Measuring the Effects of the Pboc Forward Guidance on Chinese Stock Yield

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Abstract: This paper extracts the key words of China Monetary Policy Report of the People's Bank of China (PBOC) from 2006 to 2020, and constructs a quantitative communication index. With the EGARCH model, it analyzes the influence of forward guidance on the price and volatility of Chinese stock yield. The results show that forward guidance has an impact on stock yield, and the direction of influence is in line with the monetary policy expectation.

1. Introduction

Since the global financial crisis erupted in 2008, the Federal Reserve has lowered the federal funds rate to essentially zero. At this time, the traditional monetary policy failed and there was a Keynesian liquidity trap crisis. The Federal Reserve began to use "forward guidance", which means to guide the public's expectation and improve the transparency of monetary policy, so as to maintain the stability of financial markets.

The Federal Reserve's "forward guidance" has a profound impact on China. Since the 2008 financial crisis, the PBOC has expressed the future of monetary policy through China Monetary Policy Report.

2. Literature Review

2.1 Main Views

Although it started late, the research on forward guidance in China has substantial content. The research methods include Event study, VAR model and EGARCH model. Most of the researches use emotional assignment to quantify whether monetary policy is easy or tight. This depends on the researcher's subjective judgement, which is not rigorous enough.

Most of the early studies based on the Taylor rule to focus on the reaction function of the forward monetary policy. Li Yunfeng and Li Zhongfei (2011)[1] suggested that forward guidance has little effect. They studied written communication, and quantified the policy intention of China Monetary Policy Report by emotional assignment. They used VAR model and found that when predicting deposit reserve ratio, forward guidance can only be used as a supplement to macroeconomic, not a complete substitute. Gao Xiandong and Yan Wenbo(2017)[2] believed that forward guidance can affect inflation expectations. They screened the wording of price in China Monetary Policy Report, constructed the forward guidance index by ANOVA, and tested the impact of forward guidance on public inflation expectations by SVAR model.

In recent years, some scholars studied the relationship between forward guidance and Chinese financial market. In the stock market, Zou Wenli, Wang Xi and Xie Xiaoping (2020)[3] sorted out written communication and oral communication, and conducted OLS regression through Event study. They found that written communication significantly affect the stock yield, and the effect is asymmetric. Wei Luyao and Wang Yuzhao (2020)[4] analyzed written communication, constructed the emotional assignment and tested the impact of forward guidance on the stock market by EGARCH model, and found that forward guidance can affect the stock market in an expected way.

2.2 Literature Evaluation

Chinese researchers usually use emotional assignment to quantify China Monetary Policy Report, and analyze the impact of forward guidance on China's macro economy or financial market. Factually, they use three levels (−1/0/+1) to divide whether monetary policy is tight/neutral/easy, which is difficult to measure the policy fluctuation each quarter. As the stock price belongs to high frequency data, and researchers have found that the impact of forward guidance on stock yield is asymmetric, the Event Study may not be the best choice.

3. Data and Model

This paper reconstructs the forward guidance index by analyzing China Monetary Policy Report. The new index can measure the PBOC's monetary policy more accurate. Then analyzing the connection between the forward guidance index and the stock yield in China by EGARCH model.

3.1 The Construction of the Forward Guidance Index

The forward guidance index was constructed by ANOVA. I obtained the China Monetary Policy Report from the PBOC official website. The sample ranged from the first quarter of 2007 to the fourth quarter of 2020, with a total of 56. In order to improve the accuracy, I eliminated the description of international economic and financial situation in the fourth part "Macroeconomic Analysis", so the rest is all about China. The monetary policy period of each quarter is judged by the deposit reserve ratio, benchmark one-year lending/deposit rate, and repo rate. There are 33 easy periods, 8 neutral periods and 15 tight periods.

My method of extracting keywords is based on Bian Zhicun and Zhang Yi (2012)[5]and I reclassify the wording types. There are 12 types of wording: deflation, inflation, price stability, easy/tight/neutral policy, easy/tight/neutral quantitative monetary policy tools, easy/tight/neutral pricing monetary policy tools. By ANOVA, the following 9 keywords have passed the significance test: inflation, deflation, tight/neutral policy, easy/tight/neutral quantitative monetary policy tools, easy/tight pricing monetary policy tools. Then I analyzed the monotonicity of different monetary policy periods. The results show that 4 keywords meet with the strict monotonicity and 5 are of opposite signs. However, the frequency of the 5 keywords is significantly different in easy and tight period, so they can be regarded as the monotonicity.

When constructing the forward guidance index, I also applied the method of Bian Zhicun and Zhang Yi (2012)[5], and the formula is as follows:

$$FG_t = \sum_{i=1}^{n} \frac{not(x_{i,t}) - meannot(x_i)}{stdv(x_i)} sig(x_i)\eta^2(x_i) \tag{1}$$

$not(x_{i,t})$ is the frequency of wording i at time t, $meannot(x_i)$ is the average frequency of all periods, $stdv(x_i)$ is the standard deviation of the frequency of all periods, $\eta^2(x_i)$ is the weight of each wording, $sig(x_i)$ is the sign of i. Plus or minus of $sig(x_i)$ reflects the direction of forward guidance, and it is plus when the occurrence number of wording in the easy monetary period is greater than that in the tight monetary period.

According to the formula, the PBOC forward guidance index can be obtained. From Fig.1, the larger the index, the stronger the forward guidance intention becomes easier; the smaller the index, the stronger the forward guidance intention becomes tighter.
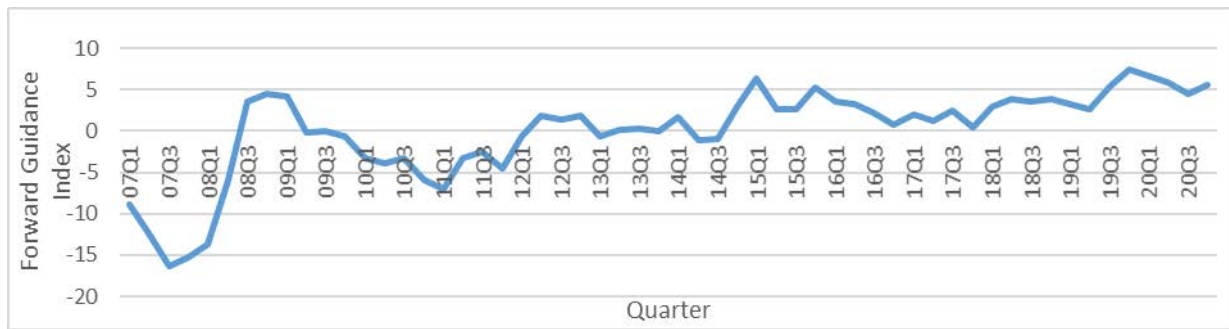
Fig.1 The Pboc Forward Guidance Index

3.2 The Construction of Stock Yield

In order to fully reflect the overall situation of Shanghai and Shenzhen stock markets, I use the CSI 300 index. First, taking logarithm and then making first-order difference to get the stock yield. As it belongs to time series, the stock yield must be stable in the empirical test. So I use ADF unit root test, and Table1 shows P-value < 0.01, therefore the logarithm yield of CSI 300 index is a stable series.

Table 1 Adf Unit Root Test

Dickey-Fuller test for unit root		Number of obs	=	1994
	Test Statistic	1% Critical Value	5% Critical Value	10%Critical Value
Z(t)	-46.76	-3.430	-2.860	-2.570

MacKinnon approximate p-value for Z(t) = 0.0000

Table 2 shows the result of the descriptive analysis of the logarithm yield of CSI 300 index. The kurtosis is 7.002 and the skewness is -0.441, showing the characteristics of bias, peak and thick tail, which does not follow the normal distribution.

Table 2 Descriptive Analysis Of the Logarithm Yield of Csi 300 Index

Variable	Mean	Sd	Skewness	Kurtosis
dlnstock	-0.0000271	0.0162433	-0.4411485	7.002325

3.3 Basic Estimation Model

This paper applies EGARCH model to correct the skewness, kurtosis and volatility of stock yield, and to remove the restriction of non-negative coefficient in the variance equation. Forward guidance generally has two effects on stock yield: It affects the value of stock yield, and also affects the volatility of stock yield. The mean equation can test the impact of forward guidance on the numeric value of the stock yield, and the variance equation can test the impact of forward guidance on the volatility of stock yield. Therefore, the following model is established:

4. Mean Equation:

$$r_t = \alpha + \lambda r_{t-1} + \beta FG_t + \varepsilon_t \quad (2)$$

r_t is the stock yield at t; α is a constant term; FG_t is the forward guidance index at t; ε_t is the error term.

5. Variance Equation:

Hypothesizing that the error term in the mean equation obeys the normal distribution of mean value 0 and variance h_t at t-1, then the expression of variance equation is as follows:

$$\ln(h_t) = \alpha + \gamma_1 \ln(h_{t-1}) + \gamma_2 \left(\left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| - \sqrt{\frac{2}{\pi}} \right) + \gamma_3 \left(\left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| \right) + \gamma_4 FG_t \quad (3)$$

The variance equation is used to evaluate the volatility, so there is no need to distinguish the direction of forward guidance, and FG_t takes the absolute value.

6. Empirical Analysis

I added the forward guidance index FG into the EGARCH model to test the impact of the forward guidance index on the stock yield, the results are as follows:

Table 3 Impact of The Forward Guidance on Logarithm Yield of Csi 300 Index

dlnstock	Coef	Std.Err.	z	P>|z|	[95% Conf. Interval]	
dlnstock						
FG	0.0006271	0.0002289	2.74	0.006	0.0001785	0.0010757
_cons	-0.000259	0.0002776	-0.93	0.351	-0.000803	0.000285
ARCH						
earch						
L1.	-0.0421822	0.0182861	-2.31	0.021	-0.0780223	-0.0063422
Earch_a						
L1.	0.4172843	0.0318076	13.12	0.000	0.3549427	0.479626
egarch						
L1.	1.078154	0.0777606	13.87	0.000	0.925746	1.230562
_cons	0.6338998	0.6430193	0.99	0.324	-0.6263949	1.894194

It can be seen from Table3 that the P-value of FG index is 0.006<0.01, so it is significant at the 1% confidence level. Since the sign of easy monetary policy is plus and that of tight monetary policy is minus, the FG index means that easy monetary policy will make the stock yield rise, and the tight monetary policy will make the stock yield fall. The direction of the stock yield changes is within expectations. It shows that the PBOC can strengthen the regulation of the stock yield with the assistance of forward guidance.

In the variance equation, the P-value of earch is less than 0.05, which indicates that forward guidance has an asymmetric impact on the volatility of stock yield, and it is significant at the 5% confidence level. The coefficient sigh is minus, which means that "bad news" causes more volatility.

7. Conclusion and Suggestion

By analyzing the impact of the PBOC's forward guidance on stock yield from 2007 to 2020, conclusions are as follows:

1). The PBOC's forward guidance has a significant impact on Chinese stock yield: easy monetary policy will raise the stock yield, and tight monetary policy will lower the stock yield.

2). The PBOC's forward guidance intensifies the volatility of Chinese stock yield, and tight monetary policy makes the stock yield volatility more obvious.

According to the above conclusion, some policy proposals are proposed:

[1] First, to improve the accuracy of the wording of forward guidance. This is beneficial for the public to understand the future policy intention, so as to strengthen the effectiveness of forward guidance. Second, in order to reduce the volatility of stock yield, the monetary policy in China Monetary Policy Report should be more neutral and flexible.

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