

Assessing China's Economic Prospects in the Context of Deflationary Trends

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Abstract. Consumer Price Index (CPI) is an crucial economic indicator which measures the changes in consumer prices and it reflects inflation. It is closely related to economic growth and its stability, and it's influenced by both domestic factors and global factors. Each country could make effective economic policies with the help of CPI. This study delves into the intricate dynamics of the Consumer Price Index (CPI) in China, examining its temporal fluctuations and underlying factors. By analyzing historical data spanning multiple years, it uncovers trends in inflation rates, identifying both inflationary and deflationary pressures that shape the purchasing power of Chinese consumers. The analysis highlights key economic indicators influencing CPI variations, including commodity prices, monetary policy adjustments, supply chain disruptions, and global economic conditions. Furthermore, the study assesses the impact of these changes on various sectors and consumer segments, providing insights into the resilience and adaptability of the Chinese economy in the face of fluctuating price levels. Ultimately, this comprehensive examination aims to offer policy recommendations for maintaining price stability and fostering sustainable economic growth.

Keywords: Consumer Price Index (CPI), deflationary trend, China

1. Introduction

China's Consumer Price Index (CPI) is an important macroeconomic indicator to measure the changes in the level of consumer prices in China, which reflects the changes in the costs paid by residents to purchase physical goods and services. As a key indicator of macroeconomic analysis and decision-making and national economic accounting, CPI is of great significance for evaluating the level of inflation, monitoring the health of the economy and formulating and adjusting economic policies. In recent years, China's economy has experienced rapid development, but also faced with complex and changeable economic environment at home and abroad. In the context of global economic integration, changes in the prices of international commodities, raw materials and fluctuations in the global economic situation will have a direct or indirect impact on China's CPI. In addition, the adjustment of China's internal economic structure, the upgrading of consumption, the implementation of monetary policy and macro-control policies are also important factors affecting the change of CPI [1].

It is particularly noteworthy that the change trend of China's CPI not only reflects the fluctuation of the price level, but also is closely related to economic growth, residents' income, social stability and other aspects. In recent years, China's CPI has shown low growth for many times, which is caused by internal factors such as decreasing domestic demand, falling prices of agriculture and services, as well as external factors such as low international commodity prices and changes in the global economic situation. Therefore, in-depth analysis of the causes and trends of China's CPI changes is of great significance for understanding China's economic operation and formulating scientific and reasonable economic policies [2].

As an important index to measure the level of inflation, CPI is directly related to the formulation and adjustment of national macroeconomic policies. Through in-depth study of CPI, the government can detect price fluctuations in time and predict inflation risks, so as to take targeted macro-control measures, such as adjusting monetary policies and fiscal policies, to maintain price stability and promote healthy economic development.



The change of CPI directly affects the living cost and consumption ability of residents. In daily life, CPI can be used as an important indicator to measure residents' living standards and happiness. By monitoring changes in the CPI, it is possible to understand the changes in the costs that residents need to pay when purchasing goods and services, so as to assess the improvement or decline of residents' quality of life. This is of great significance for the government to formulate livelihood policies and improve residents' living standards.

In foreign trade, the stability of CPI is directly related to the confidence of trading partners in China's economic environment. A stable CPI level can bring great confidence to trading partners and promote the smooth development of bilateral or multilateral trade. At the same time, the stability of CPI will also help accelerate the process of China's economic globalization and enhance China's status and influence in the global economic system.

This paper studies the fluctuation of China's CPI in recent years and its relationship with potential indicators such as time, which could influence the trends of China's economic situation. The author analyzes the changes of China's CPI between January 2021 and December 2023 and their effects to the economy by using linear regression models. It emphasizes the main economic indicators which influence CPI most and assesses the impact of these changes on each sector as well.

2. Method

As a basic and widely used statistical tool, linear regression model plays an important role in the analysis of consumer price index (CPI) changes in China. Linear regression models are designed to predict or explain changes in dependent variables by fitting a linear relationship between one or more independent variables (explanatory variables) and dependent variables. In this case, we pay particular attention to linear regression models that use time (in months) as the independent variable and CPI as the dependent variable, the so-called "near-end regression" application, which focuses on extracting linear trends from historical data and making future projections accordingly.

2.1. Basic Principle of Linear Regression Model

Linear regression models assume that the dependent variable (Y, such as CPI) is a linear function of the independent variable (X, such as time) plus an error term, that is:

$$Y = \beta_0 + \beta_1 X + \varepsilon \quad (1)$$

Where β_0 is the intercept term, β_1 is the slope coefficient, reflecting the average change in the dependent variable for each unit change in the independent variable, and ε is the random error term. Represents part of the variation that the model fails to account for. By means of methods such as least square method, we can estimate the values of β_0 and β_1 , thus obtaining the best fitting linear equation.

2.2. Applications of Proximal Regression in CPI Analysis

2.2.1. Data Preparation and Preprocessing

Before applying linear regression model, it is necessary to preprocess CPI time series data, including missing value processing, outlier detection and correction, data stationarity test, etc. In particular, since CPI data can be affected by seasonal factors, seasonal adjustments or methods such as seasonal differences may be required to eliminate seasonal effects to improve the accuracy of the model [3].

2.2.2. Model Construction and Parameter Estimation

The linear regression model is constructed with time (usually in the unit of month or year) as the independent variable and CPI as the dependent variable. By using linear regression functions in statistical software or programming languages (such as R, Python, etc.), the intercept term and slope coefficient of the model can be calculated to obtain a linear equation of the change of CPI over time.

2.2.3. Model Evaluation and Test

After building the model, it is necessary to evaluate it to test the fitting effect and prediction ability of the model. Commonly used evaluation indexes include coefficient of determination (R^2), mean square error (MSE), root mean square error (RMSE), etc. In addition, it is necessary to conduct a significance test on the model to ensure that the independent variables in the model have a significant impact on the dependent variables. At the same time, the residual analysis method is used to check whether the model satisfies the basic assumptions of linear regression, such as the normality and independence of the residual.

2.3. Limitations

Linear regression models assume a linear relationship between the independent variable and the dependent variable. However, in practical applications, economic indicators such as CPI may be affected by a variety of complex factors, and their changing trends may not be strictly linear. Therefore, linear regression models may not fully and accurately reflect the true state of the data.

Complex patterns or seasonality may not be captured: In addition to linear trends, CPI data may have complex patterns such as cyclical fluctuations, seasonal changes, and so on. Linear regression models have limitations in capturing these complex patterns, which can lead to a decline in model prediction accuracy. In order to overcome this limitation, you can consider using seasonal decomposition, time series decomposition and other methods to preprocess the data, or use more complex regression models (such as ARIMA, seasonal ARIMA, etc.) for modeling [4-6].

3. Data Analysis

Table 1. Monthly Changes in China’s CPI from January 2021 to December 2023.

Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
-0.30%	-0.20%	0.40%	0.90%	1.30%	1.10%	1.00%	0.80%	0.70%
Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22
1.50%	2.30%	1.50%	0.90%	0.90%	1.50%	2.10%	2.10%	2.50%
Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
2.70%	2.50%	2.80%	2.10%	1.60%	1.80%	2.10%	1.00%	0.70%
Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
0.10%	0.20%	0.00%	-0.30%	0.10%	0.00%	-0.20%	-0.50%	-0.30%

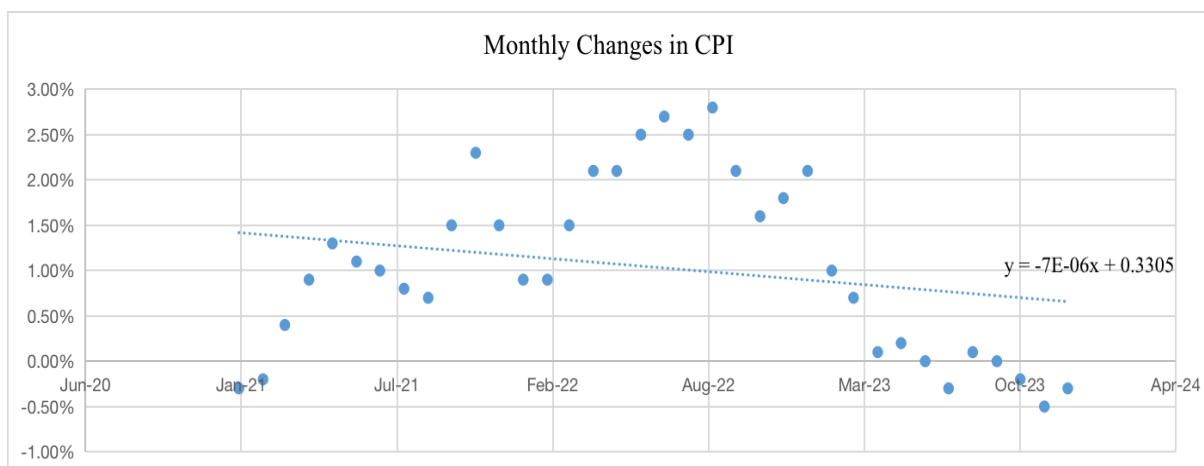


Fig 1. Monthly Changes in China’s CPI from January 2021 to December 2023.

Table 1 and Figure 1 indicate the monthly changes of China's consumer price index (CPI) from January 2021 to December 2023. It fluctuated significantly in the past two years, with the overall

trend showed a downward state. According to the principle of linear regression model, a relationship could be analyzed between CPI and time (per month), which is

$$y = -7E-06x + 0.3305 \quad (2)$$

The annual change rate of CPI in August 2023 was 0.1%, up 0.4 percentage points from the previous month, which reflects the gradual recovery of the Chinese economy after experiencing multiple challenges. Although the overall CPI growth rate is limited, there is some variation in the price changes of various sub-items, especially in the areas of food, housing and health.

From the CPI data for 2022, the annual rate of change for food and non-alcoholic beverages is as high as 3.7%, compared to -0.1% in 2021. This change is mainly influenced by rising global food prices and rising domestic agricultural production costs. At the same time, the prices of basic life services such as housing, water, electricity and gas also showed an upward trend, with an annual change rate of 2.8% in 2022, compared to -0.5% in 2021. This shows that the pressure of residents on the cost of living has increased. In terms of health consumption, the annual rate of change in 2022 is 2.8%, which is down from a high of 5.0% in 2021. This may be related to the changes in medical demand after the epidemic and the government's regulatory policy on the price of medical services. Nevertheless, health consumption still occupies an important position in residents' expenditure, reflecting people's attention to health management [7].

Clothing and footwear consumption showed a weaker trend, with an annual change rate of -0.2% in 2022, down from 1.6% in 2021. This phenomenon may be related to the fact that consumers are more inclined to conservative spending strategies amid economic uncertainty, especially on non-essential items. Transportation prices increased by 1.4% in 2022, slowing from 3.1% in 2021, mainly due to the impact of oil price fluctuations and policy regulation. In the context of unstable global energy markets, changes in transportation costs have a direct impact on the travel of residents and the transportation of goods [8].

The annual rate of change in entertainment and culture consumption was relatively stable at 0.6% in 2022, unchanged from 2021. This shows that in the process of economic recovery, residents' demand for cultural and recreational activities still exists, but the slow growth rate may be related to the lack of consumer confidence. Taken as a whole, the changes in China's CPI reflect the complexity of the macroeconomic situation. At present, in the face of weak global economic recovery and insufficient domestic demand, the Chinese government needs to take effective measures to stimulate consumption in order to promote sustained economic growth. By strengthening the supervision of basic consumer goods, optimizing the management of the supply chain, raising the level of residents' income and other measures, we can better cope with the pressure of inflation, restore consumer confidence, and promote healthy economic development.

According to the changes in China's Consumer Price Index (CPI) shown in Table 2, the overall CPI index in 2023 decreased by 0.3% year-on-year, which is in sharp contrast to the 1.8% growth in 2022. The reversal reflects the new challenges and pressures facing China's economy as it recovers from the epidemic. Prices of food and non-alcoholic beverages showed a significant decrease of 2.0% in 2023, while an increase of 3.7% was recorded in 2022. This change is likely to be closely related to the stabilization of domestic food production, the recovery of supply chains, and changes in market demand. With the gradual easing of the epidemic, consumers may have more diversified choices in terms of diet, further affecting the volatility of food prices.

The price of tobacco and alcohol products increased by 1.4% in 2023, a slight increase from 0.5% in 2022. This phenomenon may reflect the trend of consumers gradually resuming social activities after the epidemic and recovering demand for alcohol consumption. While the overall economy is under pressure, some categories of consumer demand are showing strong growth. In terms of clothing and footwear, prices edged up 0.3% in 2023, while a -0.2% decline was recorded in 2022. This shows that with the recovery of the economy, consumers are more willing to buy, especially during holidays

and promotions, clothing consumption gradually picks up. At the same time, it may also be related to rising production costs and rising raw material prices (Table 2).

Table 2. Changes in China's CPI Index (2022-2023).

	2023	2022	2021
CPI (overall index) [+]	-0.3%	1.80%	1.5%
Food and non-alcoholic beverages [+]	-2.0%	3.70%	-0.1%
Alcoholic beverages and tobacco [+]	1.4%	0.50%	0.6%
Clothing and footwear [+]	0.3%	-0.2%	1.6%
Housing, water, electricity, gas and other fuels [+]	2.9%	2.8%	-0.5%
Furniture, household equipment and maintenance [+]	0%	1.5%	0.8%
Health [+]	-2.2%	2.8%	5.0%
Transport [+]	1.8%	1.4%	3.1%
Recreation and culture [+]	1.4%	0.6%	0.7%

According to China's National Bureau of Statistics, CPI rose 0.5% in the year to July 2024. Although the price of food, tobacco and alcoholic beverages rose by 0.2% year-on-year in July, the growth rate of monthly catering income slowed by 2.4% to 3.0%, which was the lowest since March 2023. In addition, the consumption of cosmetics and gold, silver and jewelry decreased by 6.1% and 10.4% respectively, showing the downward pressure of consumption. Further more, big discretionary purchases, such as cars, dropped 4.9 percent in July since consumer confidence has weakened. In fact, the current economic situation is complicated, and the expectations of residents and businesses have turned negative. The central problem now is that unstable expectations have led to a lack of "willingness to borrow" by market players, so traditional fiscal and monetary policy tools are ineffective, and the government should change economic policy [5].

4. Conclusion

At present, China is still facing deflationary pressure to a certain extent, which is reflected in the continued low growth rate of the consumer price index (CPI), and even negative growth in some periods. This situation reveals the relative deficiency of aggregate demand, especially weak consumer demand, which poses a challenge to economic growth. Therefore, it is necessary to change the existing economic strategy and pay more attention to the development of the following aspects:

First of all, the government should intensify policy adjustment by implementing more proactive fiscal policies and prudent monetary policies to stimulate economic growth and boost consumer confidence. This includes measures such as cutting taxes and fees, increasing transfer payments and optimizing the structure of fiscal expenditure to raise the disposable income of residents and enterprises and enhance their consumption and investment capacity.

Secondly, we should pay attention to the trend of consumption upgrading, encourage and support enterprises to carry out technological innovation and product upgrading to meet the growing diversified and personalized needs of consumers. At the same time, we will strengthen the supervision of the consumer market, crack down on fake and shoddy products and unfair competition, and maintain good market order and the rights and interests of consumers. Promoting the growth of domestic demand through consumption upgrading is an important way to deal with deflation.

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