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Volatility analysis of consumer demand growth in china based on the index of business conditions

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ABSTRACT

This paper analyzes the volatility of China's consumer demand since the reform and opening up, especially since 1999, chooses leading and coincident index from more than 200 monthly indicators of macroeconomic related to consumption using time-difference correlation analysis and other methods, and builds the business conditions index of China's consumer demand using synthetical index method. Then analyzes volatility characteristics of China's consumer demand in detailed, and forecasts the growth rate of our social retailgoods, of urban and rural social retailgoods respectively in 2013. 　　© 2013 Trade Science Inc. - INDIA

KEYWORDS

Consumer demand;
Business conditons cycle;
Synthetic index;
Volatility characteristics.

INTRODUCTION

In the developed countries where the consumption structure is relatively stable, although the consumer demand accounts for a large proportionin in aggregate demand, its volatility is far less than the investment, exports and other component factors. Thus it's mostly the fluctuations of investment, inventory, and export caused the economic fluctuation. In comparison, in developing countries and transitional countries where the consumption structure and system change a lot, the volatility of consumption is greater than the developed countries, and have more influence on economic fluctuation. China is is in the economic transition over a long period of time as well as a developing country. After 1978, the domestic economy develops rapidly and residents' living standards improve highly, at the same time our country conducted a series of system reform covering the enterprise, the income distribution, education, medical, housing, and social security etc. Great changes have taken place in residents' consumption structure and environment. Therefore, it's full of practical significance for the government regulating the economy and making consumption policy, bying studying the fluctuation characteristics of consumer demand growth and the changes of consumer behavior, and analyzing the trend of consumer demand growth in the future.

Economic scholars in China have obtained some achievements from the theory and method on research of the forecast and monitoring of economic cyclical changes. Dong Wenquan etc[5]. introduce various kinds of practical calculating methods employed in the worldwide research of economic cycles in a comprehensive way, develop the index of business conditions and warning signal system of macro economy for our country, analysis and forecast it; Liu Jinquan[6] uses the absolute

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deviation, conditional variance and growth at risk to measure the economic risks and conditional volatilities under the environment with economic uncertainty, also uses the response function to describe the dynamic responds of growth level to growth risk; Chen lei etc[8]. build synthetic index and warning signal system reflecting the running status of our country's economy, and use the system predict main macro economic indicators such as the investment, consumption, foreign trade, money supply and inflation. Gao Tiemei etc[9]. establish the business conditions index system of multi dimensional, using composite indices in the fields of the price level, real estate, export, and motor vehicles, and analyze the overall situation and the future development tendency of macro economic fluctuation in the view of the structure. Kong Xianli etc[10]. build the index of business conditions in the equipment manufacturing industry in China using the method of synthetic index, analyze the cyclical fluctuation characteristics and causes of its operational situation. Kong Xianli etc[12]. build the index of businsss conditions in China's industrial sector using the method of synthetic index, and analyze its volatility characteristics since 2000.

This paper intends to study the business conditional index of consumer demand, use the international general method of synthetic index, and discuss fluctuation characteristics of the consumer demand growth. In this paper, the second part describes the changes of China' consumption and the consumption system and policy since the establishment of China, especially since the reform and opening up, analyze the influence of policy on consumption; The third part selects the business conditional index reflecting the cycle fluctuation of China's consumption growth, according to the choosing principle of sentiment indicator; The fourth part reflects the leading and coincident synthetic index of China's consumption growth, depict the characteristics of the consumption growth cycle in China since 2000, and predict the trend; The fifth part is about policy recommendations.

CONSUMER POLICY CHANGES AND ITS IMPACT ON CONSUMPTION[1] AFTER THE REFORM AND OPENING UP IN CHINA

At the beginning of the reform and opening up, our consumption policy come to turn from controlling to encouraging the original residents' spending, such as: increasing employment, improving salary and reward, providing price subsidies to the agricultural sector, cancelling the Chinese ticket and openning markets. The implementation of compensatory consumption policy improves residents' ability to consume, and expands the rights to make independent consumption decisions. In the early 1980s, China's government relaxed the control to economy gradually, prices began to become market-oriented. After the third plenary session of twelve, China started to reform on price step by step. In 1988, the central government phased out the price dual-track system, relaxed price controls, which leading to a national agitation of snapping up. The whole market of consumer goods fluctuations, and the price index rose by 18.8%, appearring more serious inflation. For this situation, the government took a variety of strict measures to limit consumer demand, such as strengthenning the management of wages and bonuses, compressing group consumption, encouraging residents savings in urban and rural areas, and guiding the purchasing power to shunt. Tight macroeconomic policy inhibited the inflation, the residents income growth dropped significantly. Consumer spending, especially durable goods buying is inhibited, domestic consumption market became weak.

After the readjustment from 1989 to 1991, the national economy began to grow rapidly since 1992. But because of the too fast fixed assets investment growth and too much credit supply, high inflation emerged again in 1993. Starting from 1993, the government carried out tight consumption regulation policy, such as higher deposit rates, indexed deposit, imposing consumption tax, strengthening the salary management, carrying out inspection to the national consumption fund, making a new unified tax law about individual income etc. The moderately tight monetary policy curbed inflation, made a stable national economic growth, achieved economic "soft landing" successfully. In the second half of 1997, external demand redused because of Asian financial crisis. Combined with structural factors' deep influence to domestic economic development, the effective demand became insufficient and the deflation trends emerged. In 1998, national economic deflation emerged, consumption rate

declined.

Under the shortage condition of economy, consumer goods market ran as a seller's market, residents were "hungry" on spending, consumer demand changed as the supply or the investment demand changed. With large increase in the supply of consumer goods, the buyer's market appeared, our residents' consumption behavior became rational gradually, and got rid of the decisive influence from investment demand, became independent variables operating in the economy.

During the 1990s, China's reform and opening up were deepening gradually. Free medical care, compulsory education, system of full employment, retirement benefits etc were all in danger of collapse. People in daily life were increasingly feeling the threat of disintegration of the welfare system, education, employment, retirement kept reminding people of risk. After 1997, China started charging overall on higher education, which made tuition increasing year by year; housing allocation monetized in 1998, which ended the housing welfare system, the housing system reform went into the phase of marketization of housing construction and monetization of housing consumption; in February 1999, the reform on workers' medical insurance system in town introduced, which rised rates of personal medical expenses. Various reform measures increased the residents' unstable forecast on income and large expenditures in the future, strengthened their behaviors of increasing savings and reducing the current consumption. In this period of economic transition, China's consumption growth slowed significantly. To stimulate the consumption demand of residents, since 1998, our government started to boost regulation policy, which included: (1) The central bank reduces the savings rates eight times, to stimulate consumers' immediate consumption willingness. (2) Tax policies incline to encourage consumption. (3) Carry out credit on consumption heavily; (4) Increase salary of urban low-income earners and officers, perfect the income distribution system; (5) Concern about the problem of "agriculture, rural areas and farmers", make policy to raise the income and consumption level of rural residents; (6) Cancel the welfare housing distribution system and implement housing monetization, develop hot spots of urban housing consumption vigorously. (7) Reform holiday system,

expand "holiday spending"; (8) Expand cultural and education consumption actively. (9) Improve threshold of personal income tax, reduce the tax burden on low and middle income people, etc.

From figure 1, we can know that the consumer market has been in the process of growing since the reform and openning up, but the growth fluctuates significantly. Especially before 1998, due to the consumer market is a seller's market, consumer demand changes over the investment demand, the relationship between changes of national macroeconomic policy and the total consumption is correlative apparently, consumption fluctuates heavily. After 1999, with the emergence of a buyer's market, people's consumption behavior become more rational, and gradually get rid of the decisive influence from investment demand, becoming independent variables in the operation of economy, by which the trend of consumption growth will no longer be ups and downs. Figure 2 shows the change of the growth of the total retail sales of social consumer goods in China after 1999. After 1999, China's total retail sales of social consumer goods still fluctuates significantly, but the overall trend of consumption growth becomes stronger year by year, which relates to China's rapid economic development and people's rising living standard, as well as a series of policies to encourage consumption; influenced by the financial crisis of the world in 2008, our consumption demand growth falls back for a time. Then the government sets policies to stimulate economy at the end of 2008. In 2012, consumption began to enter into a new round of declines, in September 2012, it recoveries.

Figure 2. The change of total retail sales growth of social consumer goods in China after 1999 (monthly)

Figure 1 : The change of total retail sales growth of social consumer goods in China since the reform and opening up(monthly)[15] Total retail sales of social consumer goods (right coordinates)Total retail sales growth of social consumer goods (left coordinates)
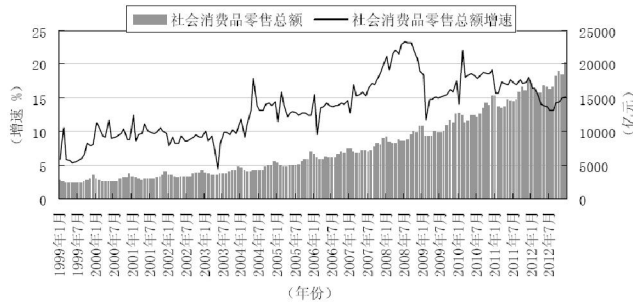
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Figure 2 : The change of total retail sales growth of social consumer goods in China after 1999 (monthly)

SELECTION OF CHINA'S INDEX OF CON-SUMPTIVE BUSINESS CONDITION

According to availability of the data, this article collected more than 200 indicators made up of macroscopic economic monthly index, industry index, and in-dexes of consumption itself, which losely related to the overall consumption, based on the principles of selection. With total retail sales growth of social consumer goods as a benchmark, using methods such as time difference correlation analysis, K-L information, and cyclical pattern matching to screen out 12 business conditional indexes, which constitute leading and consisdent indicators of the consumption growth cycle respectively 2 (see TABLE 1). All of them are the growth rate sequences of the same period, which eliminate the irregular factors after seasonal adjustments.

Economic indicators of the volatility of business condition consisting with the consumption

Coincident indicator means the volatility of the index and consumption are consistent basically. In order to ensure the stability of the coincident index of con-

TABLE 1 : Indicators group reflecting China's consumption fluctuations

Index types	Index name	Index types	Index name
Leading indicator	1. Accumulative total growth of investment in fixed assets /% 2. Money and quasi money (M2) growth /% 3. Car production growth /% 4. Electricity output growth /% 5. Urban households per capita disposable income growth /% 6. The added value growth of industrial enterprises /% 7. Cumulative growth of commercial housing sales /%	Coincident indicator	1. Total retail sales growth of social consumer goods /% 2. Rural total retail sales growth of social consumper goods[①] /% 3. Ex-factory price indices of industrial products of consumer goods 4. Price index of fuel power purchase 5. Ex-factory price indices of industrial products of durable consumer goods

Before 2009.12 "social retail sales growth of total commodities below the county level" after 2010,1, "social retail sales growth of total commodities in the countryside".

sumption we construct, this paper reflects fluctuations in consumption using a set of synthetic index. The table 1 shows that by using a variety of selection method of indicators, we determine the coincident index such as total retail sales growth of social consumer goods, rural total retail sales growth of social consumer goods, ex-factory price indices of industrial products of consumer goods, price index of fuel power purchase, ex-factory price indices of industrial products of durable consumer goods. Theoretically, these indicators' fluctuations should be consistent with the social total retail sales of consumer goods. First of all, rural social total retail sales growth of consumption goods, marks consumption in rural areas, which is a part of social total retail sales of consumer goods. As shortage of consumption in rural China, stimulating consumption in rural areas helps greatly the growth of consumption in our country. This indicator should be consistent with the volatility of total retail sales of social consumer goods; Moreover, ex-factory price indices of industrial products of consumption goods, price index of fuel power purchase, and ex-factory price indices of industrial products of durable consumption goods, are closely linked with residents' living and consumption, whose changes directly affected the change of residents' consumption. Choosing the indicators above as coincident indicators should

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be reasonable, no matter in theory or from the perspective of practical economic significance.

Economic indicators of the volatility of business condition leading the consumption

Leading indicator appears ahead of fluctuations in consumption reaching peak (or low). Many of the institutions and departments use leading indicators as the important basis of short-term prediction now. This article selected seven leading indicators, which are: accumulative total growth of investment in fixed assets, money and quasi money (M2) growth, car production growth, electricity output growth, urban households per capita disposable income growth, the added value growth of industrial enterprises, cumulative growth of commercial housing sales.

Money and quasi money (M2) growth depict the heat of the investment, while investment serve for the consumption in the end. Chain length and the time span of different investment projects to the consumption vary a lot. For instance, it the takes a certain amount of time that amount of investment in fixed assets and electricity production spread to final consumption, while there is only one link between commercial housing sale, car production and consumption, the per capita disposable income growth of urban households will directly affect the consumer. As leading indicators of consumer, they are reasonable and feasible from the economic significance and practical index fluctuation trends.

CALCULATION OF CONSUMPTIVE INDEX OF BUSINESS CONDITION AND TREND ANALYSIS

As a means of the empirical observation, the business conditional index can be used to measure the degree of economic fluctuations. International index methods include Diffusion Index (DI) and Composite Index(CI). This article will use CI method to calculate index of demand growth in our country, in order to observe fluctuations characteristics, and analyzes the future trend of consumer demand.

The calculation method of synthetic index

There are three kinds of synthetic indexes used on the international Currently: (1) Method of synthetic index

used in the U.S. department of commerce and the NBER[3], which is used in this article; (2) Survey of Japanese economic planning agency use a method different from the U.S, whose thoughts are consistent; (3) The OECD method. According the growth cycle, with a relatively simple method, the OECD compiles the index of member countries, to determine the benchmark date of member countries, analyze and predict the economic situation. This paper uses the calculation method as follows[4]:

(1) Calculate the indicators' rate of symmetrical change and standardizing it

Set $Y_{ij}(t)$ as the ith index of the first j index group, j = 1, 2, 3 means group of leading,, concident, and lagging indicators respectively, $i = 1,2,\cdots,k_j$ is the serial number in the group, k_j is number of the first j index group, T means the sample size. Firstly calculate rate of symmetrical change $C_{ij}(t)$ to $Y_{ij}(t)$:

$$C_{ij}(t) = 200 \times \frac{Y_{ij}(t) - Y_{ij}(t-1)}{Y_{ij}(t) + Y_{ij}(t-1)} \quad t = 2,3,\cdots,T \tag{1}$$

In order to prevent indexes which vary a lot dominating in the synthetic index, the rate of symmetrical change of each index has been standardized, whose average absolute value equals to 1. Firstly calculate a normalization factor A_{ij}:

$$A_{ij} = \sum_{t=2}^{n} \frac{|C_{ij}(t)|}{n-1} \tag{2}$$

Use A_{ij} to standardize $C_{ij}(t)$, obtain the rate of symmetrical change $S_{ij}(t)$:

$$S_{ij}(t) = \frac{C_{ij}(t)}{A_{ij}} \quad t = 2,3,\cdots,T \tag{3}$$

(2) Calculate the rate of symmetrical change respectively

Firstly, calculate integrated rate of change $R_j(t)$ at each point in the leading, coincident, and lagging indicators group

$$R_j(t) = \frac{\sum_{i=1}^{k_j} S_{ij}(t) \cdot w_{ij}}{\sum_{i=1}^{k_j} w_{ij}} \quad j = 1,2,3, \ t = 2,3,\cdots,T \tag{4}$$

Among them, w_{ij} the weight of the ith index of the first j index group, which can use as $w_{ij} = 1$, also can

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be calculated using grading system designed by Moore and Shiskin, namely considering the index's economic importance, statistical appropriateness, synchronization and correspondence with economic cycle fluctuations, and the smoothness of time series data. But the weight did not be taken seriously, because giving weights to the index can not get more useful information, compared to making $w_{ij} = 1$.

Then, calculate the normalization factor F_j

$$F_j = \left[\sum_{t=2}^{n}|R_j(t)|/(n-1)\right]\Big/\left[\sum_{t=2}^{n}|R_2(t)|/(n-1)\right]\ \ j=1,2,3 \qquad (5)$$

And calculate standardized rate of comprehensive change $V_j(t)$:

$$V_j(t) = R_j(t)/F_j \text{, } t = 2,3,\cdots,T \qquad (6)$$

Its purpose is to enhance the comparability of three indexes, applying them as a coordinated system.

(3) Calculate the synthetic index

Generate $I_j(1) = 100$, thus

$$I_j(t) = I_j(t-1) \times \frac{200 + V_j(t)}{200 - V_j(t)}\ \ j=1,2,3 \text{, } t = 2,3,\cdots,T \qquad (7)$$

Sometimes, in order to reduce the irregular change, make moving average processing to $CI_j(t)$. Resulting in a synthetic index benchmarking year for 100.

Calculate the synthetic index of the total consumption and analyze the trend of the consumption growth in our country

Based on table 1, this section uses the monthly data of each index from January 2000 to October 2012, calculates the synthesis index of consumption on leading and coincident, the corresponding graphics is shown in figure 3.
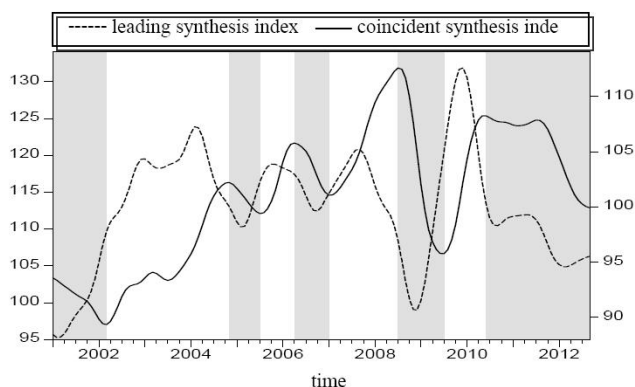

Figure 3 : Synthetic index of consumption (the shaded part is decline stage of business condition)

From the movement of synthetic index, we can see they show the correspondence of peak and valley very well.

Coincident synthetic index of consumption presented a strong booming rise in the early of 2002, although grew slowly in 2003.3 ~ 2003.8, then continued to speed up, until reached the peak in 2004.11, then began to fall modestly, in 2004.9 ~ 2007.2 showed a slight fluctuations, in 2006.4, reached the peak, reached at the bottom in 2005.7 and 2007.1. Then after 18 months of high speed climbing, began to decline in July and August of 2008, the range of decline was so significant that hitting bottom in July 2009, then came a strong rebound. The peak of consumptive coincident index had been at the peak of a high plateau in 2010.6 to 2010.7, during this period, our consumption grows stably and national policy to boost consumption started to work, the consumptive business condition began falling fast in July 2011, declined slowly in September 2012, then began to thaw. According to the calculations, leading indicators has reached its trough in March 2012, so we can judge that the consumptive growth cycle (consumptive coincident synthetic index) will round down the bottom in September to October of 2012, and starte to recovery into the booming rise in 2013, entering in a cycle of rising channel, rising quarter by quarter.

Forecast quarter consumption in 2013

Using five kinds models of growth curve, variable rate model, ARIMA model etc in the "macroscopic economic monitoring and warning system", we forecasted the main social total retail sales growth of consumer goods (prediction interval is the first quarter of 2013 to the forth quarter of 2013), and on the calculation of the model and the basis of the comprehensive analysis, we get the prediction results (see TABLE 2). Combined prediction results and consumptive business conditional trends, the report says, at all levels of social total retail sales of consumer goods in the whole year of 2013, growth will be in the rising stage, picking up and gradually rising.

THE POLICY SUGGESTIONS

Adjust the allocation structure, improve the level of low-income groups, expand the scale of the

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middle class.

Propensity to consume of the low-income group is significantly higher than the high ones, besides, low and middle income groups in our country is still in the process of the consumption structure upgrade. It's an effective way to promote the consumption by improving the level of low and middle income groups. On the one hand, by means of transferring payments, the government can increase farmers' income, raise the level of living allowances in urban and rural areas, increase retirees' basic annuities in enterprise, improve pension and living allowances of entitled groups and other staff, raise the level of consumption of the low-income group; on the other hand, reduce the burden on farmers from policy, provide more fair education training and employment opportunities for the majority of civilians, ensure that residents have the growing revenue and anticipated revenue, enable low-income groups to have a chance becoming middle-income earners or middle class. Experience from world shows that the more there are middle-income earners or middle class in a country, the more stable the society will become.

TABLE 2 : Predicted results of main consumptive index growth in 2013

Index name	The first quarter	The second quarter	The third quarter	The forth quarter
Total retail sales growth of social consumer goods /%	14.7	15.6	16.1	16.5
Urban total retail sales growth of social consumpter goods /%	14.4	15.5	16	16.4
Rural total retail sales growth of social consumpter goods /%	14.9	15.8	16.2	16.8

In addition, deepen the reform of the income distribution system, tilt to residents' department in the first distribution, at the same time, spare no efforts to reverse the trend of widening gap among urban and rural, regional, industry and social members. Income distribution gap is not only harmful to expanding consumer demand in China and the healthy development of economy, and poses a potential threat to social stability. Adjusting the allocation structure rationally, raising the income level of low and middle, cracking down illegal income etc, will contribute to our country economy in the short, medium and long-term, which can develop stably and coordinately.

Continue to invest in the people's livelihood, distribute the affordable housing reasonably

Cost rising on Food, health care, education, pension, employment and housing, which is closely related to people's livelihood, will impact the low and middle income groups most seriously. Inflation means shrink of wealth, rising prices raise the living costs of low and middle income earners; therefore, continueing to maintain and strengthen the fiscal expenditure on the livelihood, constantly raising the level of social security, increasing input for education, health care, pensions, social security, and low-income housing project construction, reducing trouble back at home of consumer, will help boosting consumers' confidence, stimulating consumption in a long-term positive significance.

To middle-income groups, high mortgage is the biggest burden. So lightening the burden of housing consumption, reducing the high mortgage, which caused the crowding out effect, will be effective to stimulate consumption. On this year, a large number of affordable housing will be put into use, which will promote demand growth of the building materials decoration, furniture and other related consumption, but a series of contradictions and problems appeared in the process of the allocation and use of social housing and economy applicable room, which need attention from related department. It should be noticed to be clear on the details of the policy, keeo the maneuverability strong, ensure fair, reasonable and efficient in management specification.

Develop the service industry, expand the service consumption

With the development of economy and unceasing enhancement,of people's living standard, residents consumption demand of the rich commercial area has leveled off, which is unlikely to continue to keep high consumption growth. In the future, the service consumption is going to be the focus of consumer spending. People spending on travel, fitness, culture, entertainment, health care, education, information and other aspects of consumption will continue to grow.

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In 2011, our service industry share of the GDP is 43.1%, while developed countries' accounted for about 70%[5]. So the service industry in our country have huge development space. Compared with other industry sector, service sector's employment elasticity is big, and has strong advantage in absorbing labor employment; the range of service industry is broad, ranging from labor intensive industry such as catering, housekeeping, storage logistics, to technology and knowledge intensive industry such as education, medical, financial, telecommunications and other industries, which can absorb a variety of different quality of laborer obtain employment. Ensuring employment is one of the most important factors to activate consumption, stimulate domestic demand, which is also an important factor to keep social in harmony and stability.

At present, our service industry still faces the situation of a supply shortage and unreasonable structure. The proportion of traditional service industry such as transportation, warehousing, trade, and catering is too high, while the financial, telecommunications, tourism and other modern service industry development are insufficient. In addition, the service level is not high, part of the development is not standard, the management is not perfect, and other issues such as lack of market competition mechanism remain. Therefore, to develop the service industry vigorously, we need the government to formulate policy and institutional environment conducive to the development of service industry, to encourage continuously expanding new areas and new forms, to guide it developping in the direction of modern service industry, to promote service level continuously, to increase the proportion of service industry in the economic structure gradually.

Create a good consumptive environment, guarantee the residents consuming safely.

Quality and safety of the food is a common concern for all members of society, so we must continue to intensify efforts to crack down on behavior of producting and sell counterfeit and shoddy food, improve and standardize standard of production safety of the food enterprise, establish and improve the system of food quality certification, release information about food safety in time, strengthen the food safety testing, strengthen media supervision at the same time.

Other commodities field except food, also need to increase the intensity of law enforcement, to crack down on all kinds of commercial bribery, false advertising, trademark infringement and other illegal behaviors, to safeguard fair competition in the market, protect the legitimate rights and interests of consumers. Focus on the improvement of rural consumption market and the network environment, avoid "fake" moving from urban to rural, from the entity into the network.

Deepening reform, remove the trouble back at home of consumer

Low consumption rate and high saving rate are phenomenon exiting obviously in our country, consumption tendency has been falling since the 1990 s. Which partly affected by Chinese traditional culture, lifestyle and social values, on the other hand, a series of reform such as the medical system, education system, housing system, pension system, continue to impact on residents, improving the residents' future expectations of big spending, strengthening the precautionary saving motivation of the residents, making part of the consumer demand putting off. Therefore, in order to remove the trouble back at home of consumer gradually.we need to deepen reform continuously, improve the level of social security, let people have a stable expectations.

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