LUND UNIVERSITY
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21st Century Market Integration in China: An Analysis Based on The Average Wages of Urban Units at Provincial Level

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Abstract: China is a huge country which had experienced economic booms since the last thirty years, while the country had become one of the world's largest economies, its internal disorders arising from growing disparities between regions had become one of the important impediments for further growth and causes for social instability. At such stake, attentions were paid by the government around 2000 to encourage market integration. In this paper, the Sigma convergence, Beta convergence as well as the Correlation coefficient were used to analyze the average wages of urban units at provincial level from 2000 to 2011, as a measure for the market integration during this period. The results showed that during this period, there was a convergence of average wages of urban units between all provinces as well as between provinces of each of the regions of China, implying the role of the government policies as well as the development towards a more healthier economy in the long run.

Key words: *China, Wages, Urban units, Market integration, Regional disparities, Government policies, Sigma convergence, Beta convergence, Correlation coefficient, Convergence.*

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1. Introduction:

Since China's opening up, the regions inside China had experienced uneven growth. There are some reasons for this.

Firstly, at the beginning of China's opening up, in 1978, the total trade volume (exports plus imports) of China were only 20.6 billion US dollars. The corresponding figure for year 2012 were 3866.76 billion US dollars. Since China's opening up, exports had become a major driver of China's economic growth. However, some regions of China could perform trade easier than others, especially the costal provinces such as Guangdong, Jiangsu, Zhejiang, Shanghai and Shandong, in 2007, the largest exporting provinces of China were exactly these five provinces. The trade advantage had facilitated the economic development of these provinces, causing them to grow at a faster rate than the central and western parts of China through the 1980s and 1990s.

Secondly, Deng Xiaoping, the chairman who led China's opening up, had said "let some people get rich first" and the development of the special economic zones including Shenzhen, Shantou, and Zhuhai located in Guangdong province, Xiamen located in Fujian province and Hainan province itself, these special economic zones had been given preferential policies, for instance, the foreign companies which had branches established in these special economic zones enjoyed a 15% reduction in corporate rax rate. The establishment of the special economic zones was also a factor causing the uneven growth between regions.

Up to the 21st century, the problems of China's uneven spatial growth had been realized and in 2000, policies were implemented by the Government to boost the development of its less developed western regions, the policies covered six western provinces and five autonomous regions. In 2004, premier Wen Jiabao had proposed a plan called "rise of central China plan", the aim was to accelerate the growth of the

central regions, it covered six provinces located in the central China. One object was to reduce the development gap between the eastern coast and the central, the other object was to increase the anti-strike capability of China in case that the eastern coast are destroyed in the first enemy strike.

These facts had left a number of questions, for instance, whether the level of integration increased due to the policies that the Government implemented for the last decade or not. Therefore, i would like to see the development of market integration in China during the period from 2000 to 2011, a period of not only high economic growth, but also a period that government emphasized on synchronized development across the country. For my research, due to the availability of data, I will focus on analyzing the average wages of urban units of each of the 31 provinces of China at administrative level from 2000 to 2011. Furthermore, despite analyzing all 31 provinces together, analysis will also be made for each of the three regions of China (Refer to section 2.1 for the explanation of regions) to see the market integration within each regions. Therefore, my search question would be:

"Was there a convergence or divergence of the average wages of urban units between provinces within China as well as between provinces within each of the three regions of China from 2000 to 2011?"

For accessing the market integration, one can definitely argue that there are other indicators other than the average wages of urban units that can be used. However, in this paper, due to the availability of data collection, the average wages of urban units will be used as the indicators for market integration.

1.1 Previous Research:

There are some previous papers analyzing the market integration in China. To start

with, Yanrui Wu had written an paper called “Regional Growth, Disparity and Convergence in China and India: A Comparative Study” in 2006. Wu used sigma and beta convergence to analyze the provincial data of both China and India from 1980 to 2005, which found that there was a modest convergence among Chinese provinces during the first half of the 1980s and divergence started since the early 1990s (Wu 2006). Overall, the sigma and beta convergence showed that from 1980 to 2005, these was increased income disparity in China mainly due to the fact that major municipalities and several costal provinces were developing at a much faster pace (Wu 2006).

Later in 2007, Jun Nagayasu and Ying Liu had written an paper called “Relative Prices and Wages in China: Evidence from a Panel of Provincial Data”. In this paper, Nagayasu and Liu used annual data of 29 of the 31 provinces from 1995 to 2005, Tibet was excluded due to lack of data and Chongqing was incorporated into Sichuan province since Chongqing was part of Sichuan before 1997. Nagayasu and Liu’s data contained both prices and wages, prices are measured by the Consumer Price Index and wages are the average wages of workers by sectors and provinces, for the sectors, there are 15 industries included, the data were acquired from the Chinese bureau of statistics (Nagayasu & Liu 2007). The methods Nagayasu and Liu used include two tests, namely the panel unit root tests and the MP (Moon and Perron) test, these two tests were used to examine the relative price-wage relationships (Nagayasu and Liu 2007). What this paper found was that these was no divergence in Chinese provincial prices from 1995 to 2005, however, there was a divergence in wages among provinces in China since the panel unit root tests indicated that the wages in some provinces were not following the wage level in Beijing (Nagayasu and Liu 2007).

In addition, in 2010, Joanna Tymaszewska, Joanna Tyrowicz as well as Jacek Kochanowicz had written an paper called “Intra-Provincial Inequalities and Economic Growth in China”. This paper was intended to analyze the influence of inequality on growth in China in the provincial context (Tymaszewska et al., 2010). The author Wu

obtained the data from the National Bureau of Statistics of China as well as the Central Bank of China, the data used was the panel data on industrial output, investment, employment as well as inequality for 28 of the 31 provinces of China from 1998 to 2006, three municipalities were excluded including Beijing, Tianjin and Shanghai (Tymaszewska et al., 2010). Wu used the Theil index to measure the inequality, this was worth noting method in respect that the Theil index was prefectures-level based, unlike city-level based,the prefectures-level based index enabled the author to identify the differences between rural and urban areas since both are covered within prefectures (Tymaszewska et al., 2010). The results in this paper showed that the inequality in China was rising from 1998 to 2006 while the economy was growing.

1.2 Contribution:

Compared with the paper written by Yanrui Wu in 2006, my research will be similar since sigma and beta convergence will also be used. However, my research will be different in respect that firstly, in my research, correlation coefficient will also be used to examine the wage movements between provinces. Secondly, since my research will focus on China only, there will be more detailed analysis in my paper with respect to this issue. In contrast to the paper written by Jun Nagayasu and Ying Liu in 2007 and the paper written by Joanna Tymaszewska, Joanna Tyrowicz as well as Jacek Kochanowicz in 2010, my research will be different in respect that different methods will be used.

Secondly, none of the previous papers had covered the entire 31 provinces of China due to certain reasons. In my research, due to the improvement in the data collection techniques of the National Bureau of Statistics of China, all 31 provinces will be covered to give a comprehensive and more reliable picture of the changes in the level of market integration in China.

Furthermore, due to the difficulties of accessing the National Bureau of Statistics of China from outside China, a number of researchers in the past were not able to obtain reliable regional information with respect to China. Therefore, a subsequent consequence was that most literatures on China attempted to access the developmental status of the Chinese economy from the national level. My research will add deeper insights into the development of the Chinese economy by analyzing on the provincial basis.

In addition, compared with the previous papers in this field, my research will provide an update analysis since the period under my analysis will extend to 2011 in my research. Therefore, the results obtained from my research can help to compare with the earlier periods that had been analyzed by previous researchers. Also, my research will also contribute to later researchers in the sense that my research can be used as reference for later researchers who can use the results from my research to compare with results obtained by them.

1.3 Research Design:

1.3.1 Data and Methods:

The Data is acquired from the National Bureau of Statistics of China (NBSC). The NBSC is an agency within the State Council of the People's Republic of China responsible for the collection and publication of statistics related to the economy, population as well as society of China at both the national and local levels. The NBSC is also responsible for creating rules for statistical operations as well as conducting statistical surveys. The data collected include the average wages of employed persons in urban units of each of the 31 provinces for the period from 2000 to 2011. The methods used include sigma convergence, beta convergence as well as correlation coefficient, these methods will be used to access the changes in the level of labor

market integration in China during the period under investigation, detailed explanation of these three methods as well as how these methods work will be presented in the theoretical background part of this paper.

1.3.2 Limitations of Data

For the limitations, starting with the data, China's data is suggested to become less dependable when the economy is in poor condition and under such poor condition, the officials tend to manipulate the data due to the unwillingness to report negative performance (Koch-Weser 2013). There are some obvious historical examples of the data manipulation by officials, these are as follows:

1) During the Great Leap Forward, which was from 1959 to 1962, there was a significant decline in the agricultural output in China . However, the government officials overstate the agricultural production (Koch-Weser 2013). It is suggested by one study that under the pressure from upper level officials, the cadres of lower level overstated grain production as ways to prevent themselves from punishment, such falsification of data had contributed to one of the greatest famine in the Chinese history during the early 1960s (Cai 2000).
2) During the late 1980s, China had suffered from high levels of inflation as well as high unemployment in the urban area, and a number of scholars had suggested that the Chinese economy in fact had contracted in 1989. However, the official data showed that in 1989, the economic growth rate was over 10 percent (Young 2003).
3) During the 1998 Asian Financial Crisis, China's GDP growth was reported as 7.8 percent annually, which was only 1 percent slower compared with the corresponding figure for 1997, such figure not only seemed to be problematic by looking at the regional context, but also contradicted with the huge decline in particular economic activities, such as the huge decline in the airline travel and

energy consumption (Rawski 2001). Later at 2005, when the NBSC revised the historical GDP growth in 2005, the GDP growth rate for 1998 has been passed for any revision (Wu 2006).

In January 2010, the head of the NBSC, had admitted that the local officials had overstated GDP growth while the Central Government's estimate was lower and more reliable (Koch-Weser 2013). As a matter of fact, since 1998, the NBSC had started to reject the GDP growth data reported by provincial officials and started to measure GDP growth itself (Rawski 2001). Nevertheless, the Central government could still manipulate data though NBSC in a different way. This is because firstly, when the Central government deducted the inflated data reported by local government, it does not announce the size of the revisions to the public; Secondly, under the Central Government's control, the NBSC might smooth the data, through smoothing, the growth during booms can be understated while the growth during recessions can be overstated, disguising either an overheated economy, or an economy undergone downturns (Bradsher 2012).

Such manipulation could also happen to the data regarding the average wages that i use. Based on the historical instances, no one could deny that the wage data provided by NBSC for the recent decade is not falsified to a certain extent. Therefore, it is possible that the data i use could lead to potential biases that could not be avoided in my paper.

1.3.3 Limitations of Methods

Regarding the methods, the sigma convergence shows for instance, the disparities of income between different regions decrease overtime, however, it did not take into account the economic growth of different regions, for instance, a region or a country with economic growth may converge towards a certain level while sigma convergence

may show nothing. Furthermore, according to Quad, sigma convergence also has the shortcoming of offering no information about the intra-distributional dynamics of income (Quah 1996). With respect to beta convergence, it means a catch-up process where a poorer region or country grows at a faster rate than the richer one and eventually catches up with the richer one. However, such situation only indicates convergence if there is a single steady state, however, in reality, the steady-state may depend on the characteristics of a specific country or region, in which convergence will take place but not necessarily at the same long-run levels (Monfort 2008). In other words, there is a possibility that low income regions or countries grow faster than rich ones but converge to a different, for instance, a lower steady state than high income countries (Morris 2009). A common weakness for both sigma and beta convergence is that neither of them allows for an examination of the transitional behavior of cross-region growth differentials (Morris 2009). For correlation coefficient, it assumes a linear relationship between variables while in some cases such linear relationships may not exist. Furthermore, it is highly affected by extreme values, for instance, if the wages of A series are 1,2,3,4 respectively and the wages of B series are 4,3,2,1 respectively, then the correlation between A and B will be -1. However, if one more value, for instance, 100 is added to both A and B series, the correlation coefficient between A and B will increase to 0.999. Therefore, the addition of a set of large numbers had significantly increase the correlation from -1 to 0.999. In addition, since the the number of years under my analysis are 12 years in total, meaning that the result obtained for correlation coefficient could be insignificant, therefore, this paper intends to focus more on the Sigma and Beta convergence.

Therefore, it can be seen that none of the three methods is perfect and each method accesses market integration from a different perspective, in order to avoid potential biases as much as possible, all three methods will be used in my analysis.

1.3.4 Testable Hypothesis

A Hypothesis is a prediction based on the knowledge of the given subject under investigation. A testable hypothesis is a hypothesis which can be tested by experiments. Normally these is a null hypothesis and an alternative hypothesis. For instance, when a bike is believed to be stoled by thieves, then the alternative hypothesis would be "The loss of bike is due to thief theft". However, to simply prove the alternative hypothesis is not enough and can be misleading since any relationships observed from the experiment could due to random change. Therefore, an opposite hypothesis is needed to back up the alternative hypothesis, which is called the null hypothesis, under this case, the null hypothesis would be "The loss of bike is not due to thief theft". In order to prove the alternative hypothesis, the null hypothesis has to be verified first.

In this paper, there are two sets of hypotheses that can be formed:

Set A

- **Null Hypothesis (A):** There is no convergence in the average wages of urban units between all 31 provinces from 2000 to 2011.
- **Alternative Hypothesis (A):** The average wages of urban units between all 31 provinces were converging from 2000 to 2011.

Set B

- **Null Hypothesis (B):** There is no convergence in the average wages of urban units between provinces of any of the three regions from 2000 to 2011.
- **Alternative Hypothesis (B):** Convergence in the average wages of urban units did occur between provinces of their respective regions from 2000 to 2011.

In order to prove the alternative hypotheses, the null hypotheses have to be rejected.

2. Historical Background

2.1 The Provinces and The Division of Regions

China is the largest country in the world in terms of population and the third largest country in the world in terms of land mass. However, due to China's terrain, most of the land in the west is not inhabitable, therefore as a result, most of the population inhabited in the eastern coast as well as the central areas. For instance, the Xinjiang province in the west of China has a land mass of 1660000 square kilometers, but inhabited with only 20 million people, in comparison, the Shandong province on the eastern coast of China has a land mass of only 160000 square kilometers, but is inhabited with more than 90 million people. In 1949 when the People's Republic of China was established, the country was made up of 30 provinces at administrative level. Currently, China is made up of 31 provinces at administrative level in respect that in 1997, the city Chongqing of Sichuan province had become a city at provincial administrative level.

The Eastern, Central and Western regions of China was identified in the Fourth Session of the Sixth National People's Congress in 1986. The Eastern region was formed by provinces which were considered to be the most developed in China, followed by the Central region and the Western region comprises of the least developed provinces. Currently, the Eastern region comprises of 11 provinces at administrative level, namely Beijing, Shanghai, Tianjin, Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong as well as Hainan. The Central region comprises of 8 provinces, namely Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The Western region is made up of 12 provinces, namely Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Guangxi and Inner Mogolia. The figure 1 shows a map display of the three regions.

Figure 1: The division of the Eastern, Central and Western regions within China (Note:

Eastern=pink, Central=light blue, Western=yellow)

(Source: http://hx3zhlitieshe.blog.163.com/blog/static/174911068201254863742O/)

2.2 The Chinese Urban Economics

The Chinese economy was isolated into the rural and the urban economy, since China's Communist Party had acquired power since 1949, virtually, the Chinese economy did not allow any labor mobility between the rural and urban sectors (Meng 2012). The isolation of the rural and urban economy was enhanced by a household registration system called "Hukou", individuals born in rural areas receive "Agriculture Hukou" while individuals born in the urban areas receive "Non-agricultural Hukou" (Meng 2012). Since the reform and opening up in 1978, the rural reforms also began, during the late 1970s and the early 1980s, due to rural reforms, agricultural productivity had been significantly increased (Meng 2012). However, Urban economic reforms started later compared with rural reforms and were carried out at a slower pace, prior to 1978, the state and collective sectors employed nearly all the urban labor, with a mere 0.02 percent of the labor who had urban Hukous been self-employed (Meng 2012). During that time, individuals in urban areas were assigned jobs after graduation from technical schools or universities

and employers did not have the right to hire or fire employees, the wages of employees were determined by the Central Planning Commission, the structure of such lifetime employment and centrally planned wages had significantly reduced working incentives as well as mobility, a subsequent consequence was shirking, overstaffing and low productivity (Meng 2012).

Moderate urban labor market reforms began during the 1980s, however, working incentives and labor mobility haven't changed until the occurrence of two large events (Meng 2012). Starting with the first event, during the early years of the cultural revolution which occurred during the late 1960s, tens of millions of urban high school-aged kids had no school or no job, as a result, Chairman Mao sent most of these kids to rural areas to work, up to the early 1980s, most of these kids returned to the urban areas, however, there were insufficient jobs to offer, as a consequence, the urban economy experienced severe open unemployment for the first time under the Communist Regime, the government finally responded to this situation by encouraging self-employment, which triggered incentives of labor (Meng 2012). The second event was the state sector restructuring, such restructuring was carried out during the mid-1990s, a time when more than 40 percent of state-owned enterprises were experiencing losses, as a result, in 1997, the government introduced a policy called "Hold on to the large, let go of the small", meaning to keep the largest 1000 state-owned enterprises and leaving the smaller ones to market to compete, as a consequence, a number of small state-owned enterprises went bankrupt (Meng 2012). From 1990 to 1997, the share of the state/collective sector in industrial output fell from more than 90 percent to 70 percent (Meng 2012). Among the four years of restructuring, a great number of state sector urban workers had become redundant and the urban private sector started to expand at a dramatic speed, the transformation of the labor market for those with urban Hukous started (Meng 2012).

2.3 China's Uneven Growth in The Past

The growth of China had been spatially uneven since its reform and opening up, the Chinese average provincial GDP growth rates from 1978 to 2004 ranged from the lowest 5.9 percent in Qinghai to the highest 13.3 percent in Zhejiang (Winters and Yusuf 2007). Also, the poorer provinces in China had managed to keep pace with richer provinces in terms of growth rates, however, even at same growth rates, absolute differences between provinces had still increased due to the small base number of poorer provinces (Winters and Yusuf 2007). The uneven spatial growth in China had contributed to uneven progress against poverty in two ways, firstly, the income growth in China had been closely related with the reduction in poverty at subnational level, therefore, uneven spatial growth indicated that the progress against poverty was also uneven, with some provinces experienced greater reduction in poverty than others, from 1981 to 2001, the trend rate of decline in poverty rate was 17 percent annually for coastal provinces, while the corresponding rate for inland provinces was only 8 percent annually (Winters and Yusuf 2007). Secondly, by comparing the growth elasticities of poverty reduction weighted by the initial shares of total poverty and the growth rates across provinces of China, it can be found that the most rapid growth did not happen in the regions where it have the greatest impact on poverty (Winters and Yusuf 2007).

So what could cause such uneven spatial growth? There is one thing for sure, for a developing country like China with scarce technology and capital at the beginning of reform and opening up, its initial economic growth depends on the development of some growth centers, such growth centers all concentrated on the eastern coast of China, therefore, the nearby provinces benefited the most from the development of the costal growth centers, and the spillover effects from the costal growth centers to inland areas diminish as distance increases (Yao and Zhang 2001). Thus in China, geographically from the east to the west, the growth rates diminished.

2.4 Government Policies and Regional Disparities

The government policies in the past were one of the important factors that caused regional disparities. Firstly, during the era of planned economy in the 1950s, China placed the development of the heavy industries as the top priority (Fan et.al. 2009). However, such strategy of development was inconsistent with China's situation at that moment, a country with plenty of labor but limited capital (Lin et.al. 2003). In order to support the development of the heavy industry which required a lot of capital resources, the government suppressed the prices of agricultural goods as means to extract as much as resources as possible, in order to maintain the labor supply in the agricultural sector, the government implemented the household registration system to force people to work in the places where they are born (Fan et.al. 2009). Therefore, advanced cities like Beijing or Shanghai with better initial educational advantages and a greater proportion of high skilled people were experiencing a virtuous cycle, since there was almost no mobility of labor under the household registration system, initially backward regions were experiencing a vicious circle due to the lack of skilled labor and backward higher education. Therefore, the household registration system implemented under the will to vigorously develop heavy industries was one of the government policies that caused greater regional disparities in China.

Secondly, since the 1978 reform and opening up, exports as well as FDI, under various policies implemented by the government, had become two important drivers of the economy, as these things happened, the comparative advantages of coastal provinces started to appear. Most of the exports were coming from the coastal provinces and the coastal provinces had benefited the most from FDI due to their proximity to the international market. Furthermore, the coastal provinces had also benefited from government policies such as special economic zones and preferential tax breaks (Fan et.al. 2009). Thus after the reform and opening up, these government policies had caused greater gap between coastal provinces located on the east side of China and the inland regions.

Moreover, since the reform and opening up, in order to create incentives for local governments to develop their own economies, as a result, the government initiated fiscal decentralization, meaning that the local expenditures were linked more closely to the local revenues, therefore, the competition between provinces will increase, which will help to generate higher economic growth (Fan et.al. 2009). However, great variation in the development level between provinces meaned that the tax burden between provinces was different, in the coastal provinces, since there were already a greater tax base due to a larger number of firms, the governments of the coastal provinces had the room to loose their tax collection, as a result, the tax burden for each firm of coastal provinces will be lower, the subsequent result was that the coastal provinces attracted more capital from both foreign countries and inland provinces (Zhang 2005). Therefore, this was one important factor causing the coastal provinces to grow faster than the rest parts of the country.

Furthermore, government policies on the natural resource rent allocation was another factor causing the regional disparities (Fan et.al. 2009). In China, most of the natural resources are located in the central and western parts of the country, since the reform and opening up, the rapid growth of the coastal provinces had driven up the demand for natural resources, as a result, the prices of natural resources had increased due to the rapid development of the coastal provinces (Fan et.al. 2009). Normally, the increase in prices should benefit the central and western provinces and help to reduce the gap between them and the coastal provinces, however, under China's institutional structure, the central government owns the land, meaning that the government had property rights over those natural resources (Fan et.al. 2009). Most of these rents went towards the government as well as the state-owned enterprises, on the other hand, the greater revenues acquired from these natural resources had caused higher prices for non-tradable goods and therefore had reduced the competitiveness of the local economies (Zhang et.al. 2007). As a result, the central and western provinces with rich endowment of natural resources not only did not reduce the gap between them

and coastal provinces from rising prices of natural resources, but had widened the gap between them and the coastal provinces instead.

2.5 The Drivers of China's Growth Since 1980[1]

Since the 1980, export as well as foreign direct investment (FDI) had become two major drivers of China's growth. The Share of exports as a percentage of China's GDP rose from almost nothing during the 1960s to around 30% in 2003, despite exports, China's inward FDI also rose from almost nothing during the early 1980s to almost 5% of GDP in 2006 (Rodrik 2006).

Most of China's exports since the 1980s concentrated on the labor intensive, less sophisticated products. During the earlier 1990s, China's exports were mainly crude oil, refined petroleum products as well as apparel. Up to the mid 2000s, China became a major exporter of electronics products, however, most of China's exports of electronics products were in fact assembled by foreign firms which use China as an export platform and these foreign firms were one important factor causing China's emergence and economic transformation. In 2003, according to Branstetter and Lardy, foreign firms accounted for 92% of China's exports of computers, components and peripherals and 74% of China's exports of electronics and telecommunications equipment (Branstetter and Lardy 2006). The surge in China's exports since 1980 was facilitate by the cheaper costs of producing and the gradual devaluation of the Chinese Yuan since 1980, as well as the fact that the Chinese exporters were able to regain certain amounts of their foreign exchange earnings under the priorities given by the government (Branstetter and Lardy 2006).

For FDI, since the reform and opening up, the government had implemented various policies to attract FDI. In 1979, four special economic zones were established in China including the cities of Shenzhen, Zhuhai, Shantou and Xiamen, which all locate

in the southeastern China. The foreign enterprises which have facilities in these four cities were offered with preferential tax as well as administrative treatment, moreover, these firms were also given an unusually free hand in their operations. The establishment of the special economic zones as means to attract foreign investment were proved to be successful, one important reason for this was that it provided a perfect place for Hong Kong and Taiwan-based investors to exploit low cost labor for export processing. As a result, in order to attract more FDI, in 1984, 14 more cities located along the east coast of China were offered with similar priorities as the initial special economic zones such as exemptions from both taxes and administrative procedures (Branstetter and Lardy 2006). In addition, according to Branstetter and Lardy, the implementation of so called "22 regulations" by the Chinese government was also a factor attracting FDI, under these regulations, foreign enterprises can not only enjoy reduced business income tax no matter where they locate, but were also granted with increased managerial autonomy (Branstetter and Lardy 2006). The FDI during the 1980s were mainly dominated by investors from Hong Kong and Taiwan, since the 1990s, investors from Japan, United States as well as Europe had also increased their investment in China. After the 1998 Asian Financial Crisis, the pickup in demand growth was also a factor which encouraged more FDI into China (Branstetter and Lardy 2006).

2.6 The Leader "Deng Xiaoping"

China's reform and opening up was from 1978 under the leadership of Deng Xiaoping. Deng Xiaoping, or Deng, was the Chinese de facto leader who came to power in 1978 until his death in 1997. It was widely acknowledged that in modern Chinese history, Deng had done more than any other figure to realize the century-old dream of attaining wealth and power (MacFarquhar 1997). When Deng came to power, per

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[1]Part of this section was used in EKHM31 seminar assignment 1 written by the author

capita farmer income was only 132 yuan, at the then-prevailing exchange rate, it only corresponded to 66 US dollars, meanwhile one quarter of farmers had per capita income of less than 50 yuan, in comparison, the urban condition was better, with a per capita income averaging 383 yuan (MacFarquhar 1997). Up to 1995, per capita farmer income had risen to 1578 yuan while the per capita income of urban area had reached 3893 yuan (MacFarquhar 1997). These statistics were only a partial reflection of Deng's achievement.

During the period in which Deng was in charge, the transformation of the Chinese society was both far more benevolent and no less startling than the transformation of the Chinese society over the period that Mao Zedong was in charge (MacFarquhar 1997). From the political point of view, the era of Deng was marked by the slogans such as "Seeking truth from the facts" and "Practice is the sole criterion for testing truth" (MacFarquhar 1997). These slogans indicated an effort to shift the ideology away from the radical, dysfunctional ideology promoted by Mao Zedong, the former leader who established the People's Republic, but had made several mistakes including the Great Leap Forward as well as the Cultural Revolution which had turned China into turmoil (MacFarquhar 1997).

3. Theoretical Framework

3.1 Wage Determination

In every economy, wages are not set by employers, however, employers pay the wages which result from the labor market demand and supply conditions (Groshen 1990). To treat employers as price takers not only did not explain the wage differences across workers with similar level of skills, but also unable to explain how employers make the choice of choosing the wage which is within the scope of feasible wages that is determined by the market (Groshen 1990). It is important to understand wage determination in respect that it helps to understand major elements of an economy such as consumer spending patterns, income distribution, inflation as well as

inequality and poverty, to understand wage determination, it is necessary to understand the wage setting process. If the employers are price takers who pay their employers a feasible level of wages that is determined by the market, then the wage that each employee receives should depend totally on his or her own characteristics, such as educational background, intelligence quotient, age, working experience as well as personality traits, however, in reality, the wage of an individual is not totally related to his or her own characteristics or efforts, it is argued that only less than half of the wage differences among individuals are explained by his or her own characteristics (Groshen 1990). So for more than half of the wage differences which was not explained by his or her own characteristics, it is suggested by recent analysis that the characteristics of the employers could be one of the factors explaining these more than half of the wage differences, however, due to the lack of data in relation to employers, such research can not be carried on (Groshen 1990). In addition to employers characteristics, institution and government are also factors influencing an individual's wage other than his or her own characteristics, for instance, wages may have stagnated due to the fact that institutions which support the wages and vigorously encourage equality in income distribution, have been eliminated by government which are no longer dedicated to these goals (Stanford 2010). Moreover, in the case of China, government also impact on wages through the establishment of special economic zones (SEZs). The preferential policies given to the SEZs such as corporate tax reduction for foreign enterprises had boosted the total factor productivity growth within the SEZs, encouraging the wages within the SEZs to grow faster than the residual parts of the country (Wang 2010).

Wages are means to buy goods and services, however, it is also a factor which affected an individual's social status. Individuals do not only concern about the absolute level of their wages, but also care about their wages relative to the average remuneration around them, in other words, individuals care about where their remuneration lies within the hierarchy of rewards in their respective company and all these individuals have desires to be the top tiers in the pay ordering (Brown et.al.

2005).

3.2 Theory and Benefits of Integration

Integration can be defined as the rising interdependence of regions either within countries or across countries, and such rising interdependence is reflected in the factors of production (Golley and Groenewold 2007). Integration requires the removal of economic frontiers such as trade barriers between regions in order to increase the mobility of goods, services as well as factors of production, the increase in trade due to the elimination of trade barriers was one of the most important benefits of integration, according to neoclassical theory, the elimination of trade barriers enabled regional specialization based on comparative advantages, which further increase the welfare and productivity (Golley and Groenewold 2007). Trade can also accelerate the rate of technological progress, on one hand through the expansion of output market, which enables the domestic producers to take advantages of economies of scale; On the other hand, through the expansion of input market, which reduces the cost of production, for instance, the productive knowledge base will increase when the domestic producers are able to access to greater varieties of capital goods (Golley and Groenewold 2007). However, under the theory of technology diffusion, in order to absorb technologies of other regions or countries, it requires the host region or country to have sufficient level of social capability, for instance, sufficient amount of skilled labor. Regions or countries which have insufficient level of development may not benefit from technology spillovers from trade (Golley and Groenewold 2007).

Despite trade-related benefits, integration should also enhance the inter-regional transmission of growth from faster growing regions to the slower ones, through a number of connections which are stronger between regions that are highly integrated (Golley and Groenewold 2007). These include the increase in imports from slower growing regions, the diffusion of innovations which originated in faster growing

regions, as well as the ability of the faster growing regions to absorb the unemployed and underemployed labor from other regions (Golley and Groenewold 2007). These elements all contribute to the greater equalization of income across regions or countries. However, when regions become more integrated, it suggests that each region will suffer more when one of the regions experiencing an economic downturn, in other words, the trickle down effects will be stronger when regions become more integrated (Golley and Groenewold 2007). Despite this, the polarization effect may also occur when regions become more integrated in respect that the growth of highly developed regions may lead to "brain drain" for instance, causing the skilled labor from other regions to migrate towards highly developed regions, which negatively affected the economic progress in less developed regions (Golley and Groenewold 2007). Nevertheless, overall, it is widely acknowledged that the long term benefits of integration outweighing the costs.

3.3 Two Concepts of Convergence

When discussing economic growth across countries as well as regions, two concepts of convergence are involved. Under the first concept, convergence occurred when a poorer economy grow faster than a richer one, therefore overtime, the poorer economy will catch up with the richer one in terms of per capital income, such concept was referred as Beta convergence (Barrow & Sala-i-Martin 2004). Under the second concept, cross-sectional dispersion was concerned, meaning that convergence occurred if the dispersion of income decreased over time across regions or countries, such dispersion is measured by calculating the standard deviation of the logarithm of per capita income between a number of countries or regions, the second concept of convergence is referred as Sigma convergence (Barrow & Sala-i-Martin 2004). The Beta convergence (poorer economies growing faster than richer ones) tends to generate the Sigma convergence (declining dispersion of per capita income), however, such phenomenon is offset by the new disturbances which are likely to increase

dispersion, this is also why Beta convergence is a necessary but not a sufficient condition for Sigma convergence (Barrow & Sala-i-Martin 2004).

To be more specifically, for Beta convergence, it is related to the neoclassical growth theory, under the neoclassical growth theory, one key assumption was that the factors of production are subject to diminishing return, therefore, over the long run, a growing economy will reach a steady-state, at which the rate of growth depends only on the growth in labor force as well as technological progress (Monfort 2008). Diminishing return also indicates that the initially poorer economies will grow faster than richer ones and will eventually catch up with richer ones in terms of per capita income. The measurement of Beta convergence involves the estimation of a growth equation written as:

$$\ln(\triangle y_{i,t}) = \alpha + \beta \ln(y_{i,t-1}) + yZ_{i,t} + u_{i,t}$$

Where

- $y_{i,t}$ and $\triangle y_{i,t}$ are the level and the growth rate of GDP per capita respectively in region i at time t;
- $Z_{i,t}$ referred to all other factors influencing the growth rate;
- $u_{i,t}$ is the standard error term;
- α and β are the parameters (Monfort 2008).

A negative relationship between $y_{i,t-1}$(initial level of GDP per head) and the $\triangle y_{i,t}$ (growth rate of GDP per head), for instance, if β is negative and significant, will indicate a convergence process; Also, β shows the speed of convergence by implying the rate at which regions approach their steady state (Monfort 2008).

For Sigma convergence, as mentioned above, it shows the decline in the disparities across regions and countries. The limitations of the Beta convergence had made several economists to believe that the Sigma convergence can better reveal the reality in respect that it reveals the income distribution across different regions and

economies without depending on the estimation of a specific model (Monfort 2008). There are a number of measures of Sigma convergence, including the coefficient of variation, the standard deviation, the Mean Logarithmic Deviation, the Theil index, the Atkinson index as well as the Gini coefficient (Monfort 2008). However, the mostly used measure of Sigma convergence is the coefficient of variation, which will be used in my analysis. The coefficient of variation is calculated as the standard deviation over the mean. As measures of Sigma convergence, the coefficient of variation is preferred to standard deviation in respect that the standard deviation did not provide any interpretation only if the mean value is reported (Monfort 2008). To be more specifically, the standard deviation is calculated in the same units as its related series, meaning that the standard deviation is specific to the series that it refers to, which indicates that it would be misleading to compare the absolute standard deviations of the two series estimated based on the different underlying units (Feinstein & Thomas 2002). For instance, it might be found that in 1900, the average monthly wage of workers in the United States was $8 and the standard deviation was $0.50. Up to1980, the average monthly wage of workers in the United States had increased to $400 while the standard deviation was $28. Since inflation as well as growth had changed the level of wage payments completely, it is hard to made a conclusion from this regarding whether the dispersion of wages had increased or decreased in the later period (Feinstein & Thomas 2002). To see the dispersion, there is a need to measure the relative variation rather than the absolute variation, the relative variation is measured as the ratio of the standard deviation to the mean, the result is known as the coefficient of variation (Feinstein & Thomas 2002). Therefore for the previous example of United States, the two estimates for coefficient of variation are 0.5/8=0.0625 and 28/400=0.07, thus it is clear that the variation of wages had increased, meaning there is a divergence.

3.4 Correlation Coefficient

One of the central issues of the quantitative study is to analyze whether there is a relationship between two variables, statistically, such relationship is referred as correlation and the way to measure the degree of the correlation is to calculate the correlation coefficient (Feinstein & Thomas 2002). The correlation coefficient, denoted as "r", is a measure of the degree of the linear relationship between two variables and does not depend on any specific units, normally, if "r" is between -1 and 0, there is a negative correlation, and if "r" is between 0 and 1, there is a positive correlation (Feinstein & Thomas 2002). The greater the correlation coefficient "r", the stronger the relationship between two variables.

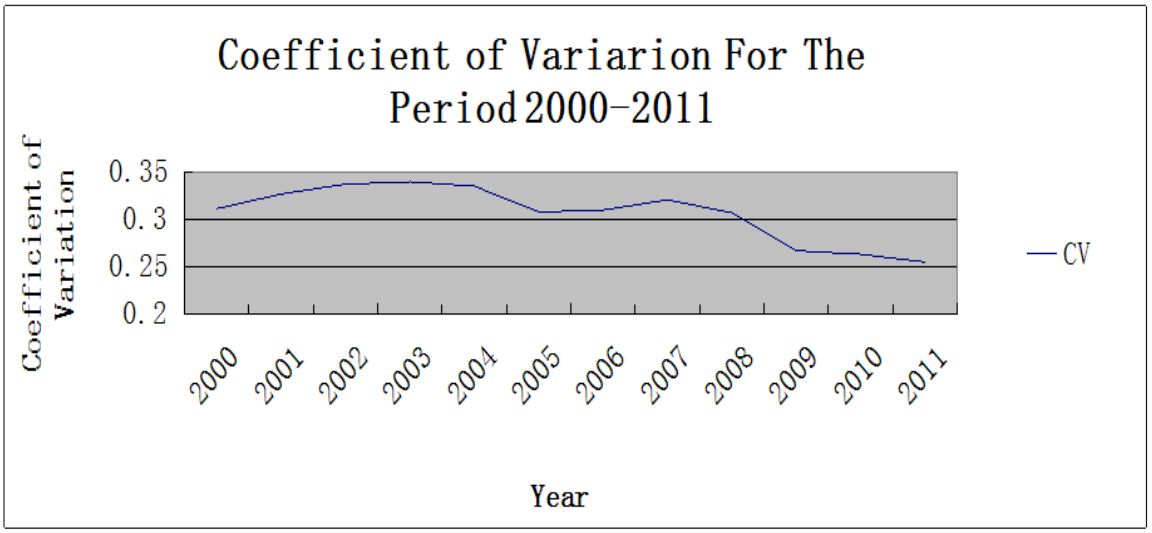
During the calculation of the correlation coefficient, the two variables A and B appear symmetrically, meaning that to interchange the data for A and B would not change the results, which indicates that the correlation coefficient only show the degree of correlation between two variables (Feinstein & Thomas 2002). However, the two variables could be causally related, meaning that one variable may be influenced by the other, nevertheless, the correlation coefficient did not show which variable is creating the influence and which variable is responding to such influence (Feinstein & Thomas 2002).

In order to calculate the correlation coefficient, the covariance must be calculated first. The covariance of two variables A and B is calculated as the sum of the products of their deviations from their respective means divided by the number of cases (Feinstein & Thomas 2002). Then the correlation coefficient is calculated as the covariance of A and B divided by the product of the standard deviation of A and the standard deviation of B (Feinstein & Thomas 2002).

4. Results

4.1 Sigma Convergence

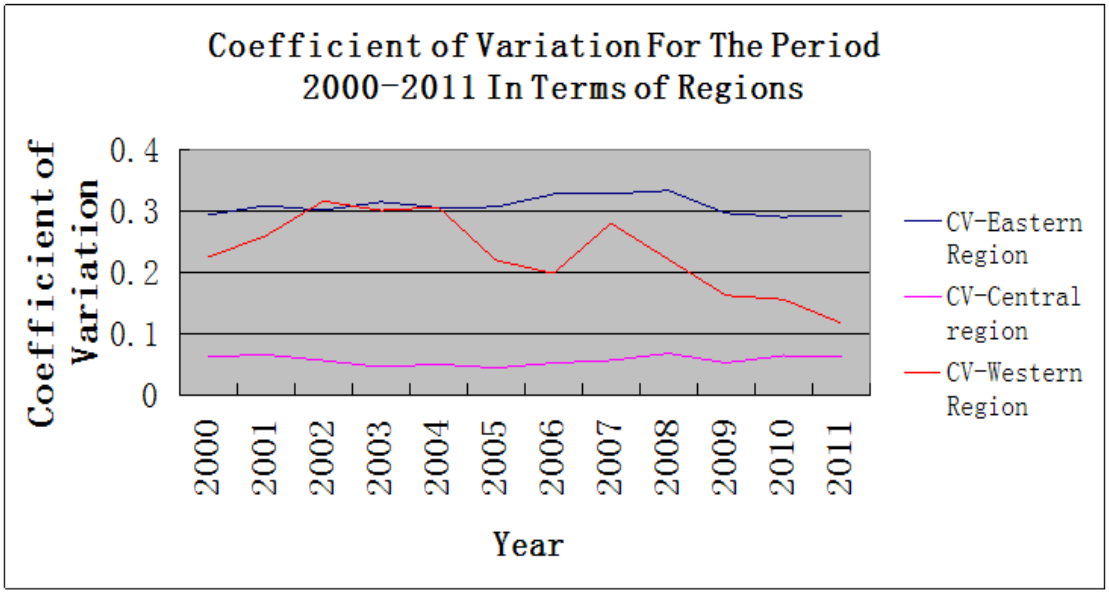
Figure 2: Coefficient of variation for the period 2000-2011



(Source: Author's calculation, based on data from NBSC)

The Sigma convergence occurred when there is a reduction in the dispersion of income between countries or regions, it shows the decline in the absolute difference of wages between countries or regions. In this paper, if Sigma convergence occurred, it means there is a decline in the absolute difference of average wages in urban units between all the 31 provinces of China. From above, Figure 2 shows the coefficient of variation for the period 2000-2011 for all 31 provinces, as it can be seen, the coefficient of variation had increased slightly from 0.311 in 2000 to 0.337 in 2002 and remained rather stable from 2002 to 2004, afterwards from 2004 to 2005, there is a decline from 0.335 to 0.307 and generally remained stable from 2005 to 2008. After 2008, there is a sharp decline from 0.307 in 2008 to only 0.255 in 2011. Overall, the coefficient of variation had declined from 0.311 in 2000 to 0.255 in 2011, meaning that there is a convergence of the average wages in urban units between all 31 provinces from 2000 to 2011.

Figure 3: Coefficient of variation for the period 2000-2011 in terms of regions



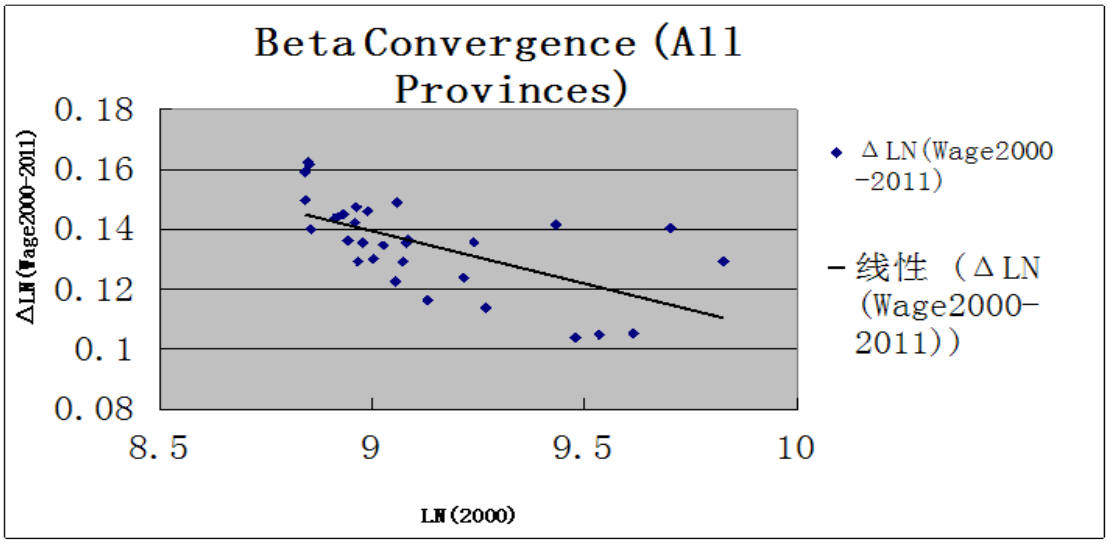
(Source: Author's calculation, based on data from NBSC)

Figure 3 above shows the coefficient of variation for the period 2000-2011 in terms of each of the three regions under analysis. It is clear from the figure that the western region had overall experienced a significant decline in the coefficient of variation. From 2007 to 2011, the coefficient of variation between western provinces have been more than halved. Overall, the coefficient of variation between western provinces had decreased from 0.226 in 2000 to 0.119 in 2011, indicating a significant convergence. However, the change in terms of the coefficient of variation is much less significant for the eastern as well as the central region. For the eastern region, the coefficient of variation between provinces in 2000 is 0.295 and in 2011, it remained at the same level as it is in 2000, this only indicates that there is no convergence in terms of the absolute levels of the average wages of urban units between eastern provinces, however, it could be possible that relative poorer provinces of eastern region are growing faster than richer ones of the same region and this will be confirmed by Beta convergence later on. For the central region, the coefficient of variation had remained quite low from 2000 to 2011, indicating that the provinces within the Central region have lower variation in terms of the average wages of urban units between each other compared with provinces of the western and eastern region. From 2000 to 2011, the

coefficient of variation between central provinces had remained rather stable, the coefficient of variation between central provinces in 2011 is roughly the same as it is in 2000. So overall, the coefficient of variation between eastern and central provinces had been rather steady from 2000 to 2011 and there is a significant drop in the level of coefficient of variation between western provinces.

4.2 Beta Convergence

Figure 4: Beta convergence for the period 2000-2011 for all provinces



(Source: Author's calculation, based on data from NBSC)

Table 1: Results of Regression for Beta convergence

Regression Statistics		
Multiple R	0.616098964	
R Square	0.379577933	
Adjusted R Square	0.358184069	
Standard Error	0.01230749	
Observations	31	
	Coefficients	P-value
Intercept	0.454546936	1.61218E-06
LN2000	-0.035012683	0.000224244

(Source: Author's calculation, based on data from NBSC)

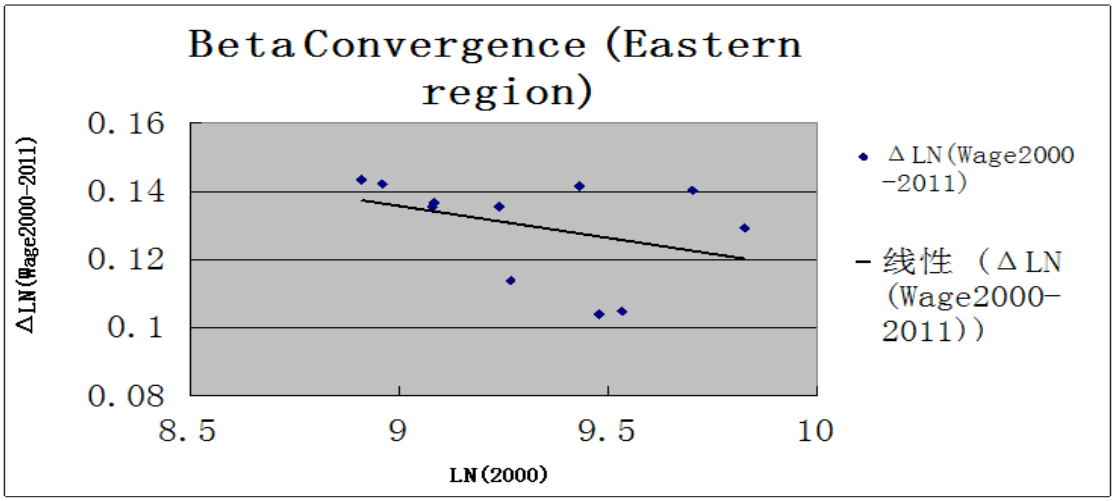
The sigma convergence shows the reduction in the dispersion of wages between provinces in absolute levels, for instance, there is no sigma convergence if the

absolute difference of average wage between the poorer Province A and the richer Province B are increasing, however, there could be a catch up happening while sigma convergence show nothing, this is because Province A may grow faster than Province B and is catching up with Province B, nevertheless, due to Province A's lower initial level of average wages, the absolute difference between Province A and Province B may still be increasing, if Province A continues to grow faster than Province B, then eventually the absolute difference of average wages between Province A and Province B will decrease. Beta convergence occurred when the poorer province is growing faster than richer ones, therefore, from the example above, it can be seen that Sigma convergence could happen at later stages compared with Beta convergence. The Figure 4 above shows the Beta convergence for the period 2000-2011 for all provinces, the X axis shows the initial level of average wages in urban units, by taking the logarithm of the average wage in 2000 for each of the 31 provinces, the Y axis shows the growth rate of average wage, by taking the slope of the logarithm of average wage from 2000-2011 for each of the provinces. If provinces with lower initial level of average wages are growing faster while provinces with higher initial level of average wages are growing slower, then there will be Beta convergence. As the black trend line shows in Figure 4, there is Beta convergence from 2000-2011 for all provinces, also from the results of regression showed by Table 1, the coefficients of initial wages (-0.035012683) is negative, confirming the negative relationships between the initial level of average wages and the growth rate, and the P-value for the initial wages are only 0.000224, indicating that the result is significant and the growth rates are influenced by the initial wage levels.

One thing needs to draw attention is that there are several obvious outliers, they are the first three blue plots lying above the black trend line from the right to the left, and from the right to the left, they are Shanghai, Beijing and Tianjin respectively. Shanghai is the largest city and financial center of China, Beijing is the capital and the second largest city of China, Shanghai had vigorously prepared the World Expo prior to 2010 and Beijing had been prepared for the Olympics prior to 2008, no doubt that

these two cities with initial high levels of average wages are still able to grow at faster rate than some provinces with lower initial level of average wages from 2000-2011. Tianjin is one of the four cities (including Beijing and Shanghai) at the provincial administrative level, geographically it connected Beijing to the Yellow Sea, therefore, it benefited significantly from trade, and the growth of Beijing to a great extend had driven the growth of Tianjin.

Figure 5: Beta convergence for the period 2000-2011 for provinces of Eastern region



(Source: Author's calculation, based on data from NBSC)

Table 2: Results of Regression for Beta convergence within Eastern region

Regression Statistics		
Multiple R	0.376376401	
R Square	0.141659195	
Adjusted R Square	0.046287995	
Standard Error	0.01466231	
Observations	11	
	Coefficients	P-value
Intercept	0.304614139	0.062772697
LN2000	-0.018758717	0.013920409

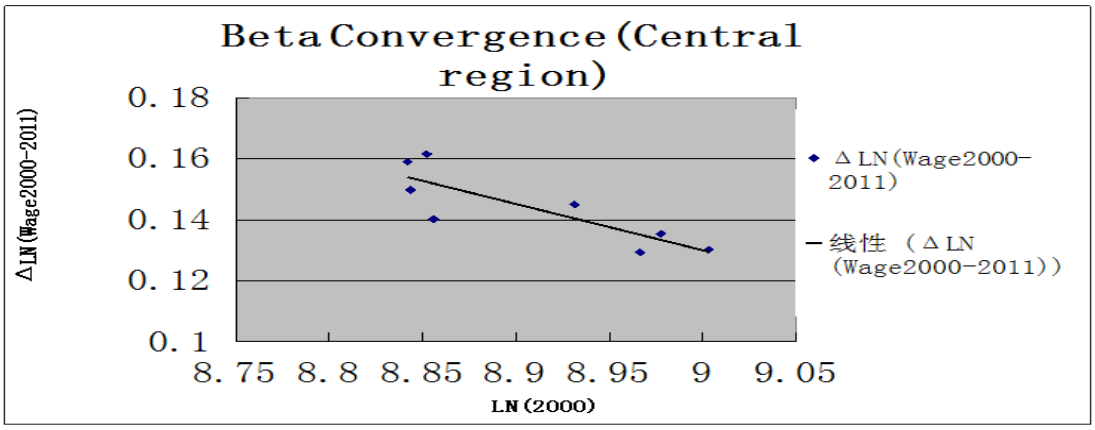
(Source: Author's calculation, based on data from NBSC)

Figure 5 above shows the Beta convergence from 2000 to 2011 for provinces within the eastern region, as the black trend line shows, Beta convergence did occur between provinces within the eastern region from 2000-2011. Also, the negative relationship

(-0.018758717) between the initial level of wage and the growth rate showing by the Table 2 confirms the occurrence of the Beta convergence. The P-value for the initial level of wages (0.013920409) is quite low, indicating that the results obtained are significant. Thus it can be concluded that during 2000-2011, Beta convergence occurred within the eastern region.

It is worth to mention that the first three blue plots lying above the black trend line from the right to the left represent Shanghai, Beijing and Tianjin respectively, these are the outliers as mentioned before due to its natural endowment and benefits from government priorities.

Figure 6: Beta convergence for the period 2000-2011 for provinces of Central region



(Source: Author's calculation, based on data from NBSC)

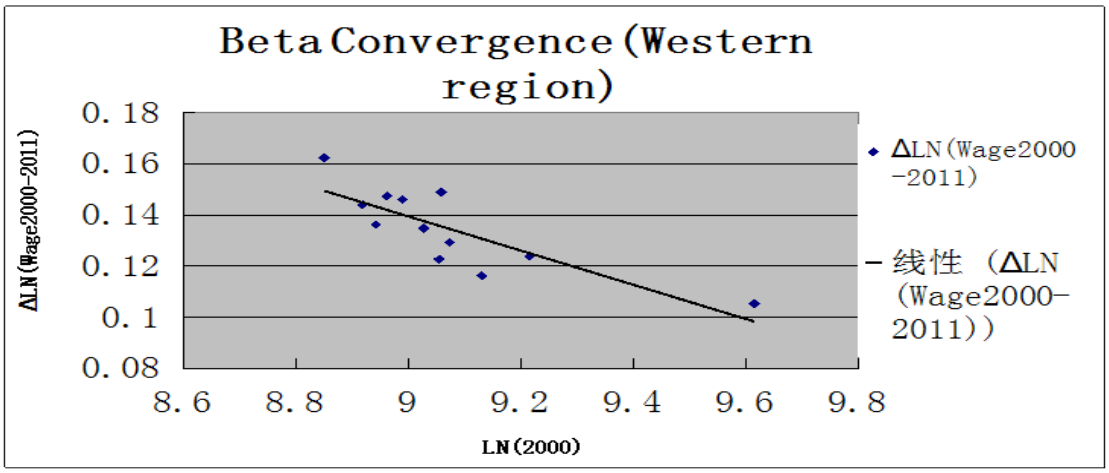
Table 3: Results of Regression for Beta convergence within Central region

Regression Statistics		
Multiple R	0.835541883	
R Square	0.698130238	
Adjusted R Square	0.647818611	
Standard Error	0.007309644	
Observations	8	
	Coefficients	P-value
Intercept	1.49542264	0.006206931
LN2000	-0.151712771	0.009793559

(Source: Author's calculation, based on data from NBSC)

From the trend line showing by Figure 6, it can be seen that Beta convergence also occurred between provinces within the central region. From Table 3, the coefficients for the initial level of wages (-0.151712771) is stronger than the coefficients for the initial level of wages (-0.018758717) for the eastern region, indicating a stronger negative relationship between the initial level of wages and the growth rate, this could be due to the fact that there are no significant outliers within the central region. The P-value for the Regression (0.009793559) is quite small, meaning that the results obtained are significant, therefore, it can be argued that Beta convergence did take place between provinces within the central region.

Figure 7: Beta convergence for the period 2000-2011 for provinces of Western region



(Source: Author's calculation, based on data from NBSC)

Table 4: Results of Regression for Beta convergence within Western region

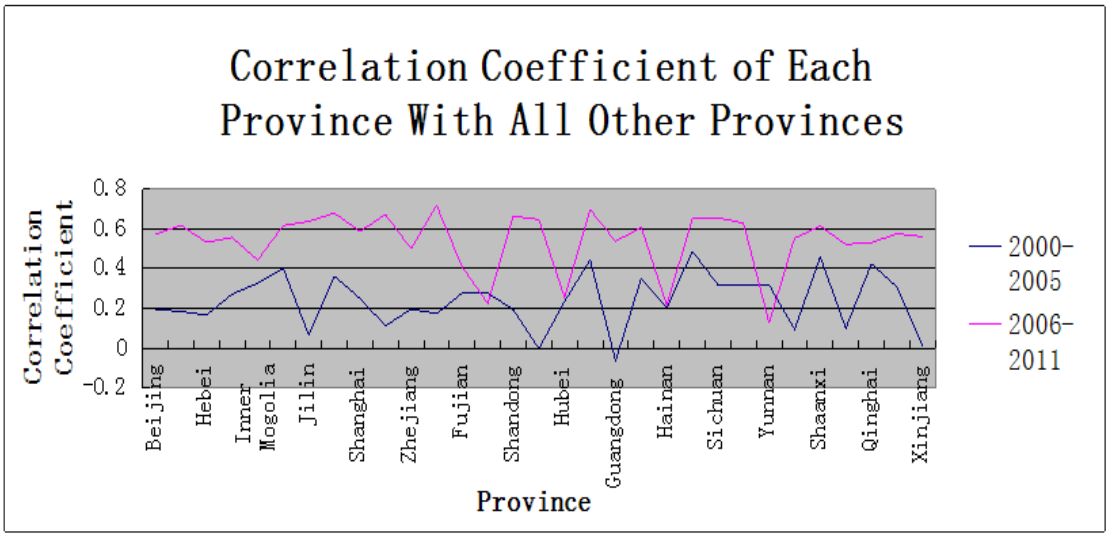
Regression Statistics		
Multiple R	0.821586292	
R Square	0.675004035	
Adjusted R Square	0.642504438	
Standard Error	0.009618369	
Observations	12	
	Coefficients	P-value
Intercept	0.741881725	0.000238083
LN2000	-0.066937889	0.001046368

(Source: Author's calculation, based on data from NBSC)

From the black trend line showing in Figure 7, it can be seen that Beta convergence occurred between provinces within the western region as well, the negative relationship between the initial level of wages and the growth rate showing by the Coefficients of initial wages is -0.066937889, stronger than the corresponding figure for eastern region (-0.018758717), but weaker than the corresponding figure for the central region (-0.151712771). The P-value (0.001046368) is quite low, suggesting that the results obtained are significant and hence it can be concluded that Beta convergence did take place between provinces within the western region.

4.3 Correlation Coefficient

Figure 8: Correlation coefficient of each province with all other provinces



(Source: Author's calculation, based on data from NBSC)

The Sigma and Beta convergence all look at levels, while the correlation coefficient tries to access the level of market integration by looking at the degree of synchronization, in this case, the degree of synchronization of wage movement between provinces.

As mentioned earlier, since the number of years under study are only 12 years, meaning that most results obtained from the correlation coefficient could be

insignificant. If the number of years for each period are 6, then by choosing a significance level of 10%, the correlation coefficient has to be at least 0.6215 in order to be significant. Therefore, from Figure 8, it can be seen that most results especially the results for the first period are insignificant if a 10% significance level is used. This indicates that the results obtained could be due to random chance.

Therefore, in this case, correlation coefficient is not used as a method to demonstrate whether there is greater market integration, but to a certain extent, used as a method to support the results obtained from Sigma and Beta convergence. As Figure 7 shows, overall, there is greater correlation between provinces in terms of average wages of urban units during the second period 2006-2011 than the first period 2000-2005, meaning that overall, the average wage movement between provinces had become more synchronized during the second period 2006-2011 than the first period 2000-2005. (Note: the X axis represents all 31 provinces, however, due to the limited length of the Figure, it does not show all of them).

5. Discussion

From the results, both Sigma and Beta convergence showed that there was a convergence of the average wages of urban units between all 31 provinces in China, meaning that from 2000 to 2011, the poorer provinces not only grew at a faster rate, but also reduced the dispersion between their levels of average wages and the level of average wages of richer provinces. The correlation coefficient also supports the results obtained through Sigma and Beta convergence.

By looking at the three regions, both the Sigma and Beta convergence showed that there was convergence between provinces within the western region, this indicates that the poorer provinces within the western region not only grew faster than their richer counterparts from 2000 to 2011, but also narrowed the absolute difference between their level of average wages and the level of average wages of richer

provinces within the western region from 2000 to 2011. For the eastern and the central region, the coefficients of variation between provinces remained pretty smooth from 2000 to 2011, meaning that these was no Sigma convergence. In other words, the dispersion of the level of average wages between provinces within both the eastern and central region had remained rather than reduced from 2000 to 2011, however, the Beta convergence showed that the poorer provinces within both the eastern and central regions grew faster than the richer provinces from their respective region, indicating that the poorer provinces within the eastern and central region was catching up with the richer provinces from their respective region from 2000 to 2011, however, the absolute differences between the poorer and the richer had not been narrowed within both regions, the possible explanation for this was that the poorer provinces within the eastern and the central region had initial low level of wages, but according to the faster growth rate showed by Beta convergence, eventually the absolute difference will be narrowed, meaning that Sigma convergence between provinces within both the eastern and central regions will probably occur in the near future.

So what could be the possible explanations for these results? Starting with the Asian Financial Crisis, the Asian Financial Crisis was the event that encouraged the Chinese government to shift its development towards the interior parts of the country rather than relying solely on a one-dimension economy which is proved to be fragile during the Asian Financial Crisis (Zheng & Chen 2007). After the Asian Financial Crisis, the demand in Asia was pretty weak and the Chinese currency "Yuan" at that moment was under high pressures for depreciation, therefore, in order to maintain the exchange rate and promote growth under weak external demand, the Chinese premier Rongji Zhu had decided to boost domestic demand through government investment (Zheng & Chen 2007). As a result, in 1998, the premier Rongji Zhu had proposed a strategy called "the great development of the western areas" and such strategy was implemented in 2000, this strategy had helped to reduce the disparities between the western region and the rest of China (Zheng & Chen 2007). Up to 2002, when Jiabao Wen became the premier, he implemented the program to revive the north-east old

industrial bases, which helped to speed up the development of the northeastern provinces including Heilongjiang, Jilin and Liaoning, later in 2004, he also proposed in his government work report that the development of central areas of China should also be accelerated to achieve balanced regional development, as a result, the "rise of the central China plan" was implemented (Zheng & Chen 2007). The programs to boost the west, north-east as well as central China had helped to reduce the gap between them and the eastern part of China which benefited the most from earlier reforms.

Secondly, another possible explanation for the results could be China's "Minimum Livelihood Guarantee Scheme", which is called as "Di Bao" in Chinese. The Di Bao Program arise from the idea of cash transfers to reduce poverty. The Di Bao Program is a program to ensure that no urban residents has an income below a formulated poverty line (Chen et.al. 2006). The program firstly started in Shanghai in 1993, and later in 1999, the program had become a policy at the national level, with government regulations (Chen et.al. 2006). After 1999, such program had expanded enormously and up to 2003, around 22 million of urban residents were receiving the Di Bao, which made up of 6% of the total urban population (Chen et.al. 2006).

6. Conclusion

The research question as mentioned before is:

"Was there a convergence or divergence of the average wages of urban units between provinces within China as well as between provinces within each of the three regions of China from 2000 to 2011?"

And the hypothesis established before are:

Set A

- **Null Hypothesis (A):** There is no convergence in the average wages of urban units between all 31 provinces from 2000 to 2011.
- **Alternative Hypothesis (A):** The average wages of urban units between all 31 provinces were converging from 2000 to 2011.

Set B

- **Null Hypothesis (B):** There is no convergence in the average wages of urban units between provinces of any of the three regions from 2000 to 2011.
- **Alternative Hypothesis (B):** Convergence in the average wages of urban units did occur between provinces of their respective regions from 2000 to 2011.

From the calculations of Sigma convergence, there was a decline in terms of the coefficients of variation between all 31 provinces from 2000 to 2011. The Beta convergence between all 31 provinces also show that generally there was a negative relationship between the initial level of wages and the growth rate, plusing the results were significant, indicating that from 2000 to 2011, between all 31 provinces, the poorer ones in generally not only grew faster than the richer ones, but also successfully narrowed the dispersion between their level of average wages of urban units and the level of those of richer provinces. Also, the correlation coefficient, although the results were insignificant due to the limited number of years under analysis, showed that during the second period 2006-2011, the wage movements between all 31 provinces were generally more synchronized than the first period 2000-2005, which to some extent support the results obtained from Sigma and Beta convergence. Therefore, there was a convergence in the average wages of urban units between all 31 provinces of China from 2000 to 2011. Thus, the Null Hypothesis (A) can be rejected.

For the provinces of each of the three regions of China, in terms of the average wages of urban units, both the Sigma and Beta convergence occurred between provinces of the western region from 2000 to 2011. For the provinces of the eastern and central

region respectively, the coefficients of variation used for Sigma convergence did not show either convergence or divergence, however, the Beta convergence did occur between provinces of the eastern region as well as between provinces of the central region, meaning that the poorer provinces of these two regions were in general growing faster than their richer counterparts of their respective regions. Therefore, the Null Hypothesis (B) can be rejected since both Sigma and Beta convergence occurred between provinces of the western region from 2000 to 2011.

Thus by accessing and analyzing the average wages of urban units between provinces, it can be seen that in this respect, the Chinese market had become more integrated since the 21st century, this is an important finding compared with the results obtained by previous researchers which showed that prior to 2000, the average wages between provinces in China were diverging, it is clear that the role of the government policies to reduce disparities started to appear during the period from 2000 to 2011. Another important finding was that between provinces of their respective regions, strong evidence for the convergence in the average wages of urban units was also found, indicating greater regional integration as well. These findings indicate that China was on a more healthier development track since 2000 and the country was developing towards a more sustainable economy.

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8. Appendix

The average wages of urban units of all 31 provinces at administrative level from 2000-2005 (denoted as Yuan annually):

Year	2000	2001	2002	2003	2004	2005
Beijing	16350	19155	21852	25312	29674	34191
Tianjin	12480	14308	16258	18648	21754	25271
Hebei	7781	8730	10032	11189	12925	14707
Shanxi	6918	8122	9357	10729	12943	15645
Inner Mogolia	6974	8250	9683	11279	13324	15985
Liaoning	8811	10145	11659	13008	14921	17331
Jilin	7924	8771	9990	11081	12431	14409
Heilongjiang	7835	8910	9926	11038	12557	14458
Shanghai	18531	21781	23959	27304	30085	34345
Jiangsu	10299	11842	13509	15712	18202	20957
Zhejiang	13076	16385	18785	21367	23506	25896
Anhui	6989	7908	9296	10581	12928	15334
Fujian	10584	12013	13306	14310	15603	17146
Jiangxi	7014	8026	9262	10521	11860	13688
Shandong	8772	10008	11374	12567	14332	16614
Henan	6930	7916	9174	10749	12114	14282
Hubei	7565	8619	9611	10692	11855	14419
Hunan	8128	9623	10967	12221	13928	15659
Guangdong	13823	15682	17814	19986	22116	23959
Guangxi	7651	9075	10774	11953	13579	15461
Hainan	7408	8321	9480	10397	12652	14417
Chongqing	8020	9523	10960	12425	14357	16630
Sichuan	8323	9934	11183	12441	14063	15826
Guizhou	7468	8991	9810	11037	12431	14344
Yunnan	9231	10537	11987	12870	14581	16140
Tibet	14976	19144	24766	26931	30873	28950
Shaanxi	7804	9120	10351	11461	13024	14796
Gansu	8560	9949	11147	12307	13623	14939
Qinghai	10050	12906	14472	15356	17229	19084
Ningxia	8590	10442	11640	12981	14620	17211
Xinjiang	8717	10278	11605	13255	14484	15558

(Source: National Bureau of Statistics of China)

The average wages of urban units of all 31 provinces at administrative level from 2006-2011 (denoted as Yuan annually):

Year	2006	2007	2008	2009	2010	2011
Beijing	40117	46507	56328	57779	65158	75482
Tianjin	28682	34938	41748	43937	51489	55658
Hebei	16590	19911	24756	27774	31451	35309
Shanxi	18300	21525	25828	28066	33057	39230
Inner Mogolia	18469	21884	26114	30486	35211	41118
Liaoning	19624	23202	27729	30523	34437	38154
Jilin	16583	20513	23486	25943	29003	33610
Heilongjiang	16505	19386	23046	24805	27735	31302
Shanghai	41188	49310	56565	58336	66115	75591
Jiangsu	23782	27374	31667	35217	39772	45487
Zhejiang	27820	31086	34146	36553	40640	45162
Anhui	17949	22180	26363	28723	33341	39352
Fujian	19318	22283	25702	28366	32340	38588
Jiangxi	15590	18400	21000	24165	28363	33239
Shandong	19228	22844	26404	29398	33321	37618
Henan	16981	20935	24816	26906	29819	33634
Hubei	16048	19818	22739	26547	31811	36128
Hunan	17850	21534	24870	26534	29670	34586
Guangdong	26186	29443	33110	36469	40432	45060
Guangxi	18064	21898	25660	27322	30673	33032
Hainan	15890	19357	21864	24790	30775	36244
Chongqing	19215	23098	26985	30499	34727	39430
Sichuan	17852	21312	25038	28149	32567	37330
Guizhou	16815	20668	24602	27437	30433	36102
Yunnan	18711	20481	24030	26163	29195	34004
Tibet	31518	46098	47280	45347	49898	49464
Shaanxi	16918	21296	25942	29566	33384	38143
Gansu	17246	20987	24017	26743	29096	32092
Qinghai	22679	26166	30983	32481	36121	41370
Ningxia	21239	26210	30719	32916	37166	42703
Xinjiang	17819	21434	24687	27617	32003	38238

(Source: National Bureau of Statistics of China)

Results for Sigma Convergence (denoted as Coefficient of Variation):

Year	CV- All Provinces	CV-Eastern Region	CV-Central region	CV-Western Region
2000	0.3108554	0.294655506	0.063825597	0.226128216
2001	0.326281882	0.309964144	0.066843075	0.260727306
2002	0.336885907	0.302432421	0.057617126	0.317231677
2003	0.339326803	0.316039647	0.046964933	0.302159413
2004	0.334780206	0.306672167	0.05148107	0.307319224
2005	0.307458839	0.307761112	0.045677591	0.22106014
2006	0.309426849	0.328853835	0.053594855	0.199375943
2007	0.320201614	0.329232981	0.057710991	0.281252363
2008	0.306691853	0.334541886	0.069215215	0.222336552
2009	0.266904508	0.29749636	0.053754197	0.163731298
2010	0.26300213	0.2916638	0.065643947	0.157003166
2011	0.25478962	0.293811398	0.063954728	0.118819179

(Source: author's calculation, based on data from NBSC)

Results for Beta Convergence:

Beta Convergence (All 31 provinces):

Provinces	Initital (2000)	LN2000	ΔWage2000-2011	ΔLN(Wage2000-2011)
Beijing	16350	9.701983176	5340.814685	0.140413707
Tianjin	12480	9.431882642	4062.248252	0.141635444
Hebei	7781	8.959440144	2525.059441	0.14226469
Shanxi	6918	8.841881989	2848.622378	0.159040876
Inner Mogolia	6974	8.849944227	3028.646853	0.162363847
Liaoning	8811	9.08375622	2706.958042	0.136682974
Jilin	7924	8.977651408	2324.300699	0.135443859
Heilongjiang	7835	8.966356155	2147.863636	0.129310385
Shanghai	18531	9.827200284	5168.27972	0.129345936
Jiangsu	10299	9.239802082	3148.636364	0.135681389
Zhejiang	13076	9.478533768	2741.874126	0.103929457
Anhui	6989	8.852092763	2902.657343	0.161533823
Fujian	10584	9.267098706	2362.164336	0.113837957
Jiangxi	7014	8.855663431	2271.839161	0.140181318
Shandong	8772	9.07932011	2624.566434	0.13546996
Henan	6930	8.843615092	2498.223776	0.14979818
Hubei	7565	8.931287626	2542.748252	0.145052552
Hunan	8128	9.00307017	2338.055944	0.130205374
Guangdong	13823	9.53408915	2750.944056	0.104926403
Guangxi	7651	8.942591637	2396.867133	0.13626798
Hainan	7408	8.910315776	2466.346154	0.143547344
Chongqing	8020	8.989693701	2834.70979	0.146068861
Sichuan	8323	9.026778046	2546.482517	0.13468875
Guizhou	7468	8.918382505	2539.678322	0.144049251
Yunnan	9231	9.130322664	2152.895105	0.116320945
Tibet	14976	9.614204199	3322.409091	0.105246456
Shaanxi	7804	8.962391702	2748.087413	0.147457287
Gansu	8560	9.054855469	2179.356643	0.122739341
Qinghai	10050	9.215327913	2755.451049	0.12385449
Ningxia	8590	9.058354015	3119.506993	0.148991238
Xinjiang	8717	9.073030421	2491.646853	0.129288415

(Source: author's calculation, based on data from NBSC)

Beta Convergence (Eastern Region):

Provinces	**Initial**	**LN2000**	**ΔWage2000-2011**	**ΔLN(Wage2000-2011)**
Beijing	16350	9.701983176	5340.814685	0.140413707
Tianjin	12480	9.431882642	4062.248252	0.141635444
Hebei	7781	8.959440144	2525.059441	0.14226469
Shanghai	18531	9.827200284	5168.27972	0.129345936
Liaoning	8811	9.08375622	2706.958042	0.136682974
Jiangsu	10299	9.239802082	3148.636364	0.135681389
Zhejiang	13076	9.478533768	2741.874126	0.103929457
Fujian	10584	9.267098706	2362.164336	0.113837957
Shandong	8772	9.07932011	2624.566434	0.13546996
Guangdong	13823	9.53408915	2750.944056	0.104926403
Hainan	7408	8.910315776	2466.346154	0.143547344

(Source: author's calculation, based on data from NBSC)

Beta Convergence (Central Region):

Provinces	**Initial**	**LN2000**	**ΔWage2000-2011**	**ΔLN(Wage2000-2011)**
Shanxi	6918	8.841881989	2848.622378	0.159040876
Jilin	7924	8.977651408	2324.300699	0.135443859
Heilongjiang	7835	8.966356155	2147.863636	0.129310385
Anhui	6989	8.852092763	2902.657343	0.161533823
Jiangxi	7014	8.855663431	2271.839161	0.140181318
Henan	6930	8.843615092	2498.223776	0.14979818
Hubei	7565	8.931287626	2542.748252	0.145052552
Hunan	8128	9.00307017	2338.055944	0.130205374

(Source: author's calculation, based on data from NBSC)

Beta Convergence (Western Region):

Provinces	**Initial**	**LN2000**	**ΔWage2000-2011**	**ΔLN(Wage2000-2011)**
Sichuan	8323	9.026778046	2546.482517	0.13468875
Chongqing	8020	8.989693701	2834.70979	0.146068861
Guizhou	7468	8.918382505	2539.678322	0.144049251
Yunnan	9231	9.130322664	2152.895105	0.116320945
Tibet	14976	9.614204199	3322.409091	0.105246456
Shaanxi	7804	8.962391702	2748.087413	0.147457287
Gansu	8560	9.054855469	2179.356643	0.122739341
Qinghai	10050	9.215327913	2755.451049	0.12385449
Ningxia	8590	9.058354015	3119.506993	0.148991238
Xinjiang	8717	9.073030421	2491.646853	0.129288415
Inner Mogolia	6974	8.849944227	3028.646853	0.162363847
Guangxi	7651	8.942591637	2396.867133	0.13626798

(Source: author's calculation, based on data from NBSC)

Results for Correlation Coefficient:

Provinces	**2000-2005**	**2006-2011**
Beijing	0.194780913	0.57313159
Tianjin	0.185352129	0.618906042
Hebei	0.166423866	0.533556237
Shanxi	0.2723894	0.558019007
Inner Mogolia	0.326432387	0.442838187
Liaoning	0.402065411	0.617022069
Jilin	0.066294345	0.638435377
Heilongjiang	0.361803114	0.679665651
Shanghai	0.250480815	0.587982156
Jiangsu	0.111405532	0.673187492
Zhejiang	0.197064188	0.50114207
Anhui	0.173837499	0.720043962
Fujian	0.278135235	0.408340957
Jiangxi	0.276437528	0.224119123
Shandong	0.193699495	0.663563562
Henan	-0.002764447	0.647618275
Hubei	0.234221097	0.255689773
Hunan	0.444955966	0.698967243
Guangdong	-0.065540048	0.537325097
Guangxi	0.351140595	0.609990925
Hainan	0.20314435	0.216720805
Chongqing	0.488326115	0.65290945
Sichuan	0.317968653	0.657121075
Guizhou	0.320670943	0.628731126
Yunnan	0.318027131	0.127436541
Tibet	0.09425413	0.5544437
Shaanxi	0.459878087	0.614880961
Gansu	0.100094565	0.522381979
Qinghai	0.42517224	0.531883166
Ningxia	0.307334858	0.576021359
Xinjiang	0.012549936	0.560935979

(Source: author's calculation, based on data from NBSC)