value added index volume is 1987=100 for Taiwan and 1978=100 for Guangdong. Thus, the gross value added is in constant prices from 1987 for Taiwan and 1978 for Guangdong.

Table 7: Result of shift-share analysis

Region	Period	Annual (%) rate of change of GDP per capita	Intra (%)	Static (%)	Dynamic (%)
Guangdong	1980-2005	15	7.9	6.3	0.8
Taiwan	1960-2005	7.6	4.7	2.3	0.6

Table 7 presents the result of the shift-share analysis for both Guangdong and Taiwan. During the period of 1980-2005, the annual rate of change of GDP per capita in Guangdong was 15%. Compare with it, Taiwan's annual rate of change is much lower than Guangdong as 7.6% during 1960-2005. This mean the effect of labor productivity growth is higher in Guangdong than Taiwan. Guangdong's employed persons are higher than Taiwan comparing with the same period. There are many reasons that can cause Chinese productivity growth: foreign direct investment (FDI), structural change within manufacturing, a series of efficient reforms that improve the

economic market, and high domestic investment rates (Wang and Zirmai, 2008). For Guangdong, except foreign direct investment and the structural change within manufacturing, the labor forces were in the condition of high-insensitive work long hours in Guangdong just as the most media have been reports (Chan, 2008). For Taiwan, as mentioned above, service industry labor productivity growth rate fell sharply after 1995 is the main reason of Taiwan overall industry productivity decline. The shift effects are positive in these two regions, which means labor moves to regions where the productivity is increasing than the level of average. The effect in Guangdong is 6.3% during 1980-2005. Compare with Guangdong, Taiwan's shift effect is lower as 2.3%. The structure change of Guangdong is higher than Taiwan during the period of 1980-2005. This is because of the move of employment within three industries is much bigger in Guangdong than in Taiwan just as table 5 and 6 showed above.

Thus both regions saw a positive contribution from structure change because of sectors with high productivity growth also has a fast increase of the employment share. Both these two regions have positive contribution therefore labor moves to sectors where productivity is increasing more rapidly than average productivity.

6 Conclusions

This article focuses on the comparison of the development process of industrial structure between Guangdong and Taiwan. It compares the development process of industrial structure between Mainland China Guangdong province and one of Asian four tigers' Taiwan. This paper is aim to see if the structure components are similar or difference during the growth process. Taking a broader view in the more descriptive parts like GDP per capita, composition of GDP by industry, productivity of each industry, gross output value of each industry and each industry output and the composition of the employed population. Then applying the shift-share analysis to examine employment and productivity for three sectors primary industry (agriculture),

secondary industry (industry) and tertiary industry (service).

Guangdong is one of the fastest growing countries in China and Taiwan's successful reform make it created Taiwan miracle and become one of the 'Asian four tiger'. The reform of Taiwan is earlier than Guangdong. Since the early 1950s to the middle of 1960s, Taiwan adopted the development strategy of import substitution; it made considerable achievements in its early stage of the economic development. Since the middle 1960s, Taiwan began change the strategy from import substitution to the export oriented strategy, and achieved great success. It kept high-speed economic growth momentum and last to the middle of 1990s. After 1980s, Taiwan authority implemented new trade policy, at the same time of improved trade liberalization degree, the key point of the policy from the past promoted rapid economic growth change to the industrial structure improvement towards the direction of the high and new technology. Guangdong experienced the process of from "three-processing and one compensation" to export oriented strategy. In general, Guangdong started about 1980 from the same level as Taiwan about 1960, despite the fast growth in Taiwan (tiger economy), Guangdong caught-up with Taiwan and before 2010 was at about the same level. Both of two regions adopted for each development policy at an appropriate time to adapt their development respectively.

From the perspective of GDP per capita, Guangdong always keeps the high growth rate of GDP per capita since the reform and opening up and since 1989 it was even higher than Taiwan. Guangdong took half the time compare with Taiwan to reach the same level of GDP per capita with Taiwan since 1980. The level of GDP per capita in Guangdong in 1980 is similar with Taiwan's 1960, after the rapid development of Guangdong, its GDP per capita exceeded Taiwan since 2008. This may because of the globalization cause large difference between the measurements of a country's income and the measurement of its production. If the difference of GNI-GDP is the same for Guangdong as for Ireland, Guangdong will at a lower level than Taiwan. FDI also plays a certain role in terms of the rapid economic development in Guangdong.

In aspect of the condition of the composition of GDP by industry for Guangdong, the GDP of primary industry has been declining since 1980; the GDP of secondary

industry always keeps the highest among the three industries, and the tertiary industry has been on the rise since 1980. During the period of 1950 to 2010, the structure change of Taiwan region's three industries has experienced from agriculture as foundation to industry as main part, and then with the change of service industry as the leading industry. Although the proportion of agriculture industry in both these two regions experience a downward trend, Taiwan has already reached the proportion of three industries shift from 'two, one, three' (secondary industry account for the largest share of GDP, while tertiary industry takes the smallest GDP proportion) to 'three, two, one' (tertiary industry account for the largest share of GDP, while primary industry takes the smallest GDP proportion) for many years, while the proportion of three industries in Guangdong is still in the stage of 'two, three, one' (secondary industry account for the largest share of GDP, and primary industry takes the smallest GDP proportion) all the time.

The productivity of tertiary industry in Guangdong was higher than secondary industry in 1985 and 1990, since 1995 the productivity of tertiary industry was lower than secondary industry until 2003. The secondary industry is still the main industries to absorb labor force, but its capacity decreased year by year, tertiary industry will replace the secondary industry become the main industry of absorbing the labor force. When it comes to Taiwan: the productivity of tertiary industry was higher than secondary industry during the period of 1972 and 1999 except 1986. After 1995 there was a fall off in the productivity of tertiary industry. Although tertiary industry is the main industry to absorb labor force, its capacity also declined year by year. And the GDP per capita growth rate of service industry also decline from 1995 to 2001. Service industry labor productivity growth rate fell sharply after 1995 is the main reason of overall industry productivity decline. From the comparison of contribution rate, I found that the secondary industry is main driving force to promote economic growth in both Guangdong and Taiwan.

The similarity is that in the beginning of the reform both two regions increase the productivity through a series of policies. Then move to give priority to the development of labor-intensive light industry, last shift to heavy industry, both of

them had a great increase of manufacturing output in electronic and electric equipment. Although in recent years Guangdong gradually changed from light industry to heavy industry, Guangdong still mainly focused on the light industry. The difference is that Taiwan has already transformed from light industry to heavy industry and it laid a solid foundation to the development of high-tech industry. Last, tertiary industry accounts for the largest share of net output among the three industries, and the numbers of workforce have moved from secondary industry to tertiary industry, that is to say the proportion of employment population in tertiary industry is the highest among the three industries. While both the productivity and GDP per capita of tertiary industry declined from 1995 to 2001. There exist the problem of the increase of labor force of service industry can not catch up the increase of productivity brings by the rapid transformation of manufacturing industry. The development speed of tertiary industry and the structural adjustment is not enough. When it comes to Guangdong, the proportion of primary industry in net output of Guangdong continues to decline. Although there is a sustained growth in terms of the proportion of tertiary industry in net output, the net output of secondary industry always kept the highest proportion among three industries except 2001 and 2002, while the employment population in tertiary industry accounted the largest population since 1995. Besides the electrical machinery equipment and electronic industries were the pillar industries in Guangdong, the high net output proportion of secondary industry and the low proportion of secondary employment population in Guangdong may because of the long hour working of the workers. Foxconn is not a particular case in terms of working overtime, Pegaron Corporation is another manufacturing company has the same problem with Foxconn. A lots of reports proved that overtime working is a common phenomenon in Guangdong. Although the industry internal structure of Guangdong tertiary gets a certain optimization, traditional service industries still account for the main body status and the proportion of emerging service industries is relatively low and develops slowly, and its development of electronic information industry is relatively backward. The high tech industry in Taiwan developed much more quickly than Guangdong, since the further

development of the strategy industry in the 1980s in Taiwan, its development focus on high value added and low energy intensive industry, established Taiwan Hsinchu Science Park and developed hi-tech enterprises like semiconductor and computer. The competent department of Taiwan's economy published the development of industry program in 2011, it put forward the prospect of future transition and the upgrade of manufacture industry is to keep the industry value added steady growth. When it comes to Guangdong, just like Lin Justin said (2011), as Guangdong took use of its advantage to develop labor intensive industry in the beginning of reform and opening up (the implementation of the policy of three-processing and one compensation), and now Guangdong accumulated such amount of capital and technology, the original industries should let the advantage industries towards to the both ends of the smiling curve. Guangdong should transfer its low value added industries to overseas and develop high value added industries; it can be manufacturing industry, R&D and service industry.

For the part of shift-share analysis, the comparison period for Guangdong and Taiwan is 1980-2005, since GDP per capita of Guangdong and Taiwan was similar during this period. Through the analysis I found that the annual growth rate of GDP per capita of Guangdong is higher than Taiwan during this period, the effect of labor productivity growth is higher in Guangdong than Taiwan. The number of employment of Guangdong is higher than Taiwan comparing with the same period. Except foreign direct investment and structural change within manufacturing, the labor forces were in the condition of high-insensitive overtime working in Guangdong just as the most media have been reports (Chan, 2008). While in Taiwan, labor productivity growth rate fell sharply after 1995 is the main reason of Taiwan overall industry productivity decline. Thus the labor productivity growth rate in Guangdong is higher than Taiwan. There is a great structural change during the period of 1980-2005 in Guangdong, also greater than Taiwan. This is because of the move of employment within three industries is much bigger in Guangdong than in Taiwan.

Taiwan as one of Asia four Tiger, tertiary industry had a certain development, while it is necessary to adjust its structure further. Its development focus on high value added

and low energy intensive industry, and achieve a certain results. Since the reform and opening up, the development of Guangdong economy is rapid, its scale of economy continuous to steadily extend, the rapid secondary and tertiary industry growth according to adjustment, Guangdong achieved optimization and upgrading of structural change through a series policies and measures. Although the development of Guangdong is fast, it still gives priority to production cost advantage, and lags in core technology innovation capacity and the self-owned brand construction, the export product generally in low technical content, low added value and profits. Key technology mainly relies on import; quite a number of enterprises are the OEM (original equipment of manufacture or outsourcing production) of multinational companies, lack of self-research and development ability. The industrial structure in Guangdong still needs to be optimized.

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