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Macroeconomic News and the RMB Exchange Rate

Abstract: This paper establishes an exchange rate determination model with financial intermediate. The theoretical model shows that the exchange rate expectation is the discounted value of the financial intermediate's macroeconomic expectation. The difference between the exchange rate expectation and the spot exchange rate is the revision of the financial intermediate's expectation. The empirical test of the macroeconomic news of China and the US on the RMB exchange rate since 2010 shows that the RMB exchange rate is mainly affected by Chinese macroeconomic news and this impact is more significant when the RMB exchange rate depreciates. Among all the Chinese news factors, the news of money supply and new RMB loans are the two factors. Unexpected increase of money supply and news RMB loans leads the RMB exchange rate to depreciation. In addition, the impact of macroeconomic news if asymmetry. The impact of the 'positive news' of China and the 'negative news' of the US is significant.

Key Words: the RMB Exchange Rate; Macroeconomic News; Expectation

I Introduction

The foreign exchange market is the world's largest financial market. According to the according to the 2016 Triennial Central Bank Survey of FX, trading in foreign exchange markets averaged $5.1 trillion per day in April 2016. Macroeconomic news has great impact on exchange rate and financial intermediates can trade by news automatically. Numerous studies have confirmed that macroeconomic news have impacts on the floating exchange rate. Hardouvelis (1988) examines the post-October 1979 response of exchange rates to the new information contained in the first announcement of fifteen US macroeconomic series and finds that markets respond primarily to monetary news, but also to news about the trade deficit, domestic inflation, and variables that reflect the state of the business cycle. Tanner (1997) measures intraday data in a 1987-1991 sample period and finds that the mark/dollar exchange rate was affected by unanticipated information about the trade deficit and the consumer price index. Kim (1998) examines the effects of scheduled Australian and US macroeconomic announcements on daily

USD/AUD exchange rate changes and finds that a higher than expected Australian current account deficit announcement depreciated the AUD while an unexpectedly higher Australian GDP growth rate appreciated it on the announcement day during the Australian market trading. Simpson, Ramchander & Chaudhry (2005) evaluate the effects of surprises in 23 types of macroeconomic announcements on foreign exchange rates and find that exchange rates respond to announcements related to consumer demand, inflation, and interest rates. Other studies discover similar conclusion (Ederington & Lee, 1993; Deravi & Hegji, 1998; Pearce & Solakoglu, 2007). Macroeconomic news not only affects the level of the exchange rate but also affect the volatility of the exchange rate. Kim (1998) disserts that the conditional volatility was higher in response to the Australian current account deficit and inflation news, while the retail sales news lowered it. Using high-frequency intraday data within the framework of ARCH-type models, Bauwens, Omrane & Giot (2005) shows that volatility increases in the pre-announcement periods, particularly before scheduled events.

The impacts of macroeconomic news from different origins and in different periods are different. Kim (1998) discovers that the US announcements, in general, had little effect during the US market trading, however, news effects measured over wider time horizon encompassing the next calendar day's Australian trading turned out to be more significant. Fatum, Hutchison & Wu (2012) compare the overall influence of Japanese news to the overall influence of US news, and show that Japanese macro news are as important as US macro news in influencing the JPY/USD exchange rate. Hakkio & Pearce (1985) finds that exchange rate are systematically related to unexpected monetary announcement after the October 1979 switch in Federal Reserve operating procedures but not before, but this response does not appear to have changed after the October 1982 Federal Reserve regime change. Dominguez & Panthaki (2006) find that news has its largest impact during periods of higher than normal news arrival and higher market uncertainty. Laakkonen & Lanne (2010) find that news effects depend on the state of the economy. In general, news increases volatility more in good times than in bad times.

Although economic news have impacts on the exchange rate, the persistence of these impacts differ from seconds to days. Ederington & Lee (1995) find that prices adjust in a series of numerous small, but rapid, price changes that begin within 10 seconds of the news release and are basically completed within 40 seconds of the release, and that there is some evidence prices overreact in the first 40 seconds but that this is corrected in the second or third minute after the release. Almeida & Payne (1998) study the high frequency reaction of the DEM/USD exchange rate to publicly announced macroeconomic information emanating from Germany and the US using data sampled at a five-minute frequency and identify significant impacts of most announcements on the exchange rate change in the 15 minutes post-announcement, although the significance of these effects decreases rapidly as the interval over which the post-announcement change in exchange rates is increased. Degennaro & Shrieves (1997) show that scheduled macroeconomic news releases result in dramatic increases in forex rate volatility when the news is released, the increase continues in the following ten minute interval and that unscheduled policy announcements are associated with a small, but statistically significant reduction in volatility for about twenty minutes. Carlson & Lo (2006) shows that the speculative activity by traders in initial reaction to the news destabilized the market for the next 2 hours. Pearce & Solakoglu (2007) dissert that the effects of the news announcements on exchange rate returns and volatility largely occurred within 5 min of the announcements. Evens & Lynon (2005) find that news arrivals induce subsequent changes in trading in all of the major end-user segments and that these induced changes remain significant for days.

Scholars analyze the mechanics of the impacts of macroeconomic news on the exchange rate from the view of efficient market and order flow. Evens & Lynon (2005, 2008) distinguish average news effects from total news effects. Average effects correspond to the direct channel for price impact, which one would expect to be reflected immediately, i.e., more quickly than indirect, order flow driven effects. Even if average effects from news are reflected in prices quickly, this does not imply that total effects are reflected quickly. Rather, participants' macro views evolve continually, and trades induced by those evolving views hit the market over extended periods. Order

flow variations contribute more to currency price dynamics following the arrival of public macro news than at other times and account for two-thirds of the total effect of macro news on the DM/$ exchange rate. Love & Payne (2008) explain that even information is partially impounded into prices via order flow and that one third of price-relevant information is incorporated via the trading process. Savaser (2011) investigates the micro effects of macro news using customer price-contingent orders and examines the link between this surge in order placement and the exchange-rate jump following the announcement. He finds that price-contingent orders can help explain post-release exchange-rate returns by half. Furthermore, the estimated effect of orders is orthogonal to the news surprises, which implies that there may be a component of the news response that purely reflects institutional features such as order types and not necessarily the public information itself.

With the reform of the RMB exchange rate, the RMB exchange rate shows more assets' price characteristics. Expectation plays more important roles in the RMB exchange rate determination. But not enough attentions have paid to studying the role of expectation in the RMB exchange rate determination. We try to research in the impacts of macroeconomic news on the RMB exchange rate.

The rest of the paper is set up as follows. Section II establish a theoretical exchange rate determination model by introducing the financial intermediate; Section III data and methodology; Section IV the empirical tests; Section V the robust test; Section VI Conclusion.

II Theoretical Model

The China's foreign exchange market is classified into two level: the retail market which link the financial intermediate and customers and the wholesale market which link the financial intermediates together and link the financial intermediates and the economic authority. Customers' supply and demand of foreign exchange is satisfied by financial intermediates in the retail market. Financial intermediates buy and sell foreign exchange to keep their positions balanced in the wholesale market. Financial intermediates give their quotes and form the RMB exchange rate central parity rate.

Financial intermediates add points into or subtract points from the central parity rate and form the foreign exchange's retail price. The economic authority can intervene in the wholesale market. From this process, it is clear that the real supply and demand of foreign exchange come from customers who are the exchange rate's price-taker. The price is form in the wholesale market, and financial intermediates play an important role. To establish an exchange rate determination model, financial intermediates should not be ignored. In China, the financial intermediate in foreign exchange wholesale market is the bank. We refer the bank as financial intermediate.

We extend Evens (2011) the microstructure model. Assume that the banks expect exchange rate satisfy revised interest rate parity and that the monetary policy complies with the revised Taylor rule.

$$E_t^B e_{t+1} - e_t = \beta\left(i_t - i_t^*\right) + \delta_t \quad (1)$$

$$E_t^B\left(i_{t+i} - i_{t+i}^*\right) = \left(1+\gamma_\pi\right)E_t^B\left(\pi_{t+i+1} - \pi_{t+i+1}^*\right) + \gamma_y E_t^B\left(y_{t+i} - y_{t+i}^*\right) + \gamma_\varepsilon E_t^B \varepsilon_{t+i} \quad (2)$$

$$\varepsilon_t = e_t + p_t^* - p_t \quad (3)$$

The demand for exchange rate arises from investment purpose, which is determined by arbitrage opportunity, and trade purpose. The individual demand for foreign exchange can be expressed as follow:

$$x_t^n = \alpha_s\left[E_t^n e_{t+1} - e_t + \beta\left(i_t^* - i_t\right)\right] - tb_t^n \quad (4)$$

Standardize a country's population as one unit. The country's total demand for foreign exchange can be expressed as:

$$x_t = \int_0^1 x_t^n dn = \alpha_s\left[\bar{E}_t^n e_{t+1} - e_t + \beta\left(i_t^* - i_t\right)\right] - tb_t \quad (5)$$

The banks' one step ahead exchange rate expectation can be expressed as:

$$E_t^B e_{t+2} - E_t^B e_{t+1} = E_t^B\left[\beta\left(i_{t+1} - i_{t+1}^*\right) + \delta_{t+1}\right] \quad (6)$$

Combine equations (2) (3) (6):

$$E_t^B e_{t+1} = -\frac{\beta}{1+\beta\gamma_\varepsilon}\left[E_t^B\left(1+\gamma_\pi\right)\left(\pi_{t+2} - \pi_{t+2}^*\right) + E_t^B\gamma_y\left(y_{t+1} - y_{t+1}^*\right) + E_t^B\gamma_\varepsilon\left(p_{t+1}^* - p_{t+1}\right)\right]$$

$$-\frac{1}{1+\beta\gamma_\varepsilon}E_t^B\delta_{t+1} + \frac{1}{1+\beta\gamma_\varepsilon}E_t^B e_{t+2} \quad (7)$$

Iterate equation (7) ahead

$$E_t^B e_{t+1} = E_t^D \sum_{i=1}^{\infty} \rho^i \left(f_{t+i} - \delta_{t+i} \right) \quad (8)$$

Note that $f_t = -\beta\left[(1+\gamma_\pi)\left(\pi_{t+2} - \pi_{t+2}^*\right) + \gamma_y\left(y_{t+1} - y\right) + \gamma_\varepsilon\left(p_{t+1}^* - p_{t+1}\right)\right]$, $\rho = \dfrac{1}{1+\beta\gamma_\varepsilon}$.

Combine equations (1) (8)

$$e_t = \beta\left(i_t^* - i_t\right) + E_t^B \sum_{i=1}^{\infty} \rho^i f_{t+i} - E_t^B \sum_{i=0}^{\infty} \delta_{t+i} \quad (9)$$

The customers' demand for foreign exchange is satisfied by the banks. Banks trade in the wholesale market to keep their position balanced, which means that the position exposure is zero.

$$\alpha\left[\bar{E}_t^n e_{t+1} - e_t + \beta\left(i_t^* - i_t\right)\right] - tb_t = 0 \quad (10)$$

Combine equations (1) (10)

$$\delta_t = E_t^B\left[e_{t+1}^e + \frac{1}{\alpha_s} tb_t\right] \quad (11)$$

Note that $e_{t+1}^e = e_{t+1} - \bar{E}_t^n e_{t+1}$. Combine equations (9) (11)

$$e_t = \beta\left(i_t^* - i_t\right) + E_t^B \sum_{i=1}^{\infty} \rho^i f_{t+i} - \frac{1}{\delta_s} E_t^B \sum_{i=0}^{\infty} \rho^i tb_{t+i} - E_t^B \sum_{i=1}^{\infty} \rho^{i-1} e_{t+i}^e \quad (12)$$

$$e_{t+1} = \beta\left(i_{t+1}^* - i_{t+1}\right) + E_{t+1}^B \sum_{i=1}^{\infty} \rho^i f_{t+i+1} - \frac{1}{\delta_s} E_{t+1}^B \sum_{i=0}^{\infty} \rho^i tb_{t+i+1} - E_{t+1}^B \sum_{i=1}^{\infty} \rho^{i-1} e_{t+i+1}^e \quad (13)$$

$$E_t^B e_{t+1} = E_t^B \sum_{i=1}^{\infty} \rho^i f_{t+i} - \frac{1}{\delta_s} E_t^B \sum_{i=0}^{\infty} \rho^i tb_{t+i} - E_t^B \sum_{i=1}^{\infty} \rho^{i-1} e_{t+i}^e \quad (14)$$

The difference between spot exchange rate and expected exchange rate can be expressed as:

$$e_{t+1} - E_t^B e_{t+1} = \beta\left(i_{t+1}^* - i_{t+1}\right) + \left(E_{t+1}^B - \rho E_t^B\right) \sum_{i=1}^{\infty} \rho^i f_{t+i+1} - E_t^B \rho f_{t+1}$$

$$-\frac{1}{\alpha_s}\left(E_{t+1}^B - \rho E_t^B\right) \sum_{i=1}^{\infty} \rho^i tb_{t+1+i} - \left(E_{t+1}^B - \rho E_t^B\right) \sum_{i=1}^{\infty} \rho^i e_{t+2+i}^e \quad (15)$$

This model shows that the spot exchange rate is the discounted value of the banks' macroeconomic expectation. The difference tween the spot exchange rate and the expected exchange rate is the revision of banks' macroeconomic expectation.

III Data and Methodology

3.1 Definition and Alternative Measurements of 'News'

There are many possible definitions of 'news'. For the purpose of our analysis, we define 'news' as 'surprises', measured by the difference between the actual values of macroeconomic variables and the market's forecasts. Following an approach familiar in the literature, we use the median or the mean of survey data to measure market expectations. In order to allow a comparison of the shocks to different macroeconomic variables, following Tanner (1997), Galati & Ho (2003), Evans & Lynon (2005), we standardize the surprises for each variable by dividing each surprise by its sample standard deviation. For the macroeconomic variable j, news is therefore defined as:

$$News_t^j = \frac{R_t^j - E_t^j}{\sigma_j}$$

R_t^j denotes the actual value of macroeconomic variable j in time t. E_t^j denotes the expected value of macroeconomic variable j in time t. σ_j is the standard deviation of the difference.

3.2 Data

Our selection of macroeconomic variable for the USA includes those typically used in the literature and closely watched by participants in the foreign exchange market. The choice of macroeconomic indicators for China is less straightforward. We choose all monthly macroeconomic variable available in Wind Macroeconomic Forecast. The American variable is the median of the financial intermediates surveyed by DataStream. The Chinese variable is the mean of the financial intermediates surveyed by Wind. Considering the reform of the exchange rate, we include three dummy variables denoting the enlargement of the RMB exchange rate fluctuation range on 16th April 2012, the enlargement of the RMB exchange rate fluctuation range on 17th March 2014 and the reform of formation of the RMB exchange rate central parity. The dummy variables take the value of zero before the reform and the value of one after the reform. The sample is daily data from 1st January 2010 to 30th September 2016.

The macroeconomic data of China and the US show that the American departments in charge of macroeconomic data is more than that of China. In general,

the release lag of China is shorter than that of the US, and the release time of China is more central than that of the US. The t-tests of all macroeconomic news shows that expect for the American unemployment rate news, all the macroeconomic news can reject the null hypothesis of zero mean, which means that the financial intermediates' expectations are the unbiased values of the actual values.

Table 1: Macroeconomic Variables

US	China
CPI	*New RMB Loan*
Durable Goods Order	*Consumption Retail Sale*
Factory Order	*Trade Balance*
Industrial Production	*Fixed Investment*
Trade Balance	*CPI*
ISM manufacturing Index	*PPI*
ISM non-manufacturing Index	*M2*
Retail Sale	*Industrial Production*
Unemployment Rate	
ADP employment	
Non-farm Payroll	
PPI	

Table2: Chinese Macroeconomic Data Announcement Date

Variable	Release Lag	Source	Release Time
New RMB Loan	1-2 Weeks	PBOC	10:00 am
Consumption Retail Sale	1-2 Weeks	NBOS	10:00 am
Trade Balance	1-2 Weeks	MOFCOM	10:00 am
Fixed Investment	1-2 Weeks	NBOS	10:00 am
CPI	1-2 Weeks	NBOS	10:00 am
PPI	1-2 Weeks	NBOS	10:00 am
M2	1-2 Weeks	PBOC	10:00 am
Industrial Production	1-2 Weeks	NBOS	10:00 am

Note: PBOC, the People's Bank of China; NBOS, National Bureau of Statistics of China; MOFCOM,

Ministry of Commerce People's Republic of China. Release time is the Beijing time.

Table3: American Macroeconomic Data Announcement Date

Variable	Release Lag	Source	Release Time
CPI	2-3 Weeks	BLS	8:30 am
Durable Goods Order	3-4 Weeks	CB	8:300 am
Factory Order	0-1 Week	CB	10:00 am
Industrial Production	2-3 Weeks	FRB	9:15 am
Trade Balance	5-6 Weeks	Commerce	8:30 am
ISM manufacturing Index	0-1 Week	ISM	10:00 am
ISM non-manufacturing Index	0-1 Week	ISM	10:00 am
Retail Sale	2-3 Weeks	CB	8:30 am
Unemployment Rate	0-1 Week	BLS	8:30 am
ADP employment	0-1 Week	ADP	8:15 am
Non-farm Payroll	1-2 Weeks	BLS	8:30 am
PPI	2-3 Weeks	BLS	8:30 am

Note: BLS, Bureau of Labor Statistics; CB, US Census Bureau; FRB, Federal Reserve Board; ISM, Institute for Supply Management; Commerce, US Department of Commerce; ADP, Automatic Data Processing. Release time is the New York Time.

Table 4: Descriptive Statistics of Chinese Macroeconomic News

Variable	Mean	Max	Min	t-test
New RMB Loan	0.141	3.832	-2.798	1.25
Consumption Retail Sale	-0.044	2.884	-7.061	-0.37
Trade Balance	0.055	3.984	-3.711	0.5
Fixed Investment	0.070	4.098	-2.786	0.61
CPI	0.041	2.404	-1.923	0.37
PPI	-0.151	3.101	-2.791	-1.37
M2	-0.019	2.390	-2.257	-0.18

Industrial Production	-0.057	5.933	-3.782	-0.5

Table 5: Descriptive Statistics of American Macroeconomic News

Variable	Mean	Max	Min	t-test
CPI	-0.163	3.031	-2.020	-1.47
Durable Goods Order	0.035	5.253	-2.853	0.28
Factory Order	-0.076	2.457	-3.353	-0.68
Industrial Production	-0.127	1.963	-3.236	-1.15
Trade Balance	-0.028	2.538	-2.782	-0.25
ISM manufacturing Index	0.105	2.008	-2.697	0.95
ISM non-manufacturing Index	0.101	2.369	-2.658	0.92
Retail Sale	-0.093	1.373	-2.402	-0.83
Unemployment Rate	-0.395	1.350	-3.374	-3.58***
ADP employment	0.152	4.399	-3.059	1.38
Non-farm Payroll	-0.068	1.849	-2.080	-0.61
PPI	-0.196	1.373	-2.402	-1.11

3.3 Methodology

Assume that the daily return of the exchange rate is subject to the random walk process. So the exchange rate on the last trade day is the expected exchange rate on the next trade day. The difference of spot exchange rate and expected exchange rate is replaced by the return of exchange rate. Accoring to Tanner (1997), Galati & Ho (2003), Evans & Lynon (2005), we use a single equation with OLS method to regress the daily return of the RMB exchange rate on macroeconomic news. Considering the RMB exchange rate is in the appreciation period before the year 2014 and in the depreciation period after the year 2014, we divide the whole sample period into two sub-periods.

Firstly, we regress the RMB return on individual macroeconomic news.

$$s_t = \beta^{CN} X_t^{CN} + \beta^{US} X_{t-1}^{US} + \sum_{i=1}^{3} \beta_i DM_i + \varepsilon_t$$

s_t is the daily return of the RMB exchange rate; X_t^{CN} is Chinese macroeconomic news vector at time t; X_{t-1}^{US} is the American macroeconomic news vector at time $t-1$; ε_t is while noise. Because the jet lag between China and the US is 12 hours, American news takes the value of first order lag. If there is no news on some day, macroeconomic news takes the value of zero.

Then, we add individual news of one country together to construct a news index and regress daily return of the RMB exchange rate on the news index to test the total impact of macroeconomic news.

$$Newsindex_{t,CN}^{CN} = News_{t,CN}^{CPI} + News_{t,CN}^{fixinvestment} + News_{t,CN}^{industrial} + News_{t,CN}^{M2} + News_{t,CN}^{newloan} + News_{t,CN}^{PPI} + News_{t,CN}^{retail} + News_{t,CN}^{trade}$$

$$Newsindex_{t}^{US} = News_{t,US}^{CPI} + News_{t,US}^{ADP} + News_{t,US}^{factoryorder} + News_{t,US}^{ISM} + News_{t,US}^{industrial} + News_{t,US}^{durable} + News_{t,US}^{nonfarm} + News_{t,US}^{PPI} + News_{t,US}^{retail} + News_{t,US}^{ISM-nonnaumu}$$

$$s_t = \beta^{CN} Newsinindex_t^{CN} + \beta^{US} Newsindex_{t-1}^{US} + \sum_{i=1}^{3} \beta_i DM_i$$

Sheehan & Wohar (1995), Galati & Ho (2003), Fatum, Hutchison & Wu (2012) have found that the impact of macroeconomic news is asymmetry. At last, we test the asymmetry effect. According to Galati & Ho (2003) we define the news as ‘positive news’ if the sign of the news variable is positive and the news as ‘negative news’ if the sign of the news is negative.

$$s_t = \beta_{CN}^{positive} Newsindex_{t,CN}^{positive} + \beta_{CN}^{negative} Newsindex_{t,CN}^{negative} + \beta_{US}^{positive} Newsindex_{t-1,US}^{positive} + \beta_{US}^{negative} Newsindex_{t-1,US}^{negative} + \sum_{i=1}^{3} \beta_i DM_i$$

IV Empirical Test

Regression of the RMB return on individual news shows that in the whole sample period, the new RMB loan news and the reform of the RMB exchange rate central parity formation are significant factors affecting the RMB return. The Chinese CPI higher than the expectation leads the RMB exchange rate to depreciation. But this effect is moderate, and is not significant in the both sub-periods. The new RMB loan news decrease then RMB return (increase the US dollar return). New RMB loan reflect the

Chinese monetary policy. New RMB loans higher than the expectation means that the easy monetary policy, which lead the RMB exchange rate to depreciation. D3 is positive, which mean that the RMB exchange rate depreciate more rapidly after the reform of the RMB exchange rate central parity formation. In the sub-period of 2010/01-2013/12, the American durable goods order news and the enlargement of the RMB exchange rate fluctuation range are significant factors affecting the RMB return. The American durable goods news has negative effect on the RMB return. In the period of 2012/04-2013/12, the RMB exchange rate has gotten an appreciating trend. In the sub-period of 2014/01-2016/09, the M2 news and the new loan news affect the RMB return significantly, which means that monetary factors play more important roles in the RMB exchange rate determination.

Table 7: Regression of the RMB Return on Individual News

	Coefficients		
	2010/01-2016/09	2010/01-2013/12	2014/01-2016/09
β_{CN}^{CPI}	-0.020*	-0.012	-0.004
	(-1.66)	(-1.11)	(-0.14)
$\beta_{CN}^{fixinvestment}$	-0.008	0.010	-0.044
	(-0.55)	(0.65)	(-1.55)
$\beta_{CN}^{industrial}$	-0.017	-0.016	-0.003
	(-1.18)	(-1.22)	(-0.07)
β_{CN}^{M2}	0.019	0.005	0.088**
	(1.47)	(0.36)	(3.17)
$\beta_{CN}^{newloan}$	0.090***	-0.018	0.094***
	(6.88)	(-0.66)	(5.10)
β_{CN}^{PPI}	0.005	0.005	0.023
	(0.44)	(0.45)	(0.81)
β_{CN}^{retail}	-0.008	0.004	-0.101
	(-0.63)	(0.34)	(-0.98)

β_{CN}^{trade}	0.003	-0.015	0.009
	(0.30)	(-0.91)	(0.50)
β_{US}^{ADP}	0.008	0.001	0.062
	(0.74)	(0.12)	(1.55)
β_{US}^{CPI}	-0.005	-0.007	-0.007
	(-0.45)	(-0.61)	(-0.26)
$\beta_{US}^{durable}$	0.011	0.062***	-0.009
	(0.90)	(3.33)	(-0.46)
$\beta_{US}^{factoryorder}$	0.011	0.006	0.029
	(1.01)	(0.57)	(0.94)
$\beta_{US}^{industrial}$	0.014	0.006	0.027
	(1.19)	(0.50)	(1.15)
β_{US}^{ISM}	-0.008	-0.008	-0.004
	(-0.70)	(-0.76)	(-0.15)
$\beta_{US}^{ISM-nonmanu}$	0.001	-0.012	0.015
	(0.13)	(-0.17)	(0.63)
$\beta_{US}^{nonfarm}$	-0.003	-0.005	0.002
	(-0.30)	(-0.41)	(0.11)
β_{US}^{PPI}	0.010	--[1]	0.010
	(0.54)		(0.45)
β_{US}^{retail}	0.008	0.001	0.018
	(0.67)	(0.09)	(0.70)
β_1	-0.004	-0.006**	0.020
	(-0.95)	(-1.97)	(1.36)
β_2	0.002	--	-0.015
	(0.83)		(-1.15)
β_3	0.014**	--	0.013
	(2.09)		(1.52)

[1] The American PPI expectation in DataStream dates back to March 2014. So the coefficient of American PPI news is null in the period 2010-2013.

Regression of the RMB return on news index shows that in the whole sample period. Chinese news index decrease the RMB return significantly. This effect exists in the period 2014/01-2016/09. Investors are more sensitive when the RMB exchange rate depreciates. Panic sentiments spread in the market, which is higher when the economic condition is out of expectation.

Table 8: Regression of the RMB Return on News Index

	Coefficients		
	2010/01-2016/09	2010/01-2013/12	2014/01-2016/09
β^{CN}	0.015***	-0.003	0.037***
	(3.79)	(-0.80)	(5.19)
β^{US}	0.004	0.002	0.008
	(1.06)	(0.62)	(1.05)
β_1	-0.003	-0.007**	0.025
	(-0.86)	(-1.99)	(1.63)
β_2	0.006	--	-0.021
	(0.98)		(-1.30)
β_3	0.014**	--	0.013
	(2.05)		(1.49)

Table 9 shows both of the Chinese and American index has asymmetric effects on the RMB return. Positive Chinese news index and negative American news index decrease the RMB exchange rate. The asymmetry effect also exists in the period 2014/01-2016/09. According to the regression of the RMB return on individual news, we infer that the asymmetry effect of Chinese news index comes from the new loan news and the M2 news, which means that the impacts of monetary factor are more significant.

Table 9: Asymmetry Effect of the Macroeconomic News on the RMB Return

	Coefficients		
	2010/01-2016/09	2010/01-2013/12	2014/01-2016/09
$\beta_{CN}^{positive}$	0.025***	-0.008	0.082***
	(4.67)	(-1.42)	(7.42)
$\beta_{CN}^{negative}$	0.004	0.003	0.005
	(0.70)	(0.43)	(0.49)
$\beta_{US}^{positive}$	-0.002	-0.001	-0.003
	(-0.36)	(-0.14)	(-0.24)
$\beta_{US}^{negative}$	0.010*	0.005	0.019*
	(1.84)	(0.98)	(1.75)
β_1	-0.003	-0.005	0.022
	(-0.79)	(-1.59)	(1.47)
β_2	0.006	--	-0.022
	(0.90)		(-1.35)
β_3	0.014**	--	0.013
	(2.04)		(1.47)

V Robust Test

We add the Chinese news of first order to fifth order and the American news of second order to fifth order to the regression to test the robustness of the models in part IV. The robust test shows that in the regression of the RMB exchange rate on individual news of period 2014/01-2016/09, the significant level of Chinese M2 news' coefficient increases from 5% to 1%. In the asymmetry effect regression, the significance level of the negative American news index's coefficient increase from 10% to 5%. The sign and significance level of the other dependent variables' coefficients remain the same. The models in parts IV are robust.

Table 10: Robust Test of Regression of the RMB Return on the Individual News

	Coefficients		
	2010/01-2016/09	2010/01-2013/12	2014/01-2016/09
β_{CN}^{CPI}	-0.023*	-0.012	-0.011
	(-1.87)	(-0.91)	(-0.40)
$\beta_{CN}^{fixinvestment}$	-0.008	0.012	-0.049
	(-0.53)	(0.77)	(-1.51)
$\beta_{CN}^{industrial}$	-0.019	-0.015	-0.037
	(-1.31)	(-1.13)	(-0.59)
β_{CN}^{M2}	0.020	-0.001	0.099***
	(1.47)	(-0.11)	(3.28)
$\beta_{CN}^{newloan}$	0.091***	-0.008	0.087***
	(6.78)	(-0.27)	(4.42)
β_{CN}^{PPI}	0.004	0.006	0.015
	(0.31)	(0.53)	(0.50)
β_{CN}^{retail}	-0.012	0.006	-0.169
	(-0.88)	(0.50)	(-1.50)
β_{CN}^{trade}	0.002	-0.025	0.008
	(0.14)	(-1.33)	(0.43)
β_{US}^{ADP}	0.009	0.001	0.061
	(0.81)	(0.06)	(1.52)
β_{US}^{CPI}	-0.009	-0.010	-0.009
	(-0.76)	(-0.83)	(-0.35)
$\beta_{US}^{durable}$	0.012	0.063***	-0.009
	(0.90)	(3.32)	(-0.48)
$\beta_{US}^{factoryorder}$	0.012	0.005	0.022
	(1.01)	(0.45)	(0.69)
$\beta_{US}^{industrial}$	0.011	0.010	0.007
	(0.91)	(0.82)	(0.27)
β_{US}^{ISM}	-0.008	-0.007	-0.005

	(-0.65)	(-0.64)	(-0.18)
$\beta_{US}^{ISM-nonmanu}$	0.003	0.002	0.010
	(0.22)	(0.15)	(0.43)
$\beta_{US}^{nonfarm}$	-0.003	-0.006	0.000
	(-0.28)	(-0.48)	(0.01)
β_{US}^{PPI}	0.011	--	0.018
	(0.55)		(0.68)
β_{US}^{retail}	0.004	0.002	0.031
	(0.35)	(0.13)	(1.06)
β_1	-0.004	-0.006**	0.014
	(-0.91)	(-1.87)	(0.90)
β_2	0.005	--	-0.013
	(0.74)		(-0.80)
β_3	0.015**	--	0.015*
	(2.08)		(1.67)

Table 11: Robust Test of Regression of the RMB Return on the News Index

	Coefficients		
	2010/01-2016/09	2010/01-2013/12	2014/01-2016/09
β^{CN}	0.015***	-0.003	0.038***
	(3.82)	(-0.79)	(5.29)
β^{US}	0.004	0.002	0.009
	(1.05)	(0.53)	(1.09)
β_1	-0.003	-0.006*	0.025*
	(-0.87)	(-1.96)	(1.67)
β_2	0.005	--	-0.022
	(0.89)		(-1.34)
β_3	0.015**	--	0.013
	(2.13)		(1.52)

Table 12: Robust Test of Asymmetry Effect of the News Index

	Coefficients		
	2010/01-2016/09	2010/01-2013/12	2014/01-2016/09
$\beta_{CN}^{positive}$	0.025***	-0.007	0.082***
	(4.36)	(-1.33)	(7.34)
$\beta_{CN}^{negative}$	0.006	0.002	0.008
	(0.98)	(0.34)	(0.81)
$\beta_{US}^{positive}$	-0.002	-0.001	-0.002
	(-0.41)	(-0.22)	(-0.14)
$\beta_{US}^{negative}$	0.011**	0.005	0.022*
	(2.04)	(0.95)	(1.93)
β_1	-0.003	-0.005	0.020
	(-0.77)	(-1.37)	(1.28)
β_2	0.004	--	-0.023
	(0.72)		(-1.43)
β_3	0.015**	--	0.013
	(2.12)		(1.54)

VI Conclusion

This paper establishes an exchange rate determination model with financial intermediate. The theoretical model shows that the exchange rate expectation is the discounted value of the financial intermediate's macroeconomic expectation. The difference between the exchange rate expectation and the spot exchange rate is the revision of the financial intermediate's expectation. The empirical test of the macroeconomic news of China and the US on the RMB exchange rate since 2010 shows that the RMB exchange rate is mainly affected by Chinese macroeconomic news and this impact is more significant when the RMB exchange rate depreciates. Among all the Chinese news factors, the news of money supply and new RMB loans are the two

factors. Unexpected increase of money supply and news RMB loans leads the RMB exchange rate to depreciation. In addition, the impact of macroeconomic news if asymmetry. The impact of the 'positive news' of China and the 'negative news' of the US is significant.

We just test the impacts of the Chinese and American news on the level of the RMB return. Indeed, to great extent, the RMB exchange rate is managed by the Chinese economic authority. Chinese economic authority is devoted to manage the volatility of the RMB exchange rate. In further researches, the intervention of the Chinese economic authority and the volatility of the RMB exchange rate should be taken into consideration.

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