

# The Assessment of the Impact of an Aging Population of China on the Country's Economy

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In the article, the author on the basis of the analysis of the structure of the population of the People's Republic of China (PRC) is making an attempt to identify the influence of increasing number of people over 65 years on the economic situation in the state. The introduction of reform of pension system of China is related to the additional expenses of the state. Basing on the method of pair correlation, the author shows that with increase of percentage of the aging population of PRC, the foreign exchange reserves of the state are increased; it is evident that the state forms the financial reserves for the pension fund of the country.

*Keywords:* PRC, pension system, social policy, correlation coefficient

At the end of 20th century, the social protection of the population has become the major attribute of the social policy of any civilized state. The goal of majority of the social protection systems is in the maintaining the stability of income of people, providing an equal access to the medical assistance and in the provision of necessary social services. In the economically developed states the social protection is an essential part of the national economy, the cost of which for many West-European states makes more than a quarter of gross domestic product. The most developed systems of social protection have the countries of the European Union (EU).

Thanks to the social protection systems the modern European economies have gotten the name socially-oriented.

As the experience of the Western-European countries shows, the existence of the thought out social protection system, covering all the citizens, not only leads to an improvement of their welfare, expands, and strengthens the country's labor force, but also contributes to the economic growth and stabilization of the political and social situation in the country. Thus, the social protection has a positive impact on the society, promoting the social harmony and provision of the common sense of the social support among its members. The determining influence on the systems of the social protection in the EU countries have the modern demographic trends (birth-rate failing is the below the natural reproduction of the population and its aging), strengthening of the European integration and economic globalization.

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### Theory

The researches of the issues of the social protection systems as one of the complex systems of the developed market economy, occupy an important place in the works of numerous scholars and practitioners in the economically developed countries, in the activity of the International Labor Organization, EU, International financial organizations such as the International Bank for Reconstruction and Development, International Monetary Fund. The International Organization of social protection exclusively has a deal with the issues of social protection. The most careful attention to the issues of social protection accounts for the 1970s and early 1980s, when the issues of the social policy and social protection were considered as one of the most important elements of the theory of the social state. It was associated with the significant increase of the social expenses in the general structure of GDP (Gross Domestic Product) of many European countries; therefore, many experts believe this index as a main in the development of theory of the "social state". It promotes the development of the social protection system. Despite the fact that the national systems of the social protection in market economy countries are still far from the perfection, their development not least determined by the sufficiently high level of professionalism of experts, who are engaged in the formation of policy in the given field. The general-theoretical bases of formation and development of the social state and system of the social protection of the population are laid in the works of classics of the economic mind (Smith, 1759/1982; Keynes, 1956; Hayek, 2012; M. Friedman & R. Friedman, 1990). In particular, the problem of the state control over the social system protection is reflected in the works of supporters of neoclassical views of Marshall (1920) and Pigou (1949/1989).

The model of social maneuvering of the incomes of population and active intervention of the state in the issues of regulation of the social protection are disclosed in the researches of Keynes (1956). The particular provisions of welfare economics are represented by the theory of economic optimality of Pareto (2008). The ration of the social fairness with the categories of equality and freedom were researched by Rawls (1993), M. Friedman and R. Friedman (1990). The issues of formation and development of the "social market economy", the basis of existing of which was the provision that the government should balance the requirements of the economic freedom of effectiveness and growth, on the one hand, need for the social fairness in the distribution of incomes, on the other hand.

The issues of the social protection have gotten quite serious development also in the works of such famous economists as: Beveridzh (1944), Andersen and Regini (2000), Stiglitz, Fitoussi, and Sen (2010), and others.

To the issues of the social protection of the population is devoted many works of the European and American scientists. The formation of the financial resources for the provision of pension fund of China is poorly studied topic. The importance of study of the given experience is represented by the following circumstances. Realizing that the volume of trade of China with the EU countries and USA is significant within the frameworks of volume of world trade, it is necessary to predict the future development of economy of PRC in the implementation of the social policy. Whether the implementation of the pension plan will have an influence on the stable growth of GDP, the ration of the yuan to the dollar, the yuan to the euro or not?

The economically developed countries of the EU have gained an extensive experience of how to organize and improve the social protection, taking into the consideration that any increase in the social security, pension payments has a significant influence on the budget of the state as a whole.

## The Goal

In this study, the author suggests to evaluate the impact of aging population of China on the stability of the economic development of the state that is predetermined the choice of the topic of this study.

## Methods

The following methods were used in the research: the method of scientific abstraction, deduction, system analysis, correlation analysis, and mathematical prediction.

## Key Findings

The attention of many researchers—economists is fixed on the economy of China, as the fast-growing market of Celestial Empire affects more profoundly on Eurasian continent and on the world economy as a whole. According to the research of the Organization for Economic Cooperation and Development (OECD) by 2016 the China will give way to the U.S., namely, to the leadership of the world's largest economy and on the expert's forecasts the GDP of China and India is most likely will exceed the GDP of "Group of 7" by 2025.

The income level per capita by 2060 in China will increase by seven times; the forecasts of OECD are based on the indicators of purchasing-power parities for 2005. At that, OECD warns that none of these forecasts are final<sup>1</sup>.

Although, the announced 7.7% of growth of GDP in 2012 is the lowest for China since 1999 (then the country's economy grew by 7.6%) what is not surprising as the world crisis leaves mark and yet this indicator exceeds the planned 7.5% by the Chinese government—the moderate numbers which the economy of China will be easily to achieve. For the 2013 the planned economic growth of People's Republic of China (PRC) is reduced the OECD from 7.8% to 7.4 %.<sup>2</sup>

The reason for that is not only the world economic crisis, but also internal, social and economic issues of the state. The author would like to focus on one of them—it is the increase of number of people of retirement age which lies in the plane of formation of social policy of China.

The Constitution of PRC and documents of PRC use the largest social and cultural commonalities as the most important for the Chinese society and to manage them are used such usual concepts for socialistic "constitutionalism" as: classes, workers, peasants, intellectuals, nations. In the introduction to the constitution it is written that "in the socialist construction it is necessary to relay on workers, peasants and intellectuals", however, in the pension reform of China get only workers and intellectuals—the peasants of Celestial Empire are not yet included in the pension reform.

The economic reform of China stimulated the awareness of the specificity of interests of various classes and groups. However, the carried out researches of sociologists suggest that the representatives of various classes of population are increasingly identify themselves not with any class (and consequently do not support its political and social attitudes and programs) and with the other sociocultural commonalities (according to the nationality, education, age, and etc.): the young people are more clearly aware of their specific interests, ethnic, and confessional commonalities, personnel specialists, employees of government machine are formed, the lecturers are increasingly write about the transformation of intellectuals into the most progressive social force.

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<sup>1</sup> [http://www.oecd-ilibrary.org/development/development-co-operation-report-2011\\_dcr-2011-en](http://www.oecd-ilibrary.org/development/development-co-operation-report-2011_dcr-2011-en).

<sup>2</sup> <http://www.stats.gov.cn/english/statisticaldata/>.

The article 44 and 45 of the Constitution of China<sup>3</sup> are formulated the tasks of the state and sometimes the society in the field of social security as well. Thus, the state in accordance with the law establishes the procedure of retirement of workers and employees (only), with the assumption that the “state and society provide for retirees”. At the state allots a task to develop a social insurance, social welfare, medical, and health services, the state and society should provide for disabled persons from the military personnel, to provide the financial assistance to the families of the fallen heroes, grant discounts to the service families, to assist to the blind, deaf, dumb, and the other citizens with the disabilities in employment, getting living allowance, getting education.

There are problems in the country and they are inevitable. The reform of pension system of China makes it aim by 2025 to cover all the working Chinese by the pension system.

Another problem, lying in the plane of social policy is the agrarian overpopulation of the country.

The government intensely pursuing a course of urbanization and by 2020 in rural localities will remain close to 500 million of people (about 30% of the population of the country) and the rest will live in the cities<sup>4</sup>.

It should be noted that in 2009 the number of persons participated in basic pension insurance in urban areas at year-end amounted to 218.91 million, a rise of 17.54 million persons year-on-year. Of the total, number of employees and retirees stood at 165.87 and 53.04 million, which rose 14.04 and 3.50 million persons respectively, year-on-year. The number of migrant workers participated in basic pension insurance hit 24.16 million, expanding 5.70 million persons year-on-year. The number of enterprises participated in basic pension insurance grew to 199.51 million persons, rose by 17.16 million persons year-on-year (see Table 1).

Table 1

*The Analysis of the Socioeconomic Indices of China From 2008 to 2012*

Category	2008	2009	2010	2011	2012
GDP growth rate	9.6	9.2	10.4	9.3	7.7
Government budget	-	-	-	-1.1	-1.5
Public revenue (million yuan)	61,330	68,518	83,102	103,874	117,210
Foreign exchange reserves (billion US)	19,460	23,992	28,473	31,811	33,116
Population (million)	-	133,474	134,100	134,735	135,404
Urban (million)	-	62,186	66,557.5	69,079	71,182
Rural (million)	-	71,288	50.32	65,656	64,222
Population ages 0-14 (% of total)	-	18.5	16.60	16.5	16.5
Population ages 15-64 (% of total)	-	73.5	74.53	74.4	74.1
Population ages 65 and above (% of total)	-	8.5	8.86	9.1	9.4

Note. Sources: [http://www.wto.org/english/res\\_e/booksp\\_e/anrep\\_e/anrep11\\_e.pdf](http://www.wto.org/english/res_e/booksp_e/anrep_e/anrep11_e.pdf).

The treatment on basic pensions for enterprise retirees improved, and all in full payment on schedule. The number of retirees brought into the community management arrived at 34.61 million, account for 73.2%, a year-on-year rise of 2%.

The revenue of basic pension insurance fund topped 974.0 billion yuan, up by 24.3%. Of which, revenue collection totaled 801.6 billion yuan, grew 23.4% year-on-year. Financial subsidies at all levels of basic pension insurance fund stood at 143.7 billion yuan. The total expenses of fund topped 739.0 billion yuan, up by

<sup>3</sup> [http://chinalawinfo.ru/constitutional\\_law/constitution](http://chinalawinfo.ru/constitutional_law/constitution).

<sup>4</sup> [http://chinalawinfo.ru/economic\\_law](http://chinalawinfo.ru/economic_law).

23.9% year-on-year. The accumulated basic pension insurance fund at year-end accounted for 993.1 billion yuan<sup>5</sup>.

The analysis of independence number of working population in China at the level of growth of GDP of the country has been carried out, using the method of pair correlation.

The aim of the correlation analysis is to identify the degree of dependency that exists between factor-based and resulting attributes. As is known, the size of the linear relationship between two attributes characterize the linear correlation coefficient, which is denoted by  $r$ . The size of the correlation coefficient can be calculated by the following formula (Pearson correlation coefficient).

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} = \frac{n \sum_{i=1}^n x_i y_i - \left( \sum_{i=1}^n x_i \right) \left( \sum_{i=1}^n y_i \right)}{\sqrt{n \sum_{i=1}^n x_i^2 - \left( \sum_{i=1}^n x_i \right)^2} \sqrt{n \sum_{i=1}^n y_i^2 - \left( \sum_{i=1}^n y_i \right)^2}} \quad (1)$$

Where,  $\bar{x}$  and  $\bar{y}$  —mean values  $X$  and  $Y$ :  $\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$ ,  $\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i$ .

$n$ : sample size;

$i$ : number of observation ( $i = 1, 2, \dots, n$ ).

The size of the correlation coefficient ranges between -1 and 1.

The data are summarized in Table 2.

The carried out calculations show that the increasing number of residents and working residents at the age of 15-64 does not influence on the growth of GDP of China, even more interesting is the dependence of growth of GDP of the country from an agrarian population. It should be noted that the correlation coefficient is less than 0.5 that indicates to the weak dependence, however, according to the other indices the coefficient is negative.

Table 2

*The Calculation of Correlation Coefficient of Dependence of Number of Population and Number of Working on the GDP Growth of PRC (Yielded by the Authors of This Paper)*

Year	GDP growth (%)	Popul (million)	Urban popul (million)	Rural popul (million)	Popul (aged 15-64)
2009	9.2	133,474	62,186	71,288	92,097
2010	10.4	134,100	66,657	67,414	93,961
2011	9.3	134,735	69,079	65,556	94,072
2012	7.7	135,404	71,182	64,222	100,334
Correlation coefficient		-0.6518	-0.49731	0.43678	-0.76523

On January 1, 2012, China is on the first place according to the gold and foreign exchange reserves ahead of Japan, the U.S., Saudi Arabia, and Russia. As it is known that the availability of the large amount of gold and foreign exchange reserves allows “insure” the economy of the country in the periods of financial crisis. They are easier allowed to go through the capital outflow, devaluation of the currency.

Thus, gold and foreign exchange reserves are needed to bridge the deficit of balance of payments of the country in the “hard times” toward the external market. According to the opinion of experts, the volume of

<sup>5</sup> <http://www.stats.gov.cn/english/statisticaldata/>.

reserves should not be less than the volume of quarter import of the country. The International reserves of PRC rose to 3.3 trillion of dollars, following the results of 2012<sup>6</sup>.

The share of gold reserves in China's reserves is 2%, while the index of Germany is 7%. By the volumes of reserves China ranks first, on the second line—Japan, Saudi Arabia, Russia, and Switzerland<sup>7</sup>.

The present level of gold and foreign exchange reserves of PRC is a good foundation for economic growth. Thus, according to the forecast of the head of Sovereign Wealth Fund of China Investment Corp (CIC), LouTszieya, Chinese economy, taking into account some strengthening of the economic activity in the world, could increase by more than 8%, following the results of 2013.

According to the Table 3, along with the growth of income in PRC, will occur the accumulation of foreign exchange reserves this is evidenced by the high rate of correlation—0.95.

However, the GDP growth is not affect at the level of foreign exchange reserves and this confirms the negative index of correlation—0.88647.

Table 3

*The Calculation of Correlation Coefficient Between Foreign Exchange Reserves, Public Revenue and GDP Growth (%) of China (Yielded by the Authors of This Paper)*

Year	Foreign exchange reserves (billion US)	Public revenue (million yuan)	GDP growth (%)
2008	19,460	61,330	9.6
2009	23,992	68,518	9.2
2010	28,473	83,102	10.4
2011	31,811	103,874	9.3
2012	33,116	117,210	7.7
Correlation coefficient	0.957952		-0.88647
Intersept		-22,240	
Slope		4.0	

The data of the carried out analysis are represented as graphics and regression equation (see Figure 1).

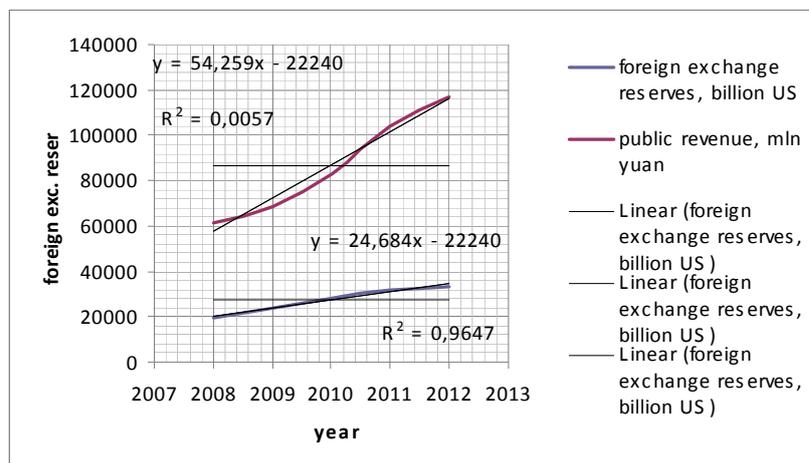


Figure 1. The correlation of foreign exchange reserves and the public revenue.

However, the goal of the research is to identify the influence of increasing number of people over 65 years

<sup>6</sup> <http://www.imf.org/external/pubs/ft/gfsr/>.

<sup>7</sup> <http://www.rbc.ua/rus/top/show/zolotovalyutnye-rezervy-kitaya-v-2012-g-vdvoe-prevysili-mirovoy-04032013151600>.

old on the state of economy of China. The author made the calculations of dependence of increase of the foreign reserve currency on the different age groups of country's population (see Table 4).

Thus, the obtained results showed that the amount of foreign exchange reserves of China is directly related to the level of ageing of population of the country, this is proved by obtained data of the correlation analysis: The correlation coefficient of foreign exchange reserves and the population over 65 years is 0.870—It is a high level of correlation. It is possible that it shows that the Chinese authorities in such way prepare for the decision of retirement policy by increasing foreign currency reserves.

Table 4

*The Calculation of Correlation Coefficient of Dependence of Foreign Exchange Reserves on the Age Groups of the Population (From 0-14 and People Older Than 65 Years) (Yielded by the Authors of This Paper)*

Year	Foreign exchange reserves (billion US)	Age from 0-14 (thousand of people)	of Age over 65 years (thousand of people)
2008	19,460	-	11,257
2009	23,992	24,663	11,309
2010	28,473	22,245	11,881
2011	31,811	22,164	11,870
2012	33,116	22,341	12,727
	-0.88647		0.870807
	slope		15.94
	intersept		-143,146

It should be noted that the problem of ageing of population is not unique to China, it is intensely indicated by the European Commission, as the population over 65 years in the EU countries—27% is constantly increasing: in 2008—17.1%, 2009—17.2%, 2010—17.4%, 2011—17.5%, and 2012—17.8%.

The forecasts of the European Commission for the next 50 years represented by the Eurostat are also disappointing. As you can see from the data given in Table 5, if the number of people over 65 years in 2030 is 42.31% of the working population, then in 2060 this index will grow by 50%, and is more than 60% of all the population of 28 countries of EU.

Table 5

*The Forecast of the European Commission About the Number of People Over 65 Years as a Percentage of the Group From 15–64 Years*

Year	Population size of the European Union	Population size over 65 years (as % of the group 15-64)
2030	522,342,413	42.31
2035	524,536,969	45.52
2040	525,702,440	45.96
2045	525,624,613	51.55
2050	524,052,690	56.06
2055	521,034,357	60.11
2060	516,939,958	60.32

*Note.* Source: [eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tps00010&language=en](http://eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tps00010&language=en).

It seems interesting to make the forecast of growth of number of people over 65 years in China and by the paces of the country's income and foreign exchange reserves. In the calculations used the EXCEL program, where as it is known, the equation for FORECAST is  $a + bx$ , where:

$$a = \bar{y} - b\bar{x} \quad a = \bar{y} - b\bar{x} \quad (2)$$

and:

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2} \quad (3)$$

and where  $x$  and  $y$  are the sample means AVERAGE (known  $x$ 's) and AVERAGE (known  $y$ 's).

The calculated data are summarized in Table 6.

Table 6

*The Forecast of Growth of Foreign Exchange Reserves, Public Revenue and People Over 65 Years (Yielded by the Authors of This Paper)*

Year	Foreign exchange reserves (billion US)	Public revenue (million yuan)	Age over 65 years (thousand of people)
2013	37,025.5	130,941.6	12,859.1
2014	40,096.5	145,653.2	13,209.2
2015	43,167.5	160,364.8	13,559.3

The made calculations will show that by 2015 exchange reserves of China could be increased by nearly 220% in comparison with 2008, the incomes will increase by 260% in comparison with 2008, respectively, if to assume that the level of growth will be kept.

According to the calculations, the level of people over 65 years will also increase and will be 13.5 million of people, undoubtedly, it will be a serious weigh of the budged of the country.

### Conclusions

Thus, first of all we should note that the effect of aging of the population is observed in most industrialized countries, primarily, in Europe, where the number of people over 65 years old is about 20%, although for China this percentage is almost two times lower—8.9%. It is curious that the level of foreign exchange reserves of China do not depend on GDP growth as evidenced by the negative coefficient of correlation  $-0.88647$ . However, the amount of China's reserves affects the number of people over 65 years old, it confirms the correlation coefficient  $0.870$ . Undoubtedly, the problem of ageing of population is characterized by the increasing number of elderly people what leads to a volume reduction in medical aid of population of youthful age and leads to the growth of social security of working population. This usually leads to the simultaneous decrease in health of population and requires reorientation of capital investments of the state toward the compensation of economic mechanisms which are designed to maintain the functioning of the social economic sector. Obviously, the made calculations show that China accumulated foreign exchange reserves are necessary, including maintain social reforms in the country and for the provision of social security of the population.

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