The Value of Institutional Research: Fund Managers and Monetary Policy Expectations in China*

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Abstract

Do asset managers serve their clients better through active efforts to seek higher returns? This is a long-running debate in the finance literature. In this paper, we present novel evidence on this question with a systematic textual analysis of the qualitative discussion in China's fund managers' quarterly reports, from which we infer their near-term expectations for monetary policy. We demonstrate that the aggregate index of manager expectations outperforms both market-based and model-based alternative projections. Furthermore, we find that expectations are even more accurate for funds that commit more analytical resources, proxied by fund size, management fees, and managers' educational background. We also show that fund managers act on these expectations, and that correctly anticipating shifts in Chinese monetary policy improves fund performance. We also find that net inflows into Chinese money-market funds react to near-term prospects for monetary policy, consistent with a strategic substitution between bank deposits and money fund shares that could weaken the transmission of Chinese monetary policy to the real economy.

*The views in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or any other person associated with the Federal Reserve System.

1 Introduction

There is a long-running debate in the finance literature on the relative merits of active and passive investment management. Do asset managers serve their clients better through active efforts to seek higher returns, or by keeping operating costs low? In this paper, we present novel evidence on this question from the nascent mutual fund industry in China.

Our starting point for the analysis is a systematic textual analysis of the qualitative discussion in China's mutual fund managers' quarterly reports. By doing this, we obtain a large panel data set of mutual fund managers' near-term expectation of shifts in Peoples Bank of China (PBoC) monetary policy. The data set includes 2,961 funds between 2008 Q3 and 2016 Q4. Both fund and manager identities are observed, which enables us to match the expectation measures to manager and fund characteristics and their investment records. Compared to expectations measured either at the market level or as repeated cross-sectionals (e.g., Survey of Professional Forecasters), the panel structure of our dataset provides a clearer identification of how expectations influence both actions (investment behavior) and outcomes both at the organization (investment fund) level and in the aggregate.

We demonstrate that managers judge their expectations well. In particular, we show that our aggregate index of manager expectation that we construct, predicts 49 -percent of variation in shifts in the monetary policy stances in the subsequent quarter. Furthermore, these forecasts outperform both the market-based and model alternative projections, such as the implied forward rates and an unrestricted Taylor rule, as well as the PBoC Survey of Commercial Bankers.

We also explore how monetary policy expectations affect investment decisions by mutual fund managers. We focus this part of our analysis on money market funds, because for this fund category, the reported portfolio allocations allow us to observe shifts in duration. We find that managers of money market funds buy (sell) long-term assets when expecting an easing (tightening) monetary policy, which is consistent with the prediction of standard models. This finding confirms that our textual analysis quantifies the managers' expectations well, and that the mutual fund managers take their own words seriously. Moreover, this finding provides direct evidence on that monetary policy expectation serves as an important factor behind investors' portfolio choice, and implies that systematic revisions of monetary policy expectations among market participants can induce significant rebalancing of asset holdings at the aggregate sector level, and thus potentially acting as a channel of monetary policy transmission.

Our monetary policy expectation measures allow us to construct an index of forecast skill by calculating how often the managers correctly anticipate shifts in monetary policy. We then identify the characteristics of the superior funds and their managers. They tend to manage a larger fund and charge higher management fees, both of which reflect how the market judges their skill. They are also more likely to hold a Ph.D. degree, which is consistent with the fact that acquiring the necessary information to optimize investment decisions entails non-negligible resource input, as first formalized by Grossman and Stiglitz (1980).

Our natural next step is to examine whether correctly anticipating shifts in monetary policy improves fund performance. We find that the answer crucially depends on the fund type and the interest rate regime. Specifically, correct predictions of monetary policy improved money market funds' performance in the period of our sample prior to 2012, when market interest rates (such as inter-bank rates), which largely determine money market funds' return, remained in a narrow range around the benchmark deposit rate set by the central bank. Subsequently, market interest rates have been less closely connected to benchmark policy interest rates, at least in the short-run. (For example, inter-bank interest rates initially rose at the beginning of the 2014-2015 easing cycle.) Hence correctly predicting the benchmark policy interest rates did not help the money market funds achieve a superior return in the latter part of the sample, as verified by our analysis. However, we find that bond funds typically earn higher returns when their managers correctly predict the near-term direction of monetary policy change, regardless of the rate regime. A possible interpretation of our finding is that bond funds invest in relatively long-term assets, whose value is heavily influenced by both the level of benchmark policy interest rates, and revisions to nearer-term expectations. In contrast, we find that correct predictions of monetary policy do not improve fund performance for equity funds and mixed funds, consistent with factors other than monetary policy being more important drivers of stock prices.

Finally, we investigate whether expected shifts in monetary policy, indicated by the fluctuations of the consensus forecast, induce systematic fund flow. We find significant net inflows into Chinese money market funds associated with near-term prospects for easing monetary policy. This fact is consistent with strategic substitution by yield chasing depositors from bank deposits to money fund shares. Specifically, an easing (tightening) monetary policy typically widens (narrows) the interest spread between the deposit rate and the money market funds' yield, due to the loose link between the wholesale bank funding market and the short-term securities market in China. Interestingly the sign of this relation is at odds with what is found for banks in most other countries, where the link between the wholesale bank funding fund and the short-term securities markets tends to be much closer, and low rates tend to depress net interest margins.[1] All else equal, this substitution mechanism in China might weaken transmission of Chinese monetary policy to the real economy, because most bank borrowers do not have access to money-market financing.

To our knowledge, this is the first study to infer institutional investor's monetary policy expectations from their written reports. Our work also contributes to several branches of the literature by providing new evidence from rapidly growing financial markets in China, which thus far have been much less studied than those in other large economies. Our result that Chinese money-market fund managers can benefit from anticipating changes in monetary policy by adjusting portfolio duration is broadly consistent with Kane and Lee (1983). Those authors found in a 1978-1981 sample that U.S. money funds on average profited by maturity adjustments ahead of shifts in the short end of the yield curve that suggested some forecasting ability, but without reference to an explicit measure of expectations. We also broaden the evidence on determinants of mutual fund performance more generally, including the benefits of manager skill and active portfolio management, for which there is conflicting evidence from other markets. For example, for U.S. equity investors, an influential paper by Carhart (1997) called into question an earlier "hot hands" literature by attributing performance persistence entirely to priced factors and to the worst-performing funds. Similarly, for U.S. money-market funds from 1990 to 1994, Domian and Reichenstein (1998) found that expenses were the main determinant of net return differentials, with similar gross returns across funds. Consistent with customer skepticism about active management, Bhattacharya and Galpin (2011) document a worldwide shift toward passive management, but less so in emerging markets. However, some more recent papers find benefits to manager skill, such as Kacperczyk, van Nieuwerburgh, and Veldkamp (2014, 2016).

[1] See, for example, Coleman, Claessens, and Donnelly (2018).

Other related literature

Our paper also is related to the literature that studies monetary policy expectations. In addition to bringing evidence for a previously unstudied economy, our work is novel to this literature in two other ways. First, while most work consider the monetary policy expectation for the professional forecasters or primary dealers, our work provides monetary policy expectation measures for institutional investors, whose views, whether right or wrong, are particularly relevant because they are an important group of players taking positions in these markets.[2]

Second, most existing works (eg., Kuttner (2001), Bernanke and Kuttner (2005)) study the financial market implication of monetary policy shocks (i.e., the component of monetary policy that surprises the market) rather than monetary policy expectations. The financial market implication of monetary policy expectations is very intuitive, as investor decisions and asset prices generally should reflect expectations about future policy, even if unchanged. However, most studies focus only on empirical estimates of policy shocks, due to difficult challenges in identification, given the endogeneity of policy.[3] Thus we can provide more direct insights into how expectations about future monetary policy affect financial decisions and market prices. Our data set matches monetary policy expectation to investment behavior at the individual level, which enables us to identify the causal effect of monetary policy expectation on investor's investment behavior.

More broadly, our paper is related to the literature on the study of agents' beliefs. One of the main conclusions of that literature is that agents' belief systematically deviate from the predictions of models with rational learning (e.g., Coibion and Gorodnichenko (2012, 2015), Greenwood and Shleifer (2014)). Interestingly, we find that mutual fund managers' monetary policy forecasts are accurate and outperform two alternatives with well-documented predictive power for policy rates in other economies: the Taylor rule and implied forward rates.

Our paper also contributes to the literature on the heterogeneity of agents' beliefs (e.g., Kandel and Pearson (1995) and Hong and Sarer (2016)). Comparing with the existing literature, we not only document the heterogeneity of agents' belief, we identify heterogeneous agents'

[2] Popular survey data sets that measure monetary policy expectations include Survey of Professional Forecasters conducted by American Statistical Association and the National Bureau of Economic Research, Survey of Professional Forecasters extracted from Bloomberg, Survey of Primary Dealers conducted by New York Fed, and Blue Chip Long Range Financial Forecasts conducted by Haver Analytics.

[3] See the comment by Bernanke and Kuttner (2005) in the first paragraph of section I

characteristics as a source of heterogeneous agent's beliefs. Moreover, we link these beliefs to investment choices and return outcomes.

2 Data description

2.1 The raw data: mutual fund reports

Throughout our sample period between 2008Q3 and 2016 Q4, all mutual fund managers in China were required by the China Securities Regulatory Commission (CSRC) to discuss their expectations for the near-term condition of the economy and financial markets. These commentaries were published in the Market Outlook subsections of the Quarterly, Semi-annual, and Annual Reports of the China Securities Journal.

The CSRC does not assign the specific topics, so the managers are free to choose the topics which they find most relevant to their investment.[4] Managers provide qualitative forecasts of economic policies, economic conditions, and other subjects. The length of the Market Outlook subsection of each report ranges from 50 to 2000 Chinese characters, depending on the number of topics and the amount of detail. We manually categorize the topics into 17 themes, including monetary policy, fiscal policy, politics, and exchange rates.

Mutual fund managers have a reputational incentive to write the Market Outlook subsection carefully, as investors can evaluate managers' ability and credibility from the correctness of their opinions.

Since the launch of the first Chinese mutual fund in September 2001, China's mutual fund industry has witnessed a strong growth. In 2016 Q2, the data set contains 2960 mutual funds, consisted of 658 equity funds, 658 bond funds, 1376 mixed funds, and 268 money market funds.

2.2 Fund and Manager Characteristics and investment data

For our purposes, a crucial detail of the mutual fund report data is that it identifies each fund and its manager, which enables us to match the manager and fund characteristics and investment history to manager expectations in a data panel. The matched panel structure

[4] However, they are not allowed to discuss any stock and company names.

enables us to identify the causal effect of expectation on the investment behavior and return outcome.

We obtain the reference information about the characteristics of both mutual funds and their managers from the China Funds Market Research Database in CSMAR, including details such as fund returns and the manager's education level:

- At the monthly frequency, we observe the total net asset value under management, the return of holding one share of fund during the time period, the share redemptions (outflows) and share purchases (inflows).

- At the quarterly frequency, we observe the value of the holding for different security classes such as government bond and asset-backed securities, and the 10 stocks (bonds) that a fund holds most heavily. For equity funds, we observe the information of the value invested in each sector; For money market funds, we observe information of the value of holding of assets with different maturities and their position in the repo market.

- At the semi-annual frequency, we observe the expense ratio and turnover ratio; For equity funds, we observe the holding of individual stocks.

- At the fund level, we observe the management fees, redemption fees, and buying fees; For equity funds, we also observe the style of investment such as value investment and growth investment.

- Lastly, for each managers, we observe the age, education, and professional experience.

2.3 Quantify monetary policy forecast

In this section, we describe how we map the textual content about monetary policy change in mutual fund reports to numerical scores.

Step 1: We divide each report in the "market outlook" sections into semantic units by punctuation marks (like commas, periods, and semicolons) and other indications that signal a pause in narrative flow.

Step 2: We keep the semantic units that are related to China's monetary policy. To do so, we judgmentally selected a dictionary of keywords related to China's monetary policy, including

- nouns such as "interest rate" and "required reserve ratio";
- verbs such as "increase" and "raise";
- adjectives such as "high" and "low";
- adverbs such as "strongly" and "potentially".

We next apply a rule that treats a semantic unit as potentially informative about future monetary policy change if it has at least one noun keyword and at least one verb or adjective keyword from our list. Note that some keywords reveal information about the *level* of the monetary policy stance rather than the change of monetary policy stances. We describe how we map the level to the change in the appendix.

In addition to the dictionary of selection keywords, we also construct a list of disqualifying words such as "Federal Reserve" and "ECB" that in our judgment indicates that the semantic unit does not characterize the stance of Chinese monetary policy. Any semantic unit that contains these words is dropped.

We assign scores to the keywords as defined in step 2. The nouns take the score value from $\{-1, 1\}$.[5] The verbs and adjective take the score value from $\{-1, 0, 1\}$.[6] Lastly, the adverbs take the score value from $\{0, 0.5, 1\}$.[7]

Step 3: We assign each semantic unit with a score within the set $[-1, 1]$.

The sign of a semantic unit's score depends on the combination of the nouns and verbs, which indicates the direction of the expected monetary policy change (e.g., interest rate increases; tighten the monetary policy):

$$\text{score(semantic unit k)} \begin{cases} > 0 & \text{if expects an easing monetary policy} \\ = 0 & \text{if expects an unchanged monetary policy} \\ < 0 & \text{if expects a tightening monetary policy} \end{cases}$$

The absolute value of the score depends on the adverbs, which reflects the degree of certainty or magnitude of the monetary policy change. (e.g., possibly; mildly). A semantic unit with

[5] For example, score("interest rate") = -1, score("money supply") = 1.
[6] For example, score("decrease") = -1, score("increase") = 1, score("same") = 0.
[7] For example, score("strongly") = 1, score("mildly") = 0.5, score("unlikely") = 0.

higher certainty or magnitude regarding the expected monetary policy change is assigned with a score with larger absolute value.[8]

Step 4: We compute the mean of score across the semantic units within each report, denoted as $E_t^i(\Delta mp_{t+1})$ for manager i in period t. By construction, $E_t^i(\Delta mp_{t+1}) \in [-1, 1]$.

The sign of $E_t^i(\Delta mp_{t+1})$ indicates the expected direction of monetary policy change in period $t+1$ comparing to the monetary policy stance in period t:

$$E_t^i(\Delta mp_{t+1}) \begin{cases} > 0 & \text{if manager i expects an easing monetary policy} \\ = 0 & \text{if manager i expects an unchanged monetary policy} \\ < 0 & \text{if manager i expects a tightening monetary policy} \end{cases}$$

The absolute value of $E_t^i(\Delta mp_{t+1})$ is derived from the adverbs (e.g. "possibly", "strongly"). The absolute value of $E_t^i(\Delta mp_{t+1})$ is increasing in the level of certainty and in the magnitude of the monetary policy change.[9]

To gauge the performance of the algorithm, we randomly drew a set of reports from the database and subjectively assigned numerical forecast score to those reports and compared to the result of our algorithm. We thus verified that our objective algorithm was equipped to operate as intended.

In the dataset, 12,643 of the reports have a valid forecast score, among which 1,932, 3,974, 4,931 and 1,986 are reported by managers of equity funds, bond funds, mixed funds, and money market funds, respectively.

[8] In our algorithm, adverbs that imply a higher probability or a larger magnitude are both assigned with a bigger number. We know that probability and magnitude have different economic meanings. However, for simplicity we don't differentiate the two cases. Our approach is reasonable if what matters the most is the expected change in the monetary policy, which is the product of probability and magnitude. For example, in the context of interest rate cut, we assign the an adverb that means high probability and an adverb that means large magnitude with the same score, as both imply that the expected cut in the interest rate is relatively large.

[9] It is worth noting that managers use adverbs in individual-specific ways. Therefore, the absolute value of $E_t^i(\Delta mp_{t+1})$ should be compared within manager, not across managers. Therefore, it is critical to control for individual cluster when computing standard errors in the empirical analysis.

3 Consensus forecast

In this section, we assess how predictive mutual fund managers' beliefs are by comparing the consensus forecast to the subsequent monetary policy stance. Presumably, mutual fund managers have strong incentives to form an accurate expectation about monetary policy. First, monetary policy directly shifts the supply and demand of credit, which influences the interest rates that determines the yield of mutual funds' portfolio. Second, monetary policy affects risk-free rates, which are used to discount future cash flows. Third, Chinese monetary policy can have further effects on asset prices through regulatory channels. For example, the issuing rates of corporate bonds cannot be 40% higher than benchmark deposit rates.

We compute the consensus forecast, denoted as $E_t\left(\Delta MP_{t+1}\right)$, as the mean of forecast scores across managers in each quarter:

$$E_t\left(\Delta MP_{t+1}\right) = \frac{\sum_{i=1}^{N_t} E_t^i\left(\Delta mp_{t+1}\right)}{N_t},$$

N_t is the number of reports with a forecast score in period t.

By construction, the forecast index $E_t\left(\Delta MP_{t+1}\right)$ takes value between -1 and 1. A positive value of the forecast index indicates that managers expect an easing monetary policy. Similarly, a negative value of the forecast index indicates that managers expect tightening monetary policy. The forecast index is zero if managers expect the monetary policy to be unchanged compared to the current period. The absolute value of the forecast index reflects the perceived probability of the monetary policy change.

Our constructed forecast index is similar to the robust consensus measure proposed by Chiang et. al. (2019), who showed that the fraction of forecasts with the same sign is a robust non-parametric estimate even when the level of individual forecasts are observed.

Figure 1 plots the consensus forecast (the solid curve) along with the 25- and 75-percentiles (the dashed curves). The figure displays a strong variation in the consensus forecast overtime, which reflects the frequent and systematic revision of monetary policy expectations. The wide inter-quartile range reflects a rich cross-sectional variations in the monetary policy expectations.

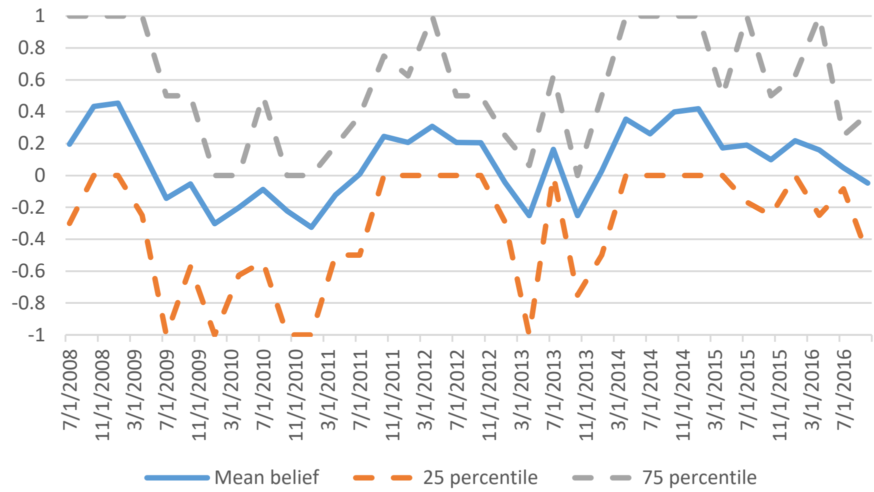


Figure 1: Consensus forecast and disagreement

Time series. The solid curve is the consensus forecast measured as the mean of forecast scores across managers. The dashed curves are the 25- and 75-percentiles of forecast scores.

3.1 Measure China's monetary policy stances

To compare the constructed monetary policy expectation measures to the realized monetary policy, we construct a Chinese monetary policy index, denoted as Δmp_t.

Like some central banks in other economies, the PBoC (People's Bank of China) uses a combination of monetary policy instruments to achieve its economic targets. These include the market-based tools commonly used in advanced economies, such as open market operation and central bank lending, as well as others less actively used elsewhere, such as the required reserve ratio. The PBoC also deploys levers with more direct effects on lending markets, such as administrated benchmark interest rates for deposits and retail lending and window guidance for retail bank lending. The benchmark interest rates impose a ceiling for deposit rates and a floor for lending rates.[10] For example, in 2012, the deposit rates were not allowed to surpass 1.1 times of benchmark deposit rate; while the lending rates could not be lower than 0.7 times of benchmark lending rate.

It is well-acknowledged that the required reserve ratio, the benchmark deposit rate and lending rate were the most actively used monetary policy instruments by PBC in 2000s and early 2010s (Chen, Funke, and Paetz (2012)). However, more recently, it is believed that conventional monetary policy instruments such as central bank repo rates and central bank bill

[10]Before 2004, the PBoC restricted both deposit and lending rates to a corridor around the corresponding benchmark interest rate, but it has not imposed any deposit rate floor or lending rate ceiling since then.

rates are increasingly important in signaling PBC's policy intentions (Zhang, 2012).

Our research focuses on studying how mutual fund managers form expectation about monetary policy rather than identifying the importance and effectiveness for different policy instruments. However, it is interesting to see how frame their references to monetary policy when it can entail such a wide variety of instruments. We find that when mutual fund managers mention specific monetary policy instruments (rather than general terms such as "monetary policy"), they refer mostly to the required reserve ratio and the benchmark deposit rate and lending rate.[11] This fact implies that these are the key instruments investors look to for judging the stance of monetary policy during our sample period. Accordingly, we construct a measure of shifts in Chinese monetary policy from the direction of change in the required reserve ratio, the benchmark deposit interest rate, and the benchmark lending interest rate.[12] We define an easing of monetary policy as a decline in either the required reserve ratio or at least one of the benchmark policy interest rates. Analogously, we identify tightening monetary policy by a higher required reserve ratio or benchmark interest rate. And often in our quarterly sample, all three of these monetary policy instruments are unchanged from the previous quarter, introducing the third possible outcome for our discrete indicator of policy direction.

The monetary policy index is defined as

$$\Delta mp_t = \begin{cases} 1 & \text{if monetary policy is easing} \\ 0 & \text{if monetary policy is unchanged} \\ -1 & \text{if monetary policy is tightening} \end{cases}$$

Figure 2 plots the indicator of monetary policy change Δmp_t with the growth rates of the required reserve ratio (green line) and the interest rates (gray and yellow lines). The darkly and lightly shaded columns indicate the periods of tightening and easing monetary policy stances, respectively.

[11] The term "interest rate", "required reserve ratio", and "required reserve ratio cut" occur 28479, 3133, and 6055 times, more frequent than other terms such as "money supply" (294 times), "M2" (1386 times), and "discount rate" (14 times). One exception is the term "open market operation" which occurs for 2553 times. However, managers almost never specify the direction of open market operations.

[12] All three series are obtained from CEIC database. For interest rates, we use household Savings Deposits Rate Within 1 Year (Including 1 Year) (series ID: 7054401 (CMBBC)) and Nominal Lending Rate Within 1 Year (Including 1 Year) (series ID: 359343407 (CMABQQ)).

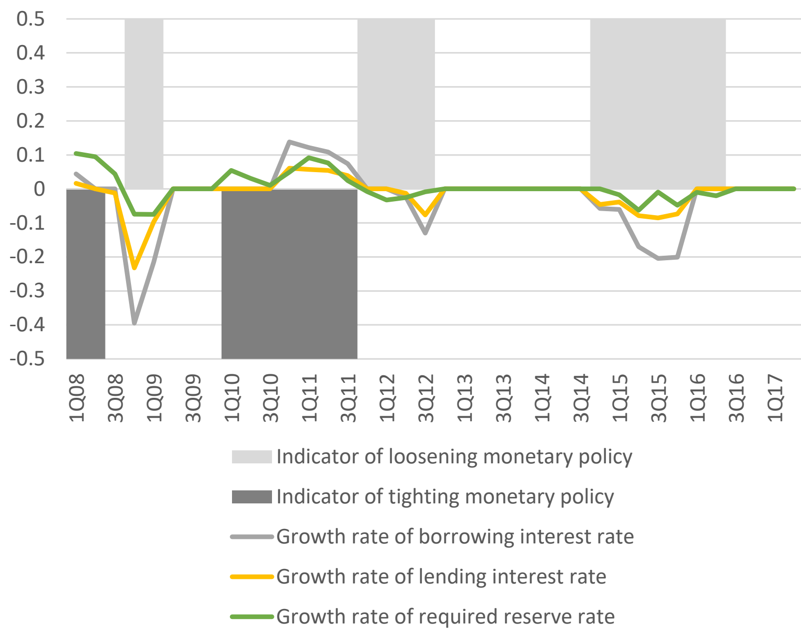


Figure 2: Monetary policy in China

Time series. The gray curve is the growth rate of the benchmark 1 year deposit interest rate. The orange curve is the growth rate of the benchmark 1 year lending interest rate. The Green line is the growth rate of the required reserve ratio. The shaded columns are the monetary policy index. The darkly shaded columns indicate the easing monetary policy periods. The lightly shaded columns indicate the tightening monetary policy periods. Monetary policy is unchanged in the periods with no columns.

3.2 Evaluate the predictive power of the consensus forecast

Figure 3 displays the consensus forecast $E_{t-1}(\Delta mp_t)$ (solid line) with the monetary policy index Δmp_t (shaded columns). The figure reveals a strong predictive power of the mutual fund managers' forecasts, particularly given the text-based and inferential nature of the data set. Specifically, the consensus forecast index leads the monetary policy shifts: the turning points of the monetary policy, indicated by the edges of the shaded columns, are usually well-anticipated by the mutual fund managers. For example, China eased monetary policy in 2014 Q4, yet the forecast index started rising in 2014 Q1, three quarters before the implementation of the policy.

Table 1 reports the results of univariate regressions of monetary policy index on the consensus forecast. As shown in Column (1), monetary policy is predicted by the consensus forecast in the previous quarter, which confirms the predictive nature of the consensus forecast revealed by Figure 3. The explanatory power of the consensus forecast is large with $R^2 = 0.47$. As shown in Column (2) of Table 1, the consensus forecast remains statistically significant when

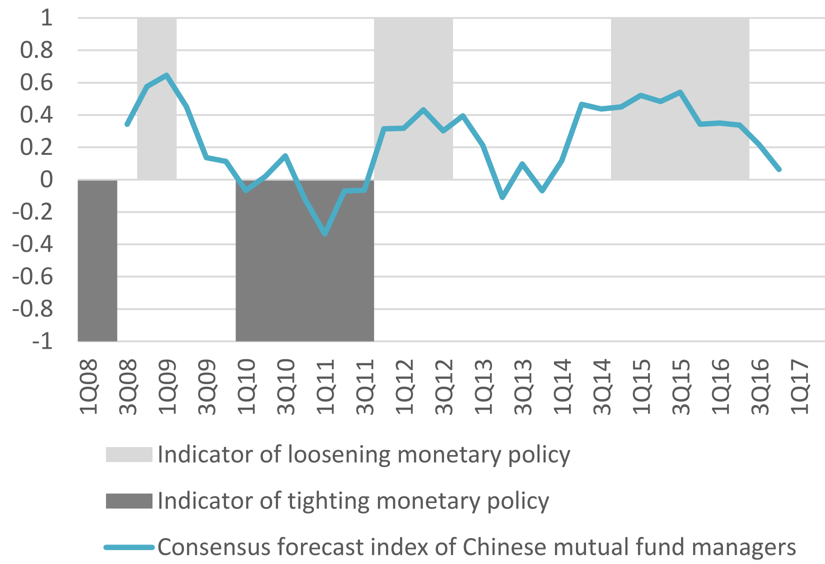


Figure 3: Consensus forecast index of Chinese mutual fund managers
Time series. The solid curve is the consensus forecast measured as the mean of forecast scores across managers. The shaded columns are the monetary policy index. The darkly shaded columns indicate the easing monetary policy periods. The lightly shaded columns indicate the tightening monetary policy periods. Monetary policy is unchanged in the periods with no columns.

the monetary policy in the previous period is included as an independent variable.

Table 1: The consensus forecast predicts monetary policy

The dependent variable is the monetary policy index. $E_{t-1}(\Delta mp_t)$ is the lagged consensus forecast. Δmp_t is the lagged monetary policy index. Data is quarterly from 2008 Q3 to 2016 Q3. t-statistics are in the parentheses. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)
Δmp_{t-1}		0.47^{**} (2.60)
$E_{t-1}(\Delta mp_t)$	2.39^{***} (5.69)	1.18^{*} (1.95)
Adj R^2	0.49	0.57
Observations	34	34

3.3 Compare the consensus forecast with Taylor rule

To further evaluate the predictive power of the consensus forecast, we compare the consensus forecast with both market-based and model-based alternative projections, as well as other survey data sets. We first compare the consensus forecast with the Taylor rule.

According to the standard Taylor rule, the short-term interest rate is determined by the following equation:

$$i_t = i^* + \beta \hat{y}_t + \gamma (\pi_t - \pi^*) \tag{1}$$

The monetary policy index Δmp_t corresponds to the sign of Δi_t. Equation (1) implies:

$$\Delta i_t = \beta \Delta \hat{y}_t + \gamma \Delta \pi_t$$

Our first step is to examine hto what extent shifts in China's monetary policy are explained by the Taylor rule. Specifically, we estimate the following regression model:

$$\Delta mp_t = \alpha + \rho \Delta mp_{t-1} + \beta \Delta \hat{y}_t + \gamma \Delta \pi_t$$

Both β and γ are expected to be negative: a higher GDP growth rate or inflation rate induce the central bank to tighten the policy. The estimation results are reported in Table 2. According to the results, 70% of China's monetary policy shifts can be explained by Taylor rule. Our result echoes an earlier finding in the literature (from before the beginning of our sample period) that China's monetary policy was well-explained by the Taylor rule (Xie and Luo (2001)).

Table 2: The expansionary power of Taylor rule

The dependent variable is the monetary policy index. $\Delta \hat{y}_t$ is the growth rate of real GDP per capita. $\Delta \pi_t$ is the change in the inflation rate. Δmp_{t-1} is the lagged monetary policy index. Data is quarterly from 2008 Q3 to 2016 Q3. t-statistics are in the parentheses. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)
Δmp_{t-1}	0.35^{**} (2.37)	
$\Delta \hat{y}_t$	-8.04^{**} (−2.43)	-13.75^{***} (−5.62)
$\Delta \pi_t$	-25.5^{***} (1.95)	-26.73^{***} (−3.27)
Adj R^2	0.71	0.66
Observations	34	34

Then we examine how much Taylor rule *predicts* monetary policy stances. Ideally we want to estimate:

$$\Delta mp_{t+1} = \alpha + \rho \Delta mp_t + \beta E_t \left(\Delta \hat{y}_{t+1} \right) + \gamma E_t \left(\Delta \pi_{t+1} \right),$$

Unfortunately, we do not observe $E_t \left(\Delta \hat{y}_{t+1} \right)$ and $E_t \left(\Delta \pi_{t+1} \right)$. (Forecast indices constructed by government agency and universities are only available after 2015.) Hence, we estimate the following regression model instead:

$$\Delta mp_{t+1} = \alpha + \rho \Delta mp_t + \beta \Delta \hat{y}_t + \gamma \Delta \pi_t.$$

The estimation results are reported in Table 3. By comparing with Table 1, the predictive power of Taylor rule is lower than the consensus forecast. Moreover, according to Column (1) of Table 3, when the Taylor rule is augmented with an AR(1) term, this model also does not outperform the joint predictive power the consensus forecast, similarly augmented with lagged monetary policy.

Table 3: The predictive power of Taylor rule

The dependent variable is the monetary policy index in the subsequent quarter. $\Delta \hat{y}_t$ is the growth rate of real GDP per capita. $\Delta \pi_t$ is the change in the inflation rate. Δmp_t is the monetary policy index. Data is quarterly from 2008 Q3 to 2016 Q3. t-statistics are in the parentheses. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)
Δmp_t	0.53**	
	(2.60)	
$\Delta \hat{y}_t$	−4.80	−12.14***
	(−1.21)	(−5.62)
$\Delta \pi_t$	−5.85	−20.14*
	(−0.55)	(−2.00)
Adj R^2	0.56	0.47
Observations	34	34

3.4 Compare the consensus forecast with implied forward rate

Next we compare the predictive power of the consensus forecast with implied forward rates at two tenors, beginning with the 3-6 months forward rate $F^{6}_{t,3}$,

$$(1 + i_{t,6})^2 = (1 + i_{t,3}) \left(1 + F^{6}_{t,3}\right),$$

where $i_{t,3}$ and $i_{t,6}$ inferred from the three-month and six-month treasury bill rates. [13] We estimate:

$$\Delta mp_{t+1} = \alpha + \eta \left(F^{6}_{t,3} - i_{t,3}\right),$$

where $F^{6}_{t,3} - i_{t,3}$ measures the expected change of three-month treasury rate in the next quarter.

Similarly, we obtain 6-12 month forward rate $F^{12}_{t,6}$ from:

$$(1 + i_{t,12})^2 = (1 + i_{t,6}) \left(1 + F^{12}_{t,6}\right),$$

and estimate:

$$\Delta mp_{t+1} = \alpha + \eta \left(F^{12}_{t,6} - i_{t,6}\right),$$

where $F^{12}_{t,6} - i_{t,6}$ measures the expected change of six-month treasury rate in the next two quarters.

In both cases, the coefficient η is expected to be negative: an expected increase in the interest rate implies a tightening monetary policy in the future. The estimation results are reported in Table 2. Surprisingly, the (nearer-term) 3-6 month implied forward rate does not predict the next-quarter shift in the monetary policy stance. While the 6-12 month implied forward rate does have some significant predictive power, a comparison with Table 1, shows that it does not match the predictive power of the consensus forecast. Moreover, as is apparent from Column (3) of Table 4, the joint predictive power of the implied forward rate and an AR(1) term is less than that of the corresponding combination of the consensus manager forecast and lagged monetary policy indicator in Table 1.

[13] (The three-month treasury rate is only available after 2011 Q3.)

Table 4: Compare consensus forecast with implied forward rates

The dependent variable is the monetary policy index in the subsequent quarter. $F^k_{t,j} - i_{t,j}$ is the interest spread between the implied j- to k-month forward rate and j-month treasury rate. Δmp_t is the monetary policy index. Data is quarterly from 2008 Q3 to 2016 Q3. t-statistics are in the parentheses. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	3-6 month		6-12 month	
	(1)	(2)	(3)	(4)
Δmp_t	0.47^{**}		0.65^{***}	
	(2.83)		(4.56)	
$F^k_{t,j} - i_{t,j}$	0.93	0.55	−1.10	-3.58^{***}
	(1.71)	(0.89)	(−1.10)	(−3.42)
Adj R^2	0.25	0.00	0.53	0.24
Observations	22	22	34	34

3.5 Compare the consensus forecast between mutual fund managers and commercial bankers

We turn next to the Survey of Commercial Bankers, conducted by the PBoC since 2004., Like our constructed manager consensus forecast measure, the survey is intended to elicit the near-term expectations of an important set of market participants. Each quarter, this survey asks commercial bankers for their assessments of the current economic environment as well as their near-term expectations about the economy. [14] For their expectations about monetary policy in the next quarter, the bankers can choose from the following three options: "to be loosened," "to be tightened," and "to be unchanged." The distribution of the answers is published on the PBoC website.[15] We construct the consensus forecast for the commercial bankers using the same ternary structure as for our fund manager expectations: $E_t\left(\Delta MP^{banker}_{t+1}\right)$, as:

$$E_t\left(\Delta MP^{banker}_{t+1}\right) = s^{loose}_t - s^{tight}_t,$$

where s^{loose}_t and s^{tight}_t are the fraction of bankers who expect monetary policy to be loosening and tightening in the next quarter, respectively.

Figure 4 plots the consensus forecast for commercial bankers (the blue curve), which is

[14] The survey covers all commercial bank branches beyond the city-level . In 2016 Q4, about 3,100 bankers were surveyed.

[15] The information about the distribution of the answers is sometimes incomplete, in which case we interpolate the distribution as much as we can. Otherwise, we regard them as missing observations.,An additional drawback is that this question is not asked in every quarter

Table 5: Consensus forecast for commercial bankers

	(1)	(2)
Δmp_t		0.81^{***} (9.32)
$E_t\left(\Delta MP_{t+1}^{banker}\right)$	1.24^{***} (3.04)	0.43^{**} (2.07)
Adj R^2	0.25	0.84
Observations	26	26

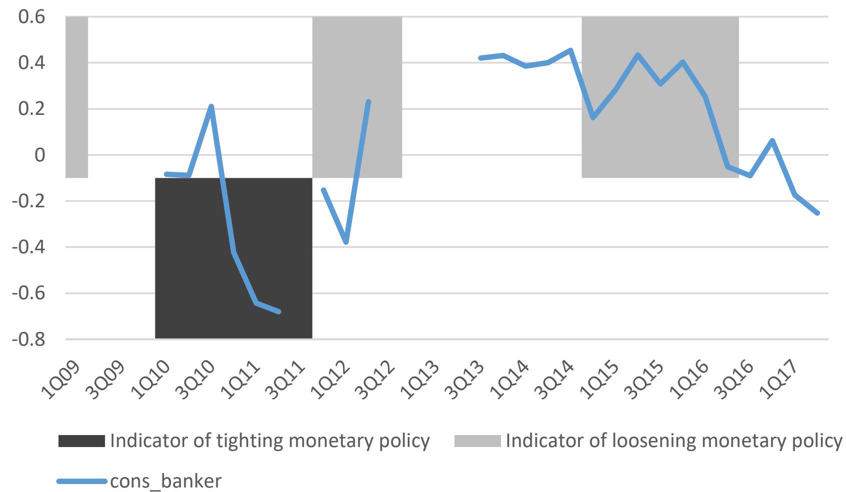
discontinuous due to missing observations. Note that one would get the exactly same consensus forecast if we compute the mean of the forecast scores, with $score$ (”to be loosened”) $= 1$, $score$ (”tightened”) $= -1$, and $score$ (”to be unchanged”) $= 0$, which is how we construct the consensus forecast for mutual fund managers. Thus, the two consensus forecasts are comparable to each other. The key difference between the consensus forecast for the commercial banker and the mutual fund managers, as shown by Figures (4) and (3), is that the bankers' forecast is much less forward looking. Specifically, the turning of the consensus forecast for the commercial bankers usually lags the shift of monetary policy by a few quarters. While the turning of the consensus forecast for the mutual fund managers often leads the shift of monetary policy by a few quarters.

The comparison suggests that commercial bankers' get less of a payoff from the accuracy of their forecasts of monetary policy, and consequently they would have less incentive to invest resources in making an accurate forecast than do mutual fund managers. One possible explanation is that the survey responses offer no scope for signaling proficiency to bank customers, because the PBoC survey report includes only summary statistics on the survey results, with no identification of the participating bankers.

Table (5) reports the results of regressions of monetary policy index on the consensus forecast for commercial bankers. As shown in Column (1), the coefficient of $E_t\left(\Delta MP_{t+1}^{banker}\right)$ is estimated as positive and statistically significant, which implies the predictive nature of the variable. The R^2 is estimated as 0.25, which is significantly lower than the R^2 explained by the mutual fund managers' consensus forecast (0.49) as reported in Column (1) of Table 1.

Overall, the findings of this section indicate that the consensus forecast constructed with the mutual funds' quarterly reports has strong predictive power for monetary policy.

Figure 4: Consensus forecast, commercial banker survey



Time series from 2009Q1 to 2017Q1: the blue curve plots the consensus forecast of monetary policy for commercial bankers.

4 Monetary policy expectation and maturity adjustment

In this section, we explore how fund managers' investment choices, take into account their monetary policy expectations. We focus our analysis on the money market funds, because their maturity structure is observed, and standard theories provide clear prediction on how they should adjust maturity according to monetary policy expectations. Although we do not have comparable information about the portfolio duration of bond funds, it is clear that bond fund managers should lengthen (shorten) duration when they expect bond yields to decline (increase). Specifically, when interest rates fall, bond prices rise, and vice versa. As maturity increases, the bond price becomes more sensitive to interest rate changes. Therefore, expecting an easing monetary policy, a manager would increase the maturity of her portfolio by buying long-term bond and selling short-term bond. Analogously, expecting a tightening monetary policy, a manager would reduce the maturity of her portfolio by selling long-term bond and buying short-term bond. Money fund managers also should lengthen (shorten) the maturity of their investments when they expect rates to fall (rise), although the consequent boost to returns comes in slightly different form. As long as their forecasts are not already full reflected in the term structure of money-market yields, anticipating changes in interest rates will allow money fund managers to delay (accelerate) their rolling of maturing instruments into lower-yielding (higher-yielding) replacements. [16]

For each money market fund, we denote the weight of holding of assets in maturity interval κ at the end of period t as $w^i_{t,\kappa}$, $\kappa \in \{[0,30],(30,60],(60,90],(90,\ ]\}$. For example, $w^i_{t,[0,30]}$ measures the weight of assets with maturities equal to or shorter than 30 days.

We characterize the maturity structure of a money market fund at the end of period t as:

$$w^i_t = \left(w^i_{t,[0,30]}, w^i_{t,(30,60]}, w^i_{t,(60,90]}, w^i_{t,(90,\ ]}\right)$$

Maturity adjustment is measured as the change in the vector of maturity structure:

$$\Delta w^i_t = w^i_t - w^i_{t-1}$$

We test the prediction of theory that money market fund adjust maturity structure according to monetary policy expectation by estimating the following panel regression model separately for each maturity interval κ:

$$\Delta w^i_{t,\kappa} = \alpha + \beta E^i_t\left(\Delta mp_{t+1}\right) + \delta X^i_{t-1} + \phi_t + \gamma^i + \epsilon^i_t,$$

where the dependent variable $\Delta w^i_{t,\kappa}$ is the change in the weight of holding of assets with maturity κ; $E^i_t\left(\Delta mp_{t+1}\right)$ is the forecast score; X^i_{t-1} includes a set of fund characteristics including fund size, fund age and fund net inflows; ϕ_t and γ^i are time and individual fixed effects, respectively.

The coefficient of interest is β, which is expected to be negative for small κ and positive for large κ.

The regression results are reported in Table 6. Each column presents the estimation results when the dependent variable is the change of weight of asset holding in the maturity interval as shown on the top row. The main conclusion obtained from the regressions is that the adjustment of maturity structure occurs mostly in the maturity intervals $[0,30]$ and $[60,90]$. Specifically, expecting an easing monetary policy in the next period, managers tend to substitute assets

[16] The other theory of maturity adjustment is the liquidity risk effect of monetary policy as argued by Jensen and Meckling (1976). Specifically, a lower interest rate (an easing monetary policy) induces customers to withdraw money from money market funds for other types of investments. Therefore, expecting an easing monetary policy, under the pressure of fund outflow, money market fund managers reach for yield and take more liquidity risk by increasing their holdings of long-term fixed income assets.

whose maturities are less than 30 days with assets whose maturities are between 60 and 90 days. Analogously, expecting a tightening monetary policy in the next period, managers tend to substitute assets whose maturities are between 60 and 90 days with assets whose maturities are less than 30 days.

Importantly, by controlling for both individual and time fixed-effects, the regressions identify the *causal* effect of monetary policy expectation on the portfolio adjustment.[17]

Table 6: Holding Changes in Response to Beliefs in Monetary Policy

The dependent variables are the change of proportion of net asset value allocated in assets with each maturity interval. $[0, 30)$ is maturity less than or equal to 30 days. $[30, 60)$ is maturity longer than 30 days and less than or equal to 60 days. $[0, 60)$ is maturity less than or equal to 60 days. $[60, 90)$ is maturity longer than 60 days and less than or equal to 90 days. $[90,]$ is maturity longer than 90 days (and in general less than a year). *lag ln(TNA)* is the lagged logarithm of fund total net asset value. *lag Age* is lagged age of the fund measured in quarters. *lag fund inflow* is the lagged fund net inflow into the fund. Data is quarterly from 2008 Q3 to 2016 Q4. All standard errors are clustered at the fund level. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) [0, 30)	(2) [30, 60)	(3) [0, 60)	(4) [60, 90)	(5) [90,]	(6) [60,]
forecast score	-0.017*	-0.006	-0.023**	0.023***	-0.001	0.022*
	(-1.67)	(-0.81)	(-2.10)	(2.62)	(-0.07)	(1.89)
lag ln(TNA)	-0.024**	0.006	-0.019*	0.005	0.026***	0.028**
	(-2.42)	(0.96)	(-1.78)	(0.75)	(3.10)	(2.48)
lag Age	-0.059**	-0.104***	-0.152***	0.017	0.118***	0.140***
	(-2.21)	(-7.17)	(-5.64)	(0.92)	(5.44)	(5.07)
lag fund inflow	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(-1.38)	(-0.16)	(-1.28)	(-0.23)	(1.14)	(1.34)
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	1,560	1,560	1,560	1,560	1,560	1,560
R^2	0.147	0.118	0.111	0.116	0.193	0.154

For simplicity, we define an asset as long-term if its maturity is longer than 60 days; An asset is short-term if its maturity is equal to or shorter than 60 days. The weight of long-term and short-term asset holding by fund i is denoted as $w^i_{t,l} = w^i_{t,(60,\,]}$ and $w^i_{t,s} = w_{t,[0,60]}$, respectively.

[17] As asset prices are observable to all managers, the feedback effect of asset prices on the expectation formation is ruled out by controlling for time-fixed effects. Hence, our estimation result cannot be driven by the possibility that the managers form their expectations of monetary policy from the asset market. Similarly, the co-movement of maturity structure and $E^i_t(\Delta mp_{t+1})$ identified in the third specification cannot be driven by any aggregate variables or fund-specific characteristics.

Figure 5 plots the money market fund managers' consensus forecast $E_t\left(\Delta mp_{t+1}\right)$, and the average of long-term asset holding weighted by fund size $\sum_{i=1}^{N_t}\left(w_{t,l}^i \times \frac{TNA_t^i}{\sum_{i=1}^{N_t} TNA_t^i}\right)$. The figure displays a positive comovement relation between the two variables, which implies that money market funds increase (decrease) the holdings of long-term assets when expecting an easing (tightening) monetary policy.

The fact that money market fund managers act on their words confirms that our constructed forecast scores accurately reflect the managers' expectations, and that the mutual fund managers take their own words seriously. Moreover, our findings provide a direct evidence that monetary policy expectations serve as an important driver of investors' portfolio choice. A sudden revision of monetary policy expectation among market participants can induce systematic adjustment of portfolio holdings, and can potentially result in financial turmoil (such as seen in the "market tantrum" during the summer of 2013, see Feroli et al. (2014) and the reference therein).

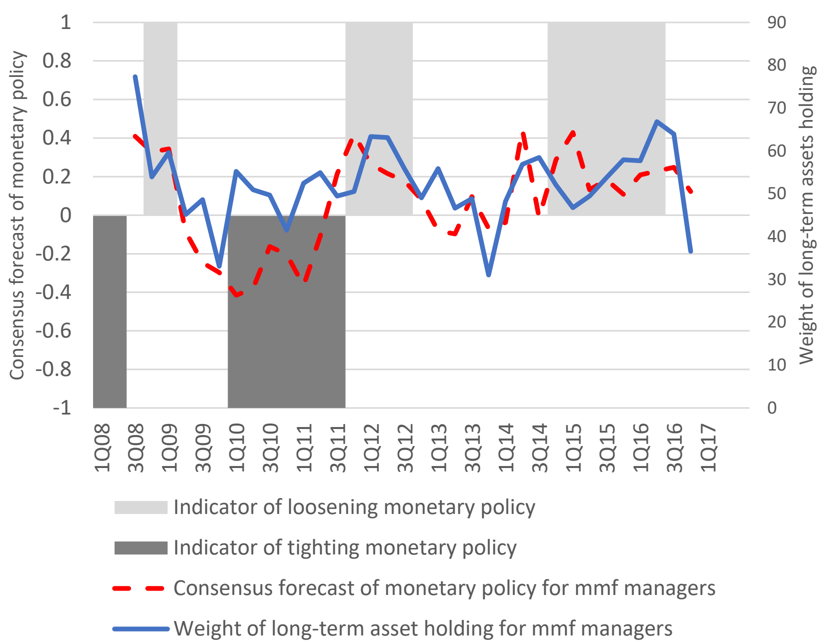


Figure 5: Consensus forecast and weight of long-term asset holding
Time series. The dashed curve displays the money market fund consensus forecast measured as the mean of forecast score across money market fund managers. The solid curve is the average weight of long-term asset holding weighted by fund size. Long-term asset is defined as assets with maturities longer than 60 days. The shaded columns are the monetary policy index. The darkly shaded columns indicate the easing monetary policy periods. The lightly shaded columns indicate the tightening monetary policy periods. Monetary policy is unchanged in the periods with no columns.

5 The characteristics of superior forecasters

In this section, we construct an index of forecast skill by calculating how often the managers correctly anticipates shifts in monetary policy. We then identify the characteristics of the superior funds and their managers.

We use a dummy variable $correct_t^i$, which is equal to one if the manager's forecast is in the same direction as the realization of monetary policy, to measure the correctness of a forecast:

$$correct_t^i = \begin{cases} 1 & \text{if } sign\left[E_t^i\left(\Delta mp_{t+1}\right)\right] = sign\left(\Delta mp_{t+1}\right) \\ 0 & \text{if } sign\left[E_t^i\left(\Delta mp_{t+1}\right)\right] \neq sign\left(\Delta mp_{t+1}\right) \end{cases}$$

We then measure a manager's forecast skill as the conditional mean of the forecast correctness in her reports:

$$correct^i = \frac{\sum_{t=1}^{T^i} correct_t^i}{\sum_{t=1}^{T^i} parti_t^i},$$

where $correct^i$ denotes manager i's forecast correctness; $correct_t^i$ is an indicator function of reporting a forecast which is consistent with the realization of monetary policy. A higher $correct^i$ implies that the manager has a better forecast skill.[18]

Next we examine the characteristics of the mutual funds and the mutual fund managers who provide the most accurate forecasts and the ones who pay the most attention to monetary policy.

We focus on the following fund and manager characteristics variables: management fee, fund age, fund size, gender (equals to one if the manager is female), having a Ph.D. degree, having a masters degree or higher, years of asset management experience.[19]

We estimate the regression of forecast skill on fund and manager characteristics separately for each of listed variable:

$$\text{correct}^i = \alpha + \beta X^i + \text{fund type},$$

where X^i is the fund and manager characteristics variable, and fund type is a vector of fund type dummies.

[18] As a measure of forecast accuracy, $correct^i$ is relatively coarse since it only considers the sign of the forecast. We choose this measurement approach for robustness.

[19] If a fund has multiple managers, we compute the mean for the manager characteristics variables.The proportions of single managed funds in Chinese mutual funds is around 70%. (Chen et. al. (2018))

The estimation results reported in the Column (1) of Table . The mutual funds that provide better forecasts on average charge higher management fees (as a percent of net assets). Furthermore, managers who manage a larger fund have a better forecast record, which implies that there is a positive assortative matching between large funds and highly skilled managers. Presumably, both the fund size and the management fees reflect the managerial skill perceived by the market. Interestingly, managers with a Ph.D. degree turn out to be better forecasters, which is consistent with the fact that policy forecasting requires non-negligible resource input, as in the spirit of Grossman and Stiglitz (1980).[20] In contrast, we found that neither fund age, gender, or professional experience is significantly correlates with forecast skill.

Table 7: Forecast skill and manager-fund characteristics

The dependent variable is forecast skill measured as the fraction of correct forecasts. *Management fee* is the management fee of the fund. *log* (fund age) is the maximum age of the fund measured in quarter. *log* (fund size) is the logarithm value of fund total net asset value, *gender* is a dummy variable which is equal to one if the manager is female. *Ph.D.* is a dummy variable which is equal to one if the manager has a Ph.D. degree. *Experience* is the manager's asset management experience measured in years. If a fund has multiple managers, we compute the mean for the manager characteristics variables. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Dependent variable	correct^i
Management fee	878.995^{***} (3.50)
log (fund age)	0.077 (1.54)
log (fund size)	1.440^{***} (3.31)
Gender	−3.459 (−1.43)
Pd.D.	4.614^{*} (0.27)
Experience	0.084 (1.34)
Observation	1,910

[20]Our results contrast those of Berger, Ehrmann, and Fratzscher (2011), who found that forecasters with a Ph.D. degree did significantly worse at forecasting Fed's policy. Instead, these authors found that past working experience at the Board of Governors was associated with forecasting performance.

6 Forecast skill and fund return

With the constructed forecast skill index, this section studies how does managers' forecast skill affect fund performance.

6.1 Cross-sectional results for fund return

We follow the literature by measuring mutual fund's risk-adjusted return as *alpha* estimated from a Fama-French three-factor model or a CAPM model for equity funds, bond funds, and mixed funds. The risk-adjusted return for money market funds is measured as the fund return in excess to the benchmark risk-free rate.

To test whether superior forecast skill (i.e., a high correct^i) associates with high risk-adjusted returns, we estimate the following regression model:

$$\text{perform}^i = c_0 + c_1\text{correct}^i + \text{fund type} + X^i, \tag{2}$$

where perform^i is monthly risk-adjusted return (basic points), correct^i is the measure of forecast skill, fund type is a vector of fund type dummies, and X^i is a set of control variables. The coefficient of interest is c_1.

The estimation results are reported in Tables (8), which shows that on average, forecast skill (correct^i) is not significantly correlated with mutual fund's risk-adjusted return. We do find stronger performance for larger funds, consistent with economies of scale, and with results reported by Ferreira e al (2013) for equity funds based in 26 foreign countries (not including either China or the United States). In contrast, Chen et al. (2004) find diseconomies of scale in U.S. equity fund performance.

We then regress the fund return on the forecast skill measure separately for each fund type. Tables (10) (11) (12) and (9) report the estimation results for bond funds, mixed funds, equity funds, and money market funds, respectively.

As reported in Table (9), forecast skill (correct^i) is positively and significantly correlated with money market funds' return. The result is robust to including various controls, such as management fees, fund size, and fund age. The result is consistent with the fact that monetary policy is a crucial factor in the money market, and that the skill of correctly anticipating mone-

Table 8: Forecast skill and fund performance: all mutual funds

The dependent variables are the two measures of risk-adjusted return for mutual funds. Correctness is the fraction of correct forecasts for each manager. Size is the logarithm value of fund total net asset value. Fund Age is the maximum age of the fund measured in quarters. Mgmt Fees is the management fee of the fund. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) CAPM	(2) CAPM	(3) Fama-French	(4) Fama-French
Correctness	0.187	0.173	0.034	0.145
	(0.49)	(0.46)	(0.07)	(0.30)
Mgmt Fees		-122.703**		-387.340***
		(-2.57)		(-6.41)
Size		0.171**		0.345***
		(2.46)		(3.92)
Fund Age		0.045***		0.064***
		(5.94)		(6.60)
Type FE	Yes	Yes	Yes	Yes
Observation	1,743	1,743	1,743	1,743
R^2	0.032	0.059	0.034	0.082

tary policy shift is rewarded. We also find stronger performance for larger funds, consistent with economies of scale reported by Domian and Reichenstein (1998) and by Dahlquist, Engstrom, and Soderlind (2000) for U.S. and Swedish money market funds, respectively.

Forecast skill is positively correlated with the performance of bond funds. However, the correlation is not statistically significant. Finally, forecast skill is not significantly correlated with the fund return for equity funds and mixed funds, and the sign of the correlation becomes negative for certain specifications. The findings are consistent with the consensus view in the literature that for the bond, equity, and mixed funds, stock-picking skill is usually more significantly rewarded than market timing skill (e.g., Graham and Harvey, 1996) which includes the skill of anticipating monetary policy shifts.

6.2 Panel regression results for fund return

One complication in interpreting the cross-sectional analysis in the previous section is that our panel data set is unbalanced, hence we are comparing average forecast correctness and fund return across fund managers who operated over different time intervals. A second issue is relates to the underlying driver of differences in managers' performance. Specifically, a positive

Table 9: Forecast skill and fund performance: money market funds

The dependent variable is the excess return of money market funds. Correctness is the fraction of correct forecasts for each manager. Size is the logarithm value of fund total net asset value. Fund Age is the maximum age of the fund measured in quarters. Mgmt Fees is the management fee of the fund. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) CAPM	(2) CAPM
Correctness	0.468***	0.397***
	(3.72)	(3.61)
Mgmt Fees		-82.553
		(-1.51)
Size		0.064***
		(4.92)
Fund Age		-0.013***
		(-5.26)
Observation	156	156
R^2	0.082	0.324

Table 10: Forecast skill and fund performance: bond funds

The dependent variables are two measures of the risk-adjusted return of bond funds. Correctness is the fraction of correct forecasts for each manager. Size is the logarithm value of fund total net asset value. Fund Age is the maximum age of the fund measured in quarters. Mgmt Fees is the management fee of the fund. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) CAPM	(2) CAPM	(3) Fama-French	(4) Fama-French
Correctness	0.644	0.567	0.759	0.726
	(1.35)	(1.20)	(1.41)	(1.35)
Mgmt Fees		236.106***		265.488***
		(2.74)		(2.70)
Size		0.084		0.019
		(1.09)		(0.22)
Fund Age		0.031**		0.015
		(2.56)		(1.10)
Observation	504	504	504	504
R^2	0.004	0.040	0.004	0.024

correlation between fund return and forecast skill can be due to a wiser investment choice guided by the correct anticipation of monetary policy shifts. An alternative interpretation is that both fund return and forecast skill are correlated with an unobserved general managerial skill. Both

Table 11: Forecast skill and fund performance: mixed funds

The dependent variables are the two measures of risk-adjusted return for mixed funds. *Correctness* is the fraction of correct forecasts for each manager. *Size* is the logarithm value of fund total net asset value. *Fund Age* is the maximum age of the fund measured in quarters. *Mgmt Fees* is the management fee of the fund. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) CAPM	(2) CAPM	(3) Fama-French	(4) Fama-French
Correctness	0.104	0.144	-0.512	-0.226
	(0.20)	(0.27)	(-0.76)	(-0.35)
Mgmt Fees		-16.218		-232.591***
		(-0.28)		(-3.22)
Size		0.459***		0.906***
		(4.15)		(6.59)
Fund Age		-0.030**		-0.056***
		(-2.43)		(-3.62)
Observation	955	955	955	955
R^2	0.000	0.021	0.001	0.068

Table 12: Forecast skill and fund performance: equity funds

The dependent variables are the two measures of risk-adjusted return for equity funds. *Correctness* is the fraction of correct forecasts for each manager. *Size* is the logarithm value of fund total net asset value. *Fund Age* is the maximum age of the fund measured in quarters. *Mgmt Fees* is the management fee of the fund. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) CAPM	(2) CAPM	(3) Fama-French	(4) Fama-French
Correctness	-0.761	-0.880	1.608	1.211
	(-0.30)	(-0.42)	(0.48)	(0.48)
Mgmt Fees		-387.982		-542.548
		(-0.37)		(-0.42)
Size		-0.681		-0.308
		(-1.20)		(-0.44)
Fund Age		0.170***		0.254***
		(7.66)		(9.34)
Observation	128	128	128	128
R^2	0.001	0.339	0.002	0.450

issues can be solved by estimating a panel regression model.

Specifically, we estimate the following panel regression model separately for bond funds and money market funds:

$$\text{perform}^i_{t+1} = c_1 parti^i_t + c_2 parti^i_t \times correct^i_t + X^i_t + \chi^i$$

Importantly, we include fund-manager fixed-effect χ^i as the independent variable, hence the general managerial ability is ruled out. The dependent variableperform$^i_{t+1}$ is the risk-adjusted return in the next period. parti^i_t is the participation dummy. parti^i_t $\times$correct^i_t is the indicator of a correct forecast *conditional* on participating. X^i_t is a set of control variables of fund-manager characteristics.

The coefficient of parti^i_t $\times$correct^i_t , c_2, is of interest, as it measures the difference of risk-adjusted return between reporting a correct forecast and reporting an incorrect forecast.

The estimation results for bond funds are reported in Table (13). As shown in Column (2), a correct forecast generates a higher risk-adjusted return than an incorrect forecast. The estimation findings support Hypothesis (1) that a more accurate forecast or a heavier allocation of attention to monetary policy *causes* a higher risk-adjusted return.

Table 13: Forecast correctness and fund performance: bond funds

The dependent variables are two measures of risk-adjusted returns. Participated is a dummy variable that is equal to 1 if the manager reports the monetary policy expectation. Participated and Correct is a dummy variable that is equal to 1 if the manager reports a correct forecast. Lag Ln(Size) is the lagged logarithm value of fund total net asset value. Lag Fund Age is the lagged age of the fund measured in quarters. Lag Fund Inflow is the lagged net fund inflow. Standard errors are clustered at the fund level. Data is quarterly from 2008 Q3 to 2016 Q4. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) CAPM	(2) Fama-French
Participated	1.462	0.795
	(1.38)	(0.78)
Participated and Correct	6.670***	7.952***
	(4.52)	(5.23)
Lag Ln(Size)	-0.303	-0.393
	(-0.35)	(-0.44)
Lag Fund Inflow	0.001**	0.001**
	(2.00)	(1.99)
Lag Fund Age	0.390***	0.274***
	(4.46)	(3.20)
Fund FE	Yes	Yes
Observation	6,932	6,932
R^2	0.174	0.151

The estimation results for money market funds are displayed in Table 14. Column (1) reports the full sample results, which shows that correct forecasts do not play a statistically significant role in money market fund's return. The finding suggests that the cross-sectional positive correlation between money market fund's return and forecast skill is mostly driven by unobserved managerial skill which is correlated with both the fund return and the measure of forecast skill.

Column (2) and column (3) present the results for two sub-samples, pre-2013q2 and post-2013q2, respectively. The results show that correct forecasts improve fund return before 2013q2. However, the effect becomes statistically insignificant after 2013q2.

The main motivation for this exercise is that PBoC accelerated the liberalization of interest rates after 2013q2.

Generally speaking, Interest rate liberalization is a process of PBoC's transition from imposing interest rates through administrative orders to influencing market rates by managing its own balance sheet. In the process, PBoC has been widening the range (around the benchmark interest rates) in which the deposit and lending interest rates are allowed to float. July 2013 is a critical moment for interest rate liberalization as most lending rates of the banking sector (except mortgage rates) were fully liberalized in that month.[21]

While the benchmark policy interest rates, particularly the benchmark deposit rate, might still serve as an important monetary policy instrument after 2013q2, it became less relevant to money market fund return, as the market interest rates, on which money market fund returns are based, no long are closely anchored to the benchmark interest rates.To show this point, Figure 6 plots the 3-month benchmark deposit rate (blue curve), the weighted-average of the 3-month inter-bank offered rates (red curve), and the return of money market fund index (green curve). Before 2013q2, the inter-bank offered rate and the money market fund index return closely comove with the benchmark deposit rate. However, the comovement pattern collapsed after 2013q2 due to the interest rate liberalization.

[21]In comparison, PBoC is more cautious in the liberalization of the deposit rates by gradually lifting the deposit rate ceiling, until completely removing it for in Oct 2015 for commercial banks and agricultural credit unions.

Table 14: Forecast correctness and fund performance: money market funds

The dependent variables are two measures of risk-adjusted returns. *Participated* is a dummy variable that is equal to 1 if the manager reports the monetary policy expectation. *Participated and Correct* is a dummy variable that is equal to 1 if the manager reports a correct forecast. *Lag Ln(Size)* is the lagged logarithm value of fund total net asset value. *Lag Fund Age* is the lagged age of the fund measured in quarters. *Lag Fund Inflow* is the lagged net fund inflow. Standard errors are clustered at the fund level. Data is quarterly from 2008 Q3 to 2016 Q4. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1) Full sample	(2) Before 2013	(3) After 2013
Participated	0.035***	0.021	0.046***
	(3.12)	(1.43)	(3.51)
Participated and Correct	-0.012	0.034*	-0.007
	(-1.09)	(1.99)	(-0.56)
Lag Ln(Size)	0.064***	0.026***	0.029***
	(8.75)	(3.65)	(3.42)
Lag Fund Inflow	-0.002	-0.001	0.001
	(-1.47)	(-0.49)	(1.01)
Lag Fund Age	0.010***	0.004**	-0.001
	(6.10)	(2.25)	(-1.03)
Risk Free Rate	17.839***	20.370***	15.338***
	(44.15)	(36.26)	(30.15)
Fund FE	Yes	Yes	Yes
Observation	3,118	732	2,386
R^2	0.641	0.712	0.695

7 Monetary policy expectation and fund flow

In this section, we examine whether revisions of monetary policy expectation, measured as the fluctuations of the consensus forecast, induce systematic fund flow. We first examine whether the anticipation of a shift in monetary policy affect the fund inflow to the mutual fund industry by estimating the following regression model:

$$FF_t = \alpha + \gamma \cdot E_t\left(\Delta mp_{t+1}\right) + \eta \cdot r_t + q_t,$$

where FF_t is the net fund flow, computed as the change rate of the total number of shares; $E_t\left(\Delta mp_{t+1}\right)$ is the consensus forecast; r_t is the market interest rate measured by the weighted average of three-month inter-bank offered rates; q_t is the quarter dummy that adjusts for potential seasonality of fund flow. The coefficient of interest is γ.

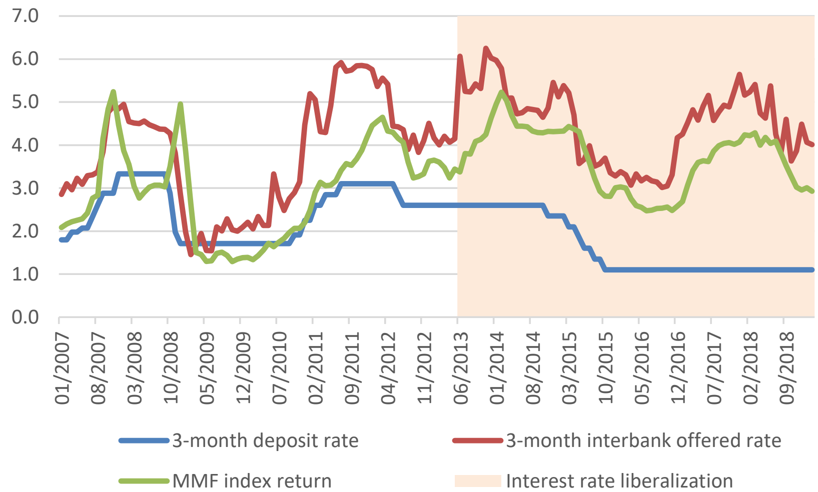


Figure 6: Interest rate liberalization in China

Time series. The blue curve is the benchmark three-month deposit rate. The red curve is the weighted average of three-month inter-bank offered rates. The green curve is the weighted average of money market funds return. The patched area indicates post-2013 June, since when the market interest rates are allowed to float in a wider range around the benchmark policy rates.

The estimation results are reported in Table 15. The results indicate that expecting an easing (tightening) monetary policy, there is an net inflow (outflow) of fund into the mutual fund industry. The finding is consistent with the yield-chasing behavior of the customers: expecting a lower deposit rate, the customers strategically shift from deposit account to mutual fund. The estimate is robust to including the market interest rate as a control variable.

Then we examine how monetary policy expectations induce fund flows for each type of funds

Table 15: Consensus forecast and fund flow: all mutual funds

The dependent variable is the net inflow rate to the mutual fund industry. $E_t(\Delta mp_{t+1})$ is the consensus forecast. r_t is the weighted average of three-month inter-bank offered rates. Data is quarterly from 2008 Q3 to 2016 Q4. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)
$E_t(\Delta mp_{t+1})$	0.10^{**} (2.20)	0.09^{**} (2.07)
r_t		0.00 (0.46)
Adj. R^2	0.06	0.03
Observation	33	33

Table 16: Consensus forecast and fund flow: fund types

The dependent variables are the net inflow rates to each fund type. $E_t(\Delta mp_{t+1})$ is the consensus forecast. r_t is the weighted average of three-month inter-bank offered rates. Data is quarterly from 2008 Q3 to 2016 Q4. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Bond		Mixed		Equity		MMF	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$E_t(\Delta mp_{t+1})$	0.04	0.04	0.04	0.04	0.00	0.02	0.41**	0.36**
	(0.30)	(0.32)	(0.54)	(0.54)	(0.03)	(0.21)	(2.55)	(2.33)
r_t		−0.00		−0.00		−0.02		0.79
		(−0.06)		(−0.17)		(−1.17)		(2.24)
Adj R^2	-0.11	-0.15	0.00	-0.03	-0.10	-0.08	0.45	0.51
Observation	34	34	34	34	34	34	34	34

separately. The estimation results are reported in Table 16. According to the results, the inflow of fund into the mutual fund industry, as documented in Table 15, is almost entirely driven by the money market funds. Specifically, there is an net inflow (outflow) into money market funds when the market expects an easing (tightening) monetary policy. This is an interesting and puzzling fact, as it is opposite to the experience in U.S. market: an increase (decrease) in the Federal Reserve's policy target rate typically induce an inflow (outflow) to U.S. money market funds.

A possible explanation is that the benchmark deposit rate in China is set by the central bank through the administrative regulation channel, rather than determined by the supply and demand of the credit market. In comparison, the interest rates on instruments held by money market funds are, to a greater extent, endogenously determined by the supply and demand of the money market. While an easing monetary policy would lower both the deposit rate and the interest rate of money market fund, it also widens the interest spread between the two and makes the latter more attractive. Yield-chasing depositors would strategically substitute from bank deposits to money market fund shares.

In contrast, the links between wholesale bank funding and short-term securities markets is much closer in the United States. Hence there is a positive relation between the Federal Reserve's policy target rate and flows to U.S. money market funds.

Table 17: Interest rate spread between money market fund and deposit rate

The dependent variable the interest spread between the money market fund index and the benchmark three-month deposit rate. Δmp_t is the monetary policy index. Data is quarterly from 2008 Q3 to 2016 Q4. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)
Δmp_t	0.66^{***} (3.46)	0.36^{**} (2.33)
Time trend		0.06^{***} (4.98)
Adj R^2	0.25	0.57
Observations	34	34

To test this hypothesis, we estimate the following regression model:

$$i_t^{mmf} - i_t = \alpha + \beta \Delta mp_t + \eta \cdot t,$$

We include a time trend in the regression to control for the widening trend of the interest spread due to the interest rate liberalization as shown in Figure 6. The estimation results are reported in Table, which confirm that easing (tightening) monetary policy widens (shrinks) the interest rate spread between money market fund and the deposit rate, which might explain the negative correlation between money market fund holdings and Δmp_t.

Due to the depositors' strategic substitution between bank deposit and money market fund shares, all else equal, transmission of Chinese monetary policy to the real economy could be weakened, because potential bank borrowers generally do not have access to money-market financing.

8 Conclusion

In this paper, we construct a novel monetary policy expectation measure by applying a systematic textual analysis of the qualitative discussion in China's fund managers' quarterly reports.

We demonstrate that the aggregate index of manager expectations outperforms both market-based and model-based alternative projections.

Furthermore, we find that expectations are even more accurate for funds that commit more analytical resources, proxied by fund size, management fees, and managers' educational background.

We also show that fund managers act on these expectations, and that correctly anticipating shifts in Chinese monetary policy improves fund performance.

Finally, we document that net inflows into Chinese money-market funds positively (negatively) associated with near-term prospects for an easing (tightening) of monetary policy.

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