Assignment NO.1 FTS

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1. Download the data of monthly CPI from 2001 to 2022 of China.

   (a) Plot the line graph of CPI data

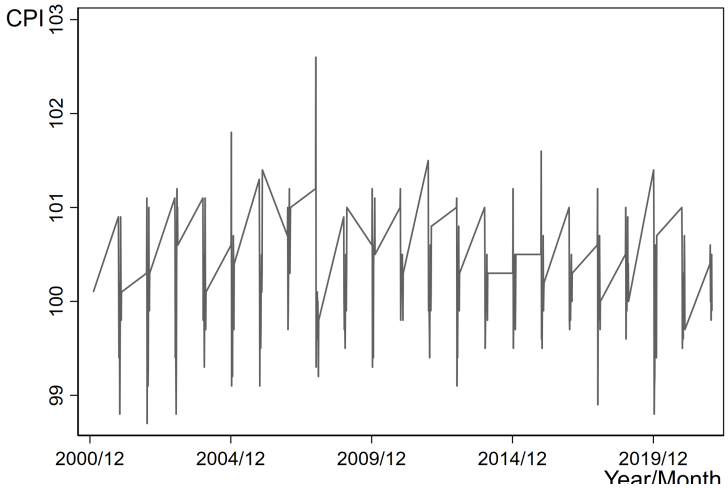

Figure 1: The Line Plot of CPI

NOTE: The data is download from National Bureau of Statistics of China, raging from December 2000 to August 2022. This dataset count Consumer Price Index regarding the preceding month as the base to be 100.

   (b) Calculate the inflation rate and the annualized inflation rate using CPI data.
   Denote the inflation rate to be $rinf$, and the annualized inflation rate to be $anrinf$.
   Use equation (1) to calculate the inflation rate

$$rinf_t = \frac{CPI_t - 100}{100} \qquad (t = 0, 2, ..., 260) \tag{1}$$

   Use equation (2) to calculate the annualized inflation rate

$$anrinf_t = (\frac{CPI_t}{100})^{12} - 1 \qquad (t = 0, 1, ..., 260) \tag{2}$$

   And the result is shown in appendix since there will be 261 observations.

(c) Calculate the mean, median, standard value and other statistics of inflation rate.

Table 1 Basic Statistics of the Inflation Rate

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
rinf	261	.18%	.10%	.006	-1.3%	2.6%

2. Use problem 1 as introduction to do the regression:

$$\pi_t = c + \alpha\pi_{t-1} + \varepsilon_t \tag{3}$$

(a) Show the result of regression.

Table 2 The Regression Result

VARIABLES	rinf
lrinf	.247***
	(.060)
Constant	.001***
	(.000)
Observations	260
R-squared	.061

NOTE: $lrinf$ denotes one period lagged inflation rate term. The coefficient of $lrinf$ and the constant are both significant. An increase of 1 unit in one period lagged inflation rate will increase current inflation rate by 0.247 units. But the R-squared 0.016 is small for a macro model, telling that this is not a model with that sufficient explanatory power.

(b) Plot the residual series of the regression equation.

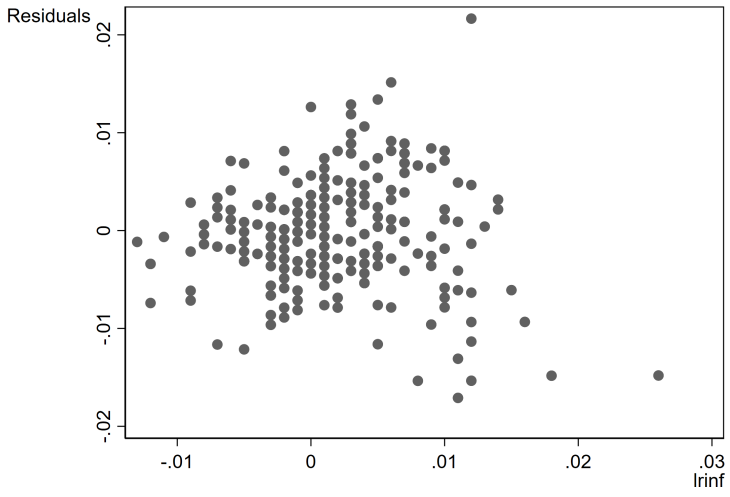

Figure 2: The Residual Plot of Inflation Rate

(c) Calculate skewness and kurtosis of residual series.

Skewness: -.0213846

Kurtosis: 3.836534

(d) How to test whether a residual series follows normal distribution?

Solution: use the code *sktest* in STATA to test the variable. Pay attention to the term Prob>chi2, whose value will be smaller if this variable is more likely to in accord wiht normal distribution.

Table 3 Skewness/Kurtosis Tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
res	260	.885	.021	5.350	.069

NOTE: Prob>chi2 is 0.069, which means at the confidence level of 5% , the residual term is not normally distributed. However, at confidence level of 10% confidence level, the residual term is in normal distribution.

Latex template: *Pitt State Physics Homework Template* from OVERLEAF
Software used: STATA, EXCEL, WORD