The Study of Statistical Calculation and Fulfillment Methods for "Upgraded" Demographic Dividend in Beijing

Wenbin Ding*
NBS Survey Office in Beijing, Beijing, China – dwb@bjstats.gov.cn

Wenjie Wang
Beijing Municipal Bureau of Statistics, Beijing, China – wangwj@bjstats.gov.cn

Ping Li
NBS Survey Office in Beijing, Beijing China – liping@bjstats.gov.cn

Ligong Liu
NBS Survey Office in Beijing, Beijing, China – liulg@bjstats.gov.cn

Abstract

While promoting the economic growth of Beijing, traditional demographic dividend also brings great pressure to the management on resource and environment, urban transportation and floating population. The paper proposes that Beijing shall actively develop the "upgraded" demographic dividend, namely to compensate degressive effect of population increase by improving employee education level and value and structure of human resource capital in enterprises and enhancing the effect of the population on promoting economic growth and self-innovation and perfecting economic structure, etc., providing talents support for the innovation-oriented, technology-intensive and high-value economic structure and the achievement of innovation-motivated development. The paper also calculates the contribution rate of the "upgraded" demographic dividend to the economic growth through modified Cobb-Douglas production function and raises methods for achieving the "upgraded" demographic dividend.

Keywords: Cobb-Douglas production function; labor resources.

1. Introduction

The demographic dividend first originated from a topic of "how the change of demographic structure affects economic growth". Traditionally, the change in population age structure represented by "rapid growth of working-age population, continuous growth of aging population and declining proportion of underage population" brings a "flourishing period" of economic development with relatively rich labor resources and low bring-up burden. This period is called demographic dividend or demographic window. According to statistical data, the permanent population and employment population in Beijing had increased rapidly from 1978 to 2013, of which the permanent population had grew from 8.715 million to 21.148 million and the employment population had grew from 4.441 million to 11.410 million, increasing 1.4 times and 1.6 times respectively. The rapid increase of Beijing population, especially the large non-native population swarming into Beijing, delivers traditional demographic dividend on the one hand, promoting rapid economic development, but also brings huge pressure to the management on resources and environment, urban transportation and floating population on the other hand, challenging sustainable development of society and economy in Beijing. Therefore, Beijing government can no longer support its economic development by simply increasing number of the labor force, instead, it shall actively develop "upgraded" demographic dividend to compensate degressive effect of population increase and provide talents support for the construction of an innovation-oriented, technology-intensive and high-value economic structure and the fulfillment of an innovation-motivated development.

2. Section 2

The production function on aspects of element and efficiency makes the population be an important resource for economic growth. Its element characteristic means that the population itself is a basic production element input. However, when the population increases to the peak (Lewis turning point), demographic debt will occur, intensifying the conflict between the population and the environment and decreasing its role in promoting social and economic development. Therefore, efforts shall be made to enhance the role of population in boosting economic growth, self-innovation and perfecting economic structure by reasonably controlling population scale, vigorously developing education, improving quality of human resource capital stock, increasing the value of the human resource capital in enterprises and perfecting the structure of human resource capital, so as to compensate the degressive effect of quantitative element input and provide motivation for exploring new economic growth point, promoting development of new emerging industry and technology revolution. This is called the "upgraded" demographic dividend. In other words, when the traditional demographic dividend faces the turning point, efforts shall be made to change the quality of human resource capital and improve its structure in order to turn the dividend from a quantitative-based one to a multi-quality one as a whole and enable the whole economy to transform from a resource-oriented one to an innovation-oriented "upgraded" economy. In a rather long period, it is the improvement of population quality, not the population quantity increase, which promotes the economic development. This is what "upgraded" demographic dividend means.

The time of "upgraded" demographic dividend can also be regarded as a time of intellectual capital from the other perspective, which means that in the process of jointly promoting urban innovation, each one can exert and explore his/her innovation potential. The whole society explores invisible human resource capital in traditional demographic dividend, cultivates visible human resource capital and improves its quality from the structure and the human resource capital itself as a whole.

3. Section 3

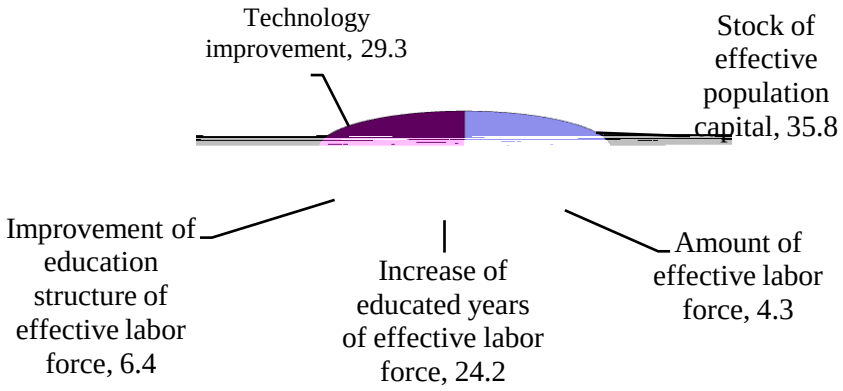
The paper obtains the following conclusion by dividing the labor force into variables of amount, education level and education structure (namely the variance1) and forming modified Cobb-Douglas production function (see attachment for specific equation):

(1) From 1990 to 2012, contribution rates of amount, improvement in education level and perfected structure of effective labor force in Beijing had reached to 4.3%, 24.2% and 6.4% respectively. Contribution rates of stock of effective human resource capital and technology improvement had hit 35.8% and 29.2% respectively. The above-mentioned factors explain 99.9% of economic increase in the past over 20 years (discriminant coefficient R2=0.999).

(2) The contribution rate of amount increase of effective labor force in Beijing to economic growth is less than 5%, which is 4.4 times lower than that of education level increase and education structure improvement. 1 year higher the average educated year is, 0.2 percentage point higher the economic growth reaches; and 1 point lower the dispersion of education level is, 0.1 percentage point higher the economic growth reaches. According to this, a 100,000 decrease of labor force with education level of middle school and below just causes no more than 0.1 percentage point of direct influence on the contribution rate to economic growth, indicating that it is not the amount increase of labor force, but the quality and structure improvement that can exert the strengths of "upgraded" demographic dividend. Vigorous development of education enables the worker to gain various scientific knowledge, which can improve the production efficiency and then better advance economic increase and relieve the conflict between the population and environment.

[1] According to the degree of the interdependency between the variance of different education levels and the economic growth, the variance on education level of middle school and above with largest interdependency is selected.

Figure 1 Contribution of Each Production Element to Economic Growth in Beijing from 1990 to 2012
Unit: %



4. Section 4

From the aspect of the relationship between "upgraded" demographic dividend and "innovation-oriented, technology-intensive and high-value" economic structure, they are interdependent and supplementary to each other. First, the construction of an "innovation-oriented, technology-intensive and high-value" economic structure requires the support of high-quality and high-skilled talents. Large amount of high-quality and high-skilled talents can increase labor productivity and enable the social economy to turn into an "environmental-friendly and resource-saving" one, saying goodbye to large and disorder usage of resources. On the other hand, the construction of an "innovation-oriented, technology-intensive and high-value" economic structure can encourage industries with low added value and high energy consumption to gradually transform into the ones with high added value and low energy consumption. During the transformation period, corresponding changes will happen to labor force demand: large amount of high-skilled and high-quality talents who can adjust to the industrial structure upgrading will be attracted, while those who fail to adjust to such development will gradually be abandoned in the course of industrial structure upgrading. In this way, the demographic dividend can be guided to transform from a quantitative-based one to a quality-oriented one, achieving "upgraded" demographic dividend.

According to the 2010 census of population, employment population of high-tech industry[2] and modern service sector in Beijing takes 4.9% and 28.9% of the whole employment population respectively; while employment population with education level of Bachelor's degree and above takes 70.3% and 70.4% respectively, almost 2 times of the proportion of the whole employment population. Besides, the proportion[3] of industry added value to GDP takes 6.9% and 52.8% respectively. From the aspect of income level, in 2013, among 3 sectors with highest income level (finance, sector on information transmission software and information technology service and sector on health and social work) in Beijing, the employment population with Bachelor's degree and above is over 30 percentage points higher than the average level in Beijing. The employment population and sector in this regard show clear supplementary relationship, which is represented by features of high education level, high technology level, high efficiency, high income, small employment number and low energy consumption.

[2] Employment population in high-tech industry is from related industrial data in the census of population.
[3] Industry added value is the 2012 data.

5. Conclusions

(1) Integrated reform and coordinated social development

Now the priorities of Beijing government is to build a livable city, coordinate the relationship between population resource and the environment, remove related industries, construct “innovation-oriented, technology-intensive and high-value” economic structure and promote cooperative development in Beijing, Tianjin and Hebei Province. Reforms on the four aspects are closely connected with each other and the factor of people acts as the connection among the other three aspects: the key to coordinated development between population resource and the environment is to adjust the relationship between population amount and the environmental carrying capability; an important role of industrial removal is the removal of low-end labor force; the construction of an “innovation-oriented, technology-intensive and high-value” economic structure needs the support of high-end talents; and the purpose of promoting cooperative development in Beijing, Tianjin and Hebei Province is to achieve reasonable population mobility and avoid excess concentration in core areas. So reforms on the four aspects can treat the factor of people as their common emphasis and coordinate with each other as a whole.

To achieve integrated planning and coordinated development, related authorities shall first focus on the factor of people so as to conduct comprehensive reform. On the one hand, supported by high-end talents and guaranteed by high income level, the living quality shall be improved and an “innovation-oriented, technology-intensive and high-value” economic structure and a livable city shall be constructed; on the other hand, emphasizing on the industry, the Beijing government shall attract high-quality talents by constructing an “innovation-oriented, technology-intensive and high-value” economic structure and removing related industries so as to guide orderly exit of the low-end labor force. Besides, with the help of the market functioning as an invisible hand, the population resource quality and price of public services can be appropriately raised to avoid disordered and excess population increase so as to reduce the environmental pressure in Beijing.

(2) Talents cultivation and accumulation of human resource capital

The most effective measure for increasing the amount of high-quality talents is to emphasize on talents education and cultivation. First, the government shall raise its investment and regulation on education, perfect the allocation of education resources and conduct comprehensive reform on aspects of students enrolling way and cultivation mechanism, etc. so as to cultivate excellent graduates with high comprehensive quality and professional capability who can better adjust themselves to the social and economic development in the future. Second, a global talents strategy shall be implemented by actively attracting high-end talents overseas and simplifying residence immigration procedures. Third, various resources shall be allocated in a reasonable manner, delivering opportunities and space for talents in each kind to give play to their capability. In addition, the government shall cooperate with enterprises to create suitable economic mechanism and environment so as to stimulate people’s motivation and willingness on technology innovation, reaching a win-win result for the government, enterprises and individuals.

In addition to the cultivation and education for the high-quality talents, the government shall also involve the local labor force with low education level in industries on restaurants, retailing and transportation to improve labor participation rate as a whole. Meanwhile, great efforts shall be made to develop vocational education to enhance the skill of common employers and increase their employment opportunities, enabling more people to put their skills to good use, narrowing the gap on education level and constructing an “olive-shaped” human resource structure so as to drive the economic development.

(3) Development of technology-based SMEs and promotion of labor mobility

Technology-based SMEs are enterprises with the greatest development potential and the main force to attract high-quality talents. However, they face many problems and challenges with regard to financing, policy and management, etc. Therefore, the government shall support their development in an active manner. First, the government shall actively guide private capitals of various kinds to flow into the technology-based SMEs to solve their difficulties on capital shortage. Second, preferential

policies on financial support and tax deduction and exemption, etc. shall be provided to encourage them to conduct innovative production. Third, the government shall also publicize an entrepreneurship spirit in the whole society, encouraging individuals, especially college graduates, to start their own businesses and changing the disparaging attitude toward enterprises of this kind in the traditional views.

Meanwhile, the government shall establish and improve policies on household registration system, income distribution system and pension insurance system, break regional and industrial boundaries in the labor market and cancel all policies and regulations that limit reasonable labor mobility, achieving free labor mobility across enterprises, industries and regions, enabling more knowledge- and technology-based talents to conduct innovative activities, enhancing efficiency on labor resource allocation and then boosting economic development.

References

[1]Wang Wenjie. Thinking and suggestions on scientific management on capital population resources [J]. The World of Survey and Research 2014 (9).

[2]Liu Yuanchun and Sun Li. “Demographic dividend”: four misunderstandings [J]. Population Research 2009 (1).

[3]Yin Deting, Zhang Hongyu and Yuan Xiaoxiao. Structural analysis and development estimation on demographic dividend in Beijing [A]. Social Sciences of Beijing 2014 (1).

[4]Che Shiyi and Guo Lin. Demographic dividend and economic growth under the change of structure and system [J]. Population Research 2011 (3).

[5]Cai Fang. Future demographic dividend – exploring resources of economic growth in China [J]. Chinese Journal of Population Science 2009 (1).

[6]Lu Lu and Ren Baoping. Development of Chinese demographic dividend in the aging time [J]. Economic Research Guide 2013 (7).

[7]Sun Xiaofang. Research and expansion of demographic dividend theory – from the perspective of characteristic transfer of Chinese population [M]. Journal of Yunnan University of Finance and Economics 2012 (5).

[8]Cai Fang. Demographic dividend and sustainable increase of Chinese economy [A]. Gansu Social Sciences 2013 (1).

[9]Wang Yupeng and Wang Yusen. Population age structure, economic growth and social welfare – one theoretical analysis framework on “demographic dividend” [J]. Economic Survey 2014 (5).

[10]Chen Bo. Study on economic growth effect of demographic dividend in China [D]. Master’s dissertation of Nanjing University 2012 (5).