EVALUATING CORE INFLATION MEASURES

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1 Sticky price measures

We examine the frequency of price changes for 570 categories of goods and services covering about 66.4% of consumer spending based on "Dixon and Tian items frequency data". Then, I looked up the monthly CPI index and weighting data for these 570 items based on their ID one by one for the years 2005 to 2021. This is used to construct various CORE inflation measures.

2 Criteria for evaluation : forecasting future inflation

This work uses Cogley's model to test the forecasting ability of core inflation rate, and it also compares the forecasting ability of various core inflation measures, including Excluding food and energy and Trimmed mean Cogley's model is based on Bryan and Cecchetti's definition of core inflation: "Core inflation is changes in the price level that are expected to persist over a long period of time."

According to Bryan and Cecchetti's definition, a valid core inflation is one that is "pure" after removing temporary factors from measured real inflation. On this basis, Cogley developed the following model to evaluate the predictive power of core inflation:

$$\pi_{t+h} - \pi_t = \alpha_h + \beta_h \left(\pi_t - \pi_t^c\right) + u_{t+h}$$

Here, x represents the headline inflation rate and core x represents some core inflation indicator, both year-on-year data. Parameter h is N (month) ahead. For sufficiently large H, the core deviation, $(\pi_t - \pi_t^c)$, should be inversely related to subsequent changes in inflation, $\pi_{t+h} - \pi_t$. Moreover, in order for the candidate to satisfy equation (1), the coefficients in the regression, should satisfy $\alpha = 0$ and $\beta = -1$.

Of importance to the forecasting model is the estimated coefficient of β, which indicates whether core inflation has sufficiently purified the transitory component. Because if the absolute value of the estimated

coefficient is equal to 1, it indicates that the model is a random walk process, and the components removed from the core inflation do not contain any information that predicts future overall inflation. If $\beta = -1$, the forecasting capacity for core inflation is the best . This proves that core inflation has fully captured the trend components of overall inflation and has a complete forecasting ability for future inflation.

1. If the $|\beta| < 1$, it indicates that subsequent changes in inflation are overestimated;
2. If the $|\beta| > 1$, it shows that underestimation of the current temporary movement in headline inflation.

Therefore, the closer the absolute value of the estimated regression coefficient β is to 1, the better the predictive power of core inflation is. In addition, the root mean square error RMSE $= \sqrt{\frac{1}{\mathrm{T}} \sum_{\mathrm{t}=1}^{\mathrm{T}} (\pi_{\mathrm{t}} - \hat{\pi}_{\mathrm{t}})^2}$obtained by Cogley regression represents the deviation between the predicted value and the actual value. $\hat{\pi}_{\mathrm{t}}$ is the forecast value of the inflation rate. The smaller the RMSE, the more accurate the forecast. and the better the forecast of core inflation.

3 Results

From the above discussion, I used my own data to re-simulate the values of the parameters.The results please see Table 1, figure 1.

Table 1: Headline CPI Forecast Accuracy: Root Mean Squared Errors and Beta

	Core Inflation					
	Excluding Food and Energy			Trimmed Mean		
	RMSE	α	β	RMSE	α	β
1 months ahead	0.2875491	0.0084757	-0.0195335	0.2866793	0.0645846	-0.0510096
2 months ahead	0.4433265	0.0284204	-0.0724343	0.4430588	0.1329443	-0.1059460
3 months ahead	0.5778391	0.0552011	-0.1493606	0.5791695	0.2423759	-0.1956752
4 months ahead	0.6936614	0.0786384	-0.2277337	0.7019321	0.2963575	-0.2439679
5 months ahead	0.7942037	0.0995841	-0.3039190	0.8085734	0.3722336	-0.3111952
6 months ahead	0.8797910	0.1218862	-0.3837018	0.8997629	0.4729218	-0.3983625
7 months ahead	0.9466686	0.1433650	-0.4598274	0.9683200	0.6086117	-0.5132120
8 months ahead	1.0048770	0.1599479	-0.5362292	1.0338213	0.6923265	-0.5903104
9 months ahead	1.0531805	0.1748061	-0.6051095	1.0921331	0.7459039	-0.6422965
10 months ahead	1.0900066	0.1942808	-0.6803401	1.1417008	0.8047791	-0.6967543
11 months ahead	1.1239888	0.2127016	-0.7557223	1.1962377	0.8123711	-0.7108918
12 months ahead	1.1554869	0.2285637	-0.8169504	1.2412841	0.8471592	-0.7446529

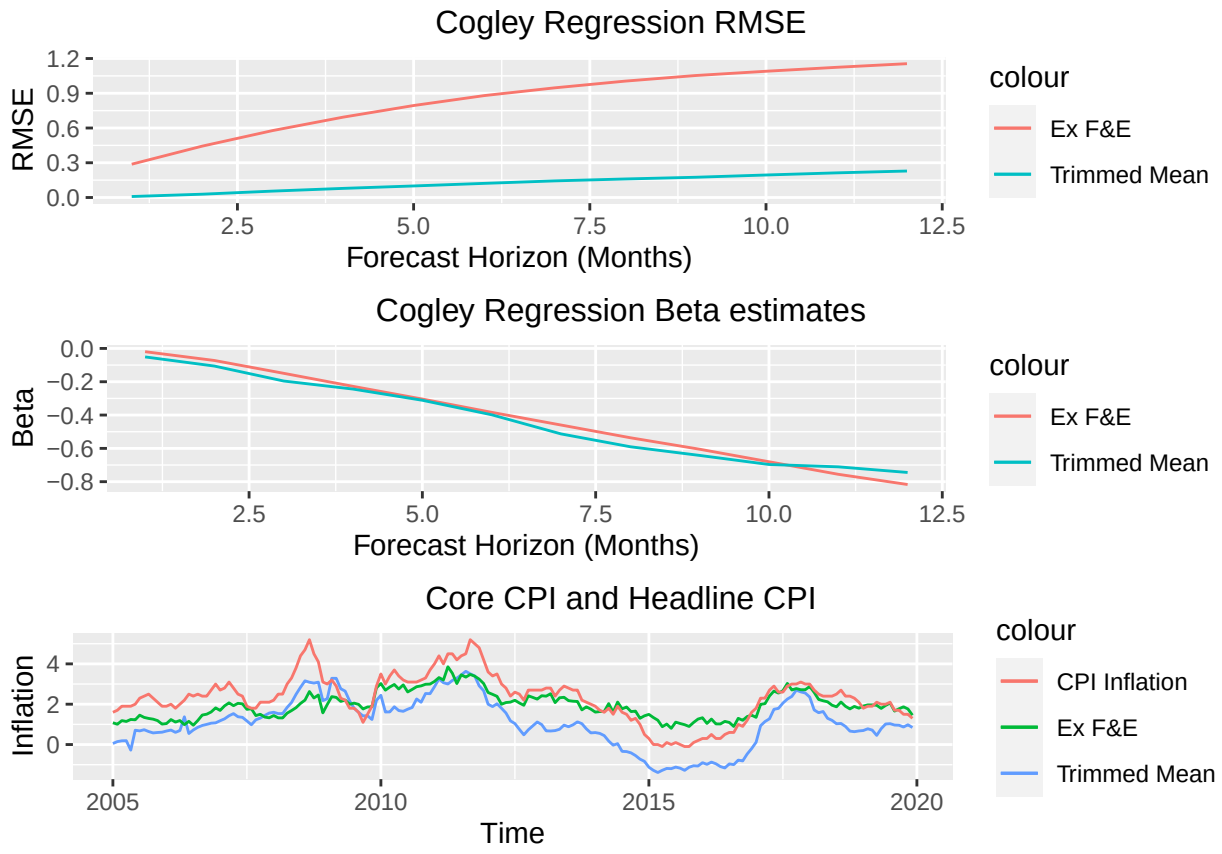

Figure 1: overall

4 Conclusions

As expected, all Cogley regressions of the core inflation rate with β estimates are all negative. The beta keeps falling as the number of forecast periods rises; The forecast RMSE for core inflation rates increases as the number of forecast periods increases continuously. This suggests that the longer the forecast period, the more inaccurate the forecast. It can be seen that the forecast ability of Excluding Food and Energy is not good as Trimmed Mean. Excluding Food and Energy coefficient estimates of the Cogley regression deviate the furthest from - 1 within 10 months forecast horizon and the root mean squared error (RMSE) of the predictions is the largest in all prediction periods. The interesting point is that when forecast horizon exceeds 10 months, the coefficient estimates of the Trimmed mean deviate from -1 becoming further away than EX F&E.