

Study on the Labor Population Structure and Human Capital Accumulation Characteristics of Different Industries in China

Wen Hua¹

¹ School of Economics, Central University of Finance and Economics, Beijing, China

Correspondence: Wen Hua, Shahe Higher Education Park, Changping District, Beijing, China. E-mail: 15248120515@163.com

Received: February 9, 2020

Accepted: March 14, 2020

Online Published: March 30, 2020

doi:10.5539/ijbm.v15n4p210

URL: <https://doi.org/10.5539/ijbm.v15n4p210>

Abstract

Based on the data of *China Labor Statistical Yearbook*, this paper analyzes the characteristics of the labor population structure and human capital accumulation by industry, and finds that the labor population structure presents the following characteristics: (1) the Labour force is concentrated in service industry; (2) the proportion of labor force in emerging and high skilled industries is small; (3) there is age structure differentiation among industries. The accumulation of human capital is characterized by: (1) a shortage of human capital accumulation in productive industries; (2) a large gap in human capital accumulation in different industries. Therefore, no matter from the perspective of labor population structure or human capital accumulation, there are some structural differentiation problems among different industries, which is directly related to the enjoyment of second demographic dividend. Therefore, we must pay attention to the structural differentiation of labor population distribution and human capital accumulation among industries, and improve the education and training system, employment security system, labor mobility system as well as social security system, so as to eliminate the second demographic dividend barrier caused by structural differentiation.

Keywords: Demographic dividend, Second demographic dividend, Structure of working population, Human capital accumulation, Structural differentiation among industries

1. Introduction

Demographic dividend is one of the important driving forces for China's rapid economic development in the past 40 years. Cai and Wang (2004) decomposed the contribution rate of China's economic growth from 1982 to 1997, and divided the source of economic growth into five parts: physical capital, demographic dividend, labor resource allocation, human capital accumulation and total factor productivity. Then they concluded that the contribution rates of these factors to economic growth were 29.02%, 23.71%, 20.23%, 23.70% and 3.34%, respectively, indicating that the contribution rate brought by labor factors was 67.64%, which was an important source of China's economic growth. In addition, labor factors can also play an important role in technological innovation through human capital accumulation. However, the contribution rate brought by technology premium only accounts for 3.34%, indicating that the potential of labor factors for technology premium hasn't been realized.

Since the beginning of this century, China's population structure has entered a new stage and presented new characteristics (Cai, 2009). According to statistics, since 2013 China's economy has been facing both the aging of population and the pressure of declined working age population. According to the statistics of employment data of urban units in China, the proportion of the elderly participating in social activities in 2016 is significantly larger than that in 2003. In 2003, the labor force participation rate of Chinese workers over the age of 65 was 1.2%, while in 2016, it increased to 1.6%, with an increase of 0.4%. The labor force participation rate of Chinese workers aged 60-65 was 1.3%, and it increased to 2.4% in 2016, with an increase of 1.1%. The labor force participation rate of Chinese workers aged 55-59 was 3.2%, and it increased to 4.2% in 2016, with an increase of 1.0%. Correspondingly, the labor force participation rate of Chinese young people declined. In 2003, the labor force participation rate of the young aged 16-19 was 3.2%, while it decreased to 1.1% in 2016, with a decrease of 2.1%; the labor force participation rate of the young aged 20-25 was 9.7%, and it decreased to 7.9% in 2016, with a decrease of 1.8%. The above data show that the population structure of China's working-age population is aging, and the time when the young participates in social activities and the old leaves from the labor market

delays. The detailed information is shown in Table 1.

Simultaneously, according to the statistics of employment data of urban units in China, the year-end number of urban unit employment in 2003 was 109.697 million, with a year on year growth rate of 1.18%. Due to the expansion of foreign trade, the number of Chinese urban unit employment continued to rise, reaching the peak in 2013, with a year on year growth rate of 18.85%. However, since 2013, the growth rate of labor population has gradually slowed down. At the end of 2016, the number was 178.881 million, with a year on year growth rate of -0.97%. The above data shows that China's working age population has begun to shrink, and the conditions for realizing population dividend have disappeared. The detailed information is shown in Figure 1.

Population dividend affects economic growth by influencing labor supply, residents' savings and public investment. The key to the problem is that the demographic dividend doesn't exist permanently (Cai, 2007), and sometimes it is even fleeting. In the historical development, some developed countries haven't even had the demographic dividend effect (Wang, 2010; Yu, 2003; Cai and Wang 2004). In the face of the disappearance of the demographic dividend, China's economy should take the second demographic dividend as a breakthrough, promote innovation through the accumulation of human capital, and create a new economic growth point. To achieve this goal, it is necessary to understand the characteristics of the structure of labor population and human capital accumulation, and then take further countermeasures.

Table 1. Age structure of employment population (unit: %)

Year	16-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
2016	1.1	7.9	14.7	15.8	13.2	15.8	13.1	10.2	4.2	2.4	1.6
2003	3.2	9.7	14.6	18.9	17.9	11.8	11.6	6.7	3.2	1.3	1.2

Source: China Labor Statistical Yearbook.

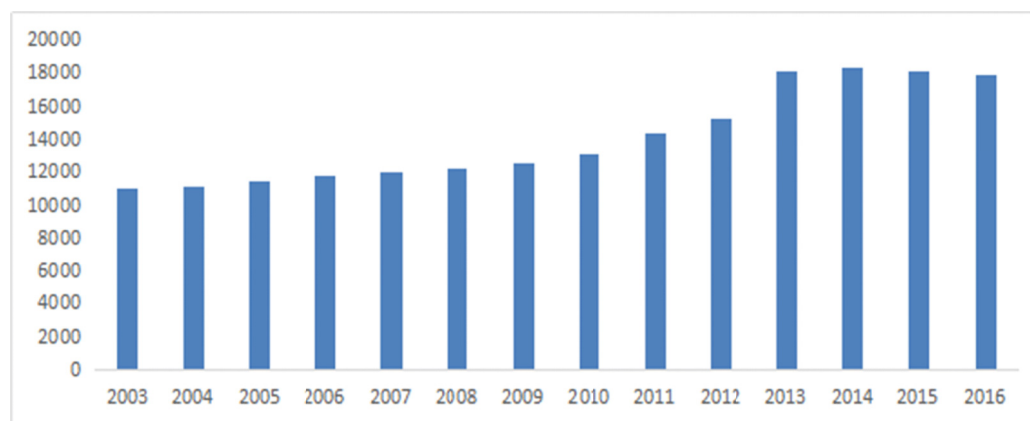


Figure 1. Statistics of total employment of urban units in China

Note: unit of Figure 1 is person.

2. Theoretical Mechanism

Malthus (1798) is the originator who studied the relationship between population and economic growth. His theory summarized the economic growth law for a long time before industrialization and played an important role in traditional economics. Up to now, it can still explain the economic growth of some underdeveloped areas to some extent. Unfortunately, Malthus didn't discuss the relationship between the structure of labor force and economic growth. Later, Lewis (1954) analyzed the relationship between the structure of labor force and economic growth from the perspective of demographic dividend.

The relationship between the structure of labor force and economic growth was divided into the following stages. The first stage of the structural transformation of the labor force population shows that the speed of economic development is very slow, which is characterized by high birth rate, high mortality rate as well as low natural growth rate; the second stage shows a moderate economic development, which is characterized by high birth rate,

low mortality rate and high natural growth rate; The third stage shows a high economic development, which is characterized by low birth rate, low mortality rate as well as low natural growth rate. At this time, due to the time interval between the “entry” and “exit” of the labor market, the “opportunity window” can be provided for economic growth.

However, this kind of economic growth effect doesn't exist permanently. When the low birth rate and low mortality rate further affect the labor population structure, the economic growth will decrease and the aging of the labor force will appear. In face of the new form of China's labor population structure, the scholars represented by Cai (2010) advocate “the second demographic dividend”, and its mechanism lies in that, compared with the traditional population dividend, the second demographic dividend has less dependence on the residents' savings and the supply of labor force, but depends on the accumulation of human capital and technological innovation (its essence is to realize the improvement of TFP). The purpose of technological innovation is to improve product quality and added value, which is closely related to the level of human capital accumulation of workers. In order to better play the role of the second demographic dividend, it is necessary to understand the characteristics of labor population structure and the human capital accumulation.

3. Distribution Characteristics of Labor Population Structure in Different Industries

3.1 The Labor Force Is Concentrated in Service Industry

According to the statistics of employment data of urban units in China, the proportion of China's labor force in service industries has generally increased, which is mainly reflected in the following aspects. The industry of TSC (Transportation, Storage and Communication) and PSS (Public administration, Social security and Social organization) have seen the largest changes in the labor population, about 5-20 million, and the industry of FII (Financial Inter-mediation and Insurance), REA(Real Estate Activities), LB(Leasing and Business services), Education and HSS(Health care and Sporting and Social welfare) have seen the moderate changes, about 3-5 million. At the same time, the labor population in WR (Wholesale and Retail industry), IST (Information transmission, Software service industry and Technical service), WEU (Water conservancy, Environmental and Utility management) and RRO (Residential service, Repair and Others) increased by a small margin, about 0.5 to 3 million. The above data indicates that China's service industry will be an important absorption industry for the working population. The detailed information is shown in Table 2.

Table 2. The changes in the number of urban employees by industry

Changes in industry population	Industry	Trend
Unchanged(<50)	Mining and Quarrying	Decline
	Farming, Forestry, Animal husbandry and Fishery	Decline
	Electricity, Gas, Water production and Supply	Decline
	Accommodation and Restaurants	Decline
Small change(50-300)	Wholesale and Retail	Rise
	Information transmission, Software service and Technical service	Rise
	Scientific research and Poly-technical services	Rise
	Water Conservancy, Environmental and Utility management	Rise
	Residential services, Repairs and Others	Rise
	Financial Inter-mediation and Insurance	Rise
	Real Estate Activities	Rise
Moderate change(300-500)	Leasing and Business services	Rise
	Education	Rise
	Culture, Arts, Radio, Film and Television	Rise
	Health care, Sporting and Social welfare	Rise
Greater change (500-2000)	Manufacturing	Decline
	Construction	Decline
	Transport, Storage and Communication	Rise
	Public administration, Social security and Social organization	Rise

Source: China Labor Statistical Yearbook.

3.2 The Population Distribution of New and High Skilled Jobs Is Small

According to the statistics of employment data of urban units in China, about 20% of China's labor force is distributed in the manufacturing, 18.09% in the WR (Wholesale and Retail industry), and the sum of the two is more than 38%, so they are the two most labor-intensive industries in China. In addition, FFAF(Farming, Forestry, Animal husbandry and Fishery), Construction, PSS (Public administration, Social security and Social organization), TSC (Transport, Storage and Communication), Education, AR (Accommodation and Restaurants) and RRO(Residential Services, Repairs and Others)hire 7.22%, 6.90%, 5.87%, 5.36%,5.28% and 5.78% of the labor force, respectively, and the sum of the above accounts for 38.63%. However, the labor force distribution of the new and high skilled jobs (such as Information transmission, Software service and Technical service) is relatively small. Compared with 2013, although the proportion of labor force distribution in new and high skilled industries has increased, their influence is far lower than the industries mentioned above. The data shows that China's labor force is distributed in low-skilled jobs, while the labor force in emerging industries and high-skilled jobs still accounts for a small proportion.

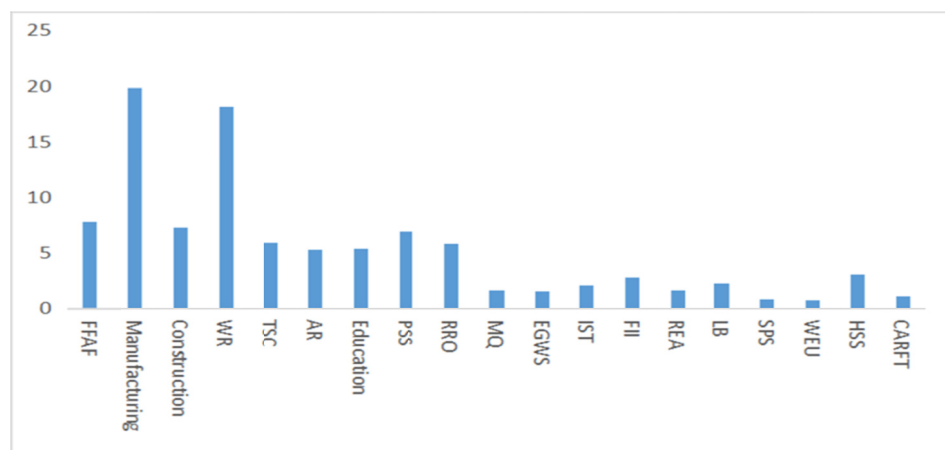


Figure 2. The population distribution of different industries

Note: unite of Figure 1 is %.

3.3 Age structural Differentiation among Industries

According to the statistics of employment data of urban units in China, the proportion of the labor force aged 16-19 in various industries is relatively small due to their higher education, and it is even lower than the elderly group over 65 years old. The labor force aged 20-34 is relatively concentrated in IST (Information transmission, Software service and Technical service), LB (Leasing and Business services), and CARFT (Culture, Arts, Radio, Film and Television), indicating that the emerging service industry is a more labor-intensive industry for young people. The working-age population aged 35-54 is relatively uniform in various industries, indicating that this part is the main working population in China. The proportion of working-age population aged 55-64 is relatively prominent in WEU (Water conservancy, Environmental and Utility management), RRO (Residential services, Repairs and Others) and FFAF(Farming, Forestry, Animal husbandry and Fishery) is relatively prominent, which shows that "Learning by Doing" makes workers of different ages have a rigid substitution. Based on the above analysis, it can be found that there is an age structural differentiation among the labor force of various industries in China.

Table 3. Comparison of age structure of employment population in urban units by industry (unit: year)

2016	16-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
Total	1.1	7.9	14.7	15.8	13.2	15.8	13.1	10.2	4.2	2.4	1.6
FFAF	0.7	2.9	5.7	6.6	7.4	12.1	13.9	16.2	10.3	12.6	11.4
MQ	0.1	3.0	11.8	13.6	14.0	21.3	17.8	13.8	3.6	0.7	0.3
Manufacturing	1.5	9.2	16.4	16.9	13.4	15.9	13.0	8.7	3.1	1.3	0.6
EGWS	0.0	4.8	11.7	16.1	14.3	19.6	15.8	11.4	5.1	0.8	0.3
Construction	0.6	6.5	12.9	13.0	12.1	18.1	15.6	13.0	4.8	2.7	0.8
WR	1.2	8.5	16.5	18.0	14.7	16.3	12.3	7.8	2.6	1.4	0.8
TSC	0.5	5.9	12.9	15.0	14.4	18.9	15.5	11.4	4.1	1.0	0.4
AR	3.2	10.3	14.7	15.5	12.8	15.6	13.5	9.1	3.3	1.6	0.5
IST	0.9	15.6	26.1	24.8	13.2	9.2	5.8	3.2	1.0	0.2	0.1
FII	0.3	10.7	22.1	20.3	11.9	14.1	11.2	6.8	2.1	0.3	0.1
REA	0.7	9.7	16.4	15.5	12.4	12.9	11.7	11.2	5.9	2.7	1.0
LB	0.8	11.0	20.5	18.4	12.7	12.7	10.4	7.7	3.5	1.6	0.8
SPS	0.4	8.5	18.4	21.9	15.0	12.3	10.2	8.7	3.6	0.6	0.4
WEU	0.5	4.8	8.9	11.1	13.2	15.9	15.0	13.6	7.8	6.3	3.0
RRO	1.9	8.7	13.6	14.2	11.6	15.2	12.8	10.8	5.1	3.9	2.4
Education	0.6	7.2	12.6	17.2	17.4	16.4	12.9	10.9	3.5	0.9	0.3
HSS	0.9	9.8	17.4	17.6	14.0	14.3	11.0	8.8	3.4	1.6	1.1
CARFT	1.5	13.7	19.2	19.7	12.2	12.3	9.2	7.3	3.3	1.0	0.7
PSS	0.2	5.0	12.4	14.6	14.1	17.8	14.7	13.4	5.8	1.5	0.6

Source: China Labor Statistical Yearbook.

3.4 Shortage of Human Capital Accumulation in Productive Industries

According to the comparison of the education level of the employees in urban units of different industries in China, it is found that the employees with college degree or above is mainly concentrated in the following industries, such as FII (Financial Inter-mediation and Insurance), SPS (Scientific research and Poly-technical Services), Education, HSS (Heath care, Sporting and Social welfare) and PSS (Public administration, Social security and Social organization). The accumulation of human capital in the above industries is generally high, and the minimum entry threshold is university degree. Correspondingly, the education level of human capital accumulation in Manufacturing, WR (Wholesale and Retail, Construction is relatively low, and these are China's comparative advantage industries. The background of industrial upgrading in China requires productive industries to improve manufacturing efficiency, but this mainly depends on human capital, so the demand of productive industries for creative and skilled workers is also very urgent.

Table 4. Comparative analysis of the education level of different industries (unit: year / %)

Industry classification	Mean education Year	Proportion of labor force
Financial Inter-mediation and Insurance	14.71	2.77
Scientific research and Poly-technical Services	14.45	0.85
Education	14.88	5.36
Heath care, Sporting and Social welfare	14.39	3.06
Public administration, Social security and Social organization	14.35	6.90
Manufacturing	11.74	19.70
Wholesale and Retail	11.25	18.10
Construction	10.31	7.22

Source: China Labor Statistical Yearbook.

3.5 Large Gap in Human Capital Accumulation in Different Industries

The data also shows that the human capital accumulation of EGWS (Electricity, Gas, Water production and Supply), IST (Information transmission, Software service and Technical service) and LB (Leasing and Business services) has been significantly improved, and the education background of the working population has been upgraded from the primary and high school to university and above in a relatively short period of time. On the contrary, the accumulation of human capital in transportation, storage and post industry has declined, which is mainly due to the rise of logistics industry caused by internet consumption in China, so that the industry absorbs a large number of low skilled workers, thus causing the decline of human capital accumulation in the whole industry. This shows that the change of industrial structure will lead to the accumulation of human capital and the difference of industrial agglomeration.

Table 5. Average education years of urban unit labor force in various industries (unite: year)

Industry sector Year	2003	2007	2011	2016
Mean	8.69	8.72	10.67	11.70
Farming, Forestry, Animal husbandry and Fishery	7.55	7.64	8.26	8.27
Mining and Quarrying	9.42	9.62	10.98	11.74
Manufacturing	9.72	9.67	10.33	11.25
Electricity, Gas, Water Production and Supply	11.26	12.04	12.62	13.19
Construction	9.13	9.17	9.63	10.31
Wholesale and Retail	10.07	9.97	10.57	11.41
Transport, Storage and Communication	13.22	13.13	13.81	11.24
Accommodation and Restaurants	9.72	9.93	10.57	10.41
Information Transmission, Software Service and Technical Service	9.48	9.58	9.92	14.56
Financial Inter-mediation and Insurance	13.33	13.88	14.20	14.71
Real Estate Activities	12.23	12.08	11.76	12.52
Leasing and Business services	10.45	12.10	12.70	12.80
Scientific research and Poly-technical Services	13.20	13.83	14.29	14.45
Water conservancy, Environmental and Utility Management	11.18	11.22	11.07	11.64
Residential Services, Repairs and Others	9.28	9.33	9.75	10.53
Education	14.04	14.33	14.66	14.88
Health care, Sporting and Social welfare	12.54	13.20	13.94	14.39
Culture, Arts, Radio, Film and Television	12.63	12.09	12.48	13.05
Public administration, Social security and Social organization	13.58	13.66	13.98	14.35

Source: China Labor Statistical Yearbook

Note: Average years of education per capita = proportion of basic education or below primary school * 6 + proportion of junior high school education * 9 + proportion of senior high school education * 12 + education at or above University * 16.

4. Conclusions

The demographic dividend is one of the important driving forces for China's rapid economic development in the past period. At present, China's population structure has entered a new stage and presented new characteristics, indicating the disappearance of the demographic dividend in China's economic activities. In order to adapt to the current background of economic restructuring and industrial structure upgrading, China's economy needs to continue to promote sustainable economic development through using the second demographic dividend. Based on the data of *China Labor Statistical Yearbook* from 2003 to 2016, this paper analyzes the characteristics of China's labor population structure and human capital accumulation by industry, and finds that the labor population structure presents the following characteristics: (1) the Labour force is concentrated in service industry; (2) the proportion of labor force in emerging and high skilled industries is small; (3) there is age structure differentiation among industries. The accumulation of human capital is characterized by: (1) a shortage of human capital accumulation in productive industries; (2) a large gap in human capital accumulation in different industries.

Therefore, no matter from the perspective of the distribution of labor population or the accumulation of human capital, it is necessary to pay attention to the structural differentiation caused by the distribution of labor population and the accumulation of human capital. In order to solve the problem of industrial structure differentiation in the process of labor distribution and human capital accumulation, China needs to find breakthroughs in education and training system, employment security system, labor mobility system as well as social security system.

References

- Cai, F. (2004). Demographic Transformation, Demographic Dividend and Sustainability of Economic Growth. *Population Research*, 2, 2-9.
- Cai, F. (2009). Future Demographic Dividend: The Development of The Source of Chinn's Economic Growth. *Chinese Journal of Population Science*, 1, 2-10.
- Cai, F. (2010). New Characteristics and Prospect of Labor Market. *China Rural Survey*, 11, 22-25.
- Lewis, W. A. (1954). Economic Development with Unlimited Supplies of Labor. *Development with Unlimited Supplies of Labor*, 22, 139-191. <https://doi.org/10.1111/j.1467-9957.1954.tb00021.x>
- Lindh, T., & Malmberg, B. (1999). Age Structure Effects and Growth in the OECD. *Journal of Population Economics*, 12, 431-449. <https://doi.org/10.1007/s001480050107>
- Malthus, T. R. (1798). *An Essay on the Principle of Population*. Cambridge University Press.
- Wang, W. (2010). Economic Growth, Population Structure Change and China's High Savings. *China Economic Quarterly*, 9, 29-52.
- Yu, X. F. (2003). China's Population Transformation and "Strategic Opportunity Period". *Chinese Journal of Population Science*, 1, 11-16.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).