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**ARE SOCIAL ENDOWMENT AND COMMERCIAL ENDOWMENT  
INSURANCE – SUBSTITUTES OR COMPLEMENTS?  
(EMPIRICAL EVIDENCES FROM CHINA'S  
REGIONAL INSURANCE MARKETS)**

*In this paper we study the relationship between social endowment insurance and commercial endowment insurance. Social endowment insurance and commercial endowment insurance are the two fundamentals of China's social security system. What's the relationship between them? Substitutes or complements? The hypothesis is that the development of commercial endowment insurance has Kuznets effect with respect to the economic development level. At the low economic level, social endowment insurance and commercial endowment insurance are complements and the development of social endowment insurance will promote the demand of commercial endowment insurance. While at the high economic level they are substitutes and the development of social endowment insurance will squeeze the demand for commercial endowment insurance. The market share of commercial endowment insurance goes up first, then goes down with respect to economic development level, i.e., the Kuznets effect.*

*Keywords:* commercial endowment insurance; social security; Kuznets effects; substitutes; complements.

Хе Лін

**ДЕРЖАВНЕ ТА КОМЕРЦІЙНЕ СОЦІАЛЬНЕ СТРАХУВАННЯ —  
ВЗАЄМОЗАМІНА АБО ВЗАЄМОДОПОВНЕННЯ?  
(ЗА ДАНИМИ РЕГІОНАЛЬНИХ РИНКІВ СТРАХУВАННЯ КИТАЮ)**

*У статті проаналізовано державне та комерційне соціальне страхування у Китаї як основа системи соціального захисту і взаємовідношення між цими формами страхування. Головна гіпотеза дослідження – розвиток комерційного страхування залежить від рівня економічного розвитку. За низького рівня економічного розвитку державне та комерційне страхування взаємодоповнюють один одного і розвиток державного страхування сприяє підвищенню попиту на комерційне страхування. За високого рівня економічного розвитку форми страхування замінюють одна одну і розвиток державного страхування вкладає знижує попит на комерційне страхування. Графік ринку комерційного страхування вкладає йде вгору, а потім спадає по відношенню до рівня економічного розвитку згідно з "ефектом Кузнеця".*

*Ключові слова:* комерційне соціальне страхування, соціальний захист, "ефект Кузнеця", заміна, доповнення.

*Рис. 1. Таб. 1. Літ. 12.*

Хе Лін

**ГОСУДАРСТВЕННОЕ И КОММЕРЧЕСКОЕ  
СОЦИАЛЬНОЕ СТРАХОВАНИЕ — ВЗАИМОЗАМЕНА ИЛИ  
ВЗАИМОДОПОЛНЕНИЕ? (ПО ДАННЫМ РЕГИОНАЛЬНЫХ  
РЫНКОВ СТРАХОВАНИЯ КИТАЯ)**

*В статье проанализировано государственное и коммерческое социальное страхование в Китае как основа системы социальной защиты и взаимоотношение между этими формами страхования. Главная гипотеза исследования – развитие коммерческого страхования вкладов зависит от уровня экономического развития. При низком уровне*

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*экономического развития государственное и коммерческое страхование взаимно дополняют друг друга и развитие государственного страхования способствует повышению спроса на коммерческое социальное страхование. При высоком уровне экономического развития формы страхования заменяют друг друга и развитие государственного страхования снижает спрос на коммерческое страхование. График рынка коммерческого социального страхования идет вверх, а затем спадает по отношению к уровню экономического развития согласно "эффекту Кузнеца".*

*Ключевые слова:* коммерческое социальное страхование, социальная защита, "эффект Кузнеца", замена, дополнение.

**1. Introduction.** China's old-age security system experienced 2 major reforms and gradually formed the modern security system with 3 fundamentals: social endowment insurance, annuities and commercial insurance. Commercial endowment insurance and social endowment insurance have complicated interactive relationships in practice. The relationships between them vary with the social and political status, economic development levels and demographic characteristics. Under the condition of immature social security, with limited endowment insurance resources, the complementary role of social endowment insurance and commercial endowment insurance is not significant, and they function independently in the absence of other's roles. With the increase of economic development level and the increase of endowment insurance demands, social endowment insurance and commercial endowment insurance both expend their capacities and have further developments. As the two kinds of insurance schemes vary in functions and structures, the development of one scheme's function and efficiency often promotes the development of the other's. They are complements at this stage. Recently, many countries experience the reforms of social security systems. General trends of the reforms are reflected in two scheme changes. First, the change from the single social security scheme provided by government to the multilevel social security schemes. Second, the change from the government monopolized scheme to the market competitive scheme. The government's role changes from the single social endowment insurance providers to regulators of social security systems. The government should use macroeconomic regulation and control policies and micromarket mechanisms to promote the competitive and sustainable development of commercial insurance. The two changes both promote the collaborative development of social endowment insurance and commercial endowment insurance. However, if social endowment insurance is overprovided, i.e. it's far beyond people's basic living needs, such as the cases in some Scandinavian countries, the demand for commercial insurance will be greatly reduced. This will restrict the development of commercial insurance. When economy is developed to some level, it is inevitable to change the welfare. A substantial increase in social endowment insurance guarantees higher standards of living after retirement. It will squeeze part of the commercial endowment insurance demands. At this stage, social insurance and commercial insurance are substitutes. What is the relationship between social endowment insurance and commercial endowment insurance? How can these two collaboratively develop? These are the main concerns of the paper.

The relationship between commercial insurance and social insurance has been studied by many. Xu, F. Q. (2010) studies the evolution and construction of the roles of commercial endowment insurance and social endowment insurance. They claim

that commercial insurance is the necessary complement of the social security system and it should coordinate with social insurance to share the old-age security responsibilities. Justino, P. (2007) discuss the importance of social endowment insurance in India and they use the two-stage least square model adapted to the data from the panel of 14 India states and finally comes to the conclusion that the policies which strengthen social security have been an important variable to economic growth in India. An, Y. (2009) and Yang, Y. S. (2002) systematically introduce the 3 fundamental based social security system in China. Wang, J. P. (2007) and Palmer, E. (2002) study the problems in British pension system and Swedish pension system, and they point out that excessive social endowment insurance will squeeze the demands of commercial insurance. This often brings in inefficiency and lack of flexibility. Mu, H. Z. (2009) introduces the main social security schemes in several countries. Cao, Q. and Zhang, X. (2006) theoretically study the relationship between social insurance and commercial insurance in China and establish the conclusion that the relationship may be the substitute from the microaspect, while the complement from the macroaspect. Our study shows that, under different economic levels, commercial endowment insurance and social endowment insurance play different roles. The hypothesis is that the development of commercial endowment insurance has Kuznets effects with respect to economic development levels. In this paper, we explore the least square model introduced in Baltagi, B. H. (1995) adapted to the data from the panel of 30 regions in China. The Kuznets effect is an important phenomenon in economic studies. Bhandari, R. et al. (2008) and Thornton, J. (2001) use empirical methods to test the Kuznets inverted-U hypothesis in economic studies. Using the empirical methods in Gujarati, D. N. and Porter, D. (2008), we formalize the regression model in our paper.

Based on the hypothesis, we use the least square methods to test the Kuznets inverted-U effects of the development of commercial endowment insurance with respect to the economic development level. We introduce the linear and quadratic of per capita GDP index as explanatory variables. Besides that, we also choose pension-wage replacement ratio and elderly dependency ratio as explanatory variables and we hope they will be influential factors to explain the development of commercial insurance. We define a new factor which reflects the market share of commercial endowment insurance as the explained variables. The empirical test shows that the hypothesis is significant and effective. The proportions of commercial endowment insurance to the total endowment insurance has significant negative regression coefficient with respect to the quadratic of per capita GDP index. When the economic level is low, commercial insurance and social insurance are complements. As the economic development level rises, the proportion of commercial endowment insurance increases gradually. When the economic level is developed to some extent, commercial insurance and social insurance are substitutes. The proportion of the commercial insurance decreases with respect to the rise of the economic development level. The excessive development of social insurance squeezes the demands of commercial endowment insurance. The inverted-U hypothesis has been supported by the evidence from the 30 regions of China.

This paper is structured as follows. In section 2, we analyze the important variables that affect the development of commercial insurance and establish the regres-

sion model to test the hypothesis. We define the market share of commercial endowment insurance as the explained variables. The linear and quadratic per capital GDP index, social pension-wage replacement ratio, and the elderly dependency ratio are the explanatory variables of the regression model. In section 3, 30 regional data sets of China in 2010 are selected for the empirical test. The evidence support that the explanatory variables have significant effects on the explained variable. In particular, the proportion of commercial insurance index have significant negative regression coefficient with respect to the quadratic of the per capita GDP index. The development of commercial insurance has inverted-U effect with respect to the economic development level. In the last section, we propose some strategic advises for the development of social security system in China.

**2. The Regression Model to Test the 'Kuznets Effect' Hypothesis.** Commercial insurance and social insurance have complicated interactive relationships and these relationships evolve according to the changes of economical development levels, social and political status, demographic characteristics etc. The problem concerned is what is the relationship between social endowment insurance and commercial endowment insurance? How can these two schemes collaboratively develop under these relationships?

In this section, we will select the important variables that affect the development of commercial insurance. These variables are used as the explanatory variables in the least square regression model. The evidence of the economic and labor safeguard data from 30 different regions of China in 2010 will be used to test the model.

First, we define a new variable as the explained variable which reflects the development of commercial insurance. Obviously, the proportion of commercial endowment to the total endowment insurance (social endowment insurance plus the commercial) is a good choice.

Next, we select the important explanatory variables of the regression model.

The economic development level is an important variable affecting the development of commercial insurance. In practice, under the low economic development level, people have limited ability to buy commercial endowment insurance products and they rely on the social endowment insurance schemes to meet their old-nursing needs. Potential demands of commercial endowment insurance can not be satisfied due to the restricted economic condition. With the rise of economic development level, the income is increased and people have demands for high-quality living standards after retirement. In order to accomplish the wealth transfer between the working phase and the retiring phase, commercial endowment insurance provides a good channel. The hypothesis is that, under this condition, commercial insurance and social insurance are complements. Commercial endowment insurance complements the insurance demands exceeding the level that social insurance could provide. As the two kinds of insurance schemes vary in functions and structures, the development of one scheme's function and efficiency often promotes the development of the other's. They together form the two fundamentals of the social security system. Meanwhile, when the economic development level rises to some level, the society is inevitable to change to use the universal welfare schemes and social endowment insurance could meet most of the old-nursing needs. Besides that, under this condition, individual wealth is accumulated faster than before and people prefer to get good quality living

after retirement by savings and investments. So, the development of social endowment insurance will squeeze part of the demands of commercial insurance, i.e., they are substitutes under the high economic development level. Some Scandinavian countries are right in this ineffective social security schemes. Based on the above explanation, it's obviously that the economic development level is an important variable affecting the development of commercial endowment insurance. With the rise of economic development level, commercial insurance and social insurance are first complements, then substitutes. The proportion of commercial endowment insurance should be first go up, then go down with respect to the economic development level. The hypothesis is that the development of commercial endowment insurance has Kuznets effect with respect to the economic development level. So, we select the linear and quadratic of per capita GDP index to be the explanatory variables to do the least square regression test. If the quadratic parameter is significantly negative, the proportion of commercial endowment insurance is definitely inverted-U curve with respect to per capita GDP index.

The old-nursing security level provided by social insurance is also an important variable affecting the development of commercial insurance. Currently, there are 3 fundamentals in China's social security system, social endowment insurance, annuities and commercial endowment insurance. If the pension-wage replacement ratio provided by social insurance is low, people will feel their living standards dropping down when they are retired. There will be great needs for commercial endowment insurance to maintain a better retirement life. If the ratio is high, people could enjoy high standards of retirement life by taking part in social insurance plans. In this situation, the demands for commercial insurance are reduced. Based on the above explanation, we select the pension-wage replacement ratio provided by social endowment insurance as the explanatory variable.

The pressure of the old-nursing security system is another important variable affecting the development of commercial endowment insurance. In most countries, security systems suffer from the aging problem and function under huge pressures. The pressure of the old nursing security system definitely affects the demands of commercial insurance. The elderly dependency ratio is a good variable reflects the pressure of the system. When the elderly dependency ratio is relatively low, i.e., the proportion of working people to retiring people is high. In this situation, people could enjoy a high standard of retirement life simply by the social endowment insurance and they need not to worry about pressure of the system. People have optimistic expectations of the retirement life, so the demands for commercial insurance are reduced. To the contrary, when the ratio is high, social system suffers huge old-nursing security pressure. In the aging society, it's hard to maintain good living standards when retired simply by the intergeneration transfer of wealth, which is right the mechanism of social endowment insurance scheme. They need the intertemporal transfer scheme of wealth which is right the mechanism of commercial insurance. If people have pessimistic expectations of the retirement life, they have to buy more commercial endowment insurance products and save more to meet their old-nursing security needs. Based on the above explanation, we select the elderly dependency ratio as an explanatory variable.

The last, besides the above variables, there are other important variables affecting the development of commercial endowment insurance, such as the efficiency of commercial insurance and social insurance, governments' support for commercial insurance, education level of local citizens etc. Due to the limitation of data and difficulties in quantifying the variables, we didn't select the above as explanatory variables.

Based on the above explanation, the hypothesis is tested by the following regression model:

$$ComR = C(1) + C(2)Gdp + C(3)Gdp^2 + C(4)RpIR + C(5)DpdR, \quad (1)$$

where *ComR* is the proportion of commercial endowment insurance to the total insurance; *Gdp* and *Gdp*<sup>2</sup> are the linear and quadratic of the per capita GDP index; *RpIR* is the pension-wage replacement ratio; *DpdR* is the elderly dependency ratio.

The hypothesis is that the development of commercial endowment insurance has Kuznets effect with respect to the economic development level. i.e., *C*(3) is a significant negative coefficient in the regression model.

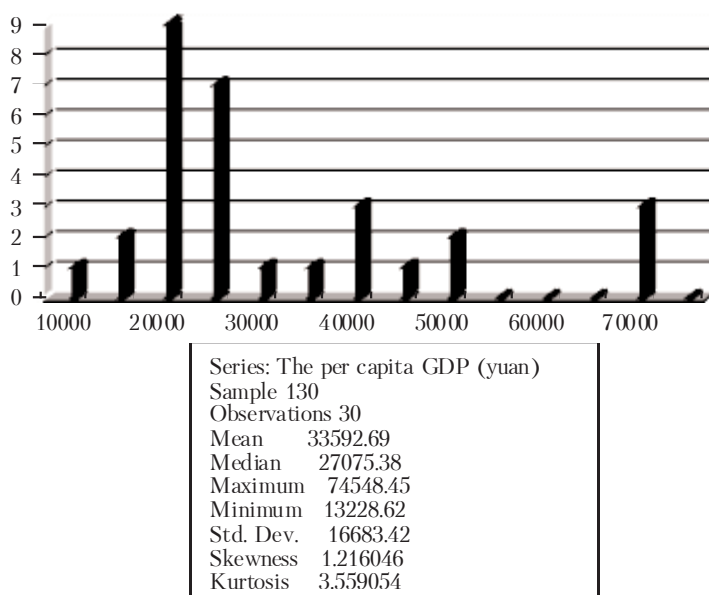
In the next section, we use the economic and labor security data from 30 different regions of China in 2010 to run the significant test. We hope the evidences from the regions of China could support the Kuznets effects hypothesis.

**3. Data Analysis.** China's social security system has experienced 2 tremendous reforms, from the social pooling paradigm to the social pooling combined with individual account paradigm. In order to avoid the impacts of paradigm changes on the effectiveness of the data, we select the cross section data. We find that special political and culture features of Tibet caused its impropriateness for the model and we omit the data on Tibet.

The data used to test the hypothesis are handled according to the following principles.

*ComR* is the proportion of commercial insurance to the total endowment insurance. It stands for the development standard of commercial endowment insurance. We use the regional average per capita endowment insurance fee (total commercial endowment insurance premium divided by population) as the quantity of commercial endowment insurance, and average per capita social pension revenues (social pension revenues divided by the population of active contributors to social pension funds) as the quantity of social endowment insurance. The sum of the above is the total endowment insurance.

In order to test the Kuznets effects of the development of commercial endowment insurance to the economic development level, it's required that the regional GDPs vary from low development level to high development level. The gaps of the economic development level and social insurance development standards are quite large between the regions of China. For example, the first-tier cities, such as Beijing and Shanghai, have achieved high economic development levels. Coastal areas and most of the Eastern cities are at medium economic levels. While the Central and Western cities represent the low economic level. We can see from Figure 1 that the range of regional per capita GDP is from 13229 yuan to 74548 yuan with the mean of 33593 yuan. Generally, we can suppose that 30000 yuan per capita GDP is the standard of medium economic development level. The 30 regional per capita GDPs cover the range of low, medium and high economic levels. We handle the *Gdp* variable with the following rules: *Gdp* is calculated by per capita GDP divided by 30000 yuan.



Data Resources: China Statistical Yearbook 2011.

Figure 1. Statistical data of 30 regional GDP in China

$RpIR$  is the pension-wage replacement ratio provided by social insurance, calculated by the average per capita social endowment insurance expenses (the total social pension expenses divided by the retirees in the social pension fund) divided by the average wage.

$DpdR$  is the elderly dependency ratio. We use the population of retirees of the social pension fund divided by the population of active contributors of the social pension fund to get  $DpdR$ . The data are all collected from the China Statistical Yearbook 2011 and China Labor Statistical Yearbook 2011.

**4. Empirical Results and Model Explanation.** Following the principles in section 3, we use the economic and labor data on 30 regions in China in 2010 to run the significance test. The model's effectiveness and significance are as follows.

The results show that, the P value of the F-test is 0.000004 and the effectiveness of the model has been proved. Meanwhile, the P-values of all the variables are significantly smaller than 0.1. The results indicate that, under the 10% confidence level, all the variables are significantly effective. The coefficient of the variable  $Gdp$  is significantly positive and the coefficient of variable  $Gdp^2$  is significantly negative. The above results indicate that the development of commercial insurance has inverted-U effects, or the Kuznets effect with respect to economic development levels. When the economic development level of a region is low, the development of social insurance will promote the development of commercial endowment insurance and they complement. When the economic level of a region is high, the development of social endowment insurance will squeeze part of the demands for commercial endowment insurance. They are substitutes in this situation. The hypothesis of inverted-U effects is supported by the evidence of the regional economic and labor data of China.

Table 1. Empirical results of the model

Dependent Variable: COMR				
Method: Least Squares				
Sample: 130				
Included observations: 30				
COMR = C(1) + C(2) x GDP + C(3) x GDP^2 + C(4) x RPLR + C(5) x DPDR				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.139223	0.069	2.017737	0.0545
C(2)	0.128953	0.051143	2.521421	0.0184
C(3)	-0.0305	0.017341	-1.759	0.0908
C(4)	-0.18254	0.090668	-2.01322	0.055
C(5)	-0.15651	0.050488	-3.09994	0.0047
R-squared	0.69287	Mean dependent var.		0.088536
Adjusted R-squared	0.64373	S.D. dependent var.		0.045686
S.E. of regression	0.027269	Akaike info criterion		-4.21512
Sum squared resid	0.01859	Schwarz criterion		-3.98159
Log likelihood	68.22683	Hannan-Quinn criter.		-4.14041
F-statistics	14.09972	Durbin-Watson stat.		2.272839
Prob (F-statistics)	0.000004			

Data Resources: China Statistical Yearbook 2011, China Labor Statistical Yearbook 2011.

The coefficient of *RplR* is significantly negative. This result is compatible to the analysis of the previous section. Generally, when the pension-wage replacement ratio achieved by social insurance is low, the demands for commercial insurance are high. People want to buy more commercial insurance products to further prompt the quality of their retirement life. On the contrary, when the pension-wage replacement ratio achieved by social insurance is high, people could maintain good living standards when they are retired and have less drive to buy commercial insurance products.

The coefficient of *DpdR* is significantly negative. The result is different to the analysis of the previous section, and it could be explained by the special labor and old-nursing status in China. In common sense, when the elderly-dependency ratio is low, the old nursing tense is not so high that people need not to buy much commercial insurance products. But, in our results, the demands for commercial endowment insurance should be high in this condition. We find that the regions with low elderly-dependency ratio are the regions with labor-intensive industries and are full of new employment migrants. In these areas, there are large quantities of working young man who are active contributors to the local social pension fund. Since there are not so many industries and working people 20 years ago, the populations of the retired people are not so large in these areas. So, the elderly-dependency ratio is quite low in these areas. As the main industries here are labor intensive, the social security standards provided by social insurance are usually low in these areas. Employment migrants, especially the migrants with high income need to buy more commercial insurance to achieve a high quality retirement life. In the contrary, the high elderly-dependency ratio reflects high social security pressure. Under this situation, people have pessimistic expectations about the retirement life standards and this increases their demands for commercial endowment insurance. But, the results of the regression model are quite different from the previous analysis. We find that the regions with high elderly-dependency ratio are briefly the Central and Western regions. In these regions, there are large populations of retired people in traditional industries. The scale of traditional industries has been reduced and the populations of working peo-



ple are much smaller than before. That is why the elderly-dependency ratio is high in these areas. Here people used to enjoy the good welfare of old-nursing securities provided by the social security system and it's difficult for them to switch to the modern commercial insurance system. Besides that, the living standard secured by the social endowment insurance is not low due to the low living expense and small income gap. People have no drive to buy commercial insurance products in these regions. So, the negative coefficient of  $DpdR$  is realistic. From the above explanation, we have thought that the regional income gap (or Gini coefficient) may be a good explanation variable. But, there is no officially published Gini data; therefore, we omit the Gini coefficient in our model.

**5. Strategy Recommendations.** According to the analysis in section 4, the evidence of 30 regional data of China support the hypothesis that the development of commercial endowment insurance has Kuznets effect with respect to the economic development level. When the economic development level is low, as the 2 insurance schemes vary in functions and structures, the development of one scheme's function and efficiency often promotes the development of the other's. Social insurance and commercial insurance both expend their capacities and have further development. The government needs to formulate appropriate policies to promote the development of commercial insurance. On one hand, social endowment insurance is a measure of secondary distribution and it could provide the basic living security for the retired. The social endowment insurance pays more attention on fairness than efficiency. On the other hand, annuities and commercial insurance should be developed to be the 2 important fundamentals of the social security system. People could choose more appropriate and effective old-nursing portfolios to meet their needs and achieve higher standard of retirement life. In this situation, commercial insurance companies should do much educational and promoting service to attract the interests of people and their market share could be expended. When the economy is well developed, the development of social endowment insurance could squeeze part of the demands for commercial insurance. In this situation, the government should consider the financial burden and the operating efficiency of the 2 types of endowment insurance, and take into account the principle of fairness, to develop the appropriate social old-nursing security policies. Meanwhile, the government should encourage commercial insurance and social insurance to compete and substitute with each other to create more flexible social security mechanisms and improve the operating efficiency of the social security system. In this situation, the capacity of commercial insurance is still expending and it's still a rewarding business. But the market share is squeezed and companies should develop more consumer-oriented and effective products to keep the competitiveness. With the rise of economic development level, social insurance and commercial insurance are complements at first, and then change to substitutes. This requires the governments to fully understand the stage and the nature of the market to accomplish the conversion of administrative policies.

There are huge development gaps between the Western and Eastern regions of China. In the underdeveloped regions, the scale of traditional industry is reduced and the scale of new developing industry is small. Besides that, the social security system is not effective due to high fund expenses in these areas. So, the lack of labor problem is serious and social security system is operated under pressure. In these areas, the

government should provide more stimulating policies to increase individual incomes and create more working opportunities for young people. Meanwhile, the government may consider the problem of overprotection of the retirees in the traditional industry. The commercial insurance companies should provide more educational and promoting services in these areas to attract more people to take part in commercial insurance. While, in the developed regions there are lots of working opportunities in the labor intensive industries and the security provided by social insurance is not sufficient. So, the social security problem is serious and there are huge demands for commercial insurance. The government should provide more old- nursing securities for new migrants to have better retirement lives and the social security standard should be promoted. Meanwhile, commercial insurance companies should grasp the opportunities and challenges to expand their market shares and further develop their competitiveness.

China is at its middle stage of economic development. In this stage, with the sustained expansion of demands for commercial insurance and further improvement of the financial system, it calls for great efforts to develop commercial insurance to establish the multilevel social security system. The commercial insurance companies should develop more competitive and flexible high-quality insurance products to meet the expanding needs. The commercial endowment insurance industry should seize the historical opportunity to optimize the operation efficiency and enhance the competitiveness at this stage. The government should provide more supportive and stimulating policies to develop the commercial endowment insurance industry and accomplish the major reforms of China's social security system.

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