Macro news and the RMB exchange rates

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Abstract: In this paper, we investigate and compare the relative influence of macro news on the 5-min spot offshore CNH/USD and onshore CNY/USD exchange rates by comprehensively considering 44 Chinese and U.S. macro news from January 4, 2012 to December 31, 2022. We document that while the US macro news are comparatively more important in the normal periods, their impacts decline and the effects of Chinese macro news increase substantially when the market is turmoil such as the U.S. zero-interest rate era, the chaos stage post "8.11" RMB exchange rate reform and the global volatile COVID-19 pandemic period. Due to the less floating exchange rate regime in the mainland, the influence of macro news is smaller on CNY/USD than CNH/USD as expected before the global COVID-19 infection. However, with growing policy and economic divergence emerge between the two countries, the CNY/USD react to less categories of US macro news and Chinese macro news display higher average magnitudes since the breakout of the COVID-19 disease.

Key words: Macro news, exchange rate, RMB, CNY, CNH, COVID-19

JEL Classifications: F31, G15

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1. Introduction

The macro news effects on exchange rates has been widely identified to be immediate and substantial among the global major currencies such as US dollar, euro, British pounds and Japanese yen etc.. (Anderson et al., 2003, 2007; Evans and Lyons, 2005, 2008). For exchange rates of different currency pairs, the influence of macro news usually varies across time and the state of the economy (Fatum et al., 2012; Faust et al., 2005). Most of the recent studies have consistently found that US macro news typically matter more than the non-US news (Gau and Wu, 2017;), especially after the 2008 global financial crisis. For instance, Cheung et al. (2019) not only find the dominant role of US macro news, but also suggest the near-irrelevance of Japanese macro news on the JPY/USD in the post global financial crisis. Omrane et al. (2020) compare the asymmetrical effects between recession and expansion states for both US and EU news, with most US news having a larger impact on the USD/EUR and nearly double the number of significant EU announcements.

In the post global financial crisis period, most of the world's economies suffered from increased uncertainty and try to recover from the slower economic growth with unprecedented accommodative monetary policy tools and policies. As suggested by Rey (2013), Avdjiev et al. (2019) and Agrippino and Rey (2020), the VIX, the US dollar index and US monetary policy shocks could induce cross-border capital flows and comovements in the international financial market that characterize the "Global Financial Cycle." The stance of US induce closely attention worldwide and make the US macro news more important than the non-US news in the post crisis era. However, the most recent study of Wang et al. (2023) considered the characteristics of currencies and find that when the global environment is in high uncertainty, the attitudes of safe-haven currencies of JPY and CHF and risky currencies, like the carry trade target currencies of AUD and NZD, are different to the US macro news apparently. The significance of responses was similar between the two types of currencies during the normal periods, but were much weaker for target currencies in

the volatile periods. These new findings suggest that the relative importance of US macro news on exchange rates may be closely associated with the global environment.

We follow the cue from these stylized facts to comparatively investigate the time- and state-dependent influence of macro news on RMB onshore and offshore exchange rates and whether the pattern of US-centric, which is widely found among most currencies in the existing literature still holds across the stable and turmoil time periods for the RMB exchange rate.

There are several motivations for studying the macro news effects on the RMB exchange rates. First, as the second largest economy in the world, the foreign exchange market of Chinese RMB is unique, which is characterized as "one currency, two markets" (Shu et al., 2015), allowing onshore CNY/USD pair trading in the mainland with managed floating regime and CNH/USD pair trading freely in the offshore global market. The status of RMB experienced fast growth in the past three years. According to the Triennial Central Bank Survey of Bank for International Settlements (2022), the Chinese renminbi exhibited the biggest increase in market share since the 2019 survey, being on one side of 7% of all trades in 2022 (up from 4% in 2019). As a result, the RMB became the fifth most traded currency, up from eighth place three years ago. The average daily turnover of the RMB grow to $526 billion per day in April 2022, which is almost double of the $280 in April 2019. Moreover, the CNY/USD surpassed AUD/USD and CAD/USD, becoming the fifth largest currency pair up from 4.1% in 2019 to 6.6% in 2022. On one hand, the two markets have different mechanisms and participants with possible diverge understanding of the same public information. On the other hand, the two exchange rates are heavily connected with limited CNH-CNY differential (Funke et al., 2015, Schrimpf and Sushko, 2019) and both markets could learn information from the behavior of the other counterparty. Thus, the response of onshore and offshore RMB exchange rates to macro news will be either similar or different, depending on the time and relative states of China and US.

Second, the RMB exchange rate liberalization and trading reforms make the onshore market more connected to the global market, making the high-frequency RMB data available and facilitating our conduction on this study. Since the initial allowance of floating in July, 2005, the road of RMB exchange rate reform was affected by the global financial crisis and back on track by conducting the exchange rate reform on August 11 of 2015, to allow the RMB determination become more market driven. Specifically, the China's foreign exchange trading system[2] (CFETS) decided to open the night trading market for CNY/USD on the first working day of 2016. As the CNH/USD is determined by demand and supply of the global market where currency can be traded across 24 hours every day, CNY/USD could be only traded in mainland and the trading time is settled from 9:30 am to 16:30 pm every weekday. To speeding up the reform of Chinese foreign exchange market and improve the connection between domestic and global FX markets in different time zones like London, New York etc., CFETS extended the trading time from 16:30 pm to 23:30 pm on weekdays since January 4, 2016. The aims of setting night trading in CFETS are to make onshore RMB easier to connect closer to the global FX market and react to global information more efficiently. Before the time extension of RMB trading in CFETS, the CNY/USD rate could not react to the announcement of US macro news in time because most US macro news are announced in schedule at the US local time among 8:30 am and 10:00 am when the trading of RMB in the CFETS has closed. This reform has a profound meaning to the macro news study on RMB as the onshore night trading market allows the CNY/USD to respond to US news immediately, right when the news is emanated. Therefore, these reforms facilitate us to compare the macro news effects on the two RMB exchange rates at the same time with the available high-frequency data of CNH/USD and CNY/USD.

Several studies have studied the macro news effects on the exchange rates of

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[2] The CFETS is also known as the National Interbank Funding Center and is only foreign exchange and interbank money market in mainland China. CFETS is headquartered in Shanghai, with a backup center in Beijing and sub-centers in Guangzhou, Shenzhen, Tianjin, Jinan, Dalian, Nanjing, Xiamen, Qingdao, Wuhan, Chongqing, Chengdu, Zhuhai, Shantou, Fuzhou, Ningbo, Xi'an, Shenyang, and Haikou.

emerging economies' currencies and have found the important roles of US news variables (Caporale et al., 2017, 2018; Chan et al., 2017). There is limited literature investigating and comparing macro news effects on offshore and onshore RMB exchange rates. Chen (2020) study seven kinds of Chinese and US macro announcements on the intraday spot onshore and offshore RMB against US dollar rate between 2015-2018, suggesting that the offshore market has a higher price discovery ability than the onshore market and finding that the dummy variables refer to GDP, trade balance, foreign reserves announcements influential. As the study only covers the trading period from 9:30 am to 16:30 pm in CFETS, most of the important US news widely used in the existing literature are not be able to be included. We will consider the longer trading time to incorporate most US macro news after the night market reform from CFETS and overcome this limitation.

Third, the independence of policy and target goals between China and US lead to more divergent economic growth speed in the post global financial crisis. The US entered the ultra-accommative monetary policy by implementing the quantitative easing (QE) since the global financial crisis and end the eight years zero interest rate with high risk on December 15, 2015. After more than five years of normal time with recovery of the economy, the coronavirus crisis interrupted the process. On March 11, 2020, the WHO declared COVID-19 a global pandemic and the global economy was largely affected. The weak global economy further increased the risk levels in global financial markets and high uncertainty returns. In response, the fed cut the target for the federal funds rate by a total of 1.5 percentage points at its meetings on March 3 and March 15, 2020, lowering the funds rate to a range of 0% to 0.25%, and resumed the QE. Due to the different pace of recovery from the COVID-19, US first decided to raise the target range for the federal funds rate to 0.25% to 0.5 percent on March 16 of 2022 and continuously increase to 4.25% to 4.5% by the end of December, 2022. However, the coronavirus was well controlled in mainland, China did not make the interest rates fluctuate in high volatility. The gradual deviation of policy goals

between the two countries contributes the onshore and offshore exchange rates respond differently to macro news during and after the COVID-19 crisis.

Against this backdrop, we investigate comprehensively how Chinese and US macro news affect the intra-day 5-minutes frequency CNH/USD and CNY/USD exchange rates from January 4, 2012 to December 31, 2022. Specifically, we consider several important sub samples according to the global and domestic circumstances to check the dynamic effects of macro news on RMB exchange rates. We follow the existing literature and set the first sub-sample as the time before the RMB "8.11" exchange rate reform in 2015 when the US is in the zero-interest rate period. We set the second sub sample from August 12 of 2015 to January 4 of 2016. Both China and US experienced structural changes between August and December of 2015. For China, as just conducting the reform, the onshore and offshore markets are in great volatile in the following several months. Moreover, RMB joined the SDR in November, the CFETS officially published the RMB index against a basket of currencies of trading partners in December and opened the night market for CNY on January 4, 2016. For US, the fed end the zero-interest rate policy on December 15 and started to set the monetary policy in a normal state. Therefore, the second sub sample not only covers the above frequent policies changes in both countries, but also facilitate the comparison of macro news between the CNY and CNH as the night trading market makes the high frequency data of CNY responding to US news available. The fourth sub sample is the normal period from January 4, 2016 to March 10, 2020. The fifth sub sample starts from March 11 of 2020 when the WHO declared the COVID-19 a global pandemic to March 16, 2022 when the US decided to raise the target range for the federal funds rate, covering the two years of zero-interest rate period. The remain time till the end of 2022 refers to the last sub sample when the US enters a period of rapid and continuous interest rate hike.

Our results suggest that the impacts of macro news surprises are time- and state-dependent for the high-frequency CNH/USD and CNY/USD exchange rates. The

macro news pattern of US-centric is not always the case in the RMB exchange rates. We find whether the news effects are US-centric depends on the US, Chinese and the global environments, particularly associated with the US monetary policies, policies related to the RMB exchange rate reforms and the global coronavirus pandemic.

In terms of the offshore market, the percentage and average estimated magnitudes of influential US macro news are higher than the Chinese news in the full sample from January 4, 2012 to December 31, 2022. This is also the case in two sub-sample from January 4, 2016 to March 10, 2020 and March 17, 2022 to December 31, 2022, when the US quit the ultra-accommodative zero-interest rate returning to the normal monetary policy and the global circumstances are relatively stable. However, the roles of macro news is not always US-centric in the offshore RMB market. Our results indicate that the impacts of US macro news will decline either in the number or the average magnitudes of the influential news whenever the US enters the zero-interest rate monetary policy stance with high uncertainty of the global environment or the Chinese foreign exchange market experienced frequent reforms, or world is suffered from the panic coronavirus pandemic. This kind of pattern are consistently found across the three sub-samples including period from January 1, 2012 to August 10, 2015 when the US was effectively in zero-interest rate and the exchange rate regime of RMB has not been conducted, volatile time after the "8.11" reform from August 11 to January 3, 2016 and the COVID-19 period between March 11, 2020 and March 16, 2022. The three turmoil periods identified the decreasing role of US macro news and the growing impacts of Chines news. The roles of Chinese macro news are particularly dominant during sub-sample from August 11 to January 3, 2016 when the market witnessed the inclusion of RMB in the SDR basket by the IMF on November 30, the official publish of RMB index by the CFETS in December and the end of the zero-interest rate era in US on December 15. These frequent structural policies contribute more roles of Chinese macro news on the CNH/USD high-frequency exchange rate determination.

The investigation of the macro news effects on the intraday CNY/USD exchange rate since the launch of the night foreign exchange market on January 4, 2016 is consistent with the argument that the US macro news paly more roles in the normal time with less uncertainty. The findings in the onshore markets also point that due to the less floating exchange rate arrangements for the onshore RMB, the effects of macro news are smaller on the high-frequency CNY/USD exchange rate as expected during the normal and stable period before the global COVID-19 pandemic. However, with growing divergence in policy and economic goals emerge between the two countries, the CNY/USD react to less categories of U.S. macro news and Chinese macro news show higher and dominant average influential magnitudes since the breakout of the coronavirus disease. Moreover, since the US did not consider the COVID-19 as the most concern for the economy and decided to raise the interest rate since March 16, 2022, the responses of CNH/USD and CNY/USD tend to be more diversified. As the US news became more important on the offshore CNH/USD exchange rate, the Chinese macro news play dominant roles on the onshore CNY/USD exchange rate.

The contribution of our paper are three folds. First, as we consider a comprehensive macro news dataset covering 11 Chinese and 33 US scheduled macro news reflecting both countries' macroeconomic fundamentals and investigate the contemporaneous and lagged macro news effects on the 5-min CNH/USD and CNY/USD rate, we find the impacts of Chinese and US macro news are time- and state-dependent. Second, we check whether the macro news effects are US-centric on the high-frequency CNH/USD and CNY/USD exchange rates. The results indicate that the US-centric performance of macro news is also time- and state-dependent. The US macro news are relatively more important for the RMB exchange rates in the normal periods, but their impacts decline and the Chinese macro news will play increasing roles when the environment is turmoil with high uncertainty such as the U.S. zero interest rate era, the RMB exchange rate reform period and the global

COVID-19 pandemic period. Third, our study will shed light on the macro news effects on the both the RMB and other currencies' exchange rates that the US macro news will not always dominant the impacts on the exchange rates. The stances of US monetary policy, the situation of the domestic country and the global environment will all possibly contribute to the relative importance of US and domestic macro news.

The rest of the paper is organized as follows. Section 2 describes the data, section 3 introduces the econometric methodology, section 4 report the empirical results, robust check and extended investigation, and we conclude in section 5.

2. Data

Our analysis consists of the 5 minutes frequency spot CNH/USD, CNY/USD exchange rate data, scheduled Chinese and US time-stamped macro news with detailed surveys and actual announcements information. The spot RMB exchange rates are the last price of every 5 minutes from Bloomberg. The time period of CNH starts from January 1, 2012 to December 31, 2022 and the CNY covers from January 4, 2016 to December 31, 2022. As mentioned earlier, before 2016, the onshore RMB foreign exchange market closed at 16:30 pm every work day, so the CNY exchange rate can not react to the U.S. macro news instantly as the offshore RMB that trades globally. Since January 4 of 2016, The CFETS opened the night trading market of CNY and extend the trading time from 16:30 pm to 23:30 pm, which facilitates the CNY responds to U.S. macro news in time. The macro news data are summarized from Bloomberg economic calendar. We construct the offshore and onshore exchange rate returns as the natural log difference of the 5-min CNH/USD and CNY/USD rates respectively. The exchange rate data is measured as the RMB price per USD, so an increase of the rate is associated with an appreciation of the USD and a positive return refers to a gain in the relative value of the USD vis-àvis the RMB. The summary statistics of the change of CNH/USD and CNY/USD are reported in table 1.

Table 1. Summary statistics for five-minute CNH/USD and CNY/USD returns.

Time	Observation	Mean	Min	Max	Std. Dev.	Skewness	Kurtosis
CNH Return							

2012/1/1—2022/12/31	827,103	0.000011	-0.754	1.800	0.016	2.023	287.000
2016/1/4—2022/12/31	525,965	0.000010	-0.754	0.879	0.019	0.411	87.255
2012/1/1—2015/8/10	271,105	-0.000008	-0.406	0.425	0.009	0.253	123.000
2015/8/11—2016/1/3	30,033	0.000184	-0.555	1.800	0.023	15.789	1300.000
2016/1/4—2020/3/10	314,654	0.000019	-0.754	0.879	0.017	0.629	127.000
2020/3/11—2022/3/16	151,629	-0.000059	-0.370	0.546	0.016	0.379	34.050
2022/3/17—2022/12/31	59,682	0.000141	-0.648	0.822	0.029	0.093	41.834
CNY Return							
2016/1/4—2022/12/31	285,936	0.000021	-0.909	1.118	0.020	0.939	439.000
2016/1/4—2020/3/10	170,856	0.000040	-0.909	1.118	0.021	1.319	559.000
2020/3/11—2022/3/17 3：00	82,320	-0.000111	-0.859	0.523	0.016	-0.839	196.000
2022/3/17 3：00—2022/12/31	32,760	0.000252	-0.890	0.855	0.027	0.732	136.000

Three criteria are used to select Chinese and U.S. macro news. First, we consider macro news that might work in standard exchange rate models, e.g., macroeconomic variables related to real economic activities, trade balances, investment, price level, forward-looking sentiment and so on. Second, as researchers have paid much attention to U.S. macro news effects on exchange rates of major currencies, like Anderson et al (2003, 2007), Gau et al (2017) and Cheung et al (2019), we consider U.S. news which are widely used and have been tested to be influential in existing literature. Third, due to limited study on Chinese macro news, we should also cover China's substantial macro news reflecting fundamental performance and comparable to U.S. news. As a result, 11 Chinese and 33 US macro news are selected and are listed in table 2.

The Chinese news variables are GDP, Industrial production, Retail sales, Trade balance, CPI, Manufacturing PMI, PPI, Aggregate financing, Foreign reserves, Money supply M2, and New yuan loans. The 33 US news variables are GDP advance, GDP second, GDP third, Capacity Utilization, Change in Nonfarm payrolls, Industrial production, ISM Manufacturing, Personal income, Retail sales advance, Unemployment rate, Existing home sales, New home sales, Personal consumption, Personal spending, Business inventories, Construction spending, Durable goods orders, Factory orders, Wholesale inventories, Trade balance, CPI, MNI Chicago PMI, PCE core deflator, PPI, Consumer confidence, Housing starts, Leading index, Philadelphia Fed business outlook, University. of Michigan consumer sentiment,

Initial jobless claims and Continuing claims.

Table 2 also reports the local release time of every macro news. Unlike the U.S. macro news which are announced at exact time in schedule, only Chinese GDP, CPI and PPI are announced at exact local time on 10:00 am, 9:30 am, 9:30 am respectively in the overall sample period. Industrial production and Retail sales are announced at 10:00 am before June 2016 and since July 2016, the two news are released on 10:00 am or 13:30 pm. Releasing time of Trade balance usually vary from 10:00 am to 12:00 am in the first half of every month. Aggregate financing, Foreign reserves, Money supply M2 and New yuan loans are mostly announced around 10:00 am or around 16:00 pm in the first half of every month. Occasionally, their announcing time also occurs earlier than 10:00 am or at night.

3. Econometric methodology

To evaluate the impact of Chinese and U.S. macro news on the 5-min offshore and onshore RMB rates against the USD, following Cheung et al. (2019), we apply the model given by Equation (1)

$$r_t = \beta_0 + \sum_{i=1}^{I} \beta_i \times r_{t-i} + \sum_{k=1}^{K} \sum_{j=0}^{J} \gamma_{k,j} \times S_{k,t-j} + \varepsilon_t \qquad (1)$$

where r_t is the log difference of the 5-min CNH/USD and CNY/USD rates respectively, $S_{k,t-j}$ is the standardized surprise[3] of the k th macro news and ε_t is the random error term. The model is estimated using OLS with heteroscedasticity and autocorrelation consistent (HAC) standard errors as suggested by Newey and West (1987). The lag of r_t, I, is chosen according to the Schwarz Information Criterion (SIC). The maximum number K of Chinese and US news is 44.

In our baseline analysis we examine the contemporaneous effects of macro news and estimate Equation (1) with $J = 0$, simultaneously including both Chinese and US

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[3] We define $S_{k,t}$ as the standardized difference between realizations and expectations for announcement k on day t as follows:

$$S_{k,t} = (A_{k,t} - E_{k,t})/\hat{\sigma}_k, \quad \hat{\sigma}_k = \sqrt{var(A_{k,t} - E_{k,t})}$$

where $A_{k,t}$ is the actual/realized value of announcement k on day t, $E_{k,t}$ is the median value of the preceding survey expectations of announcement k on day t, and $\hat{\sigma}_k$ is the sample standard deviation of the surprise component $(A_{k,t} - E_{k,t})$.

macro news. In the robustness check section, we consider the lag forms of macro news and extend the baseline model to the first and second lags of Chinese and US macro news by re-estimating equation (1) with J=1 and J=2 respectively.

Further, to study whether either positive or negative news are more influential, we use the following equation (2) to investigate the asymmetric effects of positive and negative news surprises, respectively.

$$r_t = \beta_0 + \sum_{i=1}^{I} \beta_i \times r_{t-i} + \sum_{k=1}^{K} \sum_{j=0}^{J} \gamma_{k,j}^{+} \times S_{k,t-j}^{+} + \sum_{k=1}^{K} \sum_{j=0}^{J} \gamma_{k,j}^{-} \times S_{k,t-j}^{-} + \varepsilon_t \ (2)$$

where $S_{k,t-j}^{+} = \mathrm{I}(S_{k,t-j} \geq 0)S_{k,t-j}$ and $S_{k,t-j}^{-} = \mathrm{I}(S_{k,t-j} < 0)S_{k,t-j}$ represent positive and negative macro news surprises, respectively.

4. Results

4.1 Macro news and the CNH/USD exchange rate

The results of estimating Equation (1) for CNH/USD with contemporaneous Chinese and US standardized macro news surprises across the full sample, 4 January, 2012 to 31 December 31, 2022, as well as across six sub-samples are reported in column 1 to column 6 of table 3. Column 1 shows that 5 of the 11 Chinese and 20 of the 33 US news considered are statistically significant in the full sample period. The coefficients of all significant Chinese macro news are of the reasonable negative sign indicating that higher value of the standardized surprise reflects a better Chinese fundamental performance than expected and causes offshore RMB appreciates against US dollar within 5 minutes. Similarly, 17 of the 20 significant US macro news are of the expected positive sign. The significant coefficients of unemployment rate, initial jobless claims and continuing claims are negative, the reason of which are that all of them imply the performance of US unemployment conditions. As a result, a higher standardized actual and survey difference reflects a worse employment situation and drives US dollar to depreciate against offshore RMB. The average magnitude of the 20 significant US news variables is 0.011 and the average magnitude of the 6 significant Chinese news variables is 0.0052. The set of significant macro news for both countries consist of real economic activity, money, consumption, investment,

prices, and forward-looking which are consistent with standard models of exchange rate determination. Overall, findings of the full sample clearly point to a much stronger influence of US news on the CNH/USD exchange rate compared to news emanating from China.

The magnitudes of the individual coefficient estimates indicate that Chinese GDP, trade balance and manufacturing PMI are the three most influential macro news in the full sample regression, reflecting the performance of Chinese real economic activity, trade, price level and money condition are closely associated with the change of the offshore RMB exchange rate. As Chen (2020) finds that the announcements of GDP, trade balance and foreign reserves affect the RMB exchange rate most between 2015-2018, our results suggest that the surprise of GDP and trade balance news are also the most influential news variables in a wider range of time from 2012-2022. In terms of the US, the FOMC rate decision (upper bound), CPI and change in non-farm payrolls are the first three significant macro news with largest estimated coefficients. One interesting finding is that the change of non-farm payrolls that has been widely verified by the existing literature as the "king" of macroeconomic announcements (Andersen and Bollerslev, 1998)[4] has no longer been the most important one. Instead, the information of US monetary policy and price level become the first two most influential news for the change of offshore RMB exchange rate. Moreover, forward-looking US news are of particular importance as consumer confidence, housing starts, Philadelphia Fed business outlook, University. of Michigan consumer sentiment are all influential with high significance.

The second column reports the results of macro news effects before the "8.11" exchange rate reform, January 4, 2012 to August 10, 2015. As the column shows, four Chinese macro news are significant with the expected signs. Similar with the full

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[4] The argument has been continuously supported. Anderson et al. (2003) find nonfarm payrolls has the largest individual impact on the 5-min GBP/USD, JPY/USD, DM/USD, CHF/USD rates from January 3, 1992 through December 30, 1998. Anderson et al. (2007) find nonfarm payrolls has the largest impact on the tick-by-tick GBP/USD, JPY/USD and USD/EUR from July 1, 1998 to December 31, 2002. Cheung et al. (2019) find nonfarm payrolls together with its positive and negative news surprise have the largest impact on the 5-min JPY/USD rate across full sample (January 1, 1999 to August 31, 2016) and all sub-sample including pre-GFC, GFC, post-GFC, US-ZIRP, Japan-QQE periods.

sample regression, GDP, trade balance and the manufacturing PMI are the three most influential news variables. In this period of US QE and accommodative monetary policy with zero-interest rate in response to the global recession, our results find that the number of significant US news has declined to 12[5], which is 20 in the full sample investigation. Moreover, as the average estimated coefficients of Chinese macro news is 0.0056, similar with 0.0052 in the full sample results, the magnitudes of US news variables have declined to 0.0029, which is 0.011 in the full sample. The change of non-farm payrolls has the largest coefficient estimation, following with GDP advance and GDP second news. During the period with high global uncertainty and weak economic growth worldwide, the impacts of US macro news declined with less categories of influential news and smaller average magnitudes.

Turning to the effects of Chinese and US macro news on the CNH/USD between August 11, 2015 and January 3, 2016, the third column of table 3 reports our findings. The following several months after the reform has witnessed various structural changes in both countries. As the US stopped the eight years of zero-interest rate monetary policy for the first time in the middle of December, the Chinese authority took a big step to launch reform policies related to RMB exchange rate regime, exchange rate determination and trading mechanism. Accordingly, our empirical results during this unstable period reveal that all the 11 Chinese macro news become highly significant and the average magnitudes climbed to 0.0306, which is nearly six times of the effects in the pre-reform period. Seven of the Chinese macro news are in the expected signs while the other fours ones including CPI, PPI, aggregate financing, money supply M2 are not. One possible reason is the overshooting behaviors of the currency. Another possible explanation may be the market attitudes towards the four macro news are different in this volatile period than in the normal time. We can see that the four news variables are all related to the price level and the money condition

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[5] The coefficient of FOMC rate decision (Upper bound) is not estimated because the surprise of this news variable is zero in this period. That is, the actual number of the announcement is the same with the expectation in the survey. This is also the case in the period August 11, 2015 to January 3, 2016, March 11, 2020 to March 16, 2022. As the surprise of FOMC rate decision (Lower bound) is always zero, we can not estimate the coefficient in all the periods.

of China. When the actual announcement of the price level and money supply are larger than the expectation in a volatile time, the market will mostly regard them as negative signals of the currency and lead to currency depreciation. Turning to the US news, even though the US identified 13 significant macro news, similar with the pre-reform period, their average magnitudes also increase to 0.0108, but is much less than the Chinese variables. Again, our results in this sub-sample indicate that the impacts of US macro news declined and the Chinese news variables show growing and more substantial influence when both the global and domestic markets experienced structural changes with high uncertainties.

The fourth column reports the results pertaining to the normal period from January 4, 2016 to March 10, 2020. During this period when the US monetary policy turns to normal and the market has adapted to the frequent policies reforms of China, the number of significant Chinese macro news returns to the level of the pre-reform with the 0.0042 as the average estimated coefficients, the lowest level among all the periods. The number of influential US macro news increases to 18 and the average estimated magnitudes is 0.0133, both of which are the highest level among all the sub-sample periods under our investigation. The FOMC rate decision (Upper bound), CPI and the change of non-farm payrolls are still the three most influential US news variables. Form the perspectives of significant number of news and their average magnitudes, the impacts of US macro news are more important than Chinese variables on the CNH/USD in the normal and relative stable period.

The smooth market condition was unwillingly abrupted by the coronavirus infection as the WHO declared the COVID-19 a global disease on March 11 and the world suffered the epidemic with panic. Right after the announcement by the WHO, the fed made the decision to resume QE and the monetary policy of US went back to the zero-interest rate era. The fifth column of table 3 refers to the results of March 11, 2020 to March 16, 2022, covering the turmoil time of COVID-19 until the US raised the federal funds rate. Once again, the number of significant US macro news on the

CNH/USD reduced dramatically to only 7 and the average estimated magnitudes also dropped to 0.0086 from the previous normal period. Conversely, there are five influential Chinese macro news and the average impacts of Chinese macro news increase to 0.0122, which is larger than US. The results are consistent with our previous arguments that the impacts of US macro news are more important in the normal periods, but become weaker when the period is turmoil with higher uncertainty. Moreover, this pattern is more apparent in the COVID-19 period because the epidemic caused great global panic and affect the economic performance profoundly. However, as China performed well in the battle of the infection, the RMB become relatively stronger than the USD, which contribute to the more importance of Chinese macro news on the CNH/USD rate.

The last column displays the results of the most recent sub-sample since the US decided to end the zero-interest rate on March 16, 2022. The conditions of the pandemic are different between China and US. As indicators of economic activity and employment have continued to strengthen, the Fed decided to raise the interest rate. Meanwhile, China's attitude towards the coronavirus was still serious and kept the economic and monetary policies relatively stable. Against this backdrop, impacts of both countries' macro news reverse again. The CNH/USD exchange rate identified trade balance as the only one significant macro news but finds 12 influential US news. Specifically, the average estimated coefficients of US news reach the highest level of 0.0399 among all the periods in our study. These results consistently confirm that the impacts of US macro news are more important in the normal period.

So far, our results indicate the following insights in regards to the CNH/USD high-frequency effects of Chinese and US macro news surprises. The percentage and the average magnitudes of influential US macro news are markedly higher than the Chinese news in the past more than ten years. This is also the case in the sub-sample from January 4, 2016 to March 10, 2020 and March 17, 2022 to December 31, 2022, when the global environment is in the relative stable conditions and the monetary

policies of US become normal. However, the roles of macro news is not always US-centric in the offshore RMB market. Our results indicate that the impacts of US macro news will decline either in the number or the average magnitudes of the influential news when the US enters the zero-interest rate monetary policy stance with high uncertainty of the global environment. This kind of pattern are found across the three sub-samples including the pre-reform of RMB exchange rate from January 1, 2012 to August 10, 2015, volatile time after the "8.11" reform from August 11 to January 3, 2016 and the COVID-19 period between March 11, 2020 and March 16, 2022. The three turmoil periods identified the decreasing role of US macro news and the growing impacts of Chines news, particularly when the reforms of RMB exchange rate are conducted frequently, such as the unstable time after the "8.11" exchange rate.

4.2 Macro news and the CNY/USD exchange rate

The empirical investigation of the macro news effects on the CNY/USD exchange rate starts from the January 4, 2016 to December 31, 2022. As discussed earlier, that the onshore RMB foreign exchange market only trades in the day time between 9:30 am to 16:30 pm before 2016, the impacts of US macro news will be delayed and responded when the opening of the market on 9:30 am in the next working day. This will cause the onshore market less efficiency and disconnect from the offshore market. To overcome this issue, the CFETS decided to extend the trading time of the onshore market from 16:30 pm to 23:30 pm. The opening of the onshore night market facilitates the CNY/USD to react to the US public information timely, as most of the macro news emanated from US ranges from 8:30 am to 10:00 am locally, during which the onshore FX market is not closed. As a result, the impacts of macro news on the CNY/USD are comparable to the CNH/USD after the opening of the night market and we conduct the macro news investigation on the CNY/USD since the January 4, 2016 accordingly.

The results of estimating Equation (1) for CNY/USD with contemporaneous Chinese and US standardized macro news surprises across the three sub-samples after

the opening of the night market are reported in column 1 to column 3 of table 4.

The first column refers to the results during the normal period when the US decided to terminate the zero-interest rate and the market has calmed down from the frequent reform policies on the RMB exchange rate. We find 3 and 14 Chinese and US macro news are significant, and the average estimated coefficients of both countries' news variables are 0.0023 and 0.0035, respectively. Both the number of influential news and the average effects indicate a stronger impact of the US macro news in this period. The findings support our argument that the effects of US macro news are more important in the normal time.

Compared with the offshore market, both the number and average magnitudes of Chinese and US macro news are smaller in the onshore market. This is possibly because the offshore market is more floating than the onshore market as the CNH exchange rate is determined by the market forces while the regime of the CNY is managed floating and is traded within a 2% band from the central parity. Industrial production, aggregate financing and retail sales are the most important Chinese macro news, which is different from the manufacturing PMI, M2 and retail sales as the most influential news in the offshore market. In terms of the US news, change in non-farm payrolls, CPI and factory orders are the three most important ones, two of which are the same with the offshore market.

The second column displays the results pertaining to the macro news effects during the volatile global coronavirus pandemic between March 11, 2020 and March 16, 2022. Four Chinese macro news, GDP, manufacturing PMI, trade balance and retail sales are identified to be highly significant at 1% percent level. Conversely, only 6 US macro news are significant, taking less than 20% of the overall US macro news considered in our study. Moreover, the average magnitudes of the influential Chinese macro news is 0.0136, much higher than the 0.0079 for the US news variables, which points to a more important role of Chinese macro news when the world is suffering from the infection of the coronavirus disease and US is under the zero-interest rate

monetary policy circumstance, while China has performed and controlled well against the pandemic infection and kept the domestic economic condition in stable status.

The number of the influential Chinese and US macro news are stable across the two sub-samples since the outbreak of the COVID-19 disease, as summarized in the last column in table 4. Meanwhile, the average impacts of US news increase to 0.02, reaching the highest level among the three sub-samples, as the US monetary policy has become normal and the world has gradually recovered from the shocks of the pandemic. However, the average magnitudes of the influential Chinese macro news also increase substantially to 0.0357 and surpassed the impacts of US news in the last sub-sample.

These findings point to two interesting differences between the onshore and offshore markets. First, as the number of influential US macro news recovers to 12 in the offshore market during the last period, the 7 significant US news identified in the onshore market did not indicate an apparent change between the last two sub-samples. Second, the offshore market reacts to less Chinese macro news with smaller average magnitudes in the last sub-sample, while the onshore market tends to be more concerned with the domestic macro news which dominate the impacts on the CNY/USD from the perspective of the average estimated magnitudes.

The different attitudes towards Chinese and US macro news between the onshore and offshore markets may possibly attribute to the different recovery paces from the COVID-19 disease. Since the beginning of 2022, the pandemic condition of mainland became worse. Various of major cities have been controlled to suspend the flow of people. The expectation of Chinese economy is unclear at that time and the market would like to focus more on the fundamental performance of China through the announcement of the macro news. On the contrary, the US has stimulated the economy by resuming QE and lowing the federal funds rate to zero right after the global infection of the coronavirus on March 15, 2020. After two years of recovery, the Fed noticed the indicators of the economy performed well and did not regard the

COVID-19 as great threat to the country, so the fed raised the interest rate continuously from zero to 4% within nine months.

The investigation of the macro news effects on the intraday CNY/USD exchange rate is consistent with the argument that the US macro news paly more roles in the normal time with less uncertainty in the offshore market. Moreover, the findings in the onshore markets also point that due to the less floating exchange rate arrangements for the onshore RMB, the effects of macro news are smaller on the CNY/USD exchange rate as expected during the normal and stable period before the global COVID-19 pandemic. However, with growing divergence in policy and economic goals emerge between the two countries, the CNY/USD react to less categories of U.S. macro news and Chinese macro news show higher and dominant average influential magnitudes since the breakout of the coronavirus disease.

4.3 Positive and negative macro news

The results of estimating Equation (2) and our investigation of positive versus negative news asymmetries are reported in Tables 5a – 5d respectively. Table 5a and 5b refer to the impacts of positive and negative macro news surprises on the CNH/USD exchange rate, and table 5c and 5d refer to the impacts of positive and negative news surprises on the CNY/USD exchange rate. The four tables show that the previously discussed main results in regards to the relative importance of US and Chinese news are generally robust to the separation of positive from negative news.

4.4 Robustness check and extensions

In this section, we check the robustness of previous analysis by considering lag forms of macro news. We extend the baseline model to the first and second lags of Chinese and US macro news and re-estimate equation (1) with J=1 and J=2 respectively. Specifically, we did our extension work firstly by considering the contemporaneous and first lag of both countries' macro news, and subsequently, including the contemporaneous, first and second lags of all news at the same time.

Results in table 6a and 6b simultaneously display the effects of the

contemporaneous and first lag of Chinese and US macro news on CNH/USD rate across full and sub-sample periods. The involving of the first lag does not change the previous contemporaneous effects of macro new that the significant number, average magnitudes and individual coefficients of Chinese and US contemporaneous news are all the same as the baseline model where J=0.

The lag effects of macro news tend to be weak for most of the sub-samples for the onshore and offshore markets. Two exceptions happen in the offshore market. During the volatile time between August 11, 2015 and January 3, 2016, the CNH/USD finds 9 Chinese and 14 US macro news are significant in the first lag. Among the lagged influential macro news, Chinese manufacturing PMI and new yuan loans, and eight US news including GDP second estimation, GDP third estimation, retail sales advance, durable goods orders, factory orders, CPI, PCE core deflator and continuing claims show the opposite signs, indicating the possible over-shooting effects exist in this period with high uncertainty. The lag effects also become apparent during the March 17, 2022 and December 31, 2022 period. the CNH/USD identified five influential Chinese news and ten US influential news, among which Chinese manufacturing PMI, aggregate financing, foreign reserves, and five US news including GDP second estimation, capacity utilization, personal income, retail sales advance, PCE core deflator show the opposite signs.

In terms of the onshore market, the Chinese macro news did not show clear lagged effects across all the sub-samples. The effects of the contemporaneous and first lag of Chinese and US macro news on CNY/USD rate across sub-sample periods are displayed in table 6c and 6d. The lagged effects of US macro news are relatively strong during the January 4, 2016 to March 10, 2020 period when CNY/USD finds 16 US macro news are significant and capacity utilization, personal consumption and trade balance show the opposite signs.

When re-estimating equation (1) with J=2, we find again that significant number, average magnitude and individual coefficients of the contemporaneous and first lag

are unchanged from J=0 and J=1. The lagged effects of macro news are not obvious in the onshore market and are also neglectable for most of the sub-samples in the offshore market. The two exceptions again happen during the volatile post-reform period between August 11, 2015 and January 3, 2016 and the last sub-sample from March 17, 2022 to December 31, 2022. However, the second lagged effects become weaker than the first lag and the results support the robustness of contemporaneous and first lag effects of Chinese and US news. For brevity, we do not report results of the extended model where J=2. Overall, the extension of estimating our baseline model to J=1 and J=2 illustrate the robustness of the contemporaneous effects of macro news.

5. Conclusion

In this paper we investigate the intraday influence of Chinese and US macro news on the offshore and onshore RMB exchange rates over January 4, 2012 to December 31, 2022. To do so we consider the influence of 44 different types of macro news surprises (11 different types of Chinese macro surprises and 33 different types of US macro surprises) on 5-min frequency CNH/USD and CNY/USD separately across various sub-samples January 4, 2012 to August 10, 2015, August 11, 2015 to January 3, 2016, January 4, 2016 to March 10, 2020, March 11, 2020 to March 16, 2022 and March 17, 2022 to December 31, 2022.

Our results suggest that the percentage and the average magnitudes of influential US macro news are markedly higher than the Chinese news in the full sample analysis of CNH/USD as well as across the sub-samples from January 4, 2016 to March 10, 2020 and March 17, 2022 to December 31, 2022, when the global environment is in the relative stable status and the monetary policies of US become normal. However, the impacts of US macro news will decline and the CNH/USD identified growing impacts of Chinese news across the three sub-samples including January 1, 2012 to August 10, 2015, August 11 to January 3, 2016 and March 11, 2020 and March 16, 2022 when the CNH/USD is exposed to the US zero-interest rate monetary policy

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stance, frequent Chinese exchange rate reforms and high uncertainty from the COVID-19 pandemic.

The macro news effects on the intraday CNY/USD exchange rate since the launch of the night market by CFETS on January 4, 2016 is consistent with the findings in the offshore market. Moreover, the findings in the onshore markets also point that due to the less floating exchange rate arrangements for the onshore RMB, the effects of macro news are smaller on the CNY/USD exchange rate as expected during the normal and stable period before the global COVID-19 pandemic. However, with growing divergence in policy and economic goals emerge between the two countries, the CNY/USD react to less categories of U.S. macro news and Chinese macro news show higher and dominant average influential magnitudes since the breakout of the coronavirus disease.

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Table 2. Chinese and US macro news surprises.

Macro news	CNH/USD						CNY/USD			Frequency	Announcement time
	1	2	3	4	5	6	4	5	6		
Chinese macro news											
GDP											
GDP YoY	44	15	1	17	8	3	17	8	3	Quarterly	10:00 am
Real Activity											
Industrial Production YoY	101	29	3	40	20	9	40	20	9	Monthly	10:00 am or 13:30 pm before June 2016, 10:00 am since July 2016
Retail Sales YoY	101	29	3	40	20	9	40	20	9	Monthly	10:00 am or 13:30 pm before June 2016, 10:00 am since July 2016
Trade											
Trade Balance	132	44	4	51	24	9	44	20	6	Monthly	between 10:00 am and 12:00 pm
Prices											
CPI YoY	113	34	4	43	24	8	42	24	8	Monthly	9:30 am
Manufacturing PMI	93	29	4	36	17	7	0	1	7	Monthly	9:00 am before December 2021, 9:30 am since January 2022
PPI YoY	113	34	4	43	24	8	42	24	8	Monthly	9:30 am
Money											
Aggregate Financing CNY	114	27	5	48	25	9	47	25	9	Monthly	around 10:00 am or around 16:00 pm
Foreign Reserves	78	13	3	38	17	7	34	15	6	Monthly	around 10:00 am or around 16:00 pm
Money Supply M2 YoY	125	38	5	48	25	9	47	25	9	Monthly	around 10:00 am or around 16:00 pm
New Yuan Loans CNY	126	39	5	48	25	9	47	25	9	Monthly	around 10:00 am or around 16:00 pm
US macro news											
GDP											
GDP Annualized QoQ Advance	44	15	1	17	8	3	15	8	3	Quarterly	8:30 am

	N1	N2	N3	N4	N5	N6	N7	N8	N9	Frequency	Time
GDP Annualized QoQ Second	43	14	2	16	8	3	16	8	3	Quarterly	8:30 am
GDP Annualized QoQ Third	44	14	2	16	8	4	16	7	4	Quarterly	8:30 am
Real activity											
Capacity Utilization	131	43	5	50	23	10	48	22	10	Monthly	9:15 am
Change in Nonfarm Payrolls	132	44	4	51	24	9	43	22	7	Monthly	8:30 am
Industrial Production MoM	131	43	5	50	23	10	48	22	10	Monthly	9:15 am
ISM Manufacturing	132	44	4	51	24	9	41	19	7	Monthly	10:00 am
Personal Income	131	43	5	49	24	10	44	21	10	Monthly	8:30 am
Retail Sales Advance MoM	132	43	5	50	25	9	47	24	9	Monthly	8:30 am
Unemployment Rate	132	44	4	51	24	9	43	22	7	Monthly	8:30 am
Consumption											
Existing Home Sales	132	43	5	50	24	10	48	24	10	Monthly	10:00 am
New Home Sales	131	42	5	50	24	10	49	24	10	Monthly	10:00 am
Personal Consumption	129	42	5	48	24	10	46	23	10	Monthly	8:30 am
Personal Spending	131	43	5	49	24	10	44	21	10	Monthly	8:30 am
Investment											
Business Inventories	132	43	5	50	25	9	47	24	9	Monthly	8:30 am
Construction Spending MoM	131	43	4	51	24	9	41	18	7	Monthly	10:00 am
Durable Goods Orders	185	43	5	84	38	15	76	33	12	Monthly before November, 2015; Fortnightly since December, 2015	8:30 am before November, 2015; 8:30 am or 10:00 am since December, 2015
Factory Orders	131	43	4	51	24	9	43	18	6	Monthly	10:00 am
Wholesale Inventories MoM	205	43	5	91	47	19	84	46	18	Monthly before August, 2016; Fortnightly since September, 2016	10:00 am before August 2016; 8:30 am or 10:00 am since September 2016
Trade											
Trade Balance	132	44	4	51	24	9	44	20	6	Monthly	8:30 am
Prices											
CPI MoM	131	43	5	50	24	9	49	24	9	Monthly	8:30 am
MNI Chicago PMI	132	43	5	50	24	10	47	23	10	Monthly	9:45 am

	1	2	3	4	5	6	7	8	9	Frequency	Time
PCE Core Deflator MoM	131	43	5	49	24	10	44	21	10	Monthly	8:30 am
PPI Final Demand MoM	131	43	5	50	24	9	48	23	9	Monthly	8:30 am
Forward-Looking											
Conf. Board Consumer Confidence	132	43	5	50	24	10	47	24	10	Monthly	10:00 am
Housing Starts	130	41	5	50	24	10	49	23	10	Monthly	8:30 am
Leading Index	132	43	5	50	24	10	50	24	10	Monthly	10:00 am
Philadelphia Fed Business Outlook	132	43	5	50	24	10	48	24	10	Monthly	10:00 am before October 2015, 8:30 am since November 2016
U. of Mich. Sentiment	264	86	10	100	49	19	93	45	19	Fortnightly	around 9:55 am or around 10:00 am
Weekly											
Continuing Claims	573	188	21	218	104	42	205	98	41	Weekly	8:30 am
Initial Jobless Claims	573	188	21	218	104	42	205	98	41	Weekly	8:30 am
FOMC rate											
FOMC Rate Decision (Upper Bound)	34	4	2	20	2	6	1	0	0	Irregular	
FOMC Rate Decision (Lower Bound)	32	1	2	21	2	6	1	0	0	Irregular	

Notes: We consider 11 Chinese and 33 US macro news and count the number of macro news matched with the 5-min exchange rate data in every column. The column 1 refers to the full sample 2012/1/1—2022/12/31, column 2 refers to 2012/1/1—2015/8/10, column 3 refers to 2015/8/11—2016/1/3, column 4 refers to 2016/1/4—2020/3/10, column 5 refers to 2020/3/11—2022/3/17 3：00 and column 6 refers to 2022/3/17 3：00—2022/12/31 respectively.

Table 3. Results of contemporaneous macro news effects on CNH/USD.

	CNH Return											
	2012/1/1—2022/12/31		2012/1/1—2015/8/10		2015/8/11—2016/1/3		2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news												
GDP YoY	-0.0111**	(0.0056)	-0.0125**	(0.0061)	-0.0667***	(0.0063)	0.0015	(0.0066)	-0.0377***	(0.0072)	-0.0235	(0.0391)
Industrial Production YoY	-0.0029*	(0.0017)	-0.0016	(0.0010)	-0.0443***	(0.0029)	-0.0025*	(0.0014)	0.0002	(0.0015)	-0.0116	(0.0130)
Retail Sales YoY	-0.0038***	(0.0013)	-0.0003	(0.0011)	-0.1072***	(0.0075)	-0.0040**	(0.0016)	-0.0071***	(0.0013)	-0.0165	(0.0123)
Trade Balance	-0.0049***	(0.0014)	-0.0042***	(0.0014)	-0.0023*	(0.0013)	-0.0039	(0.0027)	-0.0056**	(0.0027)	-0.0103***	(0.0039)
CPI YoY	-0.0030	(0.0021)	-0.0009	(0.0023)	0.0086**	(0.0040)	-0.0026	(0.0040)	-0.0058	(0.0036)	-0.0108	(0.0223)
Manufacturing PMI	-0.0064***	(0.0016)	-0.0042*	(0.0024)	-0.0182***	(0.0064)	-0.0060***	(0.0016)	-0.0059	(0.0046)	-0.0190	(0.0211)
PPI YoY	0.0001	(0.0028)	0.0007	(0.0042)	0.0159***	(0.0052)	0.0000	(0.0045)	0.0044	(0.0042)	-0.0145	(0.0212)
Aggregate Financing CNY	-0.0020*	(0.0010)	-0.0003	(0.0004)	0.0163***	(0.0033)	-0.0031	(0.0022)	-0.0044*	(0.0025)	-0.0097	(0.0088)
Foreign Reserves	-0.0022	(0.0025)	-0.0001	(0.0026)	-0.0149***	(0.0028)	-0.0062	(0.0058)	0.0060**	(0.0027)	-0.0038	(0.0037)
Money Supply M2 YoY	-0.0011	(0.0011)	-0.0013*	(0.0007)	0.0246***	(0.0045)	-0.0044*	(0.0024)	-0.0005	(0.0024)	0.0040	(0.0026)
New Yuan Loans CNY	-0.0005	(0.0025)	0.0001	(0.0014)	-0.0171***	(0.0033)	0.0015	(0.0057)	-0.0001	(0.0040)	0.0049	(0.0086)
US macro news												
GDP Advance	0.0122***	(0.0045)	0.0057***	(0.0022)	0.0089	(0.0168)	0.0096	(0.0066)	0.0098**	(0.0045)	0.0361***	(0.0043)
GDP Second	0.0045***	(0.0017)	0.0056***	(0.0018)	0.0024	(0.0049)	0.0026	(0.0028)	0.0089*	(0.0049)	0.0110	(0.0161)
GDP Third	0.0008	(0.0016)	0.0012	(0.0010)	0.0082	(0.0061)	0.0058**	(0.0028)	-0.0006	(0.0041)	-0.0269	(0.0275)
Capacity Utilization	0.0019	(0.0012)	0.0027***	(0.0009)	-0.0010	(0.0013)	-0.0006	(0.0021)	0.0009	(0.0031)	0.0102***	(0.0034)
Change in Nonfarm Payrolls	0.0143***	(0.0030)	0.0072***	(0.0016)	0.0338***	(0.0099)	0.0130***	(0.0044)	0.0212***	(0.0073)	0.0440	(0.0335)
Industrial Production MoM	0.0006	(0.0012)	-0.0016*	(0.0009)	0.0028***	(0.0005)	0.0054**	(0.0025)	0.0005	(0.0034)	-0.0063	(0.0060)
ISM Manufacturing	0.0054***	(0.0010)	0.0023***	(0.0007)	0.0072***	(0.0018)	0.0088***	(0.0015)	0.0035	(0.0023)	0.0019	(0.0117)
Personal Income	0.0012	(0.0011)	-0.0009	(0.0011)	0.0037	(0.0037)	0.0011	(0.0011)	0.0048	(0.0052)	0.0147	(0.0105)
Retail Sales Advance MoM	0.0057***	(0.0014)	0.0048***	(0.0015)	-0.0015	(0.0045)	0.0081***	(0.0029)	0.0020	(0.0016)	0.0432**	(0.0214)
Unemployment Rate	-0.0059**	(0.0025)	-0.0004	(0.0014)	-0.0085	(0.0120)	-0.0071	(0.0049)	-0.0037	(0.0045)	-0.0450***	(0.0167)
Existing Home Sales	-0.0001	(0.0006)	0.0009	(0.0009)	0.0009	(0.0007)	-0.0007	(0.0010)	0.0012	(0.0016)	0.0021	(0.0107)

New Home Sales	0.0019**	(0.0008)	0.0006**	(0.0003)	0.0014***	(0.0003)	0.0009*	(0.0006)	0.0007	(0.0012)	0.0077***	(0.0016)
Personal Consumption	0.0006	(0.0010)	-0.0001	(0.0005)	0.0013	(0.0011)	-0.0013	(0.0011)	-0.0009	(0.0007)	0.0048	(0.0037)
Personal Spending	0.0037*	(0.0019)	0.0023**	(0.0010)	0.0029	(0.0046)	0.0049**	(0.0021)	0.0058	(0.0123)	-0.0131	(0.0256)
Business Inventories	-0.0006	(0.0012)	-0.0005	(0.0006)	0.0042*	(0.0022)	-0.0018	(0.0030)	0.0058	(0.0067)	-0.0268***	(0.0087)
Construction Spending MoM	0.0014*	(0.0007)	0.0003	(0.0004)	0.0158***	(0.0037)	0.0012	(0.0010)	0.0006	(0.0029)	0.0133	(0.0155)
Durable Goods Orders	0.0028***	(0.0009)	0.0007	(0.0009)	-0.0081***	(0.0017)	0.0051***	(0.0017)	0.0022*	(0.0012)	0.0033	(0.0063)
Factory Orders	0.0056***	(0.0020)	0.0013	(0.0015)	0.0214***	(0.0055)	0.0070*	(0.0036)	0.0025	(0.0038)	0.0114*	(0.0061)
Wholesale Inventories MoM	-0.0003	(0.0006)	0.0005	(0.0005)	-0.0024	(0.0020)	-0.0011	(0.0008)	-0.0015	(0.0012)	0.0049	(0.0049)
Trade Balance	-0.0011	(0.0010)	-0.0001	(0.0005)	-0.0116***	(0.0022)	-0.0052	(0.0055)	0.0017	(0.0046)	-0.0072	(0.0101)
CPI MoM	0.0300***	(0.0070)	0.0028	(0.0018)	-0.0104***	(0.0004)	0.0247***	(0.0073)	0.0147***	(0.0032)	0.1391***	(0.0350)
MNI Chicago PMI	-0.0006	(0.0008)	0.0002	(0.0005)	-0.0014	(0.0013)	0.0009	(0.0008)	-0.0009	(0.0012)	-0.0052	(0.0034)
PCE Core Deflator MoM	0.0003	(0.0020)	-0.0025	(0.0016)	-0.0136***	(0.0050)	0.0040	(0.0027)	-0.0060	(0.0046)	0.0428**	(0.0209)
PPI Final Demand MoM	0.0026*	(0.0013)	0.0008	(0.0008)	0.0059***	(0.0014)	0.0063***	(0.0017)	-0.0009	(0.0015)	0.0087	(0.0143)
Consumer Confidence	0.0021***	(0.0005)	0.0014***	(0.0005)	0.0010	(0.0009)	0.0023***	(0.0006)	-0.0001	(0.0014)	0.0144**	(0.0063)
Housing Starts	0.0014***	(0.0006)	0.0002	(0.0004)	0.0022	(0.0015)	0.0023***	(0.0009)	0.0005	(0.0007)	-0.0027	(0.0051)
Leading Index	0.0004	(0.0013)	0.0015*	(0.0008)	0.0024	(0.0023)	-0.0001	(0.0021)	0.0016	(0.0029)	-0.0003	(0.0083)
Phi Fed Business Outlook	0.0015***	(0.0005)	-0.0001	(0.0006)	0.0040*	(0.0022)	0.0018**	(0.0008)	0.0015*	(0.0008)	0.0075	(0.0051)
U. of Mich. Sentiment	0.0017**	(0.0008)	-0.0001	(0.0004)	0.0012	(0.0013)	0.0024***	(0.0009)	0.0017**	(0.0008)	0.0060	(0.0048)
Continuing Claims	-0.0008***	(0.0003)	-0.0006**	(0.0003)	0.0004	(0.0059)	-0.0007*	(0.0004)	-0.0010	(0.0010)	-0.0021	(0.0025)
Initial Jobless Claims	-0.0019***	(0.0005)	-0.0006	(0.0004)	-0.0016	(0.0023)	-0.0017**	(0.0007)	-0.0010	(0.0012)	-0.0093**	(0.0039)
FOMC Rate Decision (Upper Bound)	0.1146***	(0.0163)	-	-	-	-	0.1384***	(0.0001)	-	-	0.0925***	(0.0001)
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-	-	-	-	-	-	-
Observations	827,101		271,100		30,033		314,654		151,629		59,682	
R-squared	0.0044		0.0239		0.0101		0.0044		0.0037		0.0239	
Adj. R-squared	0.0044		0.0237		0.0083		0.0042		0.0034		0.0232	

Notes: Heteroskedasticity and autocorrelation consistent standard error proposed by Newey and West (1987) is used. *** Significance at the 1% level. ** Significance at the 5% level. * Significance at the 10% level

Table 4. Results of contemporaneous macro news effects on CNY/USD.

	CNY Return					
	2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00— 2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP YoY	0.0048	(0.0033)	-0.0306***	(0.0054)	-0.0555	(0.0541)
Industrial Production YoY	-0.0027***	(0.0009)	-0.0001	(0.0015)	0.0497**	(0.0216)
Retail Sales YoY	-0.0019*	(0.0011)	-0.0046***	(0.0013)	-0.0489***	(0.0172)
Trade Balance	0.0024	(0.0039)	-0.0050***	(0.0013)	-0.0086***	(0.0024)
CPI YoY	0.0011	(0.0100)	-0.0045	(0.0094)	0.0046	(0.0513)
Manufacturing PMI	-	-	0.0141***	(0.0001)	-0.0283	(0.0490)
PPI YoY	0.0102	(0.0127)	0.0116	(0.0108)	-0.0107	(0.0689)
Aggregate Financing CNY	-0.0023**	(0.0011)	-0.0037	(0.0026)	-0.0015	(0.0034)
Foreign Reserves	-0.0033	(0.0068)	0.0053	(0.0041)	-0.0016	(0.0011)
Money Supply M2 YoY	-0.0009	(0.0016)	-0.0013	(0.0016)	0.0006	(0.0014)
New Yuan Loans CNY	0.0003	(0.0023)	0.0022	(0.0032)	-0.0046	(0.0032)
US macro news						
GDP Advance	0.0037**	(0.0016)	0.0054***	(0.0019)	0.0153***	(0.0033)
GDP Second	0.0013	(0.0010)	0.0083*	(0.0049)	0.0031	(0.0020)
GDP Third	0.0039**	(0.0016)	-0.0010	(0.0020)	-0.0139	(0.0119)
Capacity Utilization	0.0007	(0.0012)	0.0004	(0.0008)	0.0002	(0.0011)
Change in Nonfarm Payrolls	0.0077***	(0.0027)	0.0156***	(0.0051)	0.0274	(0.0216)
Industrial Production MoM	0.0003	(0.0016)	-0.0001	(0.0009)	0.0025	(0.0020)
ISM Manufacturing	0.0053***	(0.0015)	0.0003	(0.0014)	0.0034	(0.0054)
Personal Income	0.0008	(0.0006)	-0.0014	(0.0022)	-0.0056	(0.0053)
Retail Sales Advance MoM	0.0039***	(0.0014)	0.0003	(0.0005)	0.0078	(0.0064)
Unemployment Rate	-0.0021	(0.0038)	-0.0025	(0.0022)	-0.0085	(0.0087)

Existing Home Sales	0.0046	(0.0033)	-0.0007	(0.0012)	0.0078	(0.0094)
New Home Sales	0.0002	(0.0002)	-0.0004	(0.0004)	0.0034***	(0.0013)
Personal Consumption	0.0003	(0.0009)	0.0001	(0.0003)	0.0024	(0.0018)
Personal Spending	0.0021	(0.0015)	0.0045	(0.0076)	0.0084	(0.0095)
Business Inventories	0.0058*	(0.0031)	0.0037	(0.0064)	-0.0108***	(0.0042)
Construction Spending MoM	0.0003	(0.0005)	0.0006	(0.0013)	0.0002	(0.0040)
Durable Goods Orders	0.0025***	(0.0007)	0.0002	(0.0014)	0.0053**	(0.0027)
Factory Orders	0.0007	(0.0016)	0.0070***	(0.0021)	0.0066***	(0.0020)
Wholesale Inventories MoM	0.0001	(0.0005)	-0.0004	(0.0006)	-0.0007	(0.0014)
Trade Balance	-0.0029	(0.0028)	-0.0004	(0.0035)	0.0019	(0.0032)
CPI MoM	0.0067***	(0.0025)	0.0098***	(0.0025)	0.0945***	(0.0297)
MNI Chicago PMI	0.0011*	(0.0006)	0.0011	(0.0011)	0.0007	(0.0007)
PCE Core Deflator MoM	0.0017**	(0.0008)	-0.0027	(0.0033)	0.0153	(0.0096)
PPI Final Demand MoM	0.0038**	(0.0016)	-0.0021	(0.0017)	0.0052	(0.0053)
Consumer Confidence	0.0006	(0.0004)	0.0003	(0.0008)	0.0099	(0.0084)
Housing Starts	0.0003	(0.0002)	0.0000	(0.0005)	0.0000	(0.0018)
Leading Index	0.0017	(0.0013)	-0.0004	(0.0009)	0.0031	(0.0048)
Phi Fed Business Outlook	0.0007***	(0.0002)	0.0005	(0.0005)	0.0031	(0.0025)
U. of Mich. Sentiment	0.0014**	(0.0007)	0.0008	(0.0006)	0.0038	(0.0024)
Continuing Claims	0.0003*	(0.0002)	-0.0002	(0.0005)	-0.0005	(0.0008)
Initial Jobless Claims	-0.0005	(0.0004)	-0.0011*	(0.0006)	-0.0041*	(0.0022)
FOMC Rate Decision (Upper Bound)	-0.0000	(0.0005)	-	-	-	-
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-
Observations	170,856		82,320		32,760	
R-squared	0.0635		0.0080		0.0325	
Adj. R-squared	0.0629		0.0074		0.0312	

Notes: same as Table 3.

Table 5a. Results of positive macro news surprises on CNH/USD.

	CNH Return										
	2012/1/1—2022/12/31		2012/1/1—2015/8/10		2015/8/11—2016/1/3		2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news												
GDP YoY	-0.0122*	(0.0063)	-0.0164	(0.0104)	-0.0732***	(0.0067)	0.0040	(0.0065)	-0.0234*	(0.0122)	0.0467*	(0.0262)
Industrial Production YoY	-0.0012	(0.0014)	-0.0010	(0.0016)	-	-	-0.0020	(0.0013)	0.0066**	(0.0026)	-0.0324***	(0.0091)
Retail Sales YoY	-0.0002	(0.0019)	0.0004	(0.0016)	0.0051***	(0.0004)	-0.0018	(0.0021)	-0.0024	(0.0033)	0.0091	(0.0108)
Trade Balance	-0.0038*	(0.0020)	-0.0039**	(0.0018)	-0.0024	(0.0019)	0.0022	(0.0047)	-0.0087**	(0.0037)	-0.0084**	(0.0036)
CPI YoY	0.0042	(0.0031)	-0.0002	(0.0024)	-0.0106***	(0.0011)	0.0100	(0.0069)	0.0230	(0.0193)	0.0129	(0.0099)
Manufacturing PMI	-0.0044***	(0.0016)	-0.0015	(0.0044)	-0.0137***	(0.0022)	-0.0041***	(0.0014)	-0.0060	(0.0057)	-0.0152	(0.0120)
PPI YoY	0.0042	(0.0038)	0.0139	(0.0173)	0.0287***	(0.0025)	-0.0013	(0.0047)	0.0048	(0.0048)	0.0217	(0.0265)
Aggregate Financing CNY	-0.0018	(0.0013)	-0.0006	(0.0005)	0.0306**	(0.0119)	-0.0018	(0.0031)	-0.0022	(0.0040)	0.0016	(0.0157)
Foreign Reserves	0.0007	(0.0034)	0.0046	(0.0045)	-0.0373***	(0.0026)	-0.0065	(0.0055)	0.0067*	(0.0037)	0.0029	(0.0042)
Money Supply M2 YoY	-0.0014	(0.0026)	-0.0001	(0.0010)	0.0191***	(0.0057)	-0.0117	(0.0072)	-0.0010	(0.0050)	0.0039	(0.0024)
New Yuan Loans CNY	0.0012	(0.0041)	0.0003	(0.0020)	-0.0175***	(0.0049)	0.0047	(0.0070)	-0.0065	(0.0056)	-0.0021	(0.0185)
US macro news												
GDP Advance	0.0028	(0.0055)	0.0090***	(0.0017)	-	-	-0.0014	(0.0106)	0.0100	(0.0095)	-0.4129***	(0.0088)
GDP Second	0.0041**	(0.0019)	0.0050***	(0.0012)	-0.0020	(0.0063)	0.0033	(0.0028)	0.0038***	(0.0011)	0.1153*	(0.0616)
GDP Third	0.0000	(0.0027)	0.0012	(0.0011)	-0.0515***	(0.0013)	0.0064*	(0.0034)	0.0011	(0.0035)	-0.1234***	(0.0037)
Capacity Utilization	-0.0005	(0.0014)	0.0024***	(0.0006)	0.0055***	(0.0014)	-0.0049	(0.0033)	-0.0061	(0.0041)	0.0208**	(0.0083)
Change in Nonfarm Payrolls	0.0201***	(0.0046)	0.0086***	(0.0025)	0.0451***	(0.0013)	0.0170***	(0.0052)	0.0252**	(0.0123)	0.0562*	(0.0337)
Industrial Production MoM	0.0014	(0.0015)	-0.0030***	(0.0009)	0.0024***	(0.0006)	0.0058*	(0.0033)	0.0063	(0.0044)	-0.0031	(0.0049)
ISM Manufacturing	0.0048***	(0.0014)	0.0023***	(0.0007)	-0.0065	(0.0043)	0.0089***	(0.0025)	0.0008	(0.0021)	0.0237	(0.0233)
Personal Income	0.0009	(0.0025)	-0.0001	(0.0012)	0.0072***	(0.0017)	0.0011	(0.0021)	0.0074	(0.0063)	0.0127	(0.0376)
Retail Sales Advance MoM	0.0037**	(0.0014)	0.0023**	(0.0011)	-	-	0.0072***	(0.0024)	0.0021	(0.0019)	0.0340	(0.0351)
Unemployment Rate	-0.0266***	(0.0055)	-0.0013	(0.0051)	-	-	-0.0291***	(0.0085)	-0.0275**	(0.0116)	-0.0481**	(0.0242)
Existing Home Sales	-0.0005	(0.0008)	-0.0004	(0.0014)	-0.0007	(0.0035)	-0.0011	(0.0013)	0.0015	(0.0021)	-0.0288***	(0.0053)

New Home Sales	0.0011	(0.0008)	0.0008**	(0.0004)	0.0005*	(0.0003)	0.0006	(0.0004)	0.0006	(0.0021)	0.0045	(0.0053)
Personal Consumption	0.0005	(0.0014)	-0.0009	(0.0006)	0.0355***	(0.0008)	-0.0014	(0.0014)	-0.0013**	(0.0006)	0.0141***	(0.0004)
Personal Spending	0.0035	(0.0040)	0.0014	(0.0015)	0.0004	(0.0007)	0.0037	(0.0034)	-0.0074	(0.0109)	0.0070	(0.0427)
Business Inventories	0.0009	(0.0010)	-0.0000	(0.0004)	0.0030**	(0.0013)	0.0005	(0.0050)	0.0083	(0.0083)	-0.0448***	(0.0171)
Construction Spending MoM	0.0039	(0.0032)	0.0009	(0.0015)	0.0043**	(0.0017)	0.0011	(0.0030)	0.0030	(0.0051)	0.0685***	(0.0037)
Durable Goods Orders	0.0010	(0.0014)	-0.0007	(0.0010)	-0.0077**	(0.0032)	0.0033	(0.0022)	-0.0018	(0.0015)	0.0035	(0.0064)
Factory Orders	0.0060**	(0.0029)	0.0010	(0.0010)	-0.1172***	(0.0053)	0.0108*	(0.0056)	0.0021	(0.0033)	0.0094	(0.0068)
Wholesale Inventories MoM	-0.0007	(0.0008)	-0.0003	(0.0003)	-0.0021	(0.0024)	-0.0018*	(0.0009)	-0.0010	(0.0012)	-0.0002	(0.0043)
Trade Balance	-0.0027	(0.0023)	0.0002	(0.0008)	0.1001***	(0.0361)	-0.0114	(0.0085)	-0.0099**	(0.0044)	0.0114	(0.0097)
CPI MoM	0.0293***	(0.0079)	0.0062**	(0.0024)	-	-	0.0267***	(0.0103)	0.0133***	(0.0033)	0.1345***	(0.0478)
MNI Chicago PMI	-0.0000	(0.0006)	-0.0009	(0.0009)	-0.0006**	(0.0003)	0.0014	(0.0009)	-0.0015	(0.0012)	0.0030	(0.0029)
PCE Core Deflator MoM	-0.0002	(0.0019)	-0.0014	(0.0016)	-	-	0.0012	(0.0016)	-0.0085	(0.0055)	0.0298	(0.0366)
PPI Final Demand MoM	0.0012	(0.0013)	0.0024***	(0.0004)	0.0049***	(0.0012)	0.0039**	(0.0018)	-0.0012	(0.0019)	0.0115	(0.0159)
Consumer Confidence	0.0025***	(0.0006)	0.0007	(0.0006)	0.0011	(0.0010)	0.0026***	(0.0008)	0.0010	(0.0018)	0.0134**	(0.0067)
Housing Starts	0.0009*	(0.0005)	0.0002	(0.0004)	0.0040*	(0.0022)	0.0021	(0.0016)	0.0011	(0.0010)	-0.0056***	(0.0019)
Leading Index	0.0011	(0.0013)	0.0014	(0.0011)	0.0059**	(0.0024)	0.0015	(0.0030)	0.0008	(0.0032)	-0.0228***	(0.0060)
Phi Fed Business Outlook	0.0017**	(0.0006)	0.0009	(0.0007)	0.0127**	(0.0057)	0.0018*	(0.0011)	0.0014*	(0.0008)	-0.0001	(0.0013)
U. of Mich. Sentiment	0.0026*	(0.0015)	-0.0000	(0.0007)	0.0030	(0.0025)	0.0024**	(0.0011)	0.0021	(0.0022)	0.0129***	(0.0031)
Continuing Claims	-0.0003	(0.0006)	-0.0011*	(0.0006)	0.0071	(0.0082)	-0.0000	(0.0006)	-0.0013	(0.0016)	0.0010	(0.0012)
Initial Jobless Claims	-0.0034***	(0.0009)	-0.0012*	(0.0007)	-0.0033	(0.0030)	-0.0044***	(0.0013)	-0.0019	(0.0015)	-0.0297	(0.0181)
FOMC Rate Decision (Upper Bound)	0.0923***	(0.0001)	-	-	-	-	-	-	-	-	0.0925***	(0.0001)
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-	-	-	-	-	-	-
Observations	827,101		271,100		30,033		314,654		151,629		59,682	
R-squared	0.0032		0.0233		0.0079		0.0028		0.0031		0.0158	
Adj. R-squared	0.0031		0.0232		0.0063		0.0026		0.0029		0.0151	

Notes: same as Table 3.

Table 5b. Results of negative macro news surprises on CNH/USD.

	CNH Return											
	2012/1/1—2022/12/31		2012/1/1—2015/8/10		2015/8/11—2016/1/3		2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news												
GDP YoY	-0.0055	(0.0106)	-0.0072	(0.0082)	-	-	0.0002	(0.0137)	-0.0269***	(0.0030)	-0.0608***	(0.0073)
Industrial Production YoY	-0.0078**	(0.0037)	-0.0025	(0.0026)	0.0172	(0.0162)	-0.0095***	(0.0022)	-0.0093**	(0.0040)	-0.0081	(0.0657)
Retail Sales YoY	-0.0029	(0.0022)	0.0011	(0.0038)	-0.3810***	(0.0769)	-0.0031	(0.0020)	-0.0006	(0.0031)	-0.0287	(0.0524)
Trade Balance	-0.0060***	(0.0019)	-0.0046**	(0.0021)	-0.0020*	(0.0011)	-0.0071**	(0.0031)	-0.0019	(0.0011)	-0.0133	(0.0088)
CPI YoY	-0.0095***	(0.0030)	-0.0043	(0.0045)	0.0136***	(0.0033)	-0.0104**	(0.0047)	-0.0087**	(0.0040)	-0.0431***	(0.0119)
Manufacturing PMI	-0.0093***	(0.0033)	-0.0056**	(0.0025)	-0.0195**	(0.0077)	-0.0092**	(0.0041)	-0.0057*	(0.0030)	-0.0196	(0.0248)
PPI YoY	-0.0002	(0.0042)	0.0015	(0.0032)	0.0105***	(0.0011)	-0.0009	(0.0128)	0.0028	(0.0081)	-0.0001	(0.0127)
Aggregate Financing CNY	-0.0028*	(0.0016)	-0.0000	(0.0013)	0.0151	(0.0129)	-0.0027	(0.0028)	-0.0039	(0.0026)	0.0045	(0.0139)
Foreign Reserves	-0.0050	(0.0032)	-0.0034	(0.0026)	-0.0147***	(0.0027)	-0.0057	(0.0135)	0.0049*	(0.0029)	-0.0076**	(0.0037)
Money Supply M2 YoY	-0.0001	(0.0009)	-0.0018**	(0.0008)	-	-	0.0003	(0.0026)	0.0015	(0.0021)	-0.0610**	(0.0296)
New Yuan Loans CNY	-0.0029*	(0.0016)	-0.0013	(0.0011)	-0.0304	(0.0219)	-0.0070*	(0.0041)	0.0053*	(0.0031)	-0.0112	(0.0121)
US macro news												
GDP Advance	0.0167***	(0.0057)	0.0042	(0.0029)	0.0213	(0.0189)	0.0173***	(0.0047)	0.0128***	(0.0023)	0.0415***	(0.0009)
GDP Second	0.0095*	(0.0051)	0.0098	(0.0068)	-	-	0.0146	(0.0122)	0.0075	(0.0087)	0.0018	(0.0012)
GDP Third	0.0019	(0.0021)	0.0018	(0.0016)	-	-	0.0097	(0.0063)	-	-	-0.0008	(0.0023)
Capacity Utilization	0.0029*	(0.0016)	0.0026**	(0.0012)	-0.0020*	(0.0011)	-0.0011	(0.0029)	0.0033	(0.0032)	0.0223***	(0.0026)
Change in Nonfarm Payrolls	0.0176***	(0.0042)	0.0077***	(0.0021)	0.0124***	(0.0004)	0.0212**	(0.0084)	0.0253***	(0.0094)	0.1848***	(0.0037)
Industrial Production MoM	0.0005	(0.0018)	-0.0004	(0.0010)	0.0037***	(0.0005)	0.0091**	(0.0037)	-0.0012	(0.0034)	-0.0478***	(0.0107)
ISM Manufacturing	0.0052***	(0.0014)	0.0022**	(0.0011)	-0.0008	(0.0019)	0.0088***	(0.0017)	0.0107**	(0.0044)	0.0069	(0.0134)
Personal Income	-0.0002	(0.0013)	-0.0019	(0.0018)	-0.0052	(0.0051)	-0.0014	(0.0017)	0.0046	(0.0086)	0.0184*	(0.0101)
Retail Sales Advance MoM	0.0054*	(0.0031)	0.0060***	(0.0020)	-0.0132***	(0.0051)	0.0049	(0.0062)	0.0025	(0.0028)	0.0586***	(0.0162)
Unemployment Rate	-0.0058**	(0.0029)	-0.0033*	(0.0019)	0.0172***	(0.0022)	-0.0024	(0.0044)	-0.0068	(0.0044)	-0.0821***	(0.0019)
Existing Home Sales	0.0002	(0.0007)	0.0013	(0.0009)	0.0003	(0.0005)	-0.0002	(0.0013)	-0.0004	(0.0018)	0.0004	(0.0066)

New Home Sales	0.0029**	(0.0014)	0.0006	(0.0004)	0.0016***	(0.0002)	0.0020	(0.0020)	0.0003	(0.0012)	0.0086***	(0.0013)
Personal Consumption	0.0007	(0.0008)	-0.0000	(0.0007)	0.0005	(0.0005)	-0.0013	(0.0024)	0.0069	(0.0057)	0.0010**	(0.0005)
Personal Spending	0.0040*	(0.0020)	0.0045***	(0.0017)	0.0049	(0.0060)	0.0031	(0.0033)	0.0369**	(0.0173)	-0.0372**	(0.0164)
Business Inventories	-0.0050*	(0.0026)	-0.0015	(0.0016)	0.0279	(0.0178)	-0.0052	(0.0032)	-0.0001	(0.0115)	-0.0294***	(0.0107)
Construction Spending MoM	-0.0004	(0.0007)	-0.0005	(0.0004)	-	-	-0.0003	(0.0011)	-0.0041	(0.0031)	-0.0055	(0.0115)
Durable Goods Orders	0.0045***	(0.0013)	0.0016*	(0.0010)	-	-	0.0072***	(0.0027)	0.0037*	(0.0019)	0.0193	(0.0132)
Factory Orders	0.0055**	(0.0023)	0.0016	(0.0026)	0.0248***	(0.0027)	0.0021	(0.0037)	0.0171	(0.0241)	0.0177***	(0.0028)
Wholesale Inventories MoM	0.0006	(0.0011)	0.0021***	(0.0007)	-0.0037*	(0.0020)	-0.0008	(0.0013)	-0.0043	(0.0033)	0.0127*	(0.0077)
Trade Balance	-0.0009	(0.0014)	-0.0005	(0.0007)	-0.0181***	(0.0012)	-0.0006	(0.0101)	0.0028	(0.0077)	-0.0119**	(0.0055)
CPI MoM	0.0307**	(0.0130)	0.0007	(0.0014)	-0.0104***	(0.0004)	0.0208***	(0.0079)	0.0330***	(0.0113)	0.1471***	(0.0495)
MNI Chicago PMI	-0.0012	(0.0014)	0.0010***	(0.0002)	-0.0019	(0.0021)	0.0001	(0.0013)	0.0018	(0.0027)	-0.0080***	(0.0027)
PCE Core Deflator MoM	0.0003	(0.0034)	-0.0037*	(0.0021)	-0.0095	(0.0068)	0.0058	(0.0045)	-0.0119*	(0.0071)	0.0520***	(0.0069)
PPI Final Demand MoM	0.0053**	(0.0026)	-0.0002	(0.0011)	0.0097***	(0.0021)	0.0107***	(0.0036)	0.0005	(0.0012)	0.0103	(0.0182)
Consumer Confidence	0.0015**	(0.0007)	0.0020***	(0.0008)	0.0009	(0.0012)	0.0014	(0.0010)	-0.0026**	(0.0012)	0.0372*	(0.0194)
Housing Starts	0.0013*	(0.0007)	0.0002	(0.0009)	0.0011	(0.0016)	0.0023**	(0.0010)	-0.0009	(0.0010)	0.0040	(0.0070)
Leading Index	-0.0012	(0.0021)	0.0004	(0.0012)	-0.0016	(0.0015)	-0.0023	(0.0026)	0.0016	(0.0054)	0.0001	(0.0085)
Phi Fed Business Outlook	0.0022**	(0.0011)	-0.0009	(0.0008)	0.0032*	(0.0018)	0.0024	(0.0018)	0.0066**	(0.0033)	0.0102*	(0.0060)
U. of Mich. Sentiment	0.0009	(0.0007)	-0.0002	(0.0004)	0.0009	(0.0015)	0.0022	(0.0014)	0.0016**	(0.0008)	-0.0010	(0.0045)
Continuing Claims	-0.0012***	(0.0004)	-0.0004	(0.0003)	-0.0005	(0.0074)	-0.0015***	(0.0005)	-0.0020	(0.0014)	0.0083	(0.0061)
Initial Jobless Claims	-0.0018**	(0.0008)	-0.0004	(0.0005)	-0.0040	(0.0040)	-0.0019*	(0.0010)	0.0008	(0.0022)	-0.0139***	(0.0040)
FOMC Rate Decision (Upper Bound)	0.1386***	(0.0000)	-	-	-	-	0.1384***	(0.0001)	-	-	-	-
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-	-	-	-	-	-	-
Observations	827,101		271,100		30,033		314,654		151,629		59,682	
R-squared	0.0029		0.0235		0.0083		0.0035		0.0030		0.0128	
Adj. R-squared	0.0028		0.0233		0.0067		0.0034		0.0027		0.0121	

Notes: same as Table 3.

Table 5c. Results of positive macro news surprises on CNY/USD.

	CNY Return					
	2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00— 2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP YoY	0.0123***	(0.0030)	-0.0263***	(0.0059)	0.0247	(0.0696)
Industrial Production YoY	-0.0032***	(0.0010)	0.0066***	(0.0017)	0.0310	(0.0246)
Retail Sales YoY	-0.0019	(0.0013)	-0.0004	(0.0020)	-0.0112	(0.0183)
Trade Balance	0.0108	(0.0101)	-0.0066***	(0.0021)	-0.0082***	(0.0031)
CPI YoY	0.0141	(0.0134)	0.0120	(0.0454)	0.0623	(0.0560)
Manufacturing PMI	-	-	0.0141***	(0.0001)	-0.0286	(0.0775)
PPI YoY	0.0088	(0.0143)	-0.0012	(0.0184)	-0.1530	(0.1392)
Aggregate Financing CNY	-0.0013	(0.0015)	-0.0021	(0.0032)	0.0056	(0.0045)
Foreign Reserves	-0.0130**	(0.0061)	0.0077	(0.0047)	0.0031	(0.0189)
Money Supply M2 YoY	-0.0046	(0.0030)	-0.0010	(0.0031)	0.0023	(0.0027)
New Yuan Loans CNY	0.0014	(0.0025)	-0.0037	(0.0044)	-0.0100***	(0.0037)
US macro news						
GDP Advance	0.0022	(0.0025)	0.0061**	(0.0028)	-0.0838***	(0.0055)
GDP Second	0.0007	(0.0010)	0.0005	(0.0006)	0.0132*	(0.0074)
GDP Third	0.0061**	(0.0025)	-0.0002	(0.0017)	-0.0671***	(0.0033)
Capacity Utilization	0.0006	(0.0011)	0.0025**	(0.0010)	-0.0047***	(0.0009)
Change in Nonfarm Payrolls	0.0091**	(0.0040)	0.0129***	(0.0043)	0.0314	(0.0228)
Industrial Production MoM	-0.0009	(0.0021)	-0.0017*	(0.0010)	0.0050***	(0.0007)
ISM Manufacturing	0.0051***	(0.0017)	0.0006	(0.0017)	0.0175***	(0.0048)
Personal Income	0.0010	(0.0013)	-0.0011	(0.0021)	-0.0119	(0.0148)
Retail Sales Advance MoM	0.0018	(0.0022)	-0.0001	(0.0008)	0.0011	(0.0054)
Unemployment Rate	-0.0097	(0.0080)	-0.0191**	(0.0083)	-0.0197**	(0.0077)
Existing Home Sales	0.0068	(0.0061)	-0.0013	(0.0013)	-0.0035***	(0.0005)

New Home Sales	0.0001	(0.0002)	-0.0005	(0.0007)	0.0029	(0.0033)
Personal Consumption	-0.0002	(0.0012)	-0.0001	(0.0003)	0.0066***	(0.0003)
Personal Spending	0.0017	(0.0029)	-0.0021	(0.0079)	0.0247**	(0.0120)
Business Inventories	0.0025	(0.0023)	0.0058	(0.0099)	-0.0292***	(0.0044)
Construction Spending MoM	0.0020	(0.0012)	0.0035	(0.0025)	0.0107***	(0.0008)
Durable Goods Orders	0.0028***	(0.0009)	-0.0005	(0.0020)	0.0085***	(0.0030)
Factory Orders	0.0016	(0.0027)	0.0073***	(0.0023)	0.0078***	(0.0023)
Wholesale Inventories MoM	0.0006	(0.0006)	-0.0004	(0.0007)	-0.0023	(0.0017)
Trade Balance	-0.0056	(0.0040)	-0.0077*	(0.0043)	0.0035	(0.0027)
CPI MoM	0.0032	(0.0020)	0.0091***	(0.0025)	0.0649*	(0.0351)
MNI Chicago PMI	0.0011	(0.0007)	0.0011	(0.0013)	0.0023	(0.0028)
PCE Core Deflator MoM	-0.0007	(0.0018)	-0.0017	(0.0027)	0.0042	(0.0146)
PPI Final Demand MoM	0.0026*	(0.0015)	-0.0011	(0.0017)	0.0055	(0.0043)
Consumer Confidence	0.0008*	(0.0004)	0.0006	(0.0011)	0.0027	(0.0032)
Housing Starts	-0.0001	(0.0005)	-0.0001	(0.0004)	0.0033***	(0.0009)
Leading Index	0.0009	(0.0017)	-0.0002	(0.0010)	0.0004	(0.0041)
Phi Fed Business Outlook	0.0006**	(0.0003)	0.0005	(0.0006)	-0.0030***	(0.0009)
U. of Mich. Sentiment	0.0022***	(0.0007)	0.0036**	(0.0017)	0.0078***	(0.0010)
Continuing Claims	0.0005	(0.0003)	-0.0003	(0.0008)	0.0009	(0.0006)
Initial Jobless Claims	-0.0020***	(0.0007)	-0.0012	(0.0007)	-0.0167	(0.0124)
FOMC Rate Decision (Upper Bound)	-	-	-	-	-	-
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-
Observations	170,856		82,320		32,760	
R-squared	0.0634		0.0070		0.0217	
Adj. R-squared	0.0628		0.0065		0.0204	

Notes: same as Table 3.

Table 5d. Results of negative macro news surprises on CNY/USD.

	CNY Return					
	2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP YoY	0.0007	(0.0027)	-0.0160***	(0.0042)	-0.0706***	(0.0096)
Industrial Production YoY	-0.0041**	(0.0020)	-0.0105***	(0.0023)	0.1246	(0.0861)
Retail Sales YoY	-0.0016	(0.0018)	0.0012	(0.0018)	-0.1326*	(0.0741)
Trade Balance	-0.0020	(0.0021)	-0.0032***	(0.0005)	-0.0100***	(0.0039)
CPI YoY	-0.0089	(0.0116)	-0.0151	(0.0114)	-0.0536	(0.0452)
Manufacturing PMI	-	-	-	-	-0.0282	(0.0560)
PPI YoY	0.0050	(0.0265)	0.0276**	(0.0121)	0.0614	(0.0491)
Aggregate Financing CNY	-0.0048*	(0.0027)	-0.0023	(0.0031)	-0.0027	(0.0051)
Foreign Reserves	0.0145***	(0.0055)	-0.0001	(0.0015)	-0.0019***	(0.0004)
Money Supply M2 YoY	0.0023	(0.0028)	-0.0006	(0.0018)	-0.0095	(0.0108)
New Yuan Loans CNY	-0.0023	(0.0047)	0.0073***	(0.0028)	-0.0055	(0.0045)
US macro news						
GDP Advance	0.0047***	(0.0017)	0.0056***	(0.0020)	0.0139***	(0.0030)
GDP Second	0.0056	(0.0054)	0.0112*	(0.0063)	0.0028***	(0.0007)
GDP Third	0.0019	(0.0014)	-	-	-0.0340***	(0.0069)
Capacity Utilization	0.0005	(0.0017)	-0.0003	(0.0009)	0.0007	(0.0029)
Change in Nonfarm Payrolls	0.0115**	(0.0048)	0.0215***	(0.0074)	0.0558***	(0.0001)
Industrial Production MoM	0.0018	(0.0025)	0.0003	(0.0011)	0.0023	(0.0096)
ISM Manufacturing	0.0058**	(0.0024)	-0.0054	(0.0047)	-0.0027	(0.0077)
Personal Income	-0.0002	(0.0004)	-0.0007	(0.0040)	-0.0016	(0.0083)
Retail Sales Advance MoM	0.0037**	(0.0016)	0.0010	(0.0007)	0.0161***	(0.0059)
Unemployment Rate	-0.0001	(0.0024)	-0.0057*	(0.0034)	-0.0280***	(0.0001)
Existing Home Sales	0.0021**	(0.0010)	0.0010*	(0.0005)	0.0031	(0.0055)

New Home Sales	0.0003	(0.0004)	-0.0005	(0.0004)	0.0039***	(0.0009)
Personal Consumption	0.0010	(0.0007)	0.0029	(0.0036)	0.0093***	(0.0015)
Personal Spending	0.0010	(0.0017)	0.0239**	(0.0097)	-0.0086	(0.0090)
Business Inventories	0.0070	(0.0055)	-0.0001*	(0.0001)	-0.0095*	(0.0049)
Construction Spending MoM	-0.0011**	(0.0005)	-0.0011	(0.0020)	-0.0030	(0.0036)
Durable Goods Orders	0.0020*	(0.0012)	0.0010	(0.0011)	0.0058	(0.0046)
Factory Orders	-0.0009	(0.0012)	0.0054	(0.0050)	0.0001	(0.0007)
Wholesale Inventories MoM	-0.0010	(0.0010)	-0.0009	(0.0016)	0.0031	(0.0025)
Trade Balance	-0.0059	(0.0080)	-0.0000	(0.0073)	0.0042	(0.0036)
CPI MoM	0.0096**	(0.0038)	0.0191*	(0.0099)	0.1362***	(0.0239)
MNI Chicago PMI	0.0012	(0.0008)	0.0013	(0.0013)	0.0002	(0.0002)
PCE Core Deflator MoM	0.0019**	(0.0008)	-0.0088	(0.0055)	0.0301***	(0.0099)
PPI Final Demand MoM	0.0053*	(0.0032)	-0.0049	(0.0032)	0.0063	(0.0071)
Consumer Confidence	-0.0000	(0.0011)	-0.0001	(0.0007)	0.0759***	(0.0196)
Housing Starts	0.0004	(0.0003)	0.0006	(0.0009)	-0.0010	(0.0013)
Leading Index	0.0029	(0.0019)	-0.0002	(0.0016)	0.0029	(0.0050)
Phi Fed Business Outlook	0.0010**	(0.0004)	0.0022	(0.0017)	0.0058**	(0.0029)
U. of Mich. Sentiment	0.0003	(0.0012)	-0.0001	(0.0004)	0.0003	(0.0028)
Continuing Claims	0.0001	(0.0002)	-0.0004	(0.0007)	0.0014	(0.0030)
Initial Jobless Claims	-0.0010**	(0.0005)	-0.0009	(0.0009)	-0.0054**	(0.0022)
FOMC Rate Decision (Upper Bound)	-0.0000	(0.0005)	-	-	-	-
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-
Observations	170,856		82,320		32,760	
R-squared	0.0633		0.0077		0.0296	
Adj. R-squared	0.0626		0.0072		0.0283	

Notes: same as Table 3.

Table 6a. Contemporaneous and lag effects of macro news on CNH/USD. (J=1, Contemporaneous coefficients)

Contemporaneous	2012/1/1—2022/12/31 Coefficient	s.e.	2012/1/1—2015/8/10 Coefficient	s.e.	2015/8/11—2016/1/3 Coefficient	s.e.	2016/1/4—2020/3/10 Coefficient	s.e.	2020/3/11—2022/3/17 3：00 Coefficient	s.e.	2022/3/17 3：00—2022/12/31 Coefficient	s.e.
Chinese macro news												
GDP YoY	-0.0111**	(0.0056)	-0.0125**	(0.0061)	-0.0668***	(0.0064)	0.0015	(0.0066)	-0.0378***	(0.0072)	-0.0234	(0.0390)
Industrial Production YoY	-0.0029*	(0.0017)	-0.0016	(0.0010)	-0.0443***	(0.0029)	-0.0025*	(0.0014)	0.0002	(0.0015)	-0.0117	(0.0130)
Retail Sales YoY	-0.0038***	(0.0013)	-0.0003	(0.0011)	-0.1072***	(0.0074)	-0.0040**	(0.0016)	-0.0071***	(0.0013)	-0.0165	(0.0123)
Trade Balance	-0.0049***	(0.0014)	-0.0042***	(0.0014)	-0.0023*	(0.0013)	-0.0039	(0.0027)	-0.0056**	(0.0027)	-0.0103***	(0.0038)
CPI YoY	-0.0030	(0.0021)	-0.0009	(0.0023)	0.0086**	(0.0040)	-0.0026	(0.0040)	-0.0058	(0.0036)	-0.0108	(0.0223)
Manufacturing PMI	-0.0064***	(0.0016)	-0.0042*	(0.0024)	-0.0182***	(0.0064)	-0.0060***	(0.0016)	-0.0059	(0.0046)	-0.0190	(0.0211)
PPI YoY	0.0001	(0.0028)	0.0007	(0.0042)	0.0159***	(0.0052)	0.0000	(0.0045)	0.0044	(0.0042)	-0.0145	(0.0212)
Aggregate Financing CNY	-0.0020*	(0.0010)	-0.0003	(0.0004)	0.0162***	(0.0033)	-0.0031	(0.0022)	-0.0044*	(0.0025)	-0.0098	(0.0088)
Foreign Reserves	-0.0022	(0.0025)	0.0001	(0.0027)	-0.0149***	(0.0028)	-0.0062	(0.0058)	0.0060**	(0.0027)	-0.0038	(0.0037)
Money Supply M2 YoY	-0.0011	(0.0011)	-0.0013*	(0.0007)	0.0245***	(0.0045)	-0.0044*	(0.0024)	-0.0005	(0.0024)	0.0040	(0.0026)
New Yuan Loans CNY	-0.0005	(0.0025)	0.0000	(0.0014)	-0.0170***	(0.0033)	0.0015	(0.0057)	-0.0001	(0.0040)	0.0050	(0.0086)
US macro news												
GDP Advance	0.0122***	(0.0045)	0.0057***	(0.0022)	0.0089	(0.0168)	0.0096	(0.0066)	0.0098**	(0.0045)	0.0360***	(0.0043)
GDP Second	0.0045***	(0.0017)	0.0056***	(0.0018)	0.0024	(0.0049)	0.0026	(0.0028)	0.0089*	(0.0049)	0.0110	(0.0161)
GDP Third	0.0008	(0.0016)	0.0012	(0.0010)	0.0082	(0.0061)	0.0058**	(0.0028)	-0.0006	(0.0041)	-0.0270	(0.0275)
Capacity Utilization	0.0019	(0.0012)	0.0027***	(0.0009)	-0.0011	(0.0013)	-0.0006	(0.0021)	0.0009	(0.0031)	0.0103***	(0.0034)
Change in Nonfarm Payrolls	0.0143***	(0.0030)	0.0072***	(0.0016)	0.0338***	(0.0099)	0.0130***	(0.0044)	0.0212***	(0.0073)	0.0440	(0.0335)
Industrial Production MoM	0.0006	(0.0012)	-0.0016*	(0.0009)	0.0029***	(0.0005)	0.0054**	(0.0025)	0.0005	(0.0034)	-0.0064	(0.0060)
ISM Manufacturing	0.0054***	(0.0010)	0.0023***	(0.0007)	0.0072***	(0.0018)	0.0088***	(0.0015)	0.0035	(0.0023)	0.0019	(0.0117)
Personal Income	0.0012	(0.0011)	-0.0009	(0.0011)	0.0036	(0.0037)	0.0011	(0.0011)	0.0048	(0.0052)	0.0147	(0.0105)
Retail Sales Advance MoM	0.0057***	(0.0014)	0.0048***	(0.0015)	-0.0015	(0.0045)	0.0081***	(0.0029)	0.0020	(0.0016)	0.0432**	(0.0214)
Unemployment Rate	-0.0059**	(0.0025)	-0.0004	(0.0014)	-0.0085	(0.0120)	-0.0071	(0.0049)	-0.0037	(0.0045)	-0.0450***	(0.0167)
Existing Home Sales	-0.0001	(0.0006)	0.0009	(0.0009)	0.0009	(0.0007)	-0.0007	(0.0010)	0.0012	(0.0016)	0.0021	(0.0107)

New Home Sales	0.0019**	(0.0008)	0.0006**	(0.0003)	0.0014***	(0.0003)	0.0009*	(0.0006)	0.0007	(0.0012)	0.0077***	(0.0016)
Personal Consumption	0.0006	(0.0010)	-0.0001	(0.0005)	0.0013	(0.0011)	-0.0013	(0.0011)	-0.0009	(0.0007)	0.0048	(0.0037)
Personal Spending	0.0037*	(0.0019)	0.0023**	(0.0010)	0.0029	(0.0045)	0.0049**	(0.0021)	0.0058	(0.0123)	-0.0130	(0.0256)
Business Inventories	-0.0006	(0.0012)	-0.0006	(0.0006)	0.0042*	(0.0022)	-0.0018	(0.0030)	0.0058	(0.0067)	-0.0269***	(0.0088)
Construction Spending MoM	0.0014*	(0.0007)	0.0003	(0.0004)	0.0158***	(0.0037)	0.0012	(0.0010)	0.0006	(0.0029)	0.0133	(0.0154)
Durable Goods Orders	0.0028***	(0.0009)	0.0007	(0.0009)	-0.0081***	(0.0017)	0.0051***	(0.0017)	0.0022*	(0.0012)	0.0033	(0.0064)
Factory Orders	0.0056***	(0.0020)	0.0013	(0.0015)	0.0213***	(0.0055)	0.0070*	(0.0036)	0.0025	(0.0038)	0.0114*	(0.0061)
Wholesale Inventories MoM	-0.0003	(0.0006)	0.0005	(0.0005)	-0.0024	(0.0020)	-0.0011	(0.0008)	-0.0015	(0.0012)	0.0049	(0.0049)
Trade Balance	-0.0011	(0.0010)	-0.0001	(0.0005)	-0.0116***	(0.0022)	-0.0052	(0.0055)	0.0017	(0.0046)	-0.0071	(0.0101)
CPI MoM	0.0300***	(0.0070)	0.0028	(0.0018)	-0.0103***	(0.0004)	0.0247***	(0.0073)	0.0147***	(0.0032)	0.1390***	(0.0350)
MNI Chicago PMI	-0.0006	(0.0008)	0.0002	(0.0005)	-0.0014	(0.0013)	0.0009	(0.0008)	-0.0009	(0.0012)	-0.0051	(0.0034)
PCE Core Deflator MoM	0.0003	(0.0020)	-0.0025	(0.0016)	-0.0135***	(0.0050)	0.0040	(0.0027)	-0.0060	(0.0046)	0.0428**	(0.0209)
PPI Final Demand MoM	0.0026*	(0.0013)	0.0008	(0.0008)	0.0059***	(0.0014)	0.0063***	(0.0017)	-0.0009	(0.0015)	0.0088	(0.0143)
Consumer Confidence	0.0021***	(0.0005)	0.0014***	(0.0005)	0.0010	(0.0009)	0.0023***	(0.0006)	-0.0001	(0.0014)	0.0144**	(0.0063)
Housing Starts	0.0014***	(0.0006)	0.0002	(0.0004)	0.0022	(0.0015)	0.0023***	(0.0009)	0.0005	(0.0007)	-0.0027	(0.0051)
Leading Index	0.0004	(0.0013)	0.0014	(0.0008)	0.0024	(0.0023)	-0.0001	(0.0021)	0.0016	(0.0029)	-0.0003	(0.0083)
Phi Fed Business Outlook	0.0015***	(0.0005)	-0.0001	(0.0006)	0.0040*	(0.0022)	0.0018**	(0.0008)	0.0015*	(0.0008)	0.0075	(0.0051)
U. of Mich. Sentiment	0.0017**	(0.0008)	-0.0001	(0.0004)	0.0012	(0.0013)	0.0024***	(0.0009)	0.0017**	(0.0008)	0.0060	(0.0048)
Continuing Claims	-0.0008***	(0.0003)	-0.0006**	(0.0003)	0.0004	(0.0059)	-0.0007*	(0.0004)	-0.0010	(0.0010)	-0.0021	(0.0025)
Initial Jobless Claims	-0.0019***	(0.0005)	-0.0006	(0.0004)	-0.0016	(0.0023)	-0.0017**	(0.0007)	-0.0010	(0.0012)	-0.0093**	(0.0039)
FOMC Rate Decision (Upper Bound)	0.1146***	(0.0163)	-	-	-	-	0.1384***	(0.0001)	-	-	0.0925***	(0.0001)
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-	-	-	-	-	-	-

Notes: same as Table 3.

Table 6b. Contemporaneous and lag effects of macro news on CNH/USD. (J=1, Lag coefficients)

	2012/1/1—2022/12/31		2012/1/1—2015/8/10		2015/8/11—2016/1/3		2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
Lag 1	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news												
GDP YoY	-0.0042	(0.0036)	-0.0079**	(0.0035)	-0.0159***	(0.0041)	-0.0080**	(0.0035)	0.0223**	(0.0111)	-0.0352	(0.0259)
Industrial Production YoY	-0.0011	(0.0012)	0.0019	(0.0013)	-0.0283***	(0.0017)	-0.0005	(0.0012)	-0.0033	(0.0022)	0.0041	(0.0086)
Retail Sales YoY	-0.0017*	(0.0010)	-0.0023*	(0.0012)	-0.0782***	(0.0040)	-0.0019	(0.0013)	0.0026	(0.0024)	-0.0135	(0.0090)
Trade Balance	-0.0015	(0.0015)	-0.0007	(0.0010)	-0.0069***	(0.0013)	-0.0027	(0.0034)	0.0011	(0.0013)	-0.0037	(0.0051)
CPI YoY	-0.0008	(0.0023)	0.0004	(0.0015)	0.0180	(0.0122)	0.0004	(0.0041)	-0.0015	(0.0052)	-0.0466***	(0.0143)
Manufacturing PMI	0.0019	(0.0014)	-0.0019	(0.0013)	0.0085***	(0.0032)	0.0001	(0.0011)	0.0007	(0.0025)	0.0491***	(0.0056)
PPI YoY	0.0016	(0.0024)	-0.0027	(0.0018)	-0.0017	(0.0175)	0.0101***	(0.0037)	-0.0035	(0.0056)	0.0393*	(0.0201)
Aggregate Financing CNY	0.0004	(0.0006)	0.0006	(0.0006)	-0.0073***	(0.0016)	0.0009	(0.0011)	-0.0023	(0.0019)	0.0129***	(0.0036)
Foreign Reserves	0.0013	(0.0025)	-0.0003	(0.0024)	-0.0149***	(0.0030)	-0.0035	(0.0031)	0.0079**	(0.0032)	0.0149***	(0.0034)
Money Supply M2 YoY	0.0015*	(0.0009)	-0.0011	(0.0010)	-0.0067***	(0.0023)	0.0023	(0.0017)	0.0022	(0.0018)	0.0021	(0.0016)
New Yuan Loans CNY	-0.0007	(0.0013)	0.0012	(0.0016)	0.0051***	(0.0017)	-0.0022	(0.0019)	0.0020	(0.0027)	-0.0119**	(0.0048)
US macro news												
GDP Advance	0.0019	(0.0018)	0.0005	(0.0015)	-0.0034	(0.0057)	0.0024	(0.0028)	-0.0014	(0.0111)	0.0089***	(0.0024)
GDP Second	-0.0029**	(0.0013)	0.0003	(0.0013)	-0.0037**	(0.0018)	-0.0033*	(0.0019)	-0.0164	(0.0107)	-0.0186***	(0.0065)
GDP Third	0.0017	(0.0011)	0.0024**	(0.0010)	-0.0062***	(0.0019)	0.0003	(0.0029)	0.0041	(0.0053)	0.0195**	(0.0077)
Capacity Utilization	-0.0002	(0.0010)	0.0002	(0.0007)	-0.0015	(0.0067)	0.0013	(0.0021)	0.0036	(0.0026)	-0.0082**	(0.0037)
Change in Nonfarm Payrolls	-0.0015	(0.0014)	0.0013	(0.0012)	-0.0164	(0.0153)	-0.0009	(0.0018)	-0.0058	(0.0052)	-0.0046	(0.0114)
Industrial Production MoM	0.0000	(0.0010)	0.0001	(0.0005)	0.0045	(0.0075)	-0.0001	(0.0023)	-0.0056**	(0.0026)	0.0022	(0.0045)
ISM Manufacturing	-0.0001	(0.0009)	0.0005	(0.0007)	0.0079***	(0.0030)	-0.0010	(0.0018)	-0.0007	(0.0015)	0.0017	(0.0117)
Personal Income	-0.0012*	(0.0006)	-0.0001	(0.0012)	0.0075	(0.0048)	-0.0019**	(0.0008)	-0.0008	(0.0036)	-0.0170**	(0.0072)
Retail Sales Advance MoM	-0.0013*	(0.0007)	-0.0003	(0.0008)	-0.0486***	(0.0163)	-0.0020*	(0.0011)	0.0016	(0.0015)	-0.0272*	(0.0148)
Unemployment Rate	0.0008	(0.0014)	0.0011	(0.0008)	0.0172	(0.0182)	0.0002	(0.0027)	0.0033	(0.0032)	-0.0067	(0.0111)
Existing Home Sales	-0.0003	(0.0012)	0.0001	(0.0010)	0.0013	(0.0019)	0.0016	(0.0013)	-0.0047	(0.0046)	0.0065	(0.0043)

New Home Sales	0.0007	(0.0005)	0.0001	(0.0005)	-0.0037	(0.0044)	0.0011**	(0.0004)	-0.0007	(0.0015)	0.0031	(0.0030)
Personal Consumption	-0.0002	(0.0004)	-0.0005	(0.0005)	0.0030***	(0.0004)	-0.0014*	(0.0008)	-0.0008	(0.0011)	-0.0015	(0.0012)
Personal Spending	0.0012	(0.0012)	0.0001	(0.0007)	0.0034	(0.0031)	-0.0012	(0.0020)	0.0108	(0.0082)	0.0252	(0.0153)
Business Inventories	-0.0021	(0.0016)	-0.0015*	(0.0009)	0.0001	(0.0024)	-0.0014	(0.0052)	-0.0040	(0.0078)	-0.0175	(0.0201)
Construction Spending MoM	0.0007	(0.0006)	0.0005	(0.0004)	0.0165***	(0.0051)	-0.0002	(0.0009)	0.0035**	(0.0017)	0.0097	(0.0080)
Durable Goods Orders	-0.0014**	(0.0006)	-0.0007	(0.0006)	-0.0163***	(0.0031)	-0.0019	(0.0013)	-0.0022**	(0.0010)	0.0004	(0.0020)
Factory Orders	0.0013	(0.0014)	-0.0014	(0.0015)	-0.0188***	(0.0032)	0.0010	(0.0021)	0.0040	(0.0043)	0.0055*	(0.0030)
Wholesale Inventories MoM	-0.0000	(0.0005)	-0.0000	(0.0003)	0.0038***	(0.0008)	0.0003	(0.0006)	-0.0011	(0.0011)	-0.0007	(0.0032)
Trade Balance	-0.0007	(0.0007)	0.0002	(0.0004)	0.0078***	(0.0028)	-0.0039	(0.0025)	-0.0066	(0.0047)	-0.0169	(0.0128)
CPI MoM	0.0034	(0.0026)	0.0001	(0.0009)	-0.0155***	(0.0007)	0.0052**	(0.0024)	-0.0063***	(0.0021)	0.0308**	(0.0135)
MNI Chicago PMI	0.0002	(0.0005)	0.0004	(0.0006)	-0.0006	(0.0009)	0.0007	(0.0009)	-0.0016*	(0.0009)	0.0017	(0.0017)
PCE Core Deflator MoM	-0.0008	(0.0009)	-0.0008*	(0.0005)	-0.0087*	(0.0047)	0.0000	(0.0015)	-0.0024	(0.0032)	-0.0244**	(0.0117)
PPI Final Demand MoM	0.0007	(0.0008)	0.0001	(0.0006)	0.0104**	(0.0043)	0.0006	(0.0010)	-0.0010	(0.0015)	0.0089***	(0.0024)
Consumer Confidence	0.0003	(0.0003)	0.0003*	(0.0002)	0.0006	(0.0008)	-0.0000	(0.0006)	0.0005	(0.0009)	0.0020	(0.0040)
Housing Starts	0.0006*	(0.0003)	0.0004	(0.0002)	-0.0006	(0.0013)	0.0010	(0.0006)	-0.0000	(0.0009)	0.0017	(0.0036)
Leading Index	-0.0009	(0.0011)	-0.0007	(0.0010)	0.0017	(0.0015)	-0.0029	(0.0023)	0.0000	(0.0043)	0.0033	(0.0056)
Phi Fed Business Outlook	0.0006	(0.0005)	0.0003	(0.0007)	-0.0020	(0.0020)	0.0008	(0.0006)	0.0002	(0.0014)	0.0019	(0.0052)
U. of Mich. Sentiment	-0.0001	(0.0010)	0.0006	(0.0005)	-0.0014	(0.0026)	0.0013	(0.0008)	0.0013	(0.0013)	-0.0068	(0.0052)
Continuing Claims	0.0002	(0.0002)	0.0000	(0.0003)	0.0035*	(0.0018)	-0.0002	(0.0003)	0.0024***	(0.0009)	-0.0012	(0.0013)
Initial Jobless Claims	-0.0006	(0.0004)	-0.0011***	(0.0004)	-0.0001	(0.0013)	0.0010	(0.0009)	-0.0017*	(0.0010)	-0.0041	(0.0027)
FOMC Rate Decision (Upper Bound)	-0.0241	(0.0174)	-	-	-	-	-0.0504***	(0.0007)	-	-	-0.0019***	(0.0007)
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-	-	-	-	-	-	-
Observations	827,101		271,100		30,033		314,654		151,629		59,682	
R-squared	0.0046		0.0241		0.0123		0.0047		0.0044		0.0266	
Adj. R-squared	0.0045		0.0238		0.0091		0.0044		0.0038		0.0252	

Notes: same as Table 3.

Table 6c. Contemporaneous and lag effects of macro news on CNY/USD. (J=1, Contemporaneous coefficients)

Contemporaneous	2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP YoY	0.0048	(0.0033)	-0.0306***	(0.0054)	-0.0554	(0.0541)
Industrial Production YoY	-0.0027***	(0.0009)	-0.0001	(0.0015)	0.0496**	(0.0216)
Retail Sales YoY	-0.0019*	(0.0011)	-0.0046***	(0.0013)	-0.0489***	(0.0172)
Trade Balance	0.0024	(0.0039)	-0.0050***	(0.0013)	-0.0086***	(0.0024)
CPI YoY	0.0011	(0.0100)	-0.0045	(0.0094)	0.0046	(0.0513)
Manufacturing PMI	-	-	0.0141***	(0.0001)	-0.0282	(0.0491)
PPI YoY	0.0102	(0.0127)	0.0116	(0.0108)	-0.0107	(0.0690)
Aggregate Financing CNY	-0.0023**	(0.0011)	-0.0037	(0.0026)	-0.0016	(0.0034)
Foreign Reserves	-0.0033	(0.0068)	0.0053	(0.0041)	-0.0016	(0.0011)
Money Supply M2 YoY	-0.0009	(0.0016)	-0.0013	(0.0016)	0.0006	(0.0014)
New Yuan Loans CNY	0.0003	(0.0023)	0.0023	(0.0032)	-0.0046	(0.0032)
US macro news						
GDP Advance	0.0037**	(0.0016)	0.0054***	(0.0019)	0.0153***	(0.0033)
GDP Second	0.0013	(0.0010)	0.0083*	(0.0049)	0.0031	(0.0020)
GDP Third	0.0039**	(0.0016)	-0.0010	(0.0020)	-0.0139	(0.0119)
Capacity Utilization	0.0007	(0.0012)	0.0004	(0.0008)	0.0002	(0.0011)
Change in Nonfarm Payrolls	0.0077***	(0.0027)	0.0156***	(0.0051)	0.0274	(0.0216)
Industrial Production MoM	0.0003	(0.0016)	-0.0001	(0.0009)	0.0025	(0.0020)
ISM Manufacturing	0.0053***	(0.0015)	0.0003	(0.0014)	0.0034	(0.0054)
Personal Income	0.0008	(0.0006)	-0.0014	(0.0022)	-0.0056	(0.0053)
Retail Sales Advance MoM	0.0039***	(0.0014)	0.0003	(0.0005)	0.0078	(0.0064)
Unemployment Rate	-0.0021	(0.0038)	-0.0025	(0.0022)	-0.0085	(0.0087)
Existing Home Sales	0.0046	(0.0033)	-0.0007	(0.0012)	0.0078	(0.0094)
New Home Sales	0.0002	(0.0002)	-0.0004	(0.0004)	0.0034***	(0.0013)

Personal Consumption	0.0003	(0.0009)	0.0001	(0.0003)	0.0024	(0.0018)
Personal Spending	0.0021	(0.0015)	0.0045	(0.0076)	0.0085	(0.0095)
Business Inventories	0.0058*	(0.0031)	0.0037	(0.0064)	-0.0108***	(0.0042)
Construction Spending MoM	0.0003	(0.0005)	0.0006	(0.0013)	0.0002	(0.0040)
Durable Goods Orders	0.0025***	(0.0007)	0.0002	(0.0014)	0.0052**	(0.0027)
Factory Orders	0.0007	(0.0016)	0.0070***	(0.0021)	0.0066***	(0.0020)
Wholesale Inventories MoM	0.0001	(0.0005)	-0.0004	(0.0006)	-0.0007	(0.0014)
Trade Balance	-0.0029	(0.0028)	-0.0004	(0.0035)	0.0019	(0.0032)
CPI MoM	0.0067***	(0.0025)	0.0098***	(0.0025)	0.0945***	(0.0297)
MNI Chicago PMI	0.0011*	(0.0006)	0.0011	(0.0011)	0.0007	(0.0007)
PCE Core Deflator MoM	0.0017**	(0.0008)	-0.0027	(0.0033)	0.0152	(0.0096)
PPI Final Demand MoM	0.0038**	(0.0016)	-0.0021	(0.0017)	0.0052	(0.0053)
Consumer Confidence	0.0006	(0.0004)	0.0003	(0.0008)	0.0099	(0.0084)
Housing Starts	0.0003	(0.0002)	0.0000	(0.0005)	0.0000	(0.0018)
Leading Index	0.0017	(0.0013)	-0.0004	(0.0009)	0.0031	(0.0048)
Phi Fed Business Outlook	0.0007***	(0.0002)	0.0005	(0.0005)	0.0031	(0.0025)
U. of Mich. Sentiment	0.0014**	(0.0007)	0.0008	(0.0006)	0.0038	(0.0024)
Continuing Claims	0.0003*	(0.0002)	-0.0002	(0.0005)	-0.0005	(0.0008)
Initial Jobless Claims	-0.0005	(0.0004)	-0.0011*	(0.0006)	-0.0041*	(0.0022)
FOMC Rate Decision (Upper Bound)	-0.0000	(0.0005)	-	-	-	-
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-

Notes: same as Table 3.

Table 6d. Contemporaneous and lag effects of macro news on CNY/USD. (J=1 Lag coefficients)

Lag 1	2016/1/4—2020/3/10		2020/3/11—2022/3/17 3：00		2022/3/17 3：00—2022/12/31	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP YoY	0.0033	(0.0044)	0.0205**	(0.0100)	-0.0102	(0.0196)
Industrial Production YoY	-0.0014	(0.0010)	-0.0038*	(0.0020)	-0.0053	(0.0075)
Retail Sales YoY	-0.0016	(0.0014)	0.0025	(0.0021)	-0.0001	(0.0063)
Trade Balance	-0.0028	(0.0034)	0.0015**	(0.0007)	0.0010	(0.0037)
CPI YoY	0.0034	(0.0041)	0.0013	(0.0051)	-0.0326***	(0.0083)
Manufacturing PMI	-	-	-0.0032***	(0.0001)	0.0471***	(0.0111)
PPI YoY	0.0049	(0.0039)	-0.0037	(0.0052)	0.0376**	(0.0170)
Aggregate Financing CNY	-0.0004	(0.0009)	-0.0026	(0.0018)	0.0011	(0.0027)
Foreign Reserves	-0.0034	(0.0032)	0.0038	(0.0030)	0.0078	(0.0058)
Money Supply M2 YoY	-0.0001	(0.0015)	0.0024	(0.0021)	0.0010	(0.0008)
New Yuan Loans CNY	0.0001	(0.0015)	0.0011	(0.0028)	-0.0017	(0.0024)
US macro news						
GDP Advance	0.0019	(0.0013)	-0.0015	(0.0027)	0.0036	(0.0023)
GDP Second	0.0006	(0.0010)	-0.0040	(0.0058)	0.0042*	(0.0025)
GDP Third	0.0036***	(0.0013)	0.0004	(0.0011)	-0.0335*	(0.0186)
Capacity Utilization	-0.0026*	(0.0014)	-0.0015	(0.0012)	0.0023	(0.0038)
Change in Nonfarm Payrolls	0.0039***	(0.0015)	0.0004	(0.0036)	-0.0062	(0.0108)
Industrial Production MoM	0.0042***	(0.0016)	0.0018	(0.0013)	0.0011	(0.0053)
ISM Manufacturing	0.0016***	(0.0006)	0.0001	(0.0002)	0.0088	(0.0062)
Personal Income	0.0001	(0.0007)	0.0039	(0.0028)	0.0051	(0.0043)
Retail Sales Advance MoM	0.0022	(0.0014)	0.0015	(0.0012)	0.0135	(0.0091)
Unemployment Rate	0.0013	(0.0019)	0.0002	(0.0019)	-0.0187	(0.0183)
Existing Home Sales	-0.0001	(0.0009)	0.0016**	(0.0006)	0.0006	(0.0018)
New Home Sales	0.0001	(0.0003)	0.0005	(0.0011)	0.0010	(0.0023)

Personal Consumption	-0.0013*	(0.0008)	-0.0001	(0.0002)	0.0044**	(0.0021)
Personal Spending	0.0023*	(0.0012)	0.0017	(0.0024)	0.0015	(0.0056)
Business Inventories	0.0021	(0.0021)	-0.0050	(0.0070)	-0.0142	(0.0130)
Construction Spending MoM	0.0007	(0.0006)	0.0005	(0.0007)	-0.0028	(0.0043)
Durable Goods Orders	0.0021**	(0.0010)	-0.0012	(0.0016)	-0.0037	(0.0028)
Factory Orders	0.0028	(0.0021)	0.0020	(0.0021)	0.0014	(0.0016)
Wholesale Inventories MoM	-0.0004	(0.0005)	0.0009	(0.0007)	0.0032***	(0.0010)
Trade Balance	-0.0083*	(0.0045)	0.0040	(0.0047)	-0.0058	(0.0051)
CPI MoM	0.0080***	(0.0027)	-0.0021***	(0.0007)	0.0150	(0.0114)
MNI Chicago PMI	0.0006	(0.0009)	-0.0008	(0.0008)	-0.0014***	(0.0004)
PCE Core Deflator MoM	0.0004	(0.0005)	-0.0028	(0.0019)	-0.0087*	(0.0052)
PPI Final Demand MoM	0.0025**	(0.0010)	-0.0014	(0.0010)	0.0046	(0.0057)
Consumer Confidence	0.0001	(0.0003)	-0.0008	(0.0006)	-0.0018	(0.0026)
Housing Starts	0.0012**	(0.0005)	-0.0001	(0.0007)	0.0002	(0.0012)
Leading Index	-0.0005	(0.0011)	0.0008	(0.0017)	0.0000	(0.0014)
Phi Fed Business Outlook	0.0008*	(0.0005)	-0.0007	(0.0010)	0.0008	(0.0022)
U. of Mich. Sentiment	0.0015***	(0.0006)	0.0010**	(0.0004)	-0.0018	(0.0015)
Continuing Claims	-0.0004*	(0.0002)	0.0001	(0.0005)	-0.0004	(0.0007)
Initial Jobless Claims	-0.0001	(0.0004)	-0.0000	(0.0005)	-0.0025	(0.0019)
FOMC Rate Decision (Upper Bound)	0.0006*	(0.0003)	-	-	-	-
FOMC Rate Decision (Lower Bound)	-	-	-	-	-	-
Observations	170,856		82,320		32,760	
R-squared	0.064		0.0083		0.0354	
Adj. R-squared	0.0631		0.0073		0.0328	

Notes: same as Table 3.