How Do Choice of Major and Industrial Structure Influence College Graduates' Unemployment Rate In China

Xiuwen Shi
Utah State University

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How Do Choice of Major and Industrial Structure Influence College Graduates’ Unemployment Rate In China?

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August 2015

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Committee Members:
Gorry, Devon ______________________________________________
Gorry, Aspen ______________________________________________

Abstract:

Recently, the higher education market is developing very fast, and China’s universities and colleges are increasing their enrollment. More and more college graduates with higher education backgrounds enter the labor market and the college graduates have to face higher unemployment pressure when they find jobs. For the college graduates’ unemployment problem, many literatures and research are focusing on over-enrollment problem, the influence of the major differences, and the influence of the industrial structure development.

This thesis examines the consequence of the over-enrollment problem with a group of data set and linear regressive analysis model. The finding indicates that there is not strong linear relation between the growth of total amounts of college graduates and college graduates average unemployment rate, and also the yearly growth of GDP of China. Chinese colleges and universities expand their enrollment is not unitary reason of high unemployment level of college graduates, the un-coordination between higher educational enrollment expanding pace and growth rate of economic development led to the serious situation of college graduate unemployment problem.

Moreover, the thesis also gives insight on the factor of major, and explains that major is one decisive factor with strong effect on college graduates’ unemployment with data comparison and graphic displays. The findings demonstrate that major is a decisive factor with strong effect on college graduates’ unemployment. The students have significant different chance to be hired with different groups of majors.

The thesis also demonstrates one of the most important reasons of college graduates’ unemployment problem, and this factor is the industrial structure. With further evidences, the findings state briefly that low technology secondary industries absorb the most of college graduates instead of the tertiary industry.
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2 Introduction:

Since 1999, higher education was doing a market-oriented reform in China. All kinds of colleges were increasing their enrollment. That action led to a large growth of total college graduates in 2003, which is 4 years later. That means college graduates provided increased supply to the labor market with a rapid growth period. At year of 2003, graduate students were 2.1225 million, and the initial employed rate was just 72.64% which means 0.6 million people were unemployed. (China National Ministry of Education) After that, as the increasing of enrollment students, Chinese college graduate students have to face higher unemployment pressure. Recent years, college graduates’ unemployment problem becomes the most important problem in Chinese labor market. Recently, Chinese population and labor amount is in high level. A higher educational resource is a scarce resource for China, so I believe that unemployment of college graduates is a waste of scarce resources.

This thesis examines the consequence of the over-enrollment problem with a group of data set and linear regressive analysis model. The finding indicates that there is not strong linear relation between the growth of total amounts of college graduates and college graduates average unemployment rate, and also the yearly growth of GDP of China. Chinese colleges and universities expand their enrollment is not unitary reason of high unemployment level of college graduates, the un-coordination between higher educational enrollment expanding pace and growth rate of economic development led to the serious situation of college graduate unemployment problem. The speed of colleges and universities enrollment expanding is higher than GDP growth rate which is the speed of economic expanding.

Moreover, the thesis also gives insight on the factor of major, and explains that major is one decisive factor with strong effect on college graduates’ unemployment with data comparison and graphic displays. The findings demonstrate that major is a
decisive factor with strong effect on college graduates’ unemployment. The students have significant different chance to be hired with different groups of majors. In general, the graduates with engineering majors are easier to find a job than the graduates from business school, and the students with majors in social science or science and art colleges are most difficult to be hired.

The thesis also demonstrates one of the most important reasons of college graduates’ unemployment problem, and this factor is the industrial structure. With further evidences, the findings state briefly that low technology secondary industries absorb the most of college graduates instead of the tertiary industry.

3 Overview of the Literatures:

The majority of previous from different countries on analyzing the higher educated unemployment problems are focusing on: failure of labor market price system and over-enrollment problem (2008) (Jie), labor market segmentation theory (2013) (Gary Fields), labor market screening theory (2006) (He) and the effect of industrial restructuring (2011) (Yue). To aim at unemployment problem of Chinese college graduates, this thesis paper takes how industrial restructuring influence Chinese collage graduates’ unemployed in the labor market.

Alan Greenspan talked about full employment problem in the speech of Harvard University graduation ceremony in 2005. The free market theory came under stronger attack after the collapse of the world’s major economic systems from 1930s. The apparent failure of competitive markets to restore full employment perplexed economists along with the global depression deepened. At that time, the economist John Maynard Keynes offered a better explanation which was oppositely with the tenets of Adam Smith and his followers. He indicated that the market itself did not
always converge to full employment, and the market would settle at equilibrium instead, in which significant segments of the labor force were unable to be hired. (2010) (Jiang).

Wiles, P. offered Wiles Test in 1974. Wiles Test stated briefly that the productivity of labors completely insensitive to majors if school education cannot improve the productivity in advance. (P.) Miller and Volker collected the data about the initial wage of the graduates with same major in Australia, and they found that there is no significant wage difference between these students no matter what their jobs entail. (1984) (Miller)

A British Classical economist William Petty is the first one who noticed industry change and he also called “the father of political economy in Britain” by Karl Marx. In his great work Political Arithmetick (1672) (Petty), he described income gap in different countries and the key reason for economy in a certain stage is the industrial structure. Petty indicated manufacturing industry can get more benefit than farming, and business is better than manufacturing industry. The differences among different industries make workers get different levels of incomes (2003) (Wang). As an example, a sailor can get twice more than a British farmer of total revenue from wage, food, housing and other kind of ways. In Petty’s opinion, the reason of labor transfer is the income difference among industries. The direction is from farming to handicraft industry, from handicraft to manufacturing, and from manufacturing to service and business industries. And as the economic getting more advanced, the percentage of farming industry will be decreased.

British economist Colin Clark was affected by Petty a lot. In his book The Conditions of Economic Progress, Petty collected many data among different departments of over 20 countries (1957) (Clark). Those data included labor input and output amount and homologous timeline sequences. After a careful research and compare, he got the conclusion: as time goes by, the economic getting more advanced, the total national
income are getting higher, labors in farming industry would decrease rather than labors in manufacturing industry, and then, people who work for manufacturing industry is getting less than the service industry. Which means the increasing of national income per capital is the power of transfer from the primary industry to the secondary and the tertiary industry. And that is how “The law of Petty-Clark” has been created. (2003) (Wang)

Kuznets empirical rule is using statistics way to analyze lots of data. Start from national income and labor distribution in different industry, this rule helps the research get into more depth to analyze industrial structure and its changing trend and more general and reliable. This research analyzed the output in all industry and the percentage changes among industries. It gave the result of the situation of developed countries industrial structure: the percentage of GDP of the primary industries took decrease dramatically; the percentage of GDP of the secondary industries took increase obviously; and the tertiary industries did not change too much or slightly increased but not all the time (2012) (Gao). In China’s case, the percentage of the primary industries took decrease dramatically; the percentage which secondary industries took increased but indistinctive; however, the percentage which the tertiary industries took increase obviously. So, developing country is following almost the same path.

With a policy paper from the Center for College Affordability and Productivity, the authors indicated the students have significant different chance to be hired with different majors with their analysis of college graduates and labor markets and comparison of broad aggregates. So majors studied and schools attended do matter in the labor market. (2013) (Richard Vedder)

To be more specific in China, there are some researches about the current situation about China.
Dahong Chen took Beijing as an example, he analyze and showed that all industries’ output value have positive relation with the tertiary industries and negative relation with the primary industries. In another words, the more people are in the tertiary industries, the more output value will be in all industries. On the contrary, the more people in the primary industries, the less output value will be in all industries. (2007) (Chen)

The other research is from Xiaoqing Feng. By researching east, middle, and west China and the whole country industries and employment structure, he noticed that there are great differences among those 4 kind of geographic areas on industries and employment structure. East China has the best coordination with industries and employment structure in all industries and the secondary industries has the best absorbing ability on labor force. All 4 geographic areas industries and employment structures have the similar changing trend which is the primary industries decrease dramatically; the secondary industries do not change too much, but the tertiary industries increase quickly. (2007) (Feng)

The final research outcome I read is from Chenglong Yu. He took Zhejiang province as an example to analyze the changes on industries and employment structure. He thought the developing level of the secondary and especially the tertiary industries are the most important macro factor which can affect college students to be employed. He also took a specific look at how the tertiary industries affect college students employment. And the conclusion is: rather than the secondary industries, the developing on the tertiary industries can help more college students find jobs. (2009) (Yu and Yao)

4 Methodology and Data:
4.1 Data have been collected:

For the over-enrollment problem, the thesis uses a group of data set which include the total nationwide amount of college graduates from year of 2005 to 2013, yearly growth rate of total college graduates amount, nationwide college graduates average unemployment rate, and the yearly growth rate of GDP of China. (Ministry of National Education of People's Republic of China)

For the analysis of major effect, the thesis analyses the national wide typical majors unemployment rate (China MOS-HR Information Management & Consulting Company), nationwide college graduates total average unemployment rate (Ministry of National Education of People's Republic of China), and a questionnaire published by Institute of Social Science Survey of Hunan Normal University in 2009, and it is used to do a survey about the graduates employment situation in Hunan province during May and June of 2009. (2010) (Gao, Liu and Chen)

The average unemployment rate data I used for both of first and second section are coming from the Ministry of National Education of China and an organization of Education Technology and Consulting company named China MOS-HR Information Management & Consulting Company. All of the college graduates’ unemployment rate data they provided are investigation unemployment rate and only included cities and towns, but not included rural areas. The investigation unemployment rate is provided by the universities and colleges and counted by the Ministry of National Education or MOS-HR company. Universities and colleges do the investigation with their yearly graduates at half year after their graduation by email or the paper work. Here, Average unemployment rate = (total unemployed graduates – total graduates who get into higher education – total graduates who get into the army – voluntary unemployment candidates who are not willing to get job) / total labor force of yearly graduates. The graduates who do self-employed work are counted as employed. (2014) (China MOS-HR Information Management & Consulting Company)
For the analysis of industrial structure, the thesis works with the contribution of these three industries in GDP through year of 1990 to 2014 (2014) (National Bureau of Statistics of China), the average length of schooling or education in unit of years of participants in three industries (2014) (National Bureau of Statistics of China), and Apple IPhone 4S value chain distribution data. (2012) (Zhang and Zhang)


4.2. Methodology and Model I used:

For the over-enrollment problem, the thesis uses regressive analysis model. With this model, the result shows the relationship between college graduates’ unemployment problem and Chinese colleges and universities booming enrollment, yearly growth rate of GDP is also counted as a factor. The left side of the model is the yearly college graduates’ unemployment rate, and the right side are the independent variables of total amount of yearly college graduates and the yearly growth rate of GDP of China. The estimation value of the regression coefficients indicate the relations between college graduates’ unemployment problem and Chinese colleges and universities booming enrollment and national circumstance with yearly growth rate of GDP. For the analysis of major effect, the thesis works with data comparison and graphic displays. The thesis cites the data set of the typical majors’ graduates’ unemployment rate and compares the distinction between each major with graphic displays. For the analysis of industrial structure, the thesis uses data distribution compare analysis and example analysis methods.
5 Over-enrollment of universities in China and unemployment problem

5.1 Description of current status about universities over-enrollment

From 2005 to 2013, the total amount of college graduates was growing all the time, and the college graduates’ unemployment rate stayed in a high level. Some Chinese education scholars censured Chinese Government of Education Department about over-enrollment and over-education.

5.2 Data introduction:

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Amount of College Graduates in thousand</td>
<td>3380</td>
<td>4130</td>
<td>4960</td>
<td>5590</td>
<td>6110</td>
<td>6510</td>
<td>6600</td>
<td>6800</td>
<td>7000</td>
</tr>
<tr>
<td>Yearly Growth Rate of Total Amount</td>
<td>20.7%</td>
<td>22.20%</td>
<td>19.90%</td>
<td>12.90%</td>
<td>9.10%</td>
<td>3.20%</td>
<td>4.60%</td>
<td>3.00%</td>
<td>2.90%</td>
</tr>
<tr>
<td>College Graduates Average Unemployment Rate</td>
<td>18.30%</td>
<td>14.30%</td>
<td>12.00%</td>
<td>14.00%</td>
<td>13.40%</td>
<td>16.50%</td>
<td>9.20%</td>
<td>8.50%</td>
<td>8.20%</td>
</tr>
<tr>
<td>Yearly Growth Rate of GDP</td>
<td>11.31%</td>
<td>12.68%</td>
<td>14.18%</td>
<td>9.63%</td>
<td>9.21%</td>
<td>10.45%</td>
<td>9.30%</td>
<td>7.65%</td>
<td>7.67%</td>
</tr>
</tbody>
</table>

Table 1

Table 1 indicates the total amount of college graduates from year of 2005 to 2013, college graduates average unemployment rate, and yearly growth rate of total amount and GDP in China from 2005 to 2013. (2014) (Ministry of National Education of People's Republic of China) It is important to note that the unemployment rate I used in the whole thesis paper is the average unemployment rate of Chinese college graduates six month after they graduated from the college.
To be more intuitive, Figure 1 shows the total amount of college graduates from year of 2005 to 2013, and it shows clearly that the college graduates grew fast from 2005 to 2011, and after the year of 2012, the college graduates were still on the rise but with a slow growth. Figure 2 shows the variation tendency of yearly growth rate of total college graduatates amount, college graduates average unemploylment rate, and the yearly growth rate of average unemploylment rate. Before the year of 2007, the yearly growth rate of total college graduates was stayed at high level with more than 20%, and from 2008 to 2010, the growth rate of total college graduates has dropped suddenly, and after the year of 2010, this rate stays at a stable interval between 3% to 5%. One of the causal factors that lead to this growth rate shifting trend was the college
enrollment expansion plan which was made by Ministry of National Education of China.

Compare with the college graduates’ unemployment rate and yearly growth rate of GDP, there is a negative correlation between them before year of 2008, and positive correlation between them after 2008. Moreover, the percentile changing of college graduates average unemployment rate is always less than the percentile changing of yearly growth rate of GDP. So the linear regression model would explain how these two factors have effect on the college graduates’ unemployment rate.

5.3 Linear Regression Model Analysis:

In order to demonstrate the relationship between college graduates’ unemployment problem and Chinese colleges and universities booming enrollment and also the economic environment, I am going to check the relation of the growth rate of yearly college graduates and the yearly growth rate of GDP with the yearly college graduates average unemployment rate.

I did the following regression analysis as below:

\[ y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon \]  

(1)

I use \( y_1 \) as the yearly college graduates average unemployment rate, \( x_1 \) as the total amount of yearly college graduates, \( x_2 \) as the yearly growth rate of GDP of China, \( \beta_0 \), \( \beta_1 \), and \( \beta_2 \) as the estimation value of regression coefficients and \( \varepsilon \) is the standard error.
The regression result from SPSS is showed below with table 2 and figure 3:

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.562</td>
<td>.316</td>
<td>.088</td>
<td>3.39170%</td>
<td>.316 F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df1  df2 Sig. F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2    6 .320</td>
</tr>
</tbody>
</table>

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>Zero-order</th>
<th>Partial</th>
<th>Part</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>7.854</td>
<td>7.994</td>
<td>.982</td>
<td>.364</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly Growth Rate of Total Amount</td>
<td>.177</td>
<td>.265</td>
<td>.407</td>
<td>.667</td>
<td>.530</td>
<td>.553</td>
<td>.263</td>
<td>.225</td>
<td>.305</td>
<td>3.274</td>
</tr>
<tr>
<td>Yearly Growth Rate of GDP</td>
<td>.285</td>
<td>.994</td>
<td>.175</td>
<td>.287</td>
<td>.784</td>
<td>.515</td>
<td>.116</td>
<td>.097</td>
<td>.305</td>
<td>3.274</td>
</tr>
</tbody>
</table>

### Correlations

<table>
<thead>
<tr>
<th>Pearson Correlation</th>
<th>Sig. (1-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Graduates</td>
<td>Yearly Growth Rate of Total Amount</td>
</tr>
<tr>
<td>Average Unemployment Rate</td>
<td>Yearly Growth Rate of Total Amount</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College Graduates Average Unemployment Rate</th>
<th>Yearly Growth Rate of Total Amount</th>
<th>Yearly Growth Rate of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000</td>
<td>.553</td>
<td>.515</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yearly Growth Rate of Total Amount</th>
<th>Yearly Growth Rate of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>.553</td>
<td>1.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yearly Growth Rate of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>.515</td>
</tr>
</tbody>
</table>

Table 2
5.4 Econometric Analysis:

With the result above, under 95% confidence level, the correlation between the total amounts of college graduates with college graduates average unemployment rate is 0.553. And the correlation between the yearly growth rates of GDP with college graduates average unemployment rate is 0.515. T-test P-value of the variable of the total amounts of college graduates is 0.53, and T-test P-value of the variable of the yearly growth rate of GDP is 0.784. Both of them are more than 0.05. So there is not significant difference with each of them.

Result is reliable, and it indicates that there is not strong linear relation between the college graduates average unemployment rate and other two factors, but both of these two factors influence their unemployment rate. The factor of total college graduates has stronger effect on college graduates’ unemployment rate than GDP growth rate.
5.5 Analysis result and conclusion of universities over-enrollment problem:

There is not strong linear relation between the college graduates average unemployment rate and total amount of college graduates and yearly growth rate of GDP of China. The analysis result demonstrates the factor of total college graduates has stronger effect on college graduates’ unemployment rate than GDP growth rate, and it means colleges and universities over-enrollment problem is a reason of high unemployment level of graduates, but not strong enough. In addition, the economic growth would also influence the unemployment level.

With comprehensive consideration, the un-coordination between higher educational enrollment expanding pace and growth rate of economic development is an important reason. The speed of colleges and universities enrollment expanding is higher than GDP growth rate which is the speed of economic expanding.

So Chinese colleges and universities expand their enrollment is not unitary reason of high unemployment level of college graduates, the un-coordination between higher educational enrollment expanding pace and growth rate of economic development led to the serious situation of college graduate unemployment problem. On the other hand, I truly believe that more and more people get into college and higher education is benefit for the economic system and whole society.

6 Major as a factor of China College graduates’ unemployment problem

6.1 Data introduction I for Section 6
Major is a well-known important element that would effect college graduates employment. The research result from a policy paper from the Center for College Affordability and Productivity indicated that the students have significant different chance to be hired with different majors. (2013) (Richard Vedder) Graduates from some groups of majors stand more chance on jobs than other groups of majors, and at the same time, there is not significant different between majors within a same group. For instance, major of Engineering group includes civil engineering, mechanical engineering, space engineering, etc.

Same with the research above, I want to identify how majors influence the college graduates employment in China. China MOS-HR Information Management & Consulting Company 2010 Annual Report indicated that Chinese college graduates’ unemployment problem is typical structural unemployment. (2014) (China MOS-HR Information Management & Consulting Company) There are two kinds of situation should be noticed reflected by statistical data. The first is high unemployment rate major with few students which has weak effect on total unemployment rate, and the second is low unemployment rate major with large amount of graduates has strong effect on the whole unemployment situation. The typical majors I have chosen are majors with large amount of graduates.

<table>
<thead>
<tr>
<th>Typical Majors</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>5.00%</td>
<td>7.00%</td>
<td>4.70%</td>
<td>4.30%</td>
<td>6.20%</td>
</tr>
<tr>
<td>Energy and Power Engineering</td>
<td>6.00%</td>
<td>7.10%</td>
<td>3.60%</td>
<td>3.20%</td>
<td>4.90%</td>
</tr>
<tr>
<td>Economic &amp; Finance</td>
<td>8.00%</td>
<td>5.20%</td>
<td>5.30%</td>
<td>5.70%</td>
<td>6.60%</td>
</tr>
<tr>
<td>Auditing &amp; Accounting</td>
<td>7.00%</td>
<td>5.40%</td>
<td>4.10%</td>
<td>4.90%</td>
<td>4.50%</td>
</tr>
<tr>
<td>Business &amp; Management</td>
<td>11.00%</td>
<td>7.70%</td>
<td>6.10%</td>
<td>6.90%</td>
<td>7.50%</td>
</tr>
<tr>
<td>Jurisprudence</td>
<td>23.00%</td>
<td>19.50%</td>
<td>13.20%</td>
<td>14.20%</td>
<td>14.00%</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>16.00%</td>
<td>18.10%</td>
<td>12.40%</td>
<td>12.80%</td>
<td>13.50%</td>
</tr>
<tr>
<td>Animation</td>
<td>25.00%</td>
<td>22.50%</td>
<td>12.60%</td>
<td>12.90%</td>
<td>12.80%</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>20.00%</td>
<td>17.90%</td>
<td>12.80%</td>
<td>14.50%</td>
<td>14.00%</td>
</tr>
</tbody>
</table>

Table 3

Table 6 shows the Chinese typical majors’ graduates’ unemployment rate during 2008 to 2013, and there is not a government official or authority statistical data for nationwide typicl major graduates’ unemployment rate before 2008. The typical
majors I chose include Civil Engineering and Energy And Power Engineering in engineering college; Economic And Finance, Auditing And Accounting, Business And Management majors in business school; Jurisprudence and Applied Mathematics majors in school of social sciences; Biotechnology and Animation majors in science and art college.

6.2 Data Comparison and Graphics Interpretation

![National Typical Majors Unemployment Rate](image)

Figure 4

With Figure 4, it clearly shows that there is significant difference between different groups of majors. Engineering major group, like Civil Engineering or Energy and Power Engineering, unemployment rate are obviously lower (about 5%) than majors in Business School group (about 7%), like Economic and Finance, Business and Management or even Auditing and Accounting. But the unemployment rate of all of these majors are lower than majors groups in Social Sciences or Science and Art colleges (about 15%). Unemployment rate of Jurisprudence and Animation (about 20%) are especially higher than others.

With the same data resource, (2014) (China MOS-HR Information Management &
Consulting Company) it should be noted especially that the unemployment rate of graduates from Education major group is at lower level, and it was because more teachers were hired due to a frenzied expansion of high schools, colleges, and universities within past years. So scale expansion of whole education system provided enough job position for the graduates with education major. In general, the situation of major types of Engineering and Business are better than majors in social science or science and art colleges.

To sum up, unemployment rate of majors groups of Jurisprudence, Biotechnology, Animation, and Applied Mathematics are significantly higher than other five, so these four majors contributed more on the total unemployment rate. Majors groups of Jurisprudence, Biotechnology, Animation, and Applied Mathematics have stronger effect on college graduates’ unemployment problem than others, so unemployment situation of these four majors are more serious. Graduates studied in majors groups of engineering and business take more opportunities on jobs.

6.3. Data introduction II for Section 6

The data of typical majors I have chosen are majors with large amount of graduates, and the analysis result has to ignore the influence of majors with small amount of graduates. This statistic is also restricted by nationwide data. To be more specifically, I use a questionnaire statistics covered with small sample size majors as further evidence to prove it. (2010) (Gao, Liu and Chen).

This questionnaire is published by Institute of Social Science Survey of Hunan Normal University in 2009, and it is used to do a survey about the graduates employment situation in Hunan province during May and June of 2009. The respondents are year of 2009 graduates from six univerisities of Hunan Province: Hunan University, Central South University, Hunan Normal University, Agricultural University Of
Hunan, Henan College of Chinese Medicine, and Central South University of Forestry and Technology. The survey questionnaire were distributed 300 copies, of which the effective recovery of 280, and effective rate was 93.30%. The respondents covered nine major categories, and the sample distribution is shown in Table 4.

<table>
<thead>
<tr>
<th>Colleges</th>
<th>Category</th>
<th>Effective frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunan University</td>
<td>Central South University</td>
<td>45</td>
<td>16.1</td>
</tr>
<tr>
<td></td>
<td>Hunan Normal University</td>
<td>70</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Agricultural University Of Hunan</td>
<td>42</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Central South University Of Forestry and Technology</td>
<td>40</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>Hunan College of Chinese Medicine</td>
<td>35</td>
<td>12.5</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>154</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>126</td>
<td>45</td>
</tr>
<tr>
<td>Major</td>
<td>Science</td>
<td>24</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>92</td>
<td>32.9</td>
</tr>
<tr>
<td></td>
<td>Economic &amp; Finance</td>
<td>34</td>
<td>12.1</td>
</tr>
<tr>
<td></td>
<td>Business &amp; Management</td>
<td>43</td>
<td>15.4</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>8</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>Agriculture</td>
<td>16</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>Medical Science</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>Jurisprudence</td>
<td>41</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>Literature &amp; History</td>
<td>20</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Table 4

According to Table 4, the most common major of these six universities is Engineering with 32.9% of total graduates. Economic and Finance, and Jurisprudence are also popular majors with 15.4% and 14.6% of graduates. The lowest percentage major is Medical Science with just 0.7%.
Table 5 shows the graduates’ employment situation, the questionnaire distributed two month after the students got the diploma, so the data here should be considered as the initial unemployment rate. So the initial unemployment rate of the graduates of six universities is 48.6% of 280 candidates, but there are six missing data, so the valid rate is 49.6% of total 274 candidates. The statistical result indicates the seriously situation of unemployment problem of the graduates from these six universities.

6.4 Data Comparison and Analysis Interpretation

Table 6 shows the percentage of respondents’ unemployed students of each major from these six universities. There is significant different between each type of majors.
The percentage of respondents’ unemployed students of majors with Engineering, Management, Education, and Medical Science are lower than the average level; and the percentage of respondents’ unemployed students of majors with Science, Economic, Agriculture, Jurisprudence, and Literature And History are higher than the average level. This statistical result exhibits nearly identical outcomes with nationwide statistics.

6.5. Conclusion of analysis about major as a factor of college graduates’ unemployment problem

Analysis with all of the statistical results above, major is a decisive factor with strong effect on college graduates’ unemployment. Therefore, the students have significant different chance to be hired with different groups of majors. In general, the graduates with engineering majors are easier to find a job than the graduates from business school, and the students with majors in social science or science and art colleges are most difficult to be hired. So the next step is to determine the industry distribution of the college graduates after they got into the labor market, and what is the real reason of college graduates universal unemployment.

7 Industries structure as a factor of college graduates’ unemployment problem

7.1. China industries categories introduction:

China divides the whole industry into three different parts as general, which include the primaries industries, secondary industries, and tertiary industries.

Companies and organizations in Primary Industries are extracting raw materials and
natural resources from the land and sea, e.g. oil, and iron ore, timber, fish. So industries like mining, quarrying, fishing, forestry, and farming are all parts of primary industries. Secondary Industries referred to as manufacturing industries, and companies and organizations in secondary industries involve the manufacture from raw materials into another products by labor or equipment. So industries like manufacturers and construction are all parts of secondary industries. All other companies and organizations are in tertiary industries, and they neither produce raw materials nor products. These companies and organizations provide services to the society instead. So industries of medical science, education, and government are all examples of tertiary industries, and others include culture and media, finance, supply chain, communication, transportation, scientific research, and so on. (2013) (National Bureau of Statistics of China)

7.2 Data introduction for Section 7:

After the Reform and Opening market, China’s industries’ structure is changing all the time with the fast-growing Chinese economy. Figure 5 clearly shows the contribution
of these three industries in GDP through year of 1990 to 2014, and the variation tendency of each industry and whole industrial structure. In year of 1990, three of industries had close contribution on GDP, and after 1990, the situation was changed. The proportion of primary industries on GDP dropped year by year. The primary industries contributed 27.1% to GDP in 1990, and it was just 9.2% in 2014. The secondary industries kept in relatively stable development. During the year of 1990 to 2014, the proportion of secondary industries on GDP was fluctuating between 40% and 50% and it makes highest contribution to GDP compare with others. The tertiary industries’ contribution on GDP increased from 31.6% in 1990 to 48.2% in 2014. It was particularly noteworthy that the contribution of the tertiary industries was beyond the secondary industries in 2013 and 2014, and the tendency of the proportion of tertiary industries is on the rise. (2014) (National Bureau of Statistics of China)

According to the Petty-Clark theory by William Petty and Colin Clark (2003) (Wang), along with the increase of average capita income, labor income in primary industries has gradually declined, and the contribution of the primary industries to GDP has also decreased during the same period. The secondary industries’ average labor income has increased and the proportion of secondary industries on GDP has also increased. With the further economic development, the tertiary industries become more and more important, and the per capita income in the tertiary industries becomes the highest in the whole industries. So the labor force flows from the primary industries into the secondary industries for higher income, and then flows into the tertiary industries finally.

7.3. Methodology of the influence of industries structure:

In order to understand how China’s industries’ structure influence the Chinese college graduates’ unemployment, it is very important to know the career path of college graduates. Average length of education of participants in each industry is a very
effective index to show which industry contributes more jobs for labors with higher education background.

Table 7

Table 7 indicates the average length of schooling or education in unit of years of participants in three industries. For all of three industries, the average lengths of education of participants were increasing from 1990 to 2005 (National Bureau of Statistics of China). For each year, the average lengths of education of participants in tertiary industries are the highest; the primary industries are minimally educated. So these data are evidences to demonstrate that tertiary industries and secondary industries are absorbed more college graduates than primary industries. Within the same period, the proportion of college graduates in the tertiary industries were 3.5%, 14.3%, 20.1%, and 23.8%, and this proportion has showed growth trend obviously. (2009) (Mao)

Although the tertiary industries absorbed more college graduates year after year, the secondary industries contributed the most employments for college graduates in China. Manufacturing industry is an important and large industry in secondary industries. In year of 1995, 2000, and 2005, manufacturing industry respectively absorbed 18.2%, 15.5%, and 12.5% of whole college graduates. (2011) (Gong) Construction industry is another important industry in the secondary industries, and construction industry was the second large direction of employment of college graduates.

In fact, the secondary industries, especially with manufacturing industry and construction industry have strong influence on college graduates employment. It is
generally known that China is the factory of the world with large manufacturing industry, but not strong manufacturing industry. Customers can find products “made in China” everywhere all over the world. More than 130 kinds of China-made products were ranked first in the world. (2009) (Lang) Consider about international division of labor theory explained the advantages of China under international competition. China has large reserve of cheap labor force with low education level. So according to the international division of labor theory, the products of China’s manufacturing industry are low-end and cheap productions. The characteristics of China’s manufacturing industry are simple process technology, low cost, high-volume, and low-margin business. But the problem is these kinds of manufacturers do not need too much labors with higher education, and they have to hire college graduates. So I believe this is the real mismatching problem of Chinese labor market. There are eight steps of the whole producing chain: Design, Research & Development, Manufacture, Supply chain, Storage, Order processing, financial service, and Retail & Sales. (2009) (Lang) With the advantage of cheap labor force under international division, China’s manufacturing companies only takes parts of manufacture and parts of storage, and these two steps do not provide appropriate job positions to college graduates. At the other hand, those other six steps are significant to the college graduates.

There is an example of China’s manufacturing industry and international division of labor force. Apple IPhone is a successful product of Apple Inc. and it is also one of the world's most popular mobile phones. At the bottom of the packing box of IPhone, it is clearly show that this product is designed by Apple in California and assembled in China. Actually, a company named Foxconn Technology Group is main assembly line provider for Apple products in China. And this company hired lots of college graduates in south of China with the salary about $500 per month. (2011) (Gong)

7.4. Example of Chinese manufacturer value chain distribution:
Look at the whole production chain of Apple IPhone 4S as an example. Apple IPhone 4S was the fifth generation of the IPhone, and it was announced on October 4th, 2011. The retail price for non-contract IPhone 4S 16GB was $649 without tax in the U.S. Apple Inc. is responsible for design and supply chain which valued at $360; raw materials and software licenses which valued $48; several companies in Japan, Korea, Taiwan, German, and the U.S. are responsible for critical components which valued at $179; These critical components include: companies in Taiwan provide RAM with value of $25; suppliers in Japan provide Display screen valued at $35; companies in Korea produce processor valued at $25; companies from German provide GPS hardware, microcomputer, camera, and WIFI device, and all of these valued at $30; suppliers in America produce Bluetooth device, voice-input device, 3G hardware which valued at $12; and others valued at $52. The assembly line is provided by Foxconn Technology Group in China which valued $6.5 which is just 3.6% of the whole production chain, and about 1.2% of the whole value chain. (2012) (Zhang and Zhang)

7.5. Conclusion for industrial structure as a factor of college graduates’ unemployment problem

Companies like Foxconn Technology Group in the example above are main part of China’s manufacturing industries, and some of them are state-owned, and it is the same for construction industries. They produce low-end and cheap productions with simple process technology, low cost, high-volume, and low-margin business. But most of them have to hire labors with higher education background, just like college graduates, because they are state-owned or state-related companies, and they have responsibility to absorb college graduates for reducing unemployment rate. The average initial salary for these college graduates is about $500 per month which is lot of lower than the tertiary industries, but they are the big part of college graduates. (2011) (Gong)
Due to low salary, the college students are reluctant to get into the secondary industries, for the college graduates who got into these companies would not like to stay in these companies for long time and the labor flowing rate of these companies are usually high. At the same time, the tertiary industries should have absorbed high educated level labor forces but companies in the tertiary industries cannot provide enough absorption capacity. So the industrial structure is a reason of college graduates’ unemployment problem. I think Chinese manufacturers are in transformation period, they are trying to update their technology, but it needs time to finish.

8 Deficiencies and Shortages

The deficiencies and shortages mainly show in data the thesis used. The observations of linear regression model just cover nine years data. The reason is only professional organizations and government official reports can provide accurate and valid data, and these accurate and valid data related to the college graduate unemployment problem were not available before 2005. For major related data, the thesis uses the Chinese typical majors’ graduates’ unemployment rate during 2008 to 2013, and because there is not government official or authority statistical data for nationwide typical major graduates’ unemployment rate before 2008. For the data of GDP, National Bureau of Statistics of China changed their statistical approach several times, and the yearly GDP data of statistics could not accurate because of different methods.

On the other hand, the variables just conver nine typical majors. With these reasons, the analysis results can not explain the unemployment problem accurately. China is a large country, and the different areas have different characteristics of economic environment and education environment, this thesis just covers the national wide situation and Hunan Province. So further research is necessary to explore the factors
of college graduates’ unemployment problem.

9 Conclusion of the Thesis:

The search for the determinants of unemployment problem is an old quest within economics of labor market. The economist John Maynard Keynes offered the primary explanation which was oppositely with the tenets of Adam Smith and his followers. He indicated that the market itself did not always converge to full employment, and the market would settle at equilibrium instead, in which significant segments of the workforce were unable to be hired. An authoritative market research institution China MOS-HR Information Management & Consulting Company indicated that Chinese college graduates’ unemployment problem is typical structural unemployment. The structural unemployment is labor who unemployed due to technological progress or economic structural adjustment and this concept introduced by A. H. Hansen. The law of Petty- Clark point out the regular pattern and trend of labor moves, which is when national income per capital get improved, labors are flowing from the primary industry to the secondary at the beginning, and then transfer to the tertiary industry depends on income difference which is adding value.

The first part of the thesis investigates the relationship between over-enrollment problem and college graduates’ unemployment problem. The findings demonstrate the factor of total college graduates has stronger effect on college graduates’ unemployment rate than GDP growth rate. In addition, the economic growth would also influence the unemployment level. Chinese colleges and universities expand their enrollment is not unitary reason of high unemployment level of college graduates, the un-coordination between higher educational enrollment expanding pace and growth rate of economic development is an important reason. The speed of colleges and universities enrollment expanding is higher than GDP growth rate which is the speed of economic expanding.
The second part of the thesis looks further into the factor of major. Compare with the research result from a policy paper from the Center for College Affordability and Productivity (2013) (Richard Vedder), the findings indicate that the students have significant different chance to be hired with different majors. In general, the situation of major types of Engineering and Business are better than majors in social science or science and art colleges. Graduates studied in majors groups of engineering and business take more opportunities on jobs.

The third part of the thesis pays attention to the industrial structure. Instead of the tertiary industries, the secondary industries with manufacturing industries and construction industries absorb the most college graduates in China, and the most companies in these industries produce low-end and cheap productions with simple process technology, low cost, high-volume, and low-margin business. The average initial salary for these industries is lower than the tertiary industries, so the voluntary unemployment also appears within the college graduates, but they still try to find a job. At the same time, the tertiary industries should have absorbed high educated level labor forces instead of the secondary industries, but companies in the tertiary industries cannot provide enough absorption capacity.

Summing up, this thesis finds that the college graduates high level unemployment problem of China is influenced from the combined impact of three factors. The first factor is the un-coordination between higher educational enrollment expanding pace and growth rate of economic development is an important reason. The speed of colleges and universities enrollment expanding is higher than GDP growth rate which is the speed of economic expanding. The second factor is major. Graduates studied in different majors groups would have to face significant different chance to be hired. The last factor is incomplete industrial structure. The tertiary industries should have absorbed high educated level labor forces instead of the secondary industries, but companies in the tertiary industries cannot provide enough absorption capacity.
10 Literatures and References:


