An Analysis on the Defects of Chinese CPI Calculation

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Augest 29, 2008

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Contents

Abstracts

Among the vast macroeconomic indicators, Consumer Price Index (“CPI”) is what the government, economists and consumers are most concerned about. The main reason is that CPI increase not only reflects the price level and inflation status, but also plays a vital role in the decision of macroeconomic policies. The academic community believes that when the CPI is higher than 3%, the inflation occurs; when CPI is higher than 5%, the serious inflation occurs. In fact, over the past years China's CPI has been hovering around 7 percent, far more than 5 percent, both showing that the China is now in very serious inflation and to a certain extent reflecting that China's economic policy is " malfunctioning ". Therefore, the study of the problems in the calculation of CPI is of vital importance.

The thesis believes that: China's current macro control policy "failure" is due to the lack of a scientific and accurate method in the calculation of CPI. So, team members used mathematical tools and economic theories to study the defects of the calculation methods used for China’s CPI. First, we compared the calculation methods of CPI in China with that used in the United States. Second, from the analysis of China's CPI data of the past 20 years, we derived the weight distribution of China's CPI elements and found the major defects in CPI calculation methods and causes of these defects. Third, we constructed an independent mathematical model used for CPI calculation and utilized 2006’s data as an example to re-measure the CPI growth rate. Finally, we gave a number of recommendations on how to improve China's CPI calculation. We collected the information from Internet and studied English original professional academic literature. We also interviewed the experts from Chinese Academy of Sciences, National Bureau of Statistics and the teacher of RDFZ to complete our thesis.

1. Introduction

The consumer price index (CPI) gauges the overall rate of price change for a fixed basket of goods and services bought by house-holds. Because it prices the same items every month. CPI is the ratio between the current price indices and that of the previous year with specific weight in areas like food, clothing, medical care, personal goods, transport and communications, entertainment, education and stationery goods, housing, miscellaneous goods and services. The unit of CPI is growth rate.

CPI sheds light on the general economic trend of a long period only if it is based on specified constant price. In our country, certain consumer goods and services are taken into or out of consideration while some weighting data subject to change as well in the amendment of the CPI benchmark. Our latest CPI benchmark adjustment was made in 2001.

As one of the price indices, CPI was first introduced in WWI to measure the inflation. In real life, CPI not only reflects problems but also has a close relationship with many economic indicators such as inflation rate, employment rate, COL, PPI[1] and GDP. Especially, CPI is used to get certain indicators that cannot be calculated directly, like inflation. As for the investor, they can estimate the real value of assets in future by inflation rate through CPI. As for stake holder, they have to think about the difference between profit and inflation loss when selling debts, the market value of which is under impact of new debts. Under such circumstances, CPI influences the anticipated profit of stakeholder.

CPI is a key indictor of economic performance, since it represents the stability of economic development. Stable CPI has become a goal of social development. Usually, 1-2% increase of CPI, 4% of unemployment rate and stable GDP increase are considered to be an ideal economic environment. CPI plays a very important role in macro-economic policies, especially in monetary policy and market supervision. Although CPI is a lagging indicator, it represents several leading indicators, which underlines the importance of CPI. In addition, CPI is of high value in deciding tax rate, financial analysis and banking supervision. Therefore, the calculation of CPI should be accurate to ensure an effective macro-economic policy and wise judgment on price.

Unacceptably high CPI comes with hazards:

Firstly, it lowers the purchasing power of residents. The rapid growth of CPI results from imbalance of supply and demand. Both high price and fast growing price will decrease the purchasing power of residents, of whom the income remains. For one thing, this leads to the low-income barely making both ends meet (like food and house). For another, the high-income are also under influence. The national financial security is thus threatened.

Secondly, high CPI may contribute to overheating economy and serious inflation. People would like to save rather than invest. Banks raise interest rate to withdraw funds from circulation but rely on investment to keep increased rates. This will only serve to heat the market up. Too many future deals will speed up the price inflation and result in a vicious circle.

Thirdly, it will increase market risk. Investors gain only if the profit is higher than inflation rate. In times of high inflation rate, investors show more interest in highly profitable deals, which come with high risk. It will not be a reliable market if lots of its investors are undergoing highly risky deals. So Unacceptably high CPI increases market risk and uncertainty and thus makes it more difficult for political control.

Therefore, unstable CPI will exert negative impact on national stability and economic development. Only if CPI is accurately calculated, the factor analysis is objectively made and corresponding macro-economic policy is put forward, can we maintain a reasonable level of the CPI and ensure a healthy economic development.

2. Comparison on the tendency of CPI in China and America in the

[1] COL: cost of living index；PPI：producer price index；GDP：general domestic production。

past 20 years

There are many factors to determine CPI, such as weather, season and emergencies. However, only earthquake affects CPI to a large extend. CPI goes up together with GDP in a mature market where supply and demand are balanced without natural disaster. The changes and problems of CPI in China can be found by comparing with that in America.

● ***Comparison on CPI growth rate in China and America***

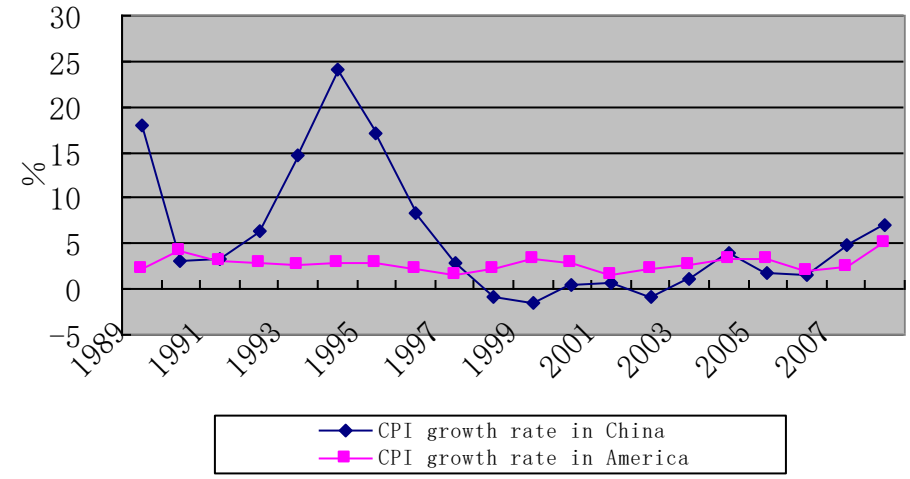

Figure 1　Comparison on CPI growth rate in China and America in the past 20 years

Source：　Website of National Statistic Bureau and American Bureau of Labor Statistics

It is can be seen from the figure 1 that, the increase of CPI in America has been at a reasonable level in the past 20 years, while CPI in China has experienced volatile growth. There are three peaks: 1988－1989,1993－1994 and 2007－2008.

In the 1st peak, serious inflation had its root in price appreciation and thus showed a close relation with CPI. As summer rush in 1988 and political crisis in 1989(including the collapse of the Soviet Union) happening one after another, our economy was under the attack of an immense financial turmoil. Price was soaring while CPI even jumped by 18%. To solve these problems, our government began to raise interest rate on a large scale at the end of 1988 to absorb funds, relieving inflation stress and increase the saving deposits rate by 70-80%. At the same time, the bank lending rate remained under political control and led to 40 billion of policy-related losses. Then, high financial deficit urged the government to adjust policy. The lending rate was raised, passing on the vicious circle to enterprises and causing imbalance between supply and demand.

During the 2nd peak, SOE ran under deficit at a rate of 50%. The loss in 1992 was close to 50 billion and went up to 80 billion in 1993. Then, the fund of state-owned banks was used up due to overdrawing for the 8th year in a row from 1985. At the end of 1993, our government decided not to overdraw the bank account

any more but issue a total of 120 billion Yuan worth of treasury bonds. However, it was the bank to shoulder 70% of the total amount of purchase. The bank had no choice but to raise lending rate to cover the deficit. This is detrimental to companies and the production decreased rapidly. Moreover the borrower's credit weakened. As a result, the CPI rose to 24%.

In the third peak, the increase of CPI was a result of volatile international economy and serious natural disasters like our snowstorm in the south and Wenchuan mass earthquake in Sichuan.

Conclusions can be drawn from the above analysis: it is impossible to list every factor affecting CPI for there are so many of them. Therefore, it is necessary to accurately calculate the CPI and determine the input data and weight data.

● ***Comparison on the absolute increase of CPI in China and America***

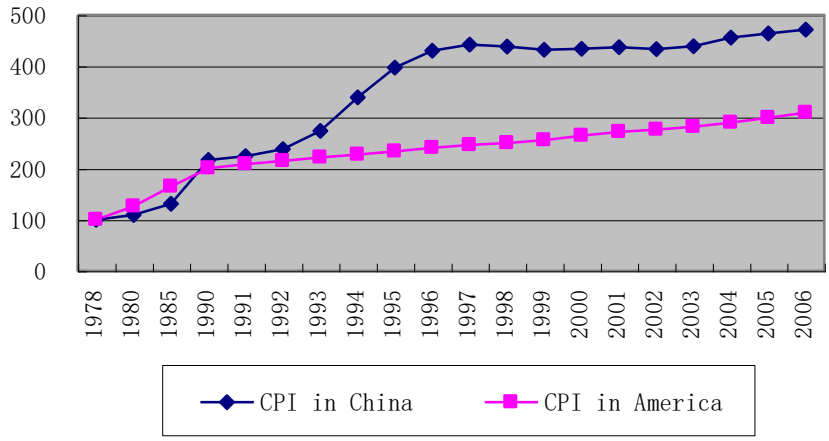

Figure 2 The absolute increase of CPI in China and America （1978＝100）

Source： Website of National Bureau of Statistics of China and American Bureau of Labor Statistics

From figure 1 and 2, we can see that America sees a more stable CPI increase than China, that is, the CPI remains 2%-3% with a slow increase in both growth rate and absolute growth. This is a sign of economic prosperity. Now, let's investigate the reason why American CPI is more stable.

First, the impact of natural disaster is excluded in America. Snowstorm and earthquake can result in partial or even national price increase, and thus should not be taken into consideration when it comes to CPI.

Secondly, US Bureau of Labor Statistics releases core CPI at the same time of telling CPI. The former is generated with food and oil excluded from the latter. There is a relatively slow price increase of products except food and oil in American market for balance between supply and demand. In fact, the core CPI is the main basis for monetary policies made by the Federal Reserve. But it is not the way China should follow. As a developed country, food only counts for 10-15% of CPI in America. Moreover, American government does not lay as much emphasis on food as China does. On the contrary, food weighs as much as 34%(table 3) or even more in China.

Our government set food as the top priority. If the weight of food is removed, CPI would have little significance in guidance.

Actually, American government should reflect itself on adopting core CPI. The oil price hit a new record high of 92.97 U.S. dollars per barrel. Oil has become one of the main expenditure for American household. If America only cares about core CPI, the guiding role of CPI will be weakened. Nevertheless, American CPI would be by no means stable if oil price is taken into account.

Thirdly, American government plays a better role in checking inflation and stabilizing prices. We sometimes exceeded the proper limits in making macro-economic policies and left CPI fluctuating. While CPI of abnormal fluctuation does not contribute to our healthy economic development, our government may push the price up and lead to market volatility by compulsory rules. American government tries best to regulate in accordance with the law of the market. To decrease the interest rate is commonly used. It is even of use that the Federal Reserve expresses its will on raising or decreasing the interesting rate through the Federal Open Market Committee.

- ***Comparison on the GDP of China and America.***

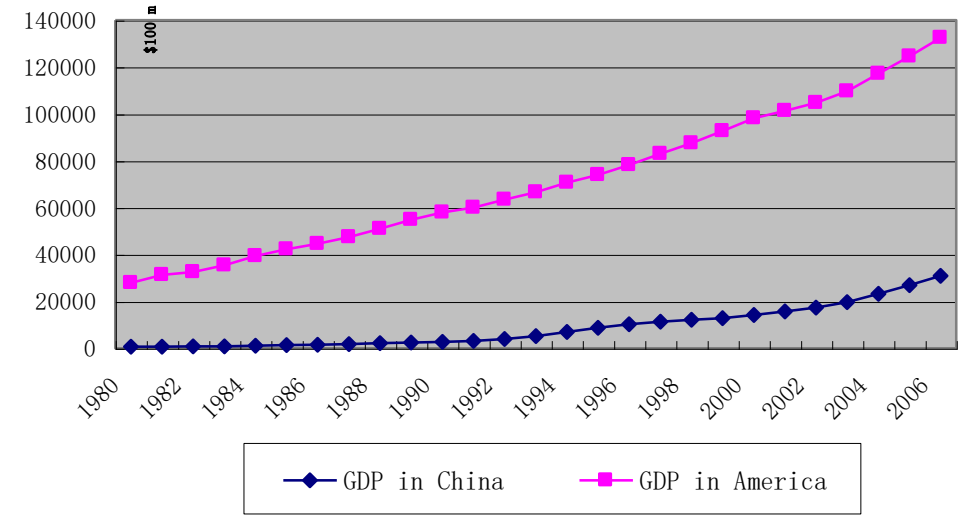

Figure 3 The GDP of China and America *from 1980 to 2006*

Source： Website of National Bureau of Statistics of China and American Bureau of Labor Statistics

Increased demand may cause shortage of supply if the quantity of the product remains. So the growth of CPI may reflect increasing need of residents (or shortage of goods). The demand of residents becomes larger when the economy develops by leaps and bounds. That is to say, the growth of GDP can be reflected on CPI. From the above table, although there was impact of economic circle, America was going through a steady development with a stable CPI since 1980s. There is little variation found between CPI and GDP, which further proves CPI changes directly with GDP.

As for the tendency chart of CPI and GDP in China, it can be seen that the economy was largely boosted at the beginning of opening-up. The GDP soared from ￥450 billion in 1980 to ￥2000 billion in 1991. whereas, China witnessed an

unstable CPI during this period, which went up from 0.7% in 1978 to 18% in 1989, fell down to 3.4% in 1991 and rebounded to 24% in 1994.

Based on the above analysis, we can see that, our GDP is increasing by at least 10% since 2000 with a growth of CPI no more than 5%, which even turned negative in 2003. As the price and living expenditure are rising sharply, people can hardly bear higher price. However, we saw a small increase of CPI. The only explanation to this discrepancy is: we have defects in calculating CPI.

3. Analysis on defects of our CPI calculation

Under our currently applied method, CPI is released around the middle of each month, usually from 11th to 14th, for the previous month. The CPI of a quarter is based on the data of every month. It also applies to the calculation of annual CPI. The CPI of December is released in the next year. There are rural CPI and urban CPI, the weighted average of which derives national CPI.

Since we have different situation, we have big difference with the West in factor selection, classification, distribution of weight, interval to amend the benchmark, as well as statistical sampling, although the principle is similar. To analyze our CPI with depth, the CPI data in Statistical Yearbook published by National Bureau of Statistics of China is referred to. First and foremost, a mathematical model of CPI is set up. Then, the weight of all factors of CPI is calculated. Reweighting is also tested in a scientific way. Last but not least, a new calculation of 2006 CPI is taken as an example.

- ***Mathematical model of calculating CPI***

When CPI is calculated, it is supposed that the total price of N products and services form array $P_1,P_2,P_3...P_n$, with weight array $W_1,W_2...W_n$. At the same time, every good and service consists of several sub-components $Q_{a1},Q_{a2}...Q_{an}$ with prices of $p_{11},p_{12}...p_{1Qa1}$,

$p_{21},p_{22}...p_{2Qa2}$, …… $p_{n1},p_{n2}...p_{nQan}$ and weights of $R_{11},R_{12}...R_{1Qa1}$, $R_{21},R_{22}...R_{2Qa2}$, $R_{n1},R_{n2}...R_{nQan}$. Then obviously,

$$R_{11}+R_{12}+...R_{1Qa1}=1$$
$$R_{21}+R_{22}+...R_{2Qa2}=1$$
$$\bullet$$
$$\bullet$$
$$\bullet$$
$$R_{n1}+R_{n2}+...R_{nQan}=1$$

The weighted arithmetic average price of each goods and services

$S_{Q1}, S_{Q2}...S_{Qn}$ is as follows:

$S_{Q1}, S_{Q2}...S_{Qn}$ are defined as follows：

$$S_{Q1} = p_{11}R_{11} + p_{12}R_{12} + ...p_{1Qa1}R_{1Qa1} = \sum_{i=1}^{Qa1} p_{1i}R_{1i}$$

$$S_{Q2} = p_{21}R_{21} + p_{22}R_{22} + ...p_{2Qa2}R_{2Qa2} = \sum_{i=1}^{Qa2} p_{2i}R_{2i}$$

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$$S_{Qn} = p_{n1}R_{n1} + p_{n2}R_{n2} + ...p_{nQan}R_{nQan} = \sum_{i=1}^{Qan} p_{ni}R_{ni}$$

Then, the price-weighted sum of goods and services, S, is:

$$S = \sum_{i=1}^{Qa1} p_{1i}R_{1i}W_1 + \sum_{i=1}^{Qa2} p_{2i}R_{2i}W_2 + ...\sum_{i=1}^{Qan} p_{ni}R_{ni}W_n$$

$$= \sum_{m=1}^{n}(\sum_{i=1}^{Qa1} p_{mi}R_{mi})W_m$$

To simplify, the price-weighted sum $\sum_{i=1}^{Qa1} p_{mi}R_{mi}$, is hereafter denoted as $P_1, P_2...P_n$. And S can now be expressed as:

$$S = \sum_{i=1}^{n} P_i W_i$$

Assuming that the prices of goods and services of n categories are $P'_1, P'_2...P'_n$, and that the weights of different categories of goods and services remains the same over the benchmark period, the weighted sum of prices for the same period of the previous year is:

$$S' = P'_1W_1 + P'_2W_2 + P'_3W_3 + ...P'_nW_n = \sum_{i=1}^{n} P'_iW_i$$

Then the CPI growth rate is $S/S'-1$, i.e.:

$$\lambda_{CPI} = S / S' - 1 = \sum_{i=1}^{n} P_i W_i / \sum_{i=1}^{n} P'_i W_i - 1$$

Apparently, this value is greater than 0 during the period of price increase and less than 0 when the price falls. Clearly, there are 3 factors determining the reliability of CPI: the number of categories of goods and services, the price level of each goods and service, and the weight of each category. In reality, since the cycle of each CPI benchmark period adjustment is relatively long, and within each cycle, the weights of many categories may have changed and certain new categories should be included, the output of the calculation may not be very reliable. On the other hand, frequent adjustments may raise the issue of comparability of the data. This dilemma is one of the biggest challenges facing CPI calculation and the main reason limiting the broader application of CPI index.

● ***Measurement of Weights in Current CPI Index***

Based on the above-mentioned mathematic model of CPI calculation, the CPI data published by the National Bureau of Statistics of China, and other data collected, we can figure out the weights of different goods and services categories included in the current benchmark period.

Since the CPI weights do not change significantly over a 10-year period, and the last adjustment took place in 2001, we can assume that the CPI weights over the 7 years for different categories are $W_1, W_2, W_3 \ldots W_8$, and the price increases for the 8 main categories in CPI are $c_1 \ldots c_8, d_1 \ldots d_8, e_1 \ldots e_8, f_1 \ldots f_8, g_1 \ldots g_8, h_1 \ldots h_8, i_1 \ldots i_8, j_1 \ldots j_8$. These 8 CPI categories are food; entertainment, education and cultural goods and services; housing; transportation and communications; health care and personal products; cloths; home hardware and maintenance; and cigarettes and alcohol. Now we have the following equations system:

$$c_1W_1 + c_2W_2 + c_3W_3 + c_4W_4 + c_5W_5 + c_6W_6 + c_7W_7 + c_8W_8 = P_1$$
$$d_1W_1 + d_2W_2 + d_3W_3 + d_4W_4 + d_5W_5 + d_6W_6 + d_7W_7 + d_8W_8 = P_2$$
$$e_1W_1 + e_2W_2 + e_3W_3 + e_4W_4 + e_5W_5 + e_6W_6 + e_7W_7 + e_8W_8 = P_3$$
$$f_1W_1 + f_2W_2 + f_3W_3 + f_4W_4 + f_5W_5 + f_6W_6 + f_7W_7 + f_8W_8 = P_4$$
$$g_1W_1 + g_2W_2 + g_3W_3 + g_4W_4 + g_5W_5 + g_6W_6 + g_7W_7 + g_8W_8 = P_5$$
$$h_1W_1 + h_2W_2 + h_3W_3 + h_4W_4 + h_5W_5 + h_6W_6 + h_7W_7 + h_8W_8 = P_6$$
$$i_1W_1 + i_2W_2 + i_3W_3 + i_4W_4 + i_5W_5 + i_6W_6 + i_7W_7 + i_8W_8 = P_7$$

With the constraint condition of:

$$W_1 + W_2 + W_3 + W_4 + W_5 + W_6 + W_7 + W_8 = 1$$

Using the CPI data input from 2001 to 2007 and considering the minor adjustments of weights over this period, we can get the approximate weights of CPI good and service categories by solving the equations:

$W_1 \approx 0.339$

$W_2 \approx 0.142$

$W_3 \approx 0.118$

$W_4 \approx 0.115$

$W_5 \approx 0.85$

$W_6 \approx 0.091$

$W_7 \approx 0.063$

$W_8 \approx 0.047$

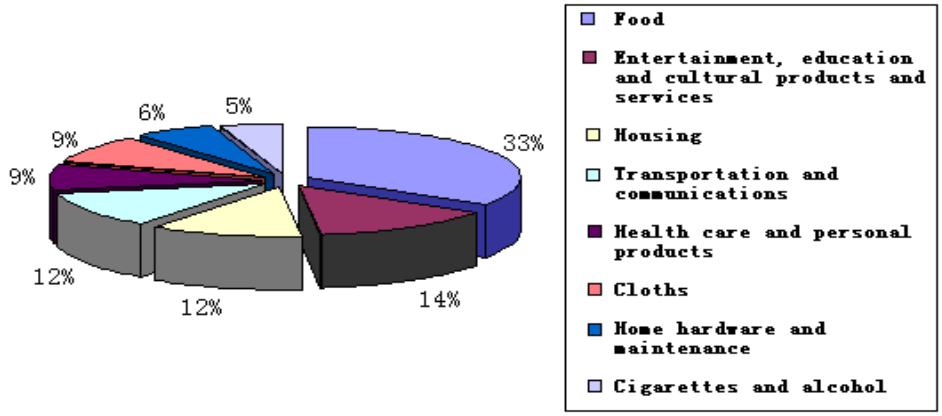


Figure 4 Estimation of Weights for Current CPI Categories

Sources: website of National Bureau of Statistics of China.

$W_1 \ldots W_8$ are weights of CPI component categories of food; entertainment, education and cultural goods and services; housing; transportation and communications; health care and personal products; cloths; home hardware and maintenance; and cigarettes and alcohol.

The calculation shows that the weight for transportation and communications, W_4, accounts only for 11.5% of CPI. Also, certain important expenditures, such as commodity housing costs and education costs for children, are not taken into consideration. This would undoubtedly affect the reliability of the CPI calculation in China.

● ***Main Problems in CPI Calculation in China***

Based on the measurement results of CPI weights, we noticed several problems in the CPI calculation in China.

Firstly, the infrequent adjustment of the CPI category weights causes its departure from the real value.

Let's assume that there are n categories of goods and services with prices of $P_1, P_2, P_3 \ldots P_n$, their CPI weights of $W_1, W_2, W_3 \ldots W_n$, and their prices for the same

period in the previous year of P'_1,$P'_2P'_3 \ldots P'_n$. Assume also that the weight for the nth category is W_n+m， the weights for the other n-1 categories are W_1-w_1, W_2-w_2, W_3-w_3, …, $W_{(n-1)}-w_{(n-1)}$, where $w_1+w_2+w_3+\ldots w_{(n-1)}=m$. Then the measurement of CPI, λ, is:

$$\lambda CPI = \sum_{i=1}^{n} P_i W_i \Big/ \sum_{i=1}^{n} P'_i W_i - 1$$

The real CPI, which is more applicable, is:

$$\sum_{i=1}^{n-1} P_i(W_i - w_i) + P_n(W_n + m) \Big/ \sum_{i=1}^{n} P'_i W_i - 1$$

The difference between these two:

$$= [\sum_{i=1}^{n-1} P_i(W_i - w_i) + P_n(W_n + m) - \sum_{i=1}^{n} P_i W_i] / \sum_{i=1}^{n} P'_i W_i - 1$$

$$= [P_n(W_n + m) - \sum_{i=1}^{n} P_i w_i] / \sum_{i=1}^{n} P'_i W_i - 1$$

Since $m=p_1+p_2+p_3\ldots+p_{(n-1)}$， a higher m value will lead to a higher value of $P_n(W_n + m) - \sum_{i=1}^{n} P_i w_i$, and as a result, a higher value of measurement error in CPI.

In the CPI calculation in China, the increases in housing and gasoline prices are neglected. Understandably, the inclusion of such price increases in housing and gasoline would lead to further increase in CPI value. The housing price is still based on the stale standard of 2002. In that cooperative housing construction and allocation environment, it's not surprising that the housing expenditure is only a small part of overall household expenditures. But after yeas of continuous increase in real estate prices, housing expenditures now occupies an important part in overall household expenditure. Without taking into account the housing price increase, the calculated CPI would not reflect the real CPI.

Gasoline price is another important element that is neglected. In the 2002 standard, with limited ownership of private cars, the weight of gas in CPI is relatively small. In 2002, the average oil price was only $22.5 a barrel. But in recent years, especially in 2008, the oil price has increased significantly, reached as high as $140 a barrel. With the expansion of private car ownership, the gasoline expenditure represents an important part in daily household expenditures, especially among urban households. Therefore, without considering the increase in oil prices, the calculated

CPI may not be very representative.

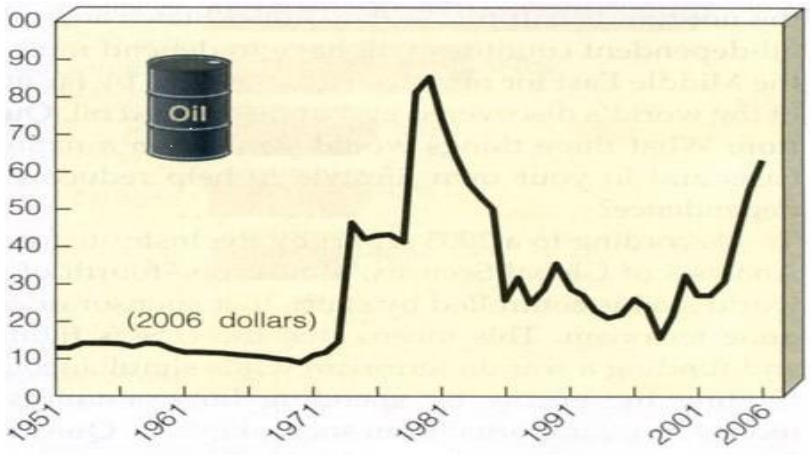


Figure 5 Global Oil Movements, 1951-2006

Sources: website of National Bureau of Statistics of China.

In addition to oil prices and housing prices, there are many other new categories of goods and services that are not considered, or not adequately considered in CPI due to its less frequent adjustments. Without these new categories, the CPI is not representative. On the other hand, if the adjustment is too frequent, the CPI may lose it comparability. Since these two objectives cannot be achieved at the same time, facing the constantly changing market situation, it's more important to ensure that the CPI reflects the economic reality and serves the purpose of aiding in the policy-formation process of national economic monitoring and supervision. Therefore, we would suggest that the CPI update cycle be reduced, and the new CPI cycle should be selected with the necessary predictability to improve it effectiveness in application.

Secondly, the extraordinary inflation is not taken into consideration in CPI calculation

CPI in China reached a high level of 8.7% in February 2008, mainly due to the significant price increase caused by the snow storm in certain regions and general price increases in other regions. But in CPI calculation, we should not include the impact of natural disasters, such as the snow storm.

The objective of CPI is to reflect the macroeconomic trends and household expenditures. It's not necessary to include seasonal demand changes and inflation caused by extraordinary factors. Under these circumstances, the CPI should be adjusted accordingly, which is not conducted in the CPI calculation in China. One popular practice in other countries is to adjust the CPI index with the inflation value.

Let's assume that there are n goods and services with prices of $P_1,P_2,P_3 \ldots P_n$, each has a weight of $W_1,W_2,W_3 \ldots W_n$ respectively and their prices for the same period in the previous year are $P'_1,P'_2,P'_3 \ldots P'_n$. Assume also that the inflation caused by seasonal factors and extraordinary element is p%. For a basket of m goods and services, the price increases are respectively $q_1\%$, $q_2\%$, $q_3\%$, …, $q_m\%$. Then the adjusted CPI is:

$$\{\sum_{i=1}^{m} P_i W_i[1/(1-q_i)] + \sum_{i=1}^{n} P_i W_i - \sum_{i=1}^{m} P_i W_i\} / \sum_{i=1}^{n} P'_i W_i - 1$$

The inflation, p, can be expressed approximately as:

$$p = k(q_1 W_1 + q_2 W_2 + ...q_m W_m) / m(W_1 + W_2 + ...W_m)$$

$$= k\sum_{i=1}^{m} q_i W_i / m\sum_{i=1}^{m} W_i \qquad \text{(where k is a constant value)}$$

Apparently, an increase in the extraordinary inflation value, p, would lead to the increase in the value of q, which in turn, increases the measurement error in CPI. Therefore, major natural disasters, such as snow storms, not only push up the inflation, but also disturb the usual CPI calculation. Without effective means to deal with these disturbances, the calculated CPI would be less representative.

Finally, the scheme of data collection can cause low quality of data

The current CPI calculation model has its sequential steps of operations: the selection of representative categories, followed by price sampling spots selection, calculation of weights and average prices, and finally the CPI calculation. Therefore, the basic data are generated from sampling. The unavoidable sampling error would also affect the CPI calculation. To generate the CPI source data, the sampling spots are decided by sorting the commercial centers with total sales first and then chosen through equidistant sampling.

Total sales are decided by the sales volume of goods and sevicess. When the sales volumes are equal, commercial centers with higher prices would generate more total sales. This leads the figures of total sales and prices to the proximity of wave function. If the distance of the equidistant sampling is close to the cycle of prices, this would lead to a higher or lower value of the collected data, which in turn, affects the reliability of CPI.

To generate the source data of CPI index, the household income and the total sales of commercial centers are sorted. Items in specialty shops and other goods are collected with equidistant sampling. Based on these data, the product prices and weights are derived for the final CPI calculation. Since the data sources are closely related, the equidistant samplings are conducted with the similar fashion, the data from different approaches tends to be the same. Therefore, the CPI calculated from these data will certainly move away from its real value.

4. Re-measurement and Adjustment of CPI in China

Since it’s difficult to acquire all the data related to the CPI component goods and services filtering and their weights determination, coupled with time constraints, we can fully utilize the published data and research results from the website of National Bureau of Statistics of China, combined with on-location survey, expert opinions, and

available mathematic models, to re-measure and adjust the CPI index in China with the 2006 report year as example.

● ***Determining the CPI Components and Their Weights***

Based on the following principles, this article adjusted the current CPI components and their weights.

Firstly, The CPI in China does not include the increases in real estate prices. The real estate prices are rising continuously and represent an important part in household expenditures and therefore, should be "included" in the category of housing. Measurement result shows that after the inclusion of real estate prices, the weight of "housing" rises to 25%, much higher than the current weight of 11%, and becomes the biggest expenditure category.

Secondly, Current education expenditures are based on the standard of 2002, which is clearly not ideal. The impact of high tuition fees and scale expansion in universities is increasing. The uniform tuition fee policy has not been widely adopted by elementary and secondary schools. This has increased the weight of education costs in household expenditures. As for the category of "Entertainment, Education and Cultural Goods and Services", its weight is measured as 18%. The mere 4% increase is due to the fact that the original education portion is not significant in the overall expenditure for "Entertainment, Education and Cultural Goods and Services" and the increase in educational expenditures is not too big on the national level.

Thirdly, The huge increase in oil prices is not reflected in the category of "Transportation and Communications". With the new CPI weighting scheme, the weight for "Transportation and Communications" is adjusted to 15%, an increase of about 3%. This is due to the fact that oil price increase only has a major impact on the expenditures of urban households, with a lesser impact on rural populations.

Fourthly, As for the decrease in weights of certain categories, such as health care, it's due to the fact that the proportion of these expenditures in the overall expenditures has decreased, even though the absolute expenditures may have grown. All in all, this is caused by the rapid growth of certain items.

With the inflationary elements deducted, we have the adjusted CPI weights in China as follows:

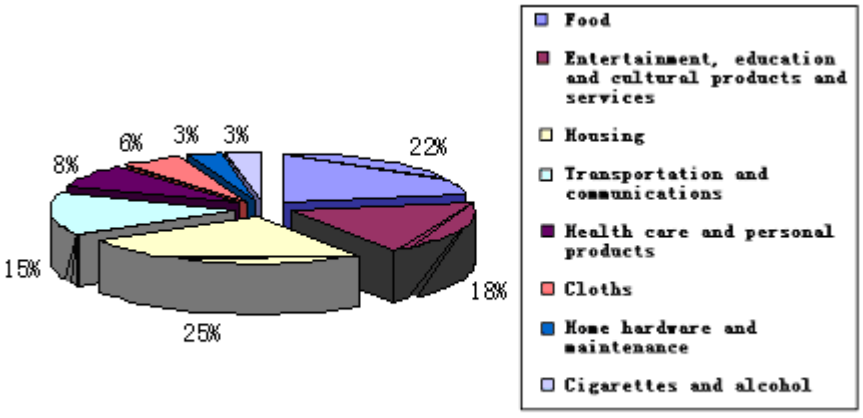


Figure 6 Adjusted CPI Weights in China

Sources: website of National Bureau of Statistics of China.

● ***Measurement of CPI Using Mathematic Model***

Statistics data shows that in 2006, the real estate prices increased 5.9% above the previous year, educational expenditures increased 4.8%, transportation (only) expenditure increased 4.1%. With these data and new calculations, among the 8 main categories in 2006 CPI index, the real increase is 2.5% for foods, 2.9% for entertainment, education and cultural goods and services, 5.1% for housing, 3.7% for transportation and communications, 1.1% for health care and personal products, 1.5% for cloths, 1.2% for household hardware and maintenance, 0.6% for cigarettes and alcohol. Denoting these data with $k_1,k_2 \ldots k_8$ and feeding them as input into the CPI mathematic model, then we have:

$$S_{CPI} = \sum_{i=1}^{8} W_i k_i$$

$$\approx 0.225*102.5 + 0.18*102.9 + 0.255*105.1$$

$$+0.145*103.7 + 0.08*101.1 + 0.055*101.5 +$$

$$0.03*101.2 + 0.03*100.6$$

$$= 103.146$$

i.e., the CPI for 2006 is approximately 3.1465.

However, the officially published CPI figure for 2006 is 1.48%, which is half the figure generated by this article. It seems that 2006 was a year with stable CPI level and effective inflation control. But the reality tells a different story. Based on our calculation, 2006 was a year of significant inflation with the CPI increase of greater than 3%. It can be deduced that in 2007, the macroeconomic policy was not strong enough, which lead to the rapid price and CPI increases in 2007 and first half of 2008.

Should the mathematic model and CPI weights in this article were used, with adequate consideration given to commodity housing prices, high oil prices and educational expenditures, etc., the CPI figures for 2007 would surely be greater than those officially published by the government. It can be argued that without the scientific and reliable CPI data in place, the macroeconomic policy is doomed to fail.

5. Suggestions on Policy

There are numerous ways to improve the CPI calculation, with the expertise and approaches from other developed nations as references and with adjustments according to the reality in China. We would like to suggest at least the following methods to ensure that the CPI index in China is more reliable and better designed.

● ***Adjust CPI base year cycle in a more timely fashion.***

The CPI calculation in China can consult with the US and European standards, and conduct more minor adjustments to the original system without losing the overall comparability. This will increase the effectiveness in application and reliability of the CPI index.

● ***Take full account of the impact of extraordinary inflation.***

The main objective of CPI is to reflect the macroeconomic trends and household expenditures. Therefore, there is no need to include into the CPI calculation the demand changes caused by seasonal factors and the inflation caused by extraordinary factors. One practical approach is to modify and adjust the CPI index, which has not yet been practiced in the CPI calculation in China.

● ***Disclose the CPI results together with the calculation methods.***

Informed public can exercise the best supervision. If a published CPI calculation method can convince the public and experts, domestic and foreign, it should be reliable. Any unreliable method can be improved with inputs from questioning parties. The CPI weights and calculation methods should be disclosed to the public. It won't do any harm to the national interest but to more effectively utilize social resources and to ensure the reliability of CPI calculation.

● ***Calculate the CPI on the basis of household income levels.***

As a result of rapid economic development in China, the income per capita in China has increased with the emergence of certain high-income groups. There also exist a considerable low-income group, and the middle-income class in-between. The income gap among these three population groups will only get wider as the economy continues to grow. The consumption capability, structure, quantity, and quality for households from different income levels are different. Generally, people with higher income have a higher level of consumption and more tolerance against price increases. On the other hand, low income level leads to low tolerance against price increase. One single CPI index cannot reflect the impact of price volatility on different population groups of different income levels. It cannot aid in establishing the policy targeting different income levels. Therefore, on the basis of current CPI index, it would be more useful to develop new consumer price index series according to different income levels.

● ***Modify CPI after its publication.***

The CPI for previous months is usually published on 11^{th} to 14^{th} of the current month. Due to the unavailability of certain data, the CPI calculation has to use estimates for certain parameters or exclude certain data. This would add to the discrepancy of the CPI index, which can reduce the reliabilities of quarterly and yearly CPI data. On the other hand, to ensure that CPI data can be employed more practically, it needs to be published as early as possible. To balance between the reliability and calculation efficiency, it may be better to adjust the CPI data one or two

months after its publication, such as improve or modify the effective digits of published numbers. In so doing, the reliability of figures can be improved over time, while relatively reliable results can be received earlier by various parties.

To summarize, the current CPI in China has reached a worrisome level. Its continuous rise will affect the economic growth negatively. At this critical moment, if we cannot face the rapid increase of CPI and employ effective means to control inflation, the future economic development in China will encounter even greater pressures and challenges.

Appendix 1: Consumer Price Indices by Category (2006)

(preceding year=100)

Item	National Indices	Urban Indices	Rural Indices
Consumer Price Index	101.5	101.5	101.5
Food	102.3	102.5	102.1
Grain	102.7	102.7	102.9
Rice	104.3	104.2	104.4
Flour	99.7	99.7	99.7
Starches and Tubers	101.8	100.1	104.3
Beans and Bean Products	100.8	100.6	101.1
Oil or Fat	98.6	98.9	98.3
Meal, Poultry and Processed Products	97.1	97.1	97.0
Eggs	96.0	96.0	96.0
Aquatic Products	101.2	101.5	100.6
Vegetables	108.2	108.2	108.4
Fresh Vegetables	108.2	108.2	108.2
Flavoring	102.3	102.1	102.5
Carbohydrate	111.2	109.7	113.4
Tea and Beverages	101.0	101.1	100.8
Tea	101.2	101.2	101.4
Beverages	100.9	101.1	100.4
Dried and Fresh Melons and Fruits	117.9	117.2	119.9
Fresh Fruits	121.5	120.2	124.9
Cake, Biscuit and Bread	101.3	101.5	101.0
Milk and Its Products	100.9	100.9	100.8
Dining Out	101.6	101.7	101.4
Other Foods and Manufacturing Services	101.2	101.2	101.2
Tobacco, Liquor and Articles	100.6	100.8	100.3
Tobacco	100.2	100.2	100.1
Liquor	101.2	101.9	100.6
Articles for Smoking and Drinking	100.7	100.8	100.3
Clothing	99.4	99.4	99.6
Garments	99.0	99.0	99.1
Clothing Material	100.5	100.2	100.8
Footgear and Hats	100.2	100.2	100.4
Clothing Manufacturing Services	101.5	101.6	101.3
Household Facilities, Articles and Services	101.2	101.3	101.0
Durable Consumer Goods	100.8	100.9	100.6
Furniture	100.2	100.2	100.3
Household Facilities	101.2	101.3	100.8
Interior Decorations	100.0	100.0	100.0

Bed Articles	99.6	99.4	99.9
Daily Use Household Articles	101.1	101.1	101.2
Household Services and Maintenance and Renovation	105.8	106.0	105.0
Health Care and Personal Articles	101.1	100.9	101.5
Health Care	100.2	100.0	100.6
Medical Instrument and Articles	97.2	97.6	96.9
Traditional Chinese Medicine	99.9	100.0	99.6
Western Medicine	98.4	98.2	98.8
Health Care Appliances and Articles	100.3	100.4	100.0
Health Care Services	103.0	102.6	103.6
Personal Articles and Services	103.2	103.0	103.4
Cosmetics	99.7	99.6	100.0
Sanitation Articles	99.9	99.8	99.9
Personal Ornaments	110.8	111.5	109.4
Personal Services	102.5	102.2	103.0
Transportation and Communication	99.9	99.3	101.3
Transportation	103.2	102.6	104.4
Transportation Facility	97.8	96.8	99.3
Fuels and Parts	112.8	113.0	112.4
Fees for Vehicles Use and Maintenance	102.4	102.6	102.1
Incity Traffic Fare	104.8	104.1	107.5
Intercity Traffic Fare	105.6	104.1	107.8
Communication	96.4	96.1	97.2
Communication Facility	82.2	79.6	87.6
Communication Service	100.0	99.9	100.3
Recreation, Education and Culture Articles	99.5	100.0	98.6
Durable Consumer Goods for Cultural and Recreational Use and Services	94.2	93.2	96.1
Education	100.0	101.0	98.5
Teaching Materials and Reference Books	100.3	100.7	99.6
Tuition and Child Care	100.0	101.0	98.4
Cultural and Recreational Articles	101.0	101.1	100.9
Cultural Articles	99.6	99.5	99.8
Newspapers and Magazines	100.7	100.7	100.6
Expenditure on Culture and Recreation	102.6	102.5	103.0
Touring and Outing	103.1	103.3	102.1
Residence	104.6	104.7	104.6
Building and Building Decoration Materials	103.9	103.9	103.9
Renting	102.7	102.5	103.8
Private Housing	103.7	103.9	103.3
Water, Electricity and Fuels	105.9	105.9	105.8

Source： Website of National Bureau of Statistics of China

Appendix 2：Consumer Price Indices by Category (2005)

(preceding year=100)

Item	National Indices	Urban Indices	Rural Indices
Consumer Price Index	101.8	101.6	102.2
Food	102.9	103.1	102.5
Grain	101.4	101.5	101.3
Rice	101.2	101.3	101.1
Flour	100.2	100.2	100.1
Starches and Tubers	105.5	105.9	104.7
Beans and Bean Products	102.4	102.1	103.0
Oil or Fat	94.3	94.0	94.4
Meal, Poultry and Their Products	102.5	102.1	103.1
Eggs	104.6	104.2	105.4
Aquatic Products	105.9	106.1	105.5
Vegetables	109.1	110.0	106.8
Fresh Vegetables	110.4	111.0	108.7
Flavoring	101.4	101.2	101.5
Carbohydrate	104.0	102.9	105.6
Tea and Beverages	100.1	100.1	100.2
Tea	100.8	100.8	100.7
Beverages	99.8	99.8	99.8
Dried and Fresh Melons and Fruits	102.2	102.8	100.6
Fresh Fruits	101.6	102.3	99.5
Cake, Biscuit and Bread	100.9	100.8	101.2
Milk and Its Products	100.9	100.7	101.9
Outward Dinner	102.4	102.6	101.7
Other Foods and Manufacturing Services	101.3	101.6	101.0
Tobacco, Liquor and Articles	100.4	100.3	100.5
Tobacco	100.4	100.4	100.4
Liquor	100.6	100.4	100.8
Articles for Smoking and Drinking	99.6	99.6	99.8
Clothing	98.3	98.0	99.1
Garments	98.1	97.9	98.7
Clothing Material	100.0	99.7	100.4
Footgear and Hats	98.3	97.7	99.4
Clothing Manufacturing Services	101.1	101.1	101.1
Household Facilities, Articles and Services	99.9	99.7	100.3
Durable Consumer Goods	98.8	98.6	99.3
Furniture	99.2	98.8	99.9
Household Facilities	98.5	98.4	98.7

Interior Decorations	99.5	99.0	100.2
Bed Articles	99.4	99.1	100.0
Daily Use Household Articles	100.4	100.3	100.5
Household Service and Manufacturing Upkeep	104.4	104.1	104.9
Health Care and Personal Articles	99.9	99.6	100.5
Health Care	99.5	99.2	100.1
Medical Instrument and Articles	97.4	97.7	97.1
Traditional Chinese Medicine	96.5	96.8	96.0
Western Medicine	97.7	97.7	97.7
Health Care Appliances and Articles	100.0	100.0	99.8
Health Care Services	105.2	104.8	105.6
Personal Articles and Services	100.8	100.6	101.2
Cosmetics	99.4	99.2	100.0
Sanitation Articles	99.4	99.5	99.4
Personal Decorations	101.6	101.9	101.2
Personal Services	101.9	101.3	102.6
Transportation and Communication	99.0	98.4	100.3
Transportation	101.5	101.1	102.0
Transportation Facility	97.3	96.2	98.4
Fuels and Parts	110.3	110.9	109.5
Using and Upkeep Fare	102.0	102.2	101.5
Incity Traffic Fare	102.2	101.9	103.6
Intercity Traffic Fare	103.3	102.4	104.3
Communication	96.6	96.2	97.7
Communication Facility	84.1	81.1	91.1
Communication Service	99.6	99.7	99.6
Recreation, Education and Culture Articles	102.2	101.3	103.8
Durable Consumer Goods for Cultural and Recreational Use and Services	93.8	92.9	95.9
Education	105.1	104.3	106.0
Teaching Materials and Reference Books	100.9	100.9	100.8
Tuition and Child Care	105.4	104.7	106.3
Cultural and Recreational Articles	101.2	101.3	100.6
Cultural Articles	99.8	99.8	99.9
Newspapers and Magazines	100.8	100.8	100.7
Expenditure of Culture and Recreation	102.9	103.0	102.0
Touring and Outgoing	99.6	99.4	100.5
Residence	105.4	105.6	105.2
Building and Building Decoration Materials	102.6	102.6	102.7
Renting	101.9	101.6	103.3
Private Housing	105.6	106.8	102.0
Water, Electricity and Fuels	108.6	107.7	110.3

Source： Website of National Bureau of Statistics of China

Appendix 3：Consumer Price Indices by Category (2004)

(preceding year=100)

Item	National Indices	Urban Indices	Rural Indices
Consumer Price Index	103.9	103.3	104.8
Food	109.9	109.1	111.5
Grain	126.4	125.7	127.7
Rice	133.2	132.2	134.9
Flour	124.1	122.9	125.5
Starches and Tubers	106.8	105.6	109.3
Bean and Its Products	120.5	120.8	119.9
Oil or Fat	118.2	115.1	121.8
Meal, Poultry and Their Products	117.6	117.9	117.1
Eggs	120.2	120.4	119.6
Aquatic Products	112.7	111.9	114.7
Vegetables	95.1	94.2	97.4
Fresh Vegetables	93.9	93.3	95.6
Flavoring	101.5	102.0	101.0
Carbohydrate	102.2	101.6	103.0
Tea and Beverages	100.0	100.1	99.8
Tea	101.1	101.4	100.5
Beverages	99.5	99.5	99.4
Dried and Fresh Melons and Fruits	104.0	103.8	104.5
Fresh Fruits	102.2	102.2	102.4
Cake, Biscuit and Bread	101.6	101.9	101.0
Milk and Its Products	100.5	100.2	101.8
Outward Dinner	104.1	103.8	104.6
Other Foods and Manufacturing Services	101.2	101.1	101.4
Tobacco, Liquor and Articles	101.2	101.2	101.3
Tobacco	100.9	100.6	101.1
Liquor	102.2	102.8	101.7
Articles for Smoking and Drinking	99.3	98.8	100.7
Clothing	98.5	98.5	98.4
Garments	98.3	98.4	98.1
Clothing Material	100.2	99.9	100.5
Footgear and Hats	98.3	98.2	98.6
Clothing Manufacturing Services	100.7	100.6	100.8
Household Facilities, Articles and Services	98.6	98.1	99.7
Durable Consumer Goods	97.1	96.6	98.3
Furniture	98.9	98.6	99.4
Household Facilities	96.1	95.7	97.3
Interior Decorations	99.2	99.1	99.4
Bed Articles	99.3	98.6	100.5

Daily Use Household Articles	99.8	99.5	100.4
Household Service and Manufacturing Upkeep	101.9	101.3	103.3
Health Care and Personal Articles	99.7	99.2	100.5
Health Care	99.1	98.4	100.1
Medical Instrument and Articles	102.3	103.3	101.6
Traditional Chinese Medicine	98.9	98.9	99.1
Western Medicine	94.9	95.3	94.1
Health Care Appliances and Articles	98.6	99.2	96.9
Health Care Services	105.2	103.6	106.8
Personal Articles and Services	101.2	101.0	101.3
Cosmetics	98.8	98.8	99.0
Sanitation Articles	98.4	98.2	98.8
Personal Decorations	104.5	106.1	102.7
Personal Services	101.8	101.3	102.4
Transportation and Communication	98.5	97.9	99.8
Transportation	100.4	100.1	100.7
Transportation Facility	96.5	95.1	97.8
Fuels and Parts	107.7	108.1	107.1
Using and Upkeep Fare	101.0	101.2	100.7
Incity Traffic Fare	101.0	101.1	100.5
Intercity Traffic Fare	102.5	101.6	103.4
Communication	96.8	96.2	98.4
Communication Facility	84.3	82.0	89.9
Communication Service	99.8	99.5	100.7
Recreation, Education and Culture Articles	101.3	100.8	102.1
Durable Consumer Goods for Cultural and Recreational Use and Services	93.3	92.6	94.8
Education	103.4	103.1	103.8
Teaching Materials and Reference Books	102.8	102.5	103.4
Tuition and Child Care	103.4	103.2	103.8
Cultural and Recreational Articles	101.1	101.3	100.2
Cultural Articles	99.4	99.4	99.3
Newspapers and Magazines	100.6	100.5	100.7
Expenditure of Culture and Recreation	103.2	103.5	101.7
Touring and Outgoing	100.6	100.8	100.5
Residence	104.9	104.3	105.8
Building and Building Decoration Materials	104.3	103.2	104.8
Rent	103.0	103.1	102.6
Private Housing	100.9	100.9	101.1
Water, Electricity and Fuels	107.5	106.7	109.1

Source： Website of National Bureau of Statistics of China

Appendix 4: Consumer Price Indices by Category (2003)

(preceding year=100)

Item	National Indices	Urban Indices	Rural Indices
Consumer Price Index	101.2	100.9	101.6
Food	103.4	103.4	103.4
Grain	102.3	102.3	102.2
Rice	103.1	103.2	102.9
Flour	101.8	101.6	102.0
Starches and Tubers	100.6	100.4	100.9
Bean and Its Products	106.5	106.3	106.7
Oil or Fat	112.6	112.0	113.4
Meal, Poultry and Their Products	103.3	102.8	104.2
Eggs	98.6	98.3	99.0
Aquatic Products	100.3	100.5	99.9
Vegetables	117.7	119.2	113.4
Fresh Vegetables	120.5	121.1	118.0
Flavoring	100.1	99.5	100.8
Carbohydrate	97.5	98.9	95.5
Tea and Beverages	99.2	99.2	98.9
Tea	99.7	99.5	99.9
Beverages	98.9	99.1	98.2
Dried and Fresh Melons and Fruits	103.0	102.6	104.2
Fresh Fruits	101.8	101.6	102.5
Cake, Biscuit and Bread	99.3	99.2	99.6
Milk and Its Products	99.2	99.2	99.0
Outward Dinner	100.1	100.1	100.2
Other Foods and Manufacturing Services	99.1	99.0	99.2
Tobacco, Liquor and Articles	99.8	99.8	99.9
Tobacco	99.8	99.7	99.9
Liquor	100.1	100.2	100.1
Articles for Smoking and Drinking	99.3	99.2	99.4
Clothing	97.8	97.4	98.6
Garments	97.6	97.3	98.5
Clothing Material	99.2	98.7	99.8
Footgear and Hats	97.7	97.4	98.4
Clothing Manufacturing Services	100.1	99.9	100.8
Household Facilities, Articles and Services	97.4	97.0	98.3
Durable Consumer Goods	95.8	95.3	97.1
Furniture	97.9	97.5	98.5
Household Facilities	94.6	94.3	95.8

Interior Decorations	98.8	98.6	99.3
Bed Articles	98.4	97.9	99.5
Daily Use Household Articles	98.3	98.0	98.7
Other Household Service and Manufacturing Upkeep	101.1	101.1	101.1
Health Cares & Personal Articles	100.9	99.8	102.5
Medical Appliances and Articles	101.2	99.8	103.5
Medical Instrument and Articles	101.0	100.8	101.2
Traditional Chinese Medicine	105.0	104.0	107.4
Western Medicine	94.5	94.1	95.2
Health Care Appliances and Articles	98.2	98.2	98.2
Health Care Services	108.9	107.6	110.0
Personal Articles and Services	100.2	100.0	100.4
Cosmetic	99.5	99.7	98.9
Sanitation Article	97.1	96.3	98.4
Personal Decorations	102.9	104.5	101.2
Personal Service	100.8	100.2	101.2
Transportation and Communication	97.8	97.4	98.6
Transportation	99.5	99.6	99.4
Transportation Facility	95.9	95.5	96.2
Fuels and Parts	108.3	108.8	107.4
Using and Upkeeping Fare	98.9	99.5	97.8
Incity Traffic Fare	100.6	100.6	100.6
Intercity Traffic Fare	101.4	100.2	102.6
Telecommunication	96.1	95.7	97.4
Telecommunication Facility	82.1	79.8	87.6
Telecommunication Service	99.4	99.1	100.1
Recreation, Education and Culture Articles	101.3	100.5	102.8
Durable Consumer Goods for Recreational Use	92.7	92.0	94.1
Education	104.3	103.9	104.8
Teaching Materials and Reference Books	101.7	102.0	101.0
Tuition and Children Care	104.5	104.1	105.0
Cultural and Recreational Articles	101.3	101.7	99.6
Cultural Articles	98.7	98.7	98.7
Newspapers and Magazines	100.4	100.5	100.1
Expenditure of Entertainment	104.6	105.0	101.5
Touring and Outgoing	95.4	95.1	99.0
Residence	102.1	102.8	101.0
Building and Building Decoration Materials	99.5	99.2	99.7
Rent	103.5	103.8	101.5
Private Housing	99.1	98.8	100.1
Water, Electricity and Fuels	105.7	106.5	103.9

Source： Website of National Bureau of Statistics of China

Appendix 5：Fixed base index of CPI since1978

Year	Consumer Price Indices	Urban Consumer Price Indices	Rural Consumer Price Indices	Price Indices of Retails Goods	Price Indices of Manufactured Goods
	(1978=100)	(1978=100)	(1985=100)	(1978=100)	(1985=100)
1978	100	100		100	
1980	109.5	109.5		108.1	
1985	131.1	134.2	100	128.1	100
1990	216.4	222	165.1	207.7	159
1991	223.8	233.3	168.9	213.7	168.9
1992	238.1	253.4	176.8	225.2	180.4
1993	273.1	294.2	201	254.9	223.7
1994	339	367.8	248	310.2	267.3
1995	396.9	429.6	291.4	356.1	307.1
1996	429.9	467.4	314.4	377.8	316
1997	441.9	481.9	322.3	380.8	315
1998	438.4	479	319.1	370.9	302.1
1999	432.2	472.8	314.3	359.8	294.8
2000	434	476.6	314	354.4	303.1
2001	437	479.9	316.5	351.6	299.2
2002	433.5	475.1	315.2	347	292.6
2003	438.7	479.4	320.2	346.7	299.3
2004	455.8	495.2	335.6	356.4	317.6
2005	464	503.1	343	359.3	333.2
2006	471	510.6	348.1	362.9	343.2

Source： Website of National Bureau of Statistics of China

Appendix 6: Gross Domestic Product since 1978

Data in this table are calculated at current prices. *100 million yuan*

Year	Gross National Income	Gross Domestic Product	Primary Industry	Secondary Industry	Tertiary Industry	Per Capita GDP(yuan)
1978	3645.2	3645.2	1027.5	1745.2	872.5	381
1979	4062.6	4062.6	1270.2	1913.5	878.9	419
1980	4545.6	4545.6	1371.6	2192.0	982.0	463
1981	4889.5	4891.6	1559.5	2255.5	1076.6	492
1982	5330.5	5323.4	1777.4	2383.0	1163.0	528
1983	5985.6	5962.7	1978.4	2646.2	1338.1	583
1984	7243.8	7208.1	2316.1	3105.7	1786.3	695
1985	9040.7	9016.0	2564.4	3866.6	2585.0	858
1986	10274.4	10275.2	2788.7	4492.7	2993.8	963
1987	12050.6	12058.6	3233.0	5251.6	3574.0	1112
1988	15036.8	15042.8	3865.4	6587.2	4590.3	1366
1989	17000.9	16992.3	4265.9	7278.0	5448.4	1519
1990	18718.3	18667.8	5062.0	7717.4	5888.4	1644
1991	21826.2	21781.5	5342.2	9102.2	7337.1	1893
1992	26937.3	26923.5	5866.6	11699.5	9357.4	2311
1993	35260.0	35333.9	6963.8	16454.4	11915.7	2998
1994	48108.5	48197.9	9572.7	22445.4	16179.8	4044
1995	59810.5	60793.7	12135.8	28679.5	19978.5	5046
1996	70142.5	71176.6	14015.4	33835.0	23326.2	5846
1997	78060.8	78973.0	14441.9	37543.0	26988.1	6420
1998	83024.3	84402.3	14817.6	39004.2	30580.5	6796
1999	88479.2	89677.1	14770.0	41033.6	33873.4	7159
2000	98000.5	99214.6	14944.7	45555.9	38714.0	7858
2001	108068.2	109655.2	15781.3	49512.3	44361.6	8622
2002	119095.7	120332.7	16537.0	53896.8	49898.9	9398
2003	135174.0	135822.8	17381.7	62436.3	56004.7	10542
2004	159586.7	159878.3	21412.7	73904.3	64561.3	12336
2005	184739.1	183867.9	23070.4	87364.6	73432.9	14103
2006	211808.0	210871.0	24737.0	103162.0	82972.0	16084

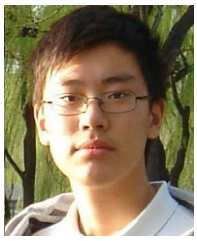
a) Since 1980, the difference between the Gross Domestic Product and the Gross National Income (formerly, the Gross National Product) is the net factor income from abroad.

b) Since the data of 1997's and 1999's balance of payment have been changed, the gross national income in 1997 and 1999 have been revised accordingly.

Appendix 7：Consumer Price Index by Category (2008.06)

Item	The same month last year =100			The same period last year =100		
	Total	Urban	Rural	Total	Urban	Rural
Consumer Price Index	107.1	106.8	107.8	107.9	107.6	108.6
1. Food	117.3	117.3	117.2	120.4	120.0	121.0
Grain	108.7	108.7	108.7	107.2	107.5	106.8
Meat, Poultry and Their Products	127.3	128.4	124.9	140.6	141.1	139.5
Eggs	102.9	102.8	103.1	104.9	104.4	105.6
Aquatic Products	118.3	117.4	120.8	114.3	113.8	115.8
Fresh Vegetables	108.3	107.8	109.6	119.6	119.0	121.4
Fresh Fruits	114.2	114.2	114.5	109.8	109.6	110.7
2. Tobacco, Liquor and Articles	103.1	103.3	102.8	102.6	102.8	102.3
3. Clothing	98.5	98.2	99.3	98.5	98.1	99.4
4. Household Facilities, Articles and Services	102.9	103.1	102.4	102.5	102.6	102.2
5. Health Care and Personal Articles	103.1	103.0	103.4	103.4	103.2	103.8
6. Transportation and Communication	98.9	98.1	100.6	98.6	97.9	100.2
7. Recreation, Education and Culture Articles	99.0	98.8	99.4	99.2	99.1	99.4
8. Residence	107.7	106.4	110.4	106.9	106.2	108.3

Source： Website of National Bureau of Statistics of China



About the Author

YE Yifan, aged 16, is the students of the high school affiliated to Renmin University of China. He is not only a member of youth league committee of student union, but also actively involved in various organizations like MUN.

During the 3-year study in New York, he once joined in the Gifted Program through highly selective reviews. He sets his mind on applying for economics major of top foreign university and working for international organization, insurance agent or foreign banks. He hopes to run his own bank, contributing to the society and alma mater.

He has a strong inclination for books on technology, history, economy, biography and literature, 2/3 of which are in English. So far, he has read almost 2000 English originals. English TV programs are his favorite. It is English performance that makes him stand out. He won many national and city-level English competitions. Moreover, math contests witness his mathematical talent.

With the recommendation of school, he had almost 10 essays, like Beauty of Incompletion，Eternal moon，Wisdom in Water， Passage of Youth in Memory，and Taste of Song Poetry by Su Shi，published on the magazine of Zuowen Tongxun and Composition and Exam, recently, he has finished his first essay collection Lonely Moon.

Since he develops a strong passion for economics under the influence of his parents engaged in financial industry, he reads books on economy extensively in spare time. His endeavor brings many credits to him:

- Top 100 of 18,000 examinees of Haidian area, Beijing in 2008 high school entrance exam.
- Passed PETS-5(National Public English Test System), equivalent to the average English level of graduate students.
- Passed GESE-7(Grade Examinations in Spoken English) held by Trinity College, Cambridge with excellent score
- 1st prize winner of Beijing Youth English competition and ranked No.5 in the national final as one of the 3 representatives from Beijing
- 1st prize winner of the Innovative Technology English Competition in Beijing for 3 years in a row among primary and middle school students.
- 1st prize winner of National Mathematics Competition in “I love mathematics” camp held by China Mathematical Society.
- Participated in AIME as a winner of AMC 10 math contest.
- Trained in the headquarter of the Chartered Bank
- Joined in the training program of economic theories given by Mckinsey.
- Succeeded in “banker of future” essay writing competition
- 2008 school erudition prize winner