High Frequency Offshore RMB Exchange Rate, Macroeconomic Surprises, and Global Financial Conditions

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Abstract

Using five-minute intraday offshore renminbi (CNH) exchange-rate data, we examine how global financial conditions shape currency responses to macroeconomic news surprises. CNH responds significantly to surprises from both China and the United States. These responses are substantially stronger under contractionary global conditions than during expansions, with amplification especially pronounced for U.S. announcements. Liquidity provides a mechanism: tighter global conditions reduce CNH market liquidity, thereby magnifying exchange-rate reactions to news. The results are robust to alternative specifications, controls, and measures of global conditions. The findings highlight the importance of global financial conditions and market liquidity for high-frequency exchange-rate price discovery.

Key words: Global financial condition; Macroeconomic news announcement; CNH exchange rate; market liquidity
JEL Classifications: F31, G15

1. Introduction

Researchers have used data of different sampling frequencies and different techniques to evaluate the effects of macroeconomic news announcements on foreign exchange rates. These results illuminate the link between macroeconomic variables and exchange rate dynamics.[1] A general finding is that announcements of macroeconomic news significantly impact exchange rates, and that the effects depend on market perceptions of policy responses and on institutional settings. Exchange rates also tend to respond more strongly to the US than to the non-US macroeconomic news, and they often react asymmetrically to the positive and negative surprise elements of announcements.[2]

In this paper, we study the effects of macroeconomic news announcements on the Chinese renminbi (RMB). Specifically, we examine the impacts of 11 Chinese and 32 US scheduled macroeconomic announcements[3] on 5-minute offshore US dollar to RMB exchange rates from 2012 to 2022. Compared with the onshore rate, the offshore US dollar to RMB exchange rate (CNH) is more responsive to market forces and therefore offers a valuable market-based gauge of announcement effects.[4] Because most existing research focuses on developed economy exchange rates, evidence on CNH – the exchange rate of a major developing economy – adds useful microstructure insights into developing economy exchange rate dynamics via the interaction between exchange rates and macroeconomic news announcements.

We also investigate the role of global financial conditions to enrich our understanding of announcement effects. Following Miranda- Agrippino and Rey (2020), we use the US monetary policy stance as a proxy for global financial conditions and infer how expansionary and contractionary phases of the global financial cycle affect exchange rate responses to macroeconomic news.[5] We further assess how CNH market liquidity mediates the influence of

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1 Andersen and Bollerslev (1998) point out high frequency data patterns reveals market mechanism or institutions.

2 See, for example, Andersen, *et al*. (2003, 2007), Cheung, *et al*. (2019), Clarida and Waldman (2008), Evans and Lyons (2005, 2008), and Stavrakeva and Tang (2024).

3 Surprise components of these announcements are used in the empirical exercise.

4 Compared with the onshore rate, the offshore CNH is less constrained by the daily central parity setting and, thus, better reflects global liquidity and risk appetite responses to macroeconomic news.

5 See Cheung, *et al*. (2019), Fatum, *et al*. (2012), and Faust, *et al.* (2007) for related comparison exercises. Stavrakeva and

global financial conditions on those responses. The results on global financial conditions and the liquidity channel shed light on the complex interplay between macroeconomic news and CNH dynamics.

Our exercise incorporates a few stylized results on exchange rate reactions to announcements of macroeconomic news. The empirical framework builds on the canonical regression framework of Andersen, *et al.* (2003) and several extensions. Several specifications are adopted to consider alternative classifications of expansionary and contractionary phases based on different measures of global financial conditions, compare results using the onshore US dollar to RMB rate instead of CNH, examine the implications of the August 2015 exchange-rate policy reform, analyze asymmetric responses to positive and negative macroeconomic surprises, and report results from a sample consisting of 100-minute windows surrounding individual announcements.

To reiterate, we use the CNH — a major developing economy exchange rate — to assess several macroeconomic announcement effects documented in the literature. In addition, we investigate the implications of global financial conditions and the mediating role of market liquidity, which are scantly examined. Specifically, we analyze CNH responses to both the Chinese and US macroeconomic announcements under expansionary and contractionary global financial conditions, and evaluate CNH market liquidity as a mediating channel.

To anticipate results, we find that the CNH responds significantly to both key Chinese and US macroeconomic news. Announcement effects vary across expansionary and contractionary phases of global financial cycles and are generally more pronounced in the latter phase. In the contraction phase, CNH reactions to the news originated from the US are stronger than news from China. CNH market liquidity significantly mediates part of the effect of global financial contraction on CNH responses to announcements of macroeconomic news. These findings are robust to a range of alternative specifications and controls. The evidence on the effect of global

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Tang (2024), Lilley, *et al*. (2022) and Davis and Zlate (2024) study macro interactions between global financial conditions and exchange rates using low frequency data or data from developed economies.

financial conditions and the mediating role of market liquidity underscores a complex interplay between CNH dynamics and macroeconomic fundamentals with implications for modeling, risk management, and policy analysis.

The rest of the paper is organized as follows. Section 2 describes the data and econometric methodology. Section 3 presents CNH responses to Chinese and US macroeconomic news announcements and the effects of global financial conditions. Section 4 assesses the role of CNH market liquidity in mediating the effects of global financial conditions. Section 5 provides sensitivity analyses. Section 6 concludes.

2. Data and Empirical Specification

2.1 Data

We use three datasets: high frequency CNH exchange rates, time-stamped announcements of Chinese and US macroeconomic news, and survey-based market expectations for those announcements. The CNH exchange rates, obtained from Bloomberg, are the traded prices at the end of every five-minute interval from 1 January 2012 through 31 December 2022. An increase in the CNH rate corresponds to an appreciation of the US dollar. Exchange rate returns are computed as log returns from consecutive five-minute rates. Appendix A reports descriptive statistics of CNH returns.

The data on scheduled, time-stamped announcements of 11 Chinese and 32 US macroeconomic news items and their corresponding survey expectations are obtained from the Bloomberg Economic Calendar. The US macroeconomic news are widely studied for their announcement effects, and they cover indicators of economic activities, trade, investment, prices, and forward-looking measures. By contrast, China does not publish comprehensive labor-market series analogous to US nonfarm payrolls and unemployment, nor the weekly initial and continuing jobless claims that the Federal Reserve closely monitors. Appendix B presents the release times and frequencies for all 43 items.

We measure the surprise associated with the announcement of kth macroeconomic variable at time t using the $S_{k,t}$ variable given by

$$S_{k,t} = (A_{k,t} - E_{k,t}) / \widehat{\sigma}_k \,, \;\; \widehat{\sigma}_k = \sqrt{var(A_{k,t} - E_{k,t})}, \tag{1}$$

where $A_{k,t}$ is the announcement value of the kth macroeconomic news, $E_{k,t}$ is the preceding survey expectation of that announcement, $\widehat{\sigma}_k$ is the standard error of the series $\{A_{k,t} - E_{k,t}\}$, the unexpected component $(A_{k,t} - E_{k,t})$ is normalized by $\widehat{\sigma}_k$ to make surprises comparable across announcements of different macroeconomic variables. Henceforth, we refer to $S_{k,t}$ as the macroeconomic surprise, or the macroeconomic news announcement for convenience.

We follow Miranda- Agrippino and Rey (2020) and use the US monetary policy stance to classify the sample into global financial expansion and contraction subsamples. The expansion subsample comprises periods when the Federal Reserve maintained a Zero Interest Rate Policy (ZIRP). For this study, the expansion subsample covers the periods from January 1, 2012 to December 16, 2015 and from March 16, 2020 to March 17, 2022. The contraction subsample comprises periods when the federal funds rate exceeded zero; it includes observations from December 17, 2015 to March 15, 2020 and from March 17, 2022 to December 31, 2022. The two subsamples are of similar magnitude: the expansion subsample contains 448,344 five- minute observations and the contraction subsample 378,754 observations. Alternative classifications based on other proxies for global financial conditions are examined in Section 5.

2.2 Econometric Specification

We follow Andersen, *et al*. (2003) and estimate the reaction of five- minute CNH returns to Chinese and US macroeconomic surprises. The baseline regression is

$$r_t = \alpha_0 + \sum_{i=1}^{I} \alpha_i r_{t-i} + \sum_{k=1}^{K} \beta_k S_{k,t} + \varepsilon_t, \tag{2}$$

where r_t denotes the five- minute return of the CNH exchange rate, $S_{k,t}$ is the macroeconomic surprise of the kth macroeconomic news item,[6] and ε_t is the random error term. Because $S_{k,t}$ is

[6] We focus on the contemporaneous effect of macroeconomic surprises in the following sections. The reported results are robust to the presence of lagged macroeconomic surprises. These results are available from the authors and the online Appendix.

standardized by its standard error, β_k measures the change in r_t associated with a one-standard-error surprise in type k macroeconomic news. Equation (2) is estimated by OLS with Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors. The lag parameter *I* is determined by the Schwarz Information Criterion. The total number of news types is $K = 43$. Differential CNH responses to positive and negative macroeconomic surprises are analyzed in Section 5.

3. Empirical Results

The CNH responses to Chinese and US macroeconomic surprises estimated from Equation (2) are reported in Table 1. Results for the full sample appear in Column [1], and results for the expansion and contraction subsamples appear in Columns [2] and [3], respectively.

3.1 Full Sample Results

In the full sample (Column [1]), six of the 11 Chinese macroeconomic surprises are statistically significant at conventional levels. Five of these significant items relate to economic activity: GDP**,** industrial production index **(**IPI**),** retail sales**,** trade balance, and PMI. Their estimated coefficients range from −0.0134 to −0.0098. The remaining significant Chinese variable is the CPI surprise, with an estimated coefficient of −0.0043, smaller in magnitude than the other five.

Among the 32 types of US macroeconomic surprises, 15 are statistically significant. These significant US news types cover both contemporaneous and forward-looking indicators, consistent with standard exchange-rate models and prior findings on US news effects (Evans and Lyons 2008; Fatum, *et al*. 2012).

The US GDP Advance (the preliminary quarterly GDP release) has a particularly large and significant effect on CNH. It produces the largest coefficient among economic activity related surprises, exceeding the effects of revised GDP releases (GDP Second, GDP Third), PMI, personal income, new home sales, and durable goods orders.

The surprise components of US CPI and PPI news announcements have significantly positive effects on CNH returns; the CPI surprise coefficient estimate exceeds that of GDP Advance. This pattern suggests that inflation surprises are associated with US dollar appreciation, consistent with market expectations of policy responses to inflationary pressure (Clarida and Waldman, 2008).

CNH also responds to forward-looking sentiment indicators. The Conference Board Consumer Confidence index (Consumer Confidence), the University of Michigan Consumer Sentiment index (MCSI), and the Philadelphia Fed Business Outlook Survey (Philly Fed Index) track the consumer and business attitudes and sentiments about future economic health. Positive surprises to these forward-looking sentiment indicators are associated with positive CNH returns; that is, US dollar appreciation.

The CNH responds to macroeconomic surprises from both China and the US. Because the two sets of news items differ in size and composition, caution is warranted when comparing their relative impacts. Bearing this in mind, we summarize key observations below.

First, 15 of the 32 US macroeconomic surprises are statistically significant, compared with six of the 11 Chinese macroeconomic surprises. Second, the CNH reacts more strongly to the US GDP Advance surprise (coefficient estimate 0.0188) than to the Chinese GDP surprise (−0.0143), and more strongly to the US CPI surprise (0.0499) than to the Chinese CPI surprise (−0.0043). Third, three US macroeconomic surprise variables have coefficients with magnitude greater than 0.0143 (the largest absolute significant Chinese coefficient), while four US macroeconomic surprise variables have coefficients with magnitude smaller than 0.0043 (the smallest absolute significant Chinese coefficient). Fourth, CNH reacts significantly to 55% (= 6/11) of the Chinese news items and 47% (= 15/32) of the US news items. Further, the average magnitude of the coefficient estimates of significant Chinese surprises is 0.010, and of the significant US surprises is 0.011.

These observations indicate that US macroeconomic news generally exerts a stronger influence on CNH—consistent with findings for exchange rates of developed economies—while CNH still exhibits economically meaningful responses to Chinese news. Caution is warranted when comparing impacts across the two sets because the US news set is larger and more diverse.

3.2 Responses Across the Expansion and Contraction Phases

Columns [2] and [3] of Table 1 show that CNH responses to Chinese and US macroeconomic surprises vary markedly between the global financial expansion and contraction subsamples.[7] Relying solely on full-sample estimates can obscure these differential effects and mis-interpret the interaction of CNH dynamics and macroeconomic variables.

For Chinese macroeconomic surprises, five items are significant in each subsample. GDP, retail sales, and PMI are significant in both subsamples, with larger magnitudes in the contraction subsample. For example, the PMI coefficient estimate moves from −0.0057 (expansion) to −0.0393 (contraction), a roughly seven-fold increase in magnitude. The average magnitude of coefficient estimates of the three common significant Chinese macroeconomic surprises are 0.0076 (expansion) and 0.0305 (contraction); the average magnitudes of the five significant Chinese macroeconomic surprises are 0.0084 (expansion) and 0.0238 (contraction). These figures indicate that the effects of Chinese surprises can increase substantially — by up to about fourfold — in the contraction subsample.

US macroeconomic surprises show an even larger change across subsamples. There are 8 significant US surprises in the expansion subsample and 19 in the contraction subsample. Only five US news items are significant in both subsamples: GDP Advance**,** PMI**,** CPI**,** PCE core deflator, and consumer confidence. The average magnitude of the coefficient estimates of these five common news items is 0.0067 in the expansion subsample and 0.0378 in the contraction subsample — more than a fivefold increase. Across all significant US macroeconomic surprises, the average magnitude of their coefficient estimates is 0.0055 in expansion (eight items) and

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[7] The classification of the expansion and contraction subsamples are given in Section 2.1.

0.0631 in contraction (19 items), an increase of over tenfold. These comparisons indicate a substantially stronger CNH reaction to US macroeconomic surprises in the contraction subsample. Both the size and composition of the set of significant US macroeconomic surprises change markedly from the expansion subsample to the contraction subsample, and the estimated impacts of significant US news increase substantially in the latter subsample.

In sum, CNH responds to both Chinese and US macroeconomic surprises. The response intensity is markedly greater in the contraction subsample, with the amplification larger for US macroeconomic surprises than for Chinese macroeconomic surprises.

4. Mediating Through CNH Market Liquidity

In this section, we investigate the role of CNH market liquidity in mediating the effects of macroeconomic surprises on CNH in the global financial expansion and contraction subsamples. Market liquidity matters because the price discovery function of foreign exchange market liquidity affects how trades move prices (Ranaldo and de Magistris, 2022), and trades have a greater price impact in less liquid markets (Evans and Lyons, 2002). Consequently, currency market illiquidity can produce excess temporary volatility and transitory pricing inefficiencies (Campbell, *et al*., 1993; Mancini, *et al*., 2013), which amplify responses to news. In short, CNH market illiquidity can exaggerate CNH's reactions to macroeconomic surprises.

Rey (2015) documents that US dollar liquidity falls during global financial contractions, and this reduction propagates liquidity curtailment across the global foreign- exchange market (Karnaukh, *et al*., 2015). Using the US Fed funds rate as a proxy for global financial conditions and deviations from the average bid-ask spread as a proxy for CNH market liquidity, Figure 1 offers anecdotal evidence of the relationship between these proxies. The figure shows that CNH liquidity tends to be negatively associated with the federal funds rate: higher rates, which indicate tighter global financial conditions, coincide with lower CNH liquidity. If market liquidity diminishes in periods of global financial contraction, CNH is likely to be more responsive to macroeconomic surprises in those periods.

To evaluate whether CNH market liquidity mediates the effect of global financial conditions, we first estimate the monthly regression

$$CNH_liq_t = \alpha + \beta_1 * GFC_t + \gamma_1 * X_t + \epsilon_t, \quad (3)$$

where CNH_liq_t is the monthly average of daily bid–ask spreads in month t (Mancini, et al., 2013);[8] lower values indicate higher liquidity. The expansion and contraction subsamples defined in Section 2 are used to construct the monthly GFC_t indicator, with GFC_t = 0 for expansion observations and GFC_t =1 for contraction observations. As an alternative proxy for global financial conditions, we also use the monthly average federal funds rate. The vector of control variables, denoted as X_t, includes the US and China economic policy uncertainty indices (International Monetary Fund, 2025; Serdengeçti, *et al*., 2021) and an indicator I(t>2015-08-11) that captures the effect of China's exchange rate reform introduced on 11 August 2015.

Equation (3) is used to generate two components of CNH market liquidity: the residual component, $liq\ \widehat{residual}_t$, which is the estimated residual from (3) and captures liquidity variation not explained by global financial conditions and the selected control variables, and b) $\widehat{liq\ GFC}_t$ (= $\widehat{\beta}_1 * GFC_t$) – the component of CNH market liquidity explained by GFC_t.

The mediating role of CNH market liquidity is assessed with the regression

$$macro\ news\ spread_t = \alpha + \beta_2 * liq\ \widehat{residual}_t + \beta_3 * \widehat{liq\ GFC}_t + \gamma_2 * X_t + \epsilon_t, \quad (4)$$

where $macro\ news\ spread_t$ is a proxy for the portion of CNH movements net of the direct effect of global financial conditions at time t. The coefficient β_2 measures the liquidity effect via the component of liquidity not related to global financial conditions and the control variables, while β_3 measures the effect via the component explained byGFC_t. The $\widehat{\beta}_3 * \widehat{\beta}_1$ therefore represents the portion of GFC_t effect that is channeled through liquidity.

The $macro\ news\ spread_t$ variable is constructed in two steps. First, for each macroeconomic news announcement in month t, we form a 100-minute event window (10 minutes before and 90 minutes after the announcement)[9] and compute the average CNH return

[8] The bid-ask spread is given by (ask price – bid price)/[(ask price + bid price)/2].

[9] See, for example, Andersen, *et al.* (2007) for the 100-minute window setup.

using 5-minute intraday observations within that window; this average captures the announcement effect. We calculate the average CNH return using observations in each individual event window. Second, for the same month we exclude all 5-minute observations used in the first step and compute the average return from the remaining intraday observations; this average excludes announcement effects. The $macro\ news\ spread_t$ variable is the absolute difference between the two monthly averages.

We assume global financial conditions affect CNH movements directly and indirectly through mediating variables such as CNH market liquidity. The direct effect of global financial conditions on CNH returns is present in periods with and without macroeconomic news announcements. By construction, $macro\ news\ spread_t$ removes the direct effect of global financial conditions while preserving the incremental effect associated with macroeconomic news announcements.

Meanwhile, the regressor $liq\ \widehat{GFC}_t$ contains the component of liquidity explained by global financial conditions; its coefficient therefore captures the portion of the global financial condition effect that is transmitted through CNH market liquidity. A statistically significant $liq\ \widehat{GFC}_t$ coefficient estimate indicates that CNH market liquidity plays a mediating role in channeling global financial condition effects to CNH dynamics.

Table 2 presents the estimation results of equations (3) and (4) under columns labeled (3) and (4), respectively. Under the "GFC" heading, the results are based on the dummy variable GFC_t constructed from the expansion and contraction subsamples defined in Section 2. Relative to the expansion subsample, the contraction subsample is associated with a 36.1% decline in CNH market liquidity; that is, an 0.361 increase in the variable CNH_liq_t (column (3)). The positive coefficient estimate of the 2015 exchange rate reform variable likely reflects the elevated CNH volatility observed after the reform.10

[10] Appendix A shows that, compared with the pre-reform period, the CNH return volatility is more than double after reform.

Because the exchange rate reform variable is significant under (3), we augment equation (4) with the regressor $liq\ \widehat{FXR}_t$, the component of liquidity explained by the reform. The statistical significance of $liq\ \widehat{residual}_t$, $\widehat{liq\ GFC}_t$ and $liq\ \widehat{FXR}_t$ (column (4)) demonstrates that CNH market liquidity affects $macro\ news\ spread_t$ through multiple channels.

The positive and significant coefficient estimate of $\widehat{liq\ GFC}_t$ – the liquidity component explained by global financial conditions – implies that global financial contractions can indirectly amplify the reaction of CNH returns to macroeconomic surprises. The coefficient estimate of $liq\ \widehat{FXR}_t$ – the liquidity component explained by the reform – indicates that the 2015 exchange rate policy reform can indirectly influence the responses of CNH to macroeconomic surprises via the market liquidity channel.[11] The significance of $liq\ \widehat{residual}_t$ further supports the role of CNH market liquidity even when global financial factors and the reform are absent.

Note that the effects of $\widehat{liq\ GFC}_t$ and $liq\ \widehat{FXR}_t$ differ: the former is driven by global market forces, while the latter is primarily by China's domestic policy.

The US economic policy uncertainty index, but not the Chinese index, has a statistically significant influence on $macro\ news\ spread_t$. This result highlights the relative importance of US conditions for CNH dynamics.

The results using the federal funds rate as the proxy for global financial conditions are reported under the "Fed funds rate" column in Table 2. Coefficient estimates of equation (3) are qualitatively similar to those reported under the "GFC" heading. For example, CNH market liquidity is positively and significantly associated with the federal funds rate (column (3)), implying that CNH market liquidity tends to decline when policy is contractionary (high federal funds rates).[12] The 2015 exchange-rate-reform indicator is also positive and significant.

Coefficient estimates of equation (4) again support the mediating role of CNH market liquidity: the three liquidity-related regressors ($liq\ \widehat{residual}_t$, $\widehat{liq\ GFC}_t$ and $liq\ \widehat{FXR}_t$) are all

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[11] Section 5 reports the implications of the reform for the CNH's responses to macroeconomic surprises.

[12] Karnaukh, *et al*., (2015) report a comparable result. They show that the average cost of executing a FX trade increases with a rise in VIX and TED spread, which can be considered as the proxies for global financial conditions.

positive and statistically significant (column (4)). Using the federal funds rate as an alternative proxy for global financial conditions does not eliminate the evidence that global financial conditions and the 2015 reform affect CNH responses to macroeconomic surprises via the liquidity channel. The US economic policy uncertainty index remains statistically significant, underscoring the relative importance of US conditions for CNH dynamics. The magnitudes of these coefficient estimates are comparable to those reported in column (4) under the "GFC" column.

In sum, Table 2 shows that part of the effect of global financial conditions is transmitted through the CNH market liquidity channel. During periods of global financial contraction, CNH liquidity falls and this liquidity reduction amplifies reactions of CNH to macroeconomic news announcements. Conversely, reactions of global financial expansion tend to enhance CNH liquidity and dampen CNH's responses to macroeconomic surprises. The evidence also indicates that US economic policy uncertainty, but not the Chinese one, plays a significant role in influencing CNH dynamics as measured by $macro\ news\ spread_t$.

5. Additional Analyses

This section evaluates the robustness of our main findings. We examine: a) alternative classifications of expansionary and contractionary subsamples based on different measures of global financial conditions; b) the use of the onshore US dollar to RMB exchange rate (CNY) in place of the offshore CNH; c) the implications of the August 2015 exchange-rate policy reform; d) asymmetric responses to positive versus negative macroeconomic surprises; and e) results obtained using a sample comprising 100-minute windows around individual macroeconomic announcements. The rest of the section examines each of these robustness checks in sequence, highlighting how they reinforce the relevance of the baseline results.

5.1 Alternative Measures of Global Financial Conditions

In Section 2.1, the US Federal funds rate is employed to construct the baseline classification of expansion and contraction subsamples. To test the sensitivity of our results, we consider

several alternative schemes to reclassify global financial conditions and re-estimate equation (2) under each scheme.

We consider four alternative measures: the US treasury premium (Du, *et al*., 2018), a global financial return factor (Miranda-Agrippino and Rey, 2020), financial intermediary returns (He, *et al*., 2017), and the S&P 500 return[13]. For the treasury-premium measure[14] we label periods with a positive premium as expansionary and those with a negative premium as contractionary. For the other three measures we classify periods above the sample mean as expansionary and those below the mean as contractionary.

Appendix C reports the re-estimation of equation (2) for each classification, and Table 3 summarizes the key differences in CNH reactions to Chinese and US macroeconomic surprises across the four schemes. These differences are related to the general results between the contraction and expansion subsamples, and across the Chinese and US announcements.

The "#Significant News" column in Table 3 shows the difference in the counts of macroeconomic surprises that produce statistically significant CNH responses between contraction and expansion subsamples. Except when using the treasury-premium as a proxy for global financial conditions, the contraction subsample yields more significant macroeconomic surprises than the expansion subsample.[15] The increase in the number of significant US macroeconomic surprises is quite noticeable when the financial intermediary returns or the S&P 500 return approaches is used to classify global financial conditions.

The "Average Response" column reports the differences in average magnitudes of the coefficient estimates of statistically significant macroeconomic surprises between the contraction and expansion subsamples. The average magnitude in this and following subsections is based on

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[13] Due to data limitations, we do not consider the credit spread approach (Gilchrist and Zakrajšek, 2012). Because of the strong negative correlation between the VIX and the S&P 500 index, we do not include the VIX in our study.

[14] It is the average one-year CIP deviation between 10 developed country government bonds and the US treasuries (Du, *et al*., 2018). The 10 developed countries are Australia, Canada, Denmark, Germany, Norway, Sweden, Switzerland, Japan, New Zealand, and United Kingdom.

[15] The discrepancy for the treasury-premium classification likely reflects its different sign interpretation and the resulting sample split, which alters event composition.

the absolute values of coefficient estimates. In two of the four cases, the average magnitude for significant Chinese macroeconomic surprises is larger in the contraction subsample than in the expansion subsample. For significant US macroeconomic surprises, their average magnitude for the contraction subsample is larger than the expansion subsample in three of the four cases.

Because the sets of significant macroeconomic surprises differ across subsamples, Table 3 also reports results under the "Average Response, Common" column, which compares average magnitudes only for coefficient estimates of macroeconomic surprises that are significant in both subsamples. Imposing this commonality restriction does not change the qualitative finding for Chinese macroeconomic surprises and strengthens it for US macroeconomic surprises; for the common significant US news items, CNH responses in contractionary periods exceed those in expansionary periods by about 45.1% to 108.3%**.**

As an additional check, we adopt a stricter classification based on the Fed funds rate: the expansion subsample defined as periods when the US Fed funds rate equals zero, and b) the contraction subsample defined as periods when the US Fed funds rate exceeds 2%. This cutoff is intended to distinguish a zero- rate regime from a stronger contractionary policy stance. The results are reported in Appendix D. Under this scheme, CNH significantly reacts to 4 (contraction) and 5 (expansion) Chinese macroeconomic surprises, and to 12 (contraction) and 8 (expansion) US macroeconomic surprises. The average CNH responses are −0.0378 versus −0.0084 for Chinese macroeconomic surprises and 0.0578 versus 0.0045 for US macroeconomic surprises in contraction and expansion subsample, respectively; these figures again point to stronger responses during contractionary episodes.

Overall, alternative characterizations of global financial conditions do not overturn the main conclusion that CNH responses to macroeconomic surprises are typically stronger in contractionary periods, with this pattern more pronounced for US announcements than for Chinese ones.

5.2 Onshore CNY

The onshore US dollar to RMB exchange rate (CNY) differs from the offshore CNH in important institutional respects: CNY is subject to a daily trading band, mainland foreign exchange regulations, and capital controls that limit cross-border arbitrage. These frictions can create a persistent wedge between onshore and offshore pricing. We estimate equation (2) using 5-minute onshore CNY data from 4 January 2016 to 31 December 2022 obtained from Bloomberg. Table 4 presents the results.[16]

The CNY results are broadly consistent with the CNH findings reported in Section 3.1. In the full sample, CNY reacts more frequently and more strongly to US macroeconomic surprises than to Chinese ones. CNY shows statistically significant responses to 12 US versus 2 Chinese macroeconomic surprises, with average magnitudes of significant coefficient estimates of 0.012 and 0.008, respectively.

The pattern of CNY responses across the expansion and contraction subsamples (columns [2] and [3], Table 4) mirrors the CNH evidence: macroeconomic surprises—particularly the US ones — exert a more pronounced influence on CNY in the contraction subsample than in the expansion one. In the contraction subsample there are 16 significant US items versus 6 in the expansion subsample; the average magnitude of all significant coefficients in the contraction subsample is 3.5 times that in the expansion subsample. Restricting the comparison to macroeconomic surprises that are significant in both subsamples yields an average response in the contraction subsample that is 2.8 times larger than the one in the expansion subsample.

For Chinese macroeconomic surprises, the average magnitude of significant coefficient estimates in the contraction subsample is 69% higher than the one in the expansion subsample. The Retail Sales surprise variable, which is significant in both subsamples, provides a striking example: its coefficient estimate is 4.7 times larger in the contraction subsample than in the expansion subsample.

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[16] The CNH and CNY samples are different due to data limitations. The CNY sample starts from January 4, 2016, when the CNY trading hours are extended from 16:30 to 23:30 Beijing time such that CNY can react news released in the US morning.

Overall, the onshore CNY evidence from both the full sample and subsamples reinforces the offshore CNH results: CNH and CNY both tend to respond more strongly to macroeconomic surprises during contractionary global financial conditions, with the effect particularly pronounced for US macroeconomic surprises.

5.3 The August 2015 Exchange Rate Policy Reform

China implemented a notable exchange rate policy reform on 11 August 2015, which is commonly referred to as the "8/11 reform." The reform increased the role of market forces in the daily onshore RMB fixing by incorporating market demand and supply and a currency-basket valuation into the fixing mechanism (Cheung, 2022). The policy change coincides with a measurable rise in onshore and offshore exchange rate volatility; greater role of market forces and higher volatility plausibly increase the currency's responsiveness to macroeconomic surprises and can amplify the transmission of global financial conditions. Appendix E documents the post-reform increase in volatility.

Columns [1] and [2] of Table 5 report CNH responses to macroeconomic surprises before and after the 8/11 reform. After the reform CNH exhibits statistically significant reactions to a larger number of macroeconomic surprises: the count of significant Chinese macroeconomic surprises rises from 2 pre-reform to 7 post-reform, and the count of significant US macroeconomic surprises rises from 12 to 15. The average magnitude of coefficient estimates of macroeconomic surprises that are significant in both subsamples show that CNH is approximately 29% more responsive after the reform.

To assess whether the reform alters CNH sensitivity differently across global financial conditions, Columns [3] and [4] in Table 5 present post-reform estimates for the expansion and contraction subsamples. In the post-reform period CNH responds significantly to 24 announcements in the contraction subsample versus 9 in the expansion subsample. The contrast is especially pronounced for US news announcements: significant US items increase from 5 in the expansion subsample to 19 in the contraction subsample. The average magnitude of all

significant coefficient estimates in the contraction subsample is 8.7 times that in the expansion subsample. The contractionary global financial condition substantially increases the CNH responses to macroeconomic surprises after the reform.

These results indicate that the 8/11 reform reinforces the influence of global financial conditions on CNH dynamics. After the reform, CNH becomes more sensitive to macroeconomic surprises overall, and this sensitivity is markedly amplified during contractionary global financial conditions.

5.4 Asymmetric Responses to Positive and Negative Macroeconomic Surprises

Previous studies show that exchange rates respond asymmetrically to macroeconomic surprises, with negative surprises having a disproportionately large effect (Andersen, *et al*., 2003). In this subsection, we test whether, after controlling for global financial conditions, the CNH exhibits asymmetric responses to positive and negative macroeconomic surprises. We estimate the specification

$$r_t = \alpha_0 + \sum_{i=1}^{I} \alpha_i r_{t-i} + \sum_{k=1}^{K} \beta_{k,j}^{+} S_{k,t}^{+} + \sum_{k=1}^{K} \beta_{k,j}^{-} S_{k,t}^{-} + \varepsilon_t, \quad (5)$$

where the positive and negative macroeconomic surprises are defined as $S_{k,t}^{+} = \mathrm{I}\left(S_{k,t} \geq 0\right) * S_{k,t}$ and $S_{k,t}^{-} = \mathrm{I}\left(S_{k,t} < 0\right) * S_{k,t}$, and $I(\cdot)$ is an indicator function. Table 6 presents the estimation results.

Table 6a reports the full-sample results. The number of significant positive macroeconomic surprises is smaller than the number of significant negative ones, and this difference is driven by the Chinese news items. CNH significantly responds to an equal number of US positive and negative surprises (15 each), but it significantly responds to only two Chinese positive macroeconomic surprises versus seven negative ones. The average magnitude of the coefficient estimates of significant negative macroeconomic surprises exceeds that for significant positive macroeconomic surprises. This pattern holds when we compare only significant US news items, only significant Chinese news items, and the combined set. And, it also holds when

the comparison is restricted to news items that are significant for both positive and negative macroeconomic surprises.

Table 6b reports results for the expansion and contraction subsamples. Several patterns emerge. First, in the expansion subsample the number of significant negative macroeconomic surprises exceeds the number of significant positive ones, again driven by an increase in significant Chinese negative macroeconomic surprises. Second, for US significant news items, the average magnitude of negative macroeconomic surprise coefficient estimates is larger than that of positive macroeconomic surprise coefficient estimates, whereas the opposite is true for the Chinese significant news items. Third, when we restrict the comparison to news items that are significant for both positive and negative macroeconomic surprises, the average magnitude of negative macroeconomic surprise effects remains larger than that of positive macroeconomic surprise effects. Fourth, in the expansion subsample the relatively large effect of negative surprises reflects both a greater number of significant negative macroeconomic surprise variables and larger average magnitudes of coefficient estimates of those variables.

Overall, CNH generally responds more strongly to negative macroeconomic news than to positive macroeconomic news – a result that is consistent with the asymmetric pattern documented for developed economy exchange rates. The CNH response to negative macroeconomic surprises is generally stronger during contractionary global financial conditions than during expansionary conditions. These findings indicate that global financial conditions shape the asymmetry in CNH responses to positive and negative macroeconomic surprises.

5.5 Event Window Specification

News announcements typically have an immediate impact on exchange rates, although pre-release information leakage can attenuate the observed effect. To capture both the immediate reaction and any potential leakage, we use a 100-minute event window around each announcement (Andersen, *et al.,* 2007). The window spans 10 minutes before the official release

and 90 minutes after it; the pre-announcement interval is intended to capture price movements associated with early information leakage.

We estimate equations (2) and (5) with a sample comprising only the 100-minute windows surrounding individual announcements; the full results are reported in Appendix E. Table 7 summarizes how the number and average magnitudes of significant macroeconomic surprise effects in the 100-minute sample compare with those reported in Tables 1 and 6. The 100-minute sample contains 68,350 observations, compared with 827,101 observations in the full sample; therefore, comparisons between the two samples should be interpreted with caution.

In Table 7, the columns labeled "#Significant News" report the differences in the counts of statistically significant macroeconomic surprise variables between the full sample and the 100-minute sample. Column [a] shows the difference between the full sample and the 100-minute sample; Columns [b] and [c] show the differences for the expansion and contraction subsamples, respectively. Rows labeled "All Chinese News" and "All US News" are based on estimates of equation (2); the remaining rows are based on estimates of equation (5). With a few exceptions, the counts of significant macroeconomic surprises are similar across the two samples. Relative to the 100-minute sample, the full sample yields one additional significant coefficient estimate in two cases under Column [a], two additional significant coefficient estimate in one case under Column [b], and one additional significant coefficient estimate in one case under Column [c].

The columns labeled "Average Response" and "Average Response, Common" report percentage differences in the average magnitudes of significant coefficient estimates and in the average magnitudes restricted to coefficient estimates that are significant in both samples, respectively. With one exception, the average magnitudes of significant coefficient estimates are broadly similar across samples. The largest discrepancy occurs for the Chinese negative macroeconomic surprises during the global financial expansion subsample, where the 100-minute sample produces coefficient estimates that are on average 25.6% larger than those

from the full sample. When the comparison is restricted to coefficient estimates that are significant in both samples, this difference falls to 3% for the same case.

Overall, although the number of significant news items and the average magnitudes of their effects vary somewhat between the full sample and the 100-minute sample, the qualitative conclusions are consistent. These comparisons indicate that our main findings on the roles of global financial conditions and on asymmetric responses are robust to the use of the 100-minute event window specification.

6. Concluding remarks

Using high frequency CNH data, we estimate how exchange rates respond to macroeconomic surprises, compare responses to Chinese versus US announcements, assess the role of global financial conditions, and evaluate whether CNH market liquidity mediates the influence of global financial conditions on those responses. These four questions address both the transmission of macroeconomic news into FX prices and the microstructural channels that amplify or dampen that transmission.

We document that CNH reactions to macroeconomic surprises are state dependent: responses are larger during contractionary global financial conditions than during expansionary ones, with the amplification most pronounced for US announcements. Because sensitivity varies with global financial conditions, models that assume constant elasticities of announcement effects can mis-estimate exchange rate risk and mis-guide hedging and algorithmic strategies. The stronger response to US news is consistent with the central roles of the US dollar in global finance and of the US economic activity in the world economy.

We show that the CNH market liquidity affects the responses of CNH to macroeconomic surprises, and partially mediates the effect of contractionary global financial conditions on exchange-rate movements. CNH liquidity declines under contractionary global financial conditions. This deterioration amplifies CNH responses to macroeconomic surprises**;** thinner markets transmit the same macroeconomic surprise into larger price moves. The reported

liquidity effect is consistent with recent work linking liquidity to exchange-rate dynamics,[17] with the added information that liquidity provision and market depth materially shape how macroeconomic news is priced in the CNH.

Our results are robust to several alternative specifications and controls. They hold when we (i) use different schemes to define expansionary and contractionary subsamples, (ii) analyze onshore RMB rather than offshore CNH, (iii) use the sample comprising 100-minute windows around individual announcements, (iv) separate positive and negative surprises, and (v) account for China's 2015 exchange rate reform. In particular, we confirm asymmetric responses – larger reactions to negative than to positive macroeconomic surprises, and larger reactions to US than to domestic news, patterns that mirror findings for developed economy exchange rates.

By combining high frequency CNH returns with explicit measures of global financial conditions and an evaluation of liquidity mediation, we offer new light on the microstructure between exchange rate movements and macroeconomic surprises. Our findings have three broader implications. First, for modeling and risk management, exchange-rate models and stress tests should incorporate regime-dependent parameters and liquidity channels rather than relying on fixed elasticities. Second, for market microstructure and liquidity policy, interventions that stabilize market liquidity — temporary liquidity facilities, incentives for market making, or clearer communication around intervention policies — can reduce extreme announcement driven moves. Third, for cross-border policy coordination, the dollar-centric transmission of US news implies that global liquidity shocks can propagate rapidly to emerging market exchange rates, so international coordination of liquidity provision during stress episodes is warranted.

Finally, our study highlights open questions for future research: whether the differential effects observed during expansionary and contractionary global financial conditions and the mediating role of market liquidity we document for the CNH is a general feature across other emerging and developed currencies, and how specific policy reforms systematically alter

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[17] See, for example, Engel and Wu (2023), International Monetary Fund (2025), and Ranaldo and de Magistris (2022).

announcement transmission. Comparative event- study and cross- country panel analyses would help determine the generality of these mechanisms and inform both market participants and policymakers about effective tools to manage announcement driven exchange rate risk.

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Table 1: Effects of Macroeconomic Surprises on CNH Returns

	[1] Full sample		[2] Global financial expansion		[3] Global financial contraction	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Chinese Macroeconomic Surprises						
GDP	-0.0143***	(0.004)	-0.0101*	(0.005)	-0.0260**	(0.011)
IPI	-0.0132***	(0.003)	-0.0079***	(0.003)	-0.0088	(0.008)
Retail Sales	-0.0116***	(0.003)	-0.0069***	(0.002)	-0.0261***	(0.010)
Trade Balance	-0.0100***	(0.003)	-0.0113***	(0.003)	-0.0087	(0.006)
CPI	-0.0043*	(0.003)	-0.0019	(0.003)	-0.0068*	(0.004)
PMI	-0.0098**	(0.005)	-0.0057***	(0.002)	-0.0393**	(0.016)
PPI	0.0002	(0.003)	0.0028	(0.002)	-0.0030	(0.006)
Aggregate Financing	-0.0039	(0.003)	-0.0037	(0.002)	-0.0039	(0.004)
Foreign Reserves	-0.0032	(0.003)	-0.0003	(0.002)	-0.0207***	(0.007)
M2	-0.0006	(0.002)	-0.0008	(0.001)	-0.0030	(0.004)
New CNY lending	-0.0031	(0.003)	-0.0006	(0.003)	-0.0043	(0.005)
US Macroeconomic Surprises						
GDP Advance	0.0188***	(0.007)	0.0075*	(0.004)	0.0358***	(0.009)
GDP Second	0.0068***	(0.002)	0.0055***	(0.002)	0.0088	(0.007)
GDP Third	0.0036	(0.003)	0.0024	(0.003)	0.0152*	(0.009)
Capacity Utilization	0.0008	(0.003)	0.0017	(0.002)	-0.0012	(0.007)
Nonfarm Payrolls	0.0186	(0.014)	0.0207	(0.013)	0.5783***	(0.164)
IP	0.0032	(0.003)	0.0006	(0.002)	0.0120*	(0.007)
PMI	0.0114***	(0.002)	0.0049**	(0.002)	0.0230***	(0.004)
Personal Income	0.0045***	(0.001)	0.0028**	(0.001)	0.0244	(0.031)
Retail Sales	0.0036*	(0.002)	0.0015	(0.002)	0.0684***	(0.020)
Unemployment Rate	0.0100	(0.013)	0.0138	(0.013)	-0.1438**	(0.063)
Existing Home Sales	0.0001	(0.001)	0.0018	(0.001)	-0.0013	(0.002)
New Home Sales	0.0067*	(0.003)	0.0014	(0.002)	0.0128**	(0.006)
Personal Consumption	-0.0011	(0.003)	-0.0022	(0.003)	-0.0015	(0.007)
Personal Spending	0.0043	(0.003)	0.0015	(0.002)	0.0163	(0.016)
Business Inventories	-0.0006	(0.001)	0.0007	(0.001)	-0.0064*	(0.004)
Construction Spending	0.0037	(0.003)	0.0017	(0.002)	0.0078	(0.005)
Durable Goods Orders	0.0027*	(0.001)	0.0006	(0.001)	0.0083*	(0.004)
Factory Orders	0.0054***	(0.002)	0.0024	(0.002)	0.0106***	(0.003)
Wholesale Inventories	-0.0014	(0.002)	-0.0008	(0.001)	-0.0022	(0.003)
Trade Balance	-0.0029	(0.002)	-0.0009	(0.001)	-0.0107	(0.010)
CPI	0.0499***	(0.012)	0.0142***	(0.005)	0.1063***	(0.026)
Chicago PMI	-0.0021	(0.002)	-0.0021	(0.002)	-0.0021	(0.005)
PCE Core Deflator	0.0025	(0.003)	-0.0043*	(0.002)	0.0132**	(0.006)
PPI	0.0062**	(0.003)	0.0009	(0.002)	0.0157**	(0.008)
Consumer Confidence	0.0058***	(0.001)	0.0028*	(0.002)	0.0107***	(0.003)
Housing Starts	0.0042**	(0.002)	0.0016	(0.001)	0.0047	(0.003)
Leading Economic Index	0.0015	(0.002)	0.0022**	(0.001)	0.0004	(0.004)
Philly Fed Index	0.0052***	(0.002)	0.0024	(0.002)	0.0086**	(0.004)
MCSI	0.0026**	(0.001)	0.0011	(0.001)	0.0060*	(0.004)
Continuing Claims	-0.0013	(0.001)	-0.0005	(0.001)	-0.0265	(0.017)
Initial Jobless Claims	0.0007	(0.001)	0.0011	(0.001)	-0.0882***	(0.028)
FOMC Rate Decision	0.0358***	(0.005)			0.0359***	(0.005)
Observations	827,101		448,344		378,754	
Adj. R-squared	0.0035		0.0036		0.0075	

Notes: Coefficient estimates and their heteroskedasticity and autocorrelation consistent standard errors from equation (2) are presented under the Columns labeled “Coefficient Estimate” and “Standard Error.” Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *. Columns [1], [2], and [3] present results for the full sample, the global financial expansion subsample, and the contraction subsample, respectively.

Table 2: CNH Market Liquidity Effects

	GFC		Fed funds rate	
	(3)	(4)	(3)	(4)
GFC_t/Fed funds rate	0.361***		0.176***	
	(0.064)		(0.043)	
$liq\ \widehat{residual}_t$		0.005***		0.004***
		(0.001)		(0.001)
$\widehat{liq\ GFC}_t$		0.011***		0.017***
		(0.003)		(0.005)
$liq\ \widehat{FXR}_t$		0.010***		0.011***
		(0.002)		(0.002)
US policy uncertainty	0.155	0.003***	0.167	0.004***
	(0.111)	(0.001)	(0.116)	(0.001)
China policy uncertainty	-0.015	0.001	-0.046	0.000
	(0.067)	(0.001)	(0.068)	(0.001)
811 FX reform	0.564***		0.633***	
	(0.097)		(0.089)	
Adj.R^2	0.63	0.6	0.61	0.64
#Observation	132	132	132	132

Notes: The table reports coefficient estimates from equations (3) and (4) and their heteroskedasticity and autocorrelation consistent standard errors in parentheses underneath. Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *. The column labeled "GFC" uses the binary indicator defined in Section 2 as the proxy for global financial conditions and the column labeled "Fed funds rate" uses the monthly average of Fed funds rates as the proxy.

Table 3: Effects of Macroeconomic Surprises: Four Measures of Contraction and Expansion Subsamples

	#Significant News				Average Response				Average Response, Common			
	[a]	[b]	[c]	[d]	[a]	[b]	[c]	[d]	[a]	[b]	[c]	[d]
Chinese News	-1	3	0	1	138.5%	16.6%	-33.7%	-33.0%	96.7%	44.6%	-38.1%	-37.9%
The US News	-1	2	5	4	628.2%	-39.6%	23.5%	62.5%	108.3%	94.9%	45.1%	84.2%

Notes: The columns labeled "#Significant News," "Average Response," and "Average Response, Common" present, respectively, the differences in the numbers of statistically significant macroeconomic surprises between the contraction and expansion subsamples, the differences in the average magnitudes of the coefficient estimates of statistically significant macroeconomic surprises between the contraction and expansion subsamples, and the differences in the average magnitudes of the coefficient estimates of statistically significant macroeconomic surprises that are common to both the contraction and expansion subsamples.

The columns labeled [a], [b], [c] and [d] give the results pertaining to four alternative classifications of global financial expansion and contraction subsamples according to the measures of the US Treasury premium (Du, *et al*., 2018), global financial return factors (Miranda-Agrippino and Rey, 2020), the financial intermediary factor (He, *et al.*, 2017), and the return on the S&P 500 index, respectively.

The rows labeled "Chinese News" and "The US News" list the results pertaining to the Chinese and the US macroeconomic surprises.

Table 4: The Responses of CNY to Macroeconomic Surprises

	[1] Full Sample		[2] Global financial expansion		[3] Global financial contraction	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Chinese Macroeconomic Surprises						
GDP	-0.0011	(0.014)	-0.0124***	(0.002)	0.0120	(0.034)
IPI	-0.0061	(0.006)	-0.0060**	(0.003)	-0.0035	(0.006)
Retail Sales	-0.0096***	(0.004)	-0.0050***	(0.002)	-0.0236***	(0.009)
Trade Balance	-0.0005	(0.006)	-0.0104***	(0.003)	0.0043	(0.008)
CPI	-0.0003	(0.007)	-0.0039	(0.010)	0.0015	(0.009)
PMI	-0.0057	(0.135)			-0.0119	(0.147)
PPI	0.0076	(0.009)	0.0099	(0.010)	0.0054	(0.014)
Aggregate Financing	-0.0057**	(0.002)	-0.0070	(0.004)	-0.0052*	(0.003)
Foreign Reserves	0.0017	(0.003)	0.0057	(0.005)	0.0007	(0.004)
M2	0.0004	(0.002)	-0.0018	(0.003)	0.0012	(0.003)
New CNY lending	-0.0021	(0.003)	0.0032	(0.005)	-0.0030	(0.003)
US Macroeconomic Surprises						
GDP Advance	0.0102**	(0.004)	0.0032*	(0.002)	0.0158***	(0.005)
GDP Second	0.0018	(0.001)	0.0010	(0.001)	0.0019	(0.001)
GDP Third	0.0031*	(0.002)	-0.0005	(0.002)	0.0048	(0.003)
Capacity Utilization	0.0021	(0.002)	0.0011	(0.001)	0.0033	(0.003)
Nonfarm Payrolls	0.0348***	(0.013)	0.0260**	(0.012)	0.4136***	(0.147)
IP	-0.0010	(0.002)	-0.0010	(0.001)	0.0007	(0.004)
PMI	0.0087***	(0.003)	-0.0001	(0.0012)	0.0144***	(0.003)
Personal Income	0.0006	(0.001)	-0.0006	(0.001)	-0.0040	(0.027)
Retail Sales	0.0022	(0.002)	0.0005	(0.001)	0.0362**	(0.018)
Unemployment Rate	0.0276**	(0.013)	0.0195*	(0.011)	-0.0315	(0.046)
Existing Home Sales	0.0039	(0.003)	0.0007	(0.002)	0.0084	(0.006)
New Home Sales	0.0029	(0.002)	-0.0014*	(0.001)	0.0062*	(0.004)
Personal Consumption	0.0002	(0.002)	-0.0009	(0.001)	0.0033	(0.006)
Personal Spending	0.0034	(0.003)	0.0008	(0.001)	0.0163**	(0.008)
Business Inventories	0.0010	(0.001)	0.0009	(0.002)	0.0008	(0.002)
Construction Spending	0.0017	(0.002)	-0.0002	(0.001)	0.0014	(0.002)
Durable Goods Orders	0.0023**	(0.001)	0.0012	(0.002)	0.0030***	(0.001)
Factory Orders	0.0037**	(0.001)	0.0042**	(0.002)	0.0035*	(0.002)
Wholesale Inventories	-0.0007	(0.001)	-0.0008	(0.002)	-0.0012	(0.002)
Trade Balance	-0.0036	(0.003)	-0.0021	(0.003)	-0.0031	(0.003)
CPI	0.0410***	(0.013)	0.0160***	(0.004)	0.0670***	(0.022)
Chicago PMI	0.0033**	(0.002)	0.0016	(0.003)	0.0043**	(0.002)
PCE Core Deflator	0.0022	(0.002)	-0.0033	(0.003)	0.0053*	(0.003)
PPI	0.0047	(0.003)	-0.0019	(0.003)	0.0084**	(0.005)
Consumer Confidence	0.0036*	(0.002)	0.0008	(0.001)	0.0056*	(0.003)
Housing Starts	0.0008	(0.001)	0.0006	(0.001)	0.0005	(0.001)
Leading Economic Index	0.0023	(0.002)	0.0004	(0.001)	0.0040	(0.003)
Philly Fed Index	0.0027**	(0.001)	0.0014	(0.002)	0.0043**	(0.002)
MCSI	0.0030**	(0.001)	0.0015	(0.001)	0.0045**	(0.002)
Continuing Claims	-0.0005	(0.001)	-0.0001	(0.000)	0.0024	(0.010)
Initial Jobless Claims	-0.0001	(0.001)	0.0001	(0.001)	-0.0446**	(0.019)
FOMC Rate Decision	-0.0000	(0.000)			0.0000	(0.000)
Observations	285,935		81,815		204,041	
Adj. R-squared	0.0264		0.0063		0.0388	

Notes: Coefficient estimates and their heteroskedasticity and autocorrelation consistent standard errors estimated from equation (2) using CNY data are presented under the Columns labeled “Coefficient Estimate” and “Standard Error”. Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *. Columns [1], [2], and [3] present results for the full sample, the global financial expansion subsample, and the contraction subsample, respectively.

Table 5: Effects of Macroeconomic Surprises and the August 2015 Exchange Rate Policy Reform

	[1] Full Sample: Before reform		[2] Full Sample: After reform		[3] Expansion Subsample After reform		[4] Contraction Sample After reform	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Chinese Macroeconomic Surprises								
GDP	-0.0213***	(0.007)	-0.0148***	(0.005)	-0.0093	(0.006)	-0.0260**	(0.011)
IPI	-0.0062	(0.004)	-0.0147***	(0.003)	-0.0084**	(0.004)	-0.0088	(0.008)
Retail Sales	-0.0003	(0.009)	-0.0122***	(0.003)	-0.0074***	(0.003)	-0.0261***	(0.010)
Trade Balance	-0.0094**	(0.005)	-0.0102**	(0.004)	-0.0128***	(0.004)	-0.0087	(0.006)
CPI	0.0003	(0.003)	-0.0058*	(0.003)	-0.0039	(0.004)	-0.0068*	(0.004)
PMI	-0.0120	(0.010)	-0.0096**	(0.005)	-0.0051***	(0.001)	-0.0393**	(0.016)
PPI	0.0029	(0.006)	0.0002	(0.003)	0.0032	(0.003)	-0.0030	(0.006)
Aggregate Financing	-0.0010	(0.002)	-0.0044	(0.003)	-0.0051	(0.004)	-0.0039	(0.004)
Foreign Reserves	-0.0002	(0.002)	-0.0140**	(0.007)	-0.0018	(0.009)	-0.0207***	(0.007)
M2	-0.0017	(0.001)	-0.0003	(0.004)	0.0015	(0.005)	-0.0030	(0.004)
New CNY lending	-0.0009	(0.004)	-0.0032	(0.004)	-0.0010	(0.004)	-0.0043	(0.005)
US Macroeconomic Surprises								
GDP Advance	0.0121***	(0.004)	0.0213**	(0.009)	0.0054	(0.006)	0.0358***	(0.009)
GDP Second	0.0070***	(0.002)	0.0064*	(0.004)	0.0024*	(0.001)	0.0088	(0.007)
GDP Third	0.0017	(0.002)	0.0081	(0.006)	-0.0041	(0.008)	0.0152*	(0.009)
Capacity Utilization	0.0075***	(0.002)	-0.0024	(0.004)	-0.0029	(0.004)	-0.0012	(0.007)
Nonfarm Payrolls	0.2634***	(0.064)	0.0186	(0.016)	0.0219	(0.016)	0.5783***	(0.164)
IP	-0.0044**	(0.002)	0.0066*	(0.004)	0.0050	(0.004)	0.0120*	(0.007)
PMI	0.0057***	(0.002)	0.0135***	(0.003)	0.0041	(0.004)	0.0230***	(0.004)
Personal Income	-0.0046	(0.005)	0.0050***	(0.002)	0.0030***	(0.001)	0.0244	(0.031)
Retail Sales	0.0336***	(0.009)	0.0024	(0.002)	0.0005	(0.002)	0.0684***	(0.020)
Unemployment Rate	-0.0027	(0.014)	0.0104	(0.016)	0.0154	(0.016)	-0.1438**	(0.063)
Existing Home Sales	0.0018	(0.002)	0.0001	(0.001)	0.0023	(0.002)	-0.0013	(0.002)
New Home Sales	0.0031**	(0.001)	0.0073*	(0.004)	0.0006	(0.002)	0.0128**	(0.006)
Personal Consumption	0.0012	(0.002)	-0.0020	(0.003)	-0.0024	(0.004)	-0.0015	(0.007)
Personal Spending	0.0050*	(0.003)	0.0044	(0.004)	0.0010	(0.002)	0.0163	(0.016)
Business Inventories	-0.0005	(0.001)	-0.0007	(0.003)	0.0039	(0.003)	-0.0064*	(0.004)
Construction Spending	0.0010	(0.002)	0.0043	(0.004)	0.0021	(0.003)	0.0078	(0.005)
Durable Goods Orders	0.0007	(0.001)	0.0051*	(0.003)	-0.0003	(0.002)	0.0083*	(0.004)
Factory Orders	0.0011	(0.002)	0.0088***	(0.003)	0.0054	(0.005)	0.0106***	(0.003)
Wholesale Inventories	0.0010	(0.001)	-0.0021	(0.002)	-0.0021	(0.002)	-0.0022	(0.003)
Trade Balance	0.0002	(0.001)	-0.0112	(0.009)	-0.0072	(0.011)	-0.0107	(0.010)
CPI	0.0033	(0.003)	0.0624***	(0.016)	0.0200***	(0.005)	0.1063***	(0.026)
Chicago PMI	0.0008	(0.002)	-0.0031	(0.003)	-0.0046	(0.004)	-0.0021	(0.005)
PCE Core Deflator	-0.0034	(0.002)	0.0045	(0.004)	-0.0058	(0.004)	0.0132**	(0.006)
PPI	0.0013	(0.001)	0.0090*	(0.005)	0.0004	(0.004)	0.0157**	(0.008)
Consumer Confidence	0.0043**	(0.002)	0.0066***	(0.002)	0.0013	(0.002)	0.0107***	(0.003)
Housing Starts	0.0009	(0.002)	0.0044**	(0.002)	0.0019	(0.002)	0.0047	(0.003)
Leading Economic Index	0.0024*	(0.001)	0.0016	(0.002)	0.0027**	(0.001)	0.0004	(0.004)
Philly Fed Index	-0.0011	(0.002)	0.0068***	(0.002)	0.0044*	(0.002)	0.0086**	(0.004)
MCSI	-0.0004	(0.001)	0.0043**	(0.002)	0.0028	(0.002)	0.0060*	(0.004)
Continuing Claims	-0.0087**	(0.004)	-0.0012	(0.001)	-0.0003	(0.001)	-0.0265	(0.017)
Initial Jobless Claims	-0.0044	(0.009)	0.0007	(0.001)	0.0012	(0.001)	-0.0882***	(0.028)
FOMC Rate Decision			0.0358***	(0.005)			0.0359***	(0.005)
Observations	271,100		555,996		177,240		378,754	
Adj. R-squared	0.0236		0.0036		0.0012		0.0075	

Notes: Coefficient estimates and their heteroskedasticity and autocorrelation consistent standard errors from equation (2) are presented under the Columns labeled “Coefficient Estimate” and “Standard Error”. Columns [1] and [2] show the results for pre- and post-reform periods. Columns [3] and [4] report the results for the global financial expansion and contraction subsamples in the post-reform period. Standard errors are heteroskedasticity and autocorrelation consistent, following Newey and West (1987). Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *.

Table 6: Asymmetric Responses to Positive and Negative Macroeconomic Surprises

6a. Full Sample

	Positive Surprises		Negative Surprises	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Chinese Macroeconomic Surprises				
GDP	-0.0077	(0.008)	-0.0070	(0.007)
IPI	-0.0038	(0.004)	-0.0154**	(0.007)
Retail Sales	0.0010	(0.004)	-0.0072*	(0.004)
Trade Balance	-0.0076	(0.005)	-0.0127***	(0.004)
CPI	0.0071	(0.005)	-0.0097***	(0.003)
PMI	-0.0059***	(0.002)	-0.0358**	(0.015)
PPI	0.0042*	(0.002)	-0.0029	(0.007)
Aggregate Financing	-0.0036	(0.004)	-0.0048	(0.004)
Foreign Reserves	0.0011	(0.003)	-0.0068*	(0.004)
M2	0.0005	(0.003)	0.0004	(0.002)
New CNY lending	-0.0018	(0.006)	-0.0072**	(0.003)
US Macroeconomic Surprises				
GDP Advance	0.0044	(0.007)	0.0282***	(0.008)
GDP Second	0.0065**	(0.003)	0.0133**	(0.006)
GDP Third	0.0063	(0.004)	0.0034	(0.003)
Capacity Utilization	-0.0025	(0.003)	0.0021	(0.004)
Nonfarm Payrolls	0.0069***	(0.002)	0.1723***	(0.047)
IP	0.0052	(0.003)	0.0023	(0.003)
PMI	0.0101***	(0.003)	0.0128***	(0.004)
Personal Income	0.0037***	(0.001)	-0.0122	(0.014)
Retail Sales	0.0016	(0.002)	0.0093	(0.006)
Unemployment Rate	-0.0877*	(0.047)	-0.0064***	(0.002)
Existing Home Sales	-0.0002	(0.001)	0.0002	(0.001)
New Home Sales	0.0049	(0.005)	0.0084*	(0.005)
Personal Consumption	-0.0086*	(0.005)	-0.0004	(0.001)
Personal Spending	0.0096	(0.011)	0.0018	(0.002)
Business Inventories	0.0015	(0.001)	-0.0054**	(0.002)
Construction Spending	0.0022	(0.005)	-0.0007	(0.003)
Durable Goods Orders	0.0005	(0.001)	0.0060**	(0.003)
Factory Orders	0.0043*	(0.003)	0.0064***	(0.002)
Wholesale Inventories	-0.0037*	(0.002)	0.0016	(0.002)
Trade Balance	-0.0046	(0.004)	-0.0011	(0.003)
CPI	0.0488***	(0.014)	0.0518**	(0.023)
Chicago PMI	-0.0006	(0.002)	-0.0041	(0.005)
PCE Core Deflator	-0.0026	(0.005)	0.0046	(0.004)
PPI	0.0029	(0.003)	0.0093*	(0.005)
Consumer Confidence	0.0064***	(0.002)	0.0045*	(0.003)
Housing Starts	0.0034*	(0.002)	0.0027	(0.003)
Leading Economic Index	0.0024*	(0.001)	-0.0007	(0.004)
Philly Fed Index	0.0035*	(0.002)	0.0085**	(0.004)
MCSI	0.0037*	(0.002)	0.0017	(0.002)
Continuing Claims	0.0005	(0.002)	-0.0021**	(0.001)
Initial Jobless Claims	0.0009	(0.001)	-0.0052	(0.008)
FOMC Rate Decision	0.0293***	(0.000)	0.0424***	(0.000)
Observations	827,101		827,101	
Adj. R-squared	0.0023		0.0027	

Notes: Coefficient estimates and their heteroskedasticity and autocorrelation consistent standard errors from equation (5) are presented under the Columns labeled “Coefficient Estimate” and “Standard Error.” Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *. The columns labeled “Positive Surprises” and “Negative Surprises” presents results pertaining to positive and negative macroeconomic surprises, respectively.

6b. Expansion and Contraction Subsamples

	Expansion				Contraction			
	Positive Surprises		Negative Surprises		Positive Surprises		Negative Surprises	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Chinese Macroeconomic Surprises								
GDP	-0.0045	(0.009)	-0.0050	(0.005)	-0.0077	(0.010)	-0.0210***	(0.003)
IPI	0.0015	(0.002)	-0.0070	(0.006)	-0.0146	(0.009)	-0.019	(0.017)
Retail Sales	0.0006	(0.002)	-0.0039**	(0.002)	0.0064	(0.014)	-0.0209	(0.021)
Trade Balance	-0.0161***	(0.004)	-0.0050*	(0.003)	0.0023	(0.008)	-0.0188***	(0.006)
CPI	0.0079	(0.005)	-0.0085**	(0.004)	0.006	(0.008)	-0.0116***	(0.004)
PMI	-0.0046***	(0.001)	-0.0178***	(0.005)	-0.0221*	(0.012)	-0.0580*	(0.032)
PPI	0.0029	(0.003)	0.0058	(0.004)	0.0057*	(0.003)	-0.0163**	(0.008)
Aggregate Financing	-0.0055	(0.004)	-0.0019	(0.003)	-0.0015	(0.007)	-0.0100	(0.007)
Foreign Reserves	0.0036	(0.003)	-0.0037*	(0.002)	-0.0176	(0.013)	-0.0224***	(0.008)
M2	0.0009	(0.002)	-0.0022	(0.002)	-0.0017	(0.011)	0.0021	(0.005)
New CNY lending	-0.0012	(0.004)	0.0006	(0.006)	-0.0024	(0.009)	-0.0072	(0.005)
US Macroeconomic Surprises								
GDP Advance	0.0102**	(0.004)	0.0089***	(0.003)	-0.0232	(0.023)	0.0480***	(0.004)
GDP Second	0.0050**	(0.002)	0.0119*	(0.006)	0.0089	(0.008)	0.0152	(0.017)
GDP Third	0.0049	(0.004)	0.0021	(0.002)	0.0125	(0.012)	0.0464***	(0.013)
Capacity Utilization	0.0003	(0.004)	0.0025	(0.003)	-0.0087	(0.008)	-0.0016	(0.010)
Nonfarm Payrolls	0.0057***	(0.001)	0.1475***	(0.047)	0.7484***	(0.239)	0.8003**	(0.329)
IP	0.0005	(0.004)	0.0002	(0.003)	0.0146**	(0.007)	0.0157	(0.010)
PMI	0.0029	(0.002)	0.0079**	(0.004)	0.0241***	(0.005)	0.0201***	(0.006)
Personal Income	0.0037***	(0.001)	-0.0118	(0.014)	0.0140	(0.090)	-0.0153	(0.030)
Retail Sales	0.0007	(0.002)	0.0043	(0.003)	0.0513	(0.035)	0.0440	(0.039)
Unemployment Rate	-0.0452	(0.048)	-0.0057***	(0.001)	-0.3497***	(0.091)	-0.1296	(0.100)
Existing Home Sales	0.0016	(0.002)	0.0011	(0.002)	-0.0034	(0.003)	-0.0001	(0.001)
New Home Sales	0.0006	(0.003)	0.0019	(0.002)	0.0089	(0.007)	0.0196**	(0.009)
Personal Consumption	-0.0122***	(0.005)	0.0009	(0.001)	0.0015	(0.013)	-0.0080*	(0.005)
Personal Spending	0.0003	(0.005)	0.002	(0.002)	0.0264	(0.027)	0.0007	(0.008)
Business Inventories	0.0015*	(0.001)	-0.0013	(0.002)	-0.0052	(0.006)	-0.0135***	(0.005)
Construction Spending	0.0009	(0.002)	-0.0003	(0.003)	0.0230	(0.021)	-0.002	(0.005)
Durable Goods Orders	-0.0004	(0.000)	0.0026*	(0.001)	0.0051	(0.006)	0.0134**	(0.006)
Factory Orders	-0.0005	(0.002)	0.0049*	(0.003)	0.0110**	(0.005)	0.0096***	(0.003)
Wholesale Inventories	-0.0019	(0.002)	0.001	(0.002)	-0.004	(0.004)	0.0034	(0.005)
Trade Balance	-0.0004	(0.002)	-0.0014	(0.002)	-0.0154	(0.013)	-0.0027	(0.019)
CPI	0.0171***	(0.005)	0.0056	(0.005)	0.1177***	(0.033)	0.0934**	(0.042)
Chicago PMI	-0.0047*	(0.003)	0.0015	(0.003)	0.0055*	(0.003)	-0.0117	(0.009)
PCE Core Deflator	-0.0090***	(0.003)	-0.0024	(0.003)	0.0103	(0.011)	0.0168**	(0.007)
PPI	0.0002	(0.004)	0.0015	(0.002)	0.0111	(0.007)	0.0237	(0.015)
Consumer Confidence	0.0025	(0.002)	0.0033	(0.003)	0.0129***	(0.003)	0.0059	(0.006)
Housing Starts	0.0033*	(0.002)	-0.0014	(0.002)	0.0014	(0.003)	0.0080**	(0.004)
Leading Economic Index	0.0028**	(0.001)	-0.0009	(0.002)	0.0012	(0.004)	-0.0005	(0.007)
Philly Fed Index	0.0012	(0.001)	0.0032	(0.004)	0.0075*	(0.004)	0.0209***	(0.008)
MCSI	0.001	(0.002)	0.0011	(0.001)	0.0086*	(0.005)	0.0029	(0.005)
Continuing Claims	0.0015	(0.002)	-0.0023**	(0.001)	-0.0274	(0.028)	-0.0322	(0.025)
Initial Jobless Claims	0.0011	(0.001)	0.0102*	(0.006)	-0.1192**	(0.056)	-0.1416***	(0.045)
FOMC Rate Decision					0.0293***	(0.000)	0.0424***	(0.000)
Observations	448,344		448,344		378,754		378,754	
Adj. R-squared	0.0035		0.0037		0.0048		0.0039	

Notes: See the Notes for Table 6a. Results from the expansion subsample are reported under the heading "Expansion" and from the contraction subsample under the heading "Contraction."

Table 7: Effects of Macroeconomic Surprises: Full Sample Vs 100-Minute Window Sample

	#Significant News			Average Response			Average Response, Common		
	[a]	[b]	[c]	[a]	[b]	[c]	[a]	[b]	[c]
All Chinese News	0	0	0	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.0%
All US News	0	0	1	0.0%	-1.8%	-10.8%	0.0%	-1.8%	-0.4%
Chinese Positive News	0	0	0	2.0%	0.0%	2.9%	2.0%	0.0%	2.9%
US Positive News	1	0	0	-3.9%	-1.5%	-0.2%	-1.3%	-1.5%	-0.2%
Chinese Negative News	0	2	0	0.0%	-25.6%	-0.8%	0.0%	3%	-0.8%
US Negative News	1	0	0	-5.6%	-0.9%	0.0%	-0.8%	-0.9%	0.0%

Notes: The table compares the responses of CNH to announcements of macroeconomic surprises reported in Tables 1 and 6 (the full sample) and Appendix E (the 100-minute window sample).

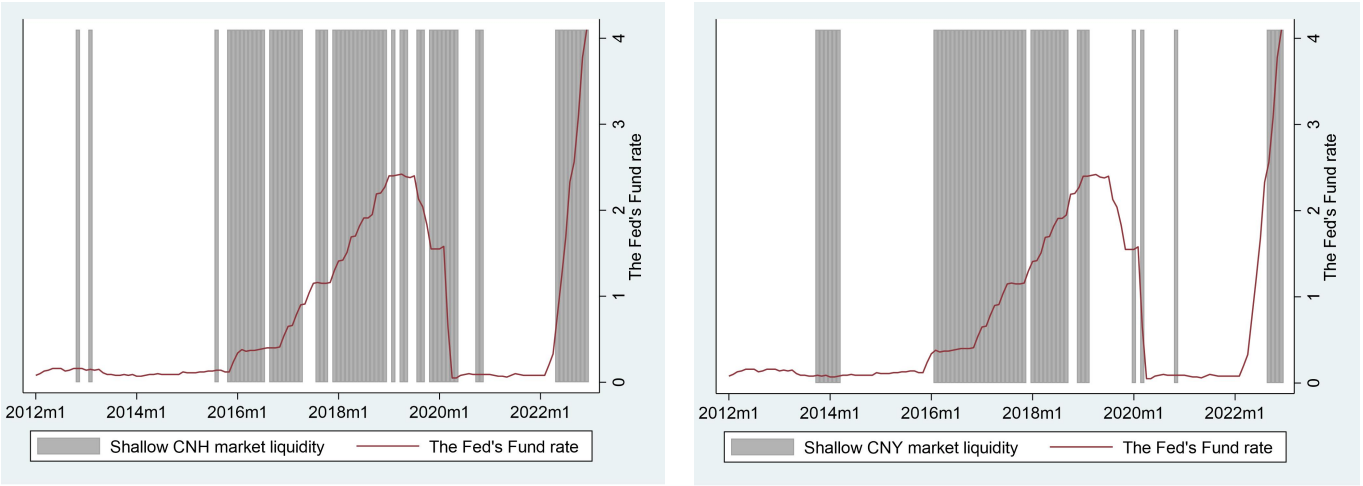
The results in rows labelled "All Chinese News" and "All US News" are based on estimation results of equation (2). Those in the remaining rows are based on estimation results of equation (5).

The columns labeled "#Significant News," "Average Response," and "Average Response, Common" present, respectively, the differences in the numbers of statistically significant macroeconomic surprises, the differences in the average magnitudes of the coefficient estimates of statistically significant macroeconomic surprises, and the differences in the average magnitudes of the coefficient estimates of statistically significant macroeconomic surprises that are common to both the full sample and the 100-minute window sample.

Under the columns "Average Response" and "Average Response, Common," present the differences in percentages. For example, the value of −0.1% in the first cell of Column [a] under "Average response" implying that the average of coefficient estimates from the full-sample regression (0.0105 in Table 1) is 0.1% smaller than the corresponding one from the 100-minute window regression (0.0106 in Appendix E).

Column [a], Column [b] and Column [c] give the differences between the full sample and the 100-minute window sample, and between the expansion and contraction periods in these two samples.

Figure 1: Global financial conditions and CNH market liquidity



Notes: The US Fed funds rate as a proxy for global financial conditions and deviations from the average bid-ask spread as a proxy for CNH market liquidity. CNH liquidity is considered shallow or stressed when the bid-ask spread exceeds the sample average from 2012 to 2022 and is indicated by the vertical bars. Expansionary global financial conditions are indicated by the Zero Interest Rate policy, and the contractionary conditions are indicated by positive Fed funds rates.

Appendix: Supplementary results

Appendix A: 5-minute CNH Returns: Summary statistics

	# Obs	Mean	Min	Max	Std. err.	Skewness	Kurtosis
Full sample: 1/1/2012 to 12/31/2022	827103	0.000011	-.7539	1.7999	0.016	2.023	286.819
Global financial expansion: 1/1/2012 to 12/16/2015; 3/16/2020 to 3/17/2022	448347	-.000016	-.5545	1.7999	0.013	6.107	884.554
Global financial contraction: 12/17/2015 to 3/15/2020; 3/17/2022 to 12/31/2022	378756	0.000041	-.7539	0.8785	0.019	0.401	95.220
Before the 811 reform: 1/1/2012 to 8/10/2015	271105	0.000001	-.4064	0.4247	0.009	0.253	122.637
After 811 reform: 8/11/2015 to 12/31/2022	555998	-.000019	-.7539	1.7999	0.019	1.924	234.244

Notes: The table reports the number of observations (# Obs), the sample average (Mean), the minimum (Min), maximum (Max), standard error (Std. err.), sample skewness (Skewness) and sample kurtosis (Kurtosis) of CNH returns in sample periods indicated in column 1.

Appendix B: The Chinese and US Macroeconomic News

Table B1. Macroeconomic News Items: A Brief Description

Chinese Macroeconomic News Items	
Economic Activity	
GDP	Quarter-on-quarter percentage change in real Gross Domestic Product, seasonally adjusted and updated quarterly
IPI	Industrial Production Index that measures the year-on- year percentage change in the total value added by all industrial sectors, expressed in current prices
Retail Sales	Year-on-year percentage change in total retail sales of consumer goods
Trade	
Trade Balance	Trade balance of goods and services in U.S. dollar
Prices	
CPI	Year-on-year percentage change in China's Consumer Price Index
PMI	The China Manufacturing Purchasing Managers' Index is a monthly survey-based indicator that measures the health and activity level of manufacturing sector; seasonally adjusted
PPI	Year-on-year percentage change in Producer Price Index
Money	
Aggregate Financing	Monthly new total financing provided to the real economy in RMB
Foreign Reserves	Total value of foreign exchange reserves denominated in U.S. dollar
M2	Year-on-year percentage change in M2 money supply
New CNY lending	Total amount of monthly new RMB loans issued by Chinese banks
US Macroeconomic News Items	
Economic activity	
GDP Advance	The advanced (initial) estimate of real GDP, annualized quarter-on-quarter rate, seasonally adjusted
GDP Second	The second (revised) estimate of real GDP, annualized quarter-on-quarter rate, seasonally adjusted
GDP Third	The third (final) estimate of real GDP, annualized quarter-on-quarter rate, seasonally adjusted
Capacity Utilization	Capacity utilization of total industry, measured as the rate between actual industry output and potential industrial capacity, seasonally adjusted
Nonfarm Payrolls	Monthly change of employees on nonfarm payrolls, seasonally adjusted
IP	Industrial Production is monthly percentage change in real output produced by manufacturing sector, seasonally adjusted
PMI	ISM Manufacturing Purchasing Managers' Index measures the level of economic activity in the manufacturing sector, seasonally adjusted
Personal Income	Monthly percentage change in total income received by all individuals and households, seasonally adjusted
Retail Sales	Monthly percentage change in total retail sales (includes all retail and food services), seasonally adjusted
Unemployment Rate	Total unemployment rate, seasonally adjusted
Consumption	
Existing Home Sales	The number of previously owned homes sold in U.S., seasonally adjusted
New Home Sales	The number of newly constructed homes sold in U.S., seasonally adjusted
Personal Consumption	The percentage contribution of personal consumption expenditures to the annualized quarter-on-quarter GDP growth rate
Personal Spending	Measure the monthly percentage change of U.S. total consumer spending (in current dollars), seasonally adjusted
Investment	
Business Inventories	Monthly percentage change in the total value of inventories held by U.S. businesses, seasonally adjusted
Construction Spending	Monthly percentage change of the total U.S. construction spending, seasonally adjusted

Durable Goods Orders	Monthly percentage change of the value of new orders placed with U.S. manufacturers for durable goods, seasonally adjusted
Factory Orders	Monthly percentage change of the value of new orders placed with U.S. factories, seasonally adjusted
Wholesale Inventories	Monthly percentage change of total value of inventories held by U.S. wholesalers, seasonally adjusted
Trade	
Trade Balance	Trade balance of goods and services, seasonally adjusted
Prices	
CPI	Monthly percentage change in the Consumer Price Index, seasonally adjusted
Chicago PMI	MNI Chicago Purchasing Managers' Index, is a monthly diffusion index based on a survey of purchasing and supply managers from both manufacturing and non-manufacturing companies in the Chicago region
PCE Core Deflator	Monthly percentage change in the Core Personal Consumption Expenditures Price Index, seasonally adjusted
PPI	Monthly percentage change in Producer Price Index for Final Demand, seasonally adjusted.
Forward-Looking	
Consumer Confidence	The Conference Board Consumer Confidence Index measures how optimistic U.S. consumers feel about current economic conditions and their expectations for months ahead, seasonally adjusted
Housing Starts	Annualized number of U.S. new privately owned housing units started by structure in a given month, seasonally adjusted
Leading Economic Index	Monthly percentage change in the Conference Board's Leading Economic Index (LEI)
Philly Fed Index	Philadelphia Fed Manufacturing Business Outlook Survey–General Activity Diffusion Index, is a monthly diffusion index from the Federal Reserve Bank of Philadelphia's Manufacturing Business Outlook Survey
MCSI	University of Michigan Consumer Sentiment Index, measures consumers' attitudes toward personal finances and the economy. The surveys are conducted by the Survey Research Center, University of Michigan.
Weekly Frequency News	
Continuing Claims	The number of people who have already filed an initial claim and are continuing to receive unemployment benefits, seasonally adjusted
Initial Jobless Claims	The number of people who filed a new claim for unemployment insurance in the past week, seasonally adjusted
FOMC	
FOMC Rate Decision	Decision on the upper limit of the target range for the federal funds rate (Due to collinearity, the lower limit of the target range is not included)

Table B2. Macroeconomic News Announcements: Some Descriptive Statistics

	Full	>0	>2	A≠E	Frequency	Announcement Time
Chinese Macroeconomic News Items						
Economic Activity						
GDP	44	20	4	32	Quarterly	10:00 am
IPI	101	49	10	94	Monthly	10:00 or 13:30 pm before and 10:00 am since June 2016
Retail Sales	101	49	10	93	Monthly	10:00 or 13:30 pm before and 10:00 am since June 2016
Trade						
Trade Balance	102	52	11	101	Monthly	between 10:00 am and 12:00 pm
Prices						
CPI	113	51	11	88	Monthly	9:30 am
PMI	93	44	10	87	Monthly	9:00 am before and 9:30 am since January 2022
PPI	113	51	11	95	Monthly	9:30 am
Money						
Aggregate Financing	114	58	11	113	Monthly	around 10:00 am or around 16:00 pm
Foreign Reserves	79	45	10	78	Monthly	around 10:00 am or around 16:00 pm
M2	125	58	11	111	Monthly	around 10:00 am or around 16:00 pm
New CNY lending	126	58	11	126	Monthly	around 10:00 am or around 16:00 pm
US Macroeconomic News Items						
Economic activity						
GDP Advance	44	20	5	43	Quarterly	8:30 am
GDP Second	43	19	3	33	Quarterly	8:30 am
GDP Third	44	21	5	33	Quarterly	8:30 am
Capacity Utilization	132	60	12	119	Monthly	9:15 am
Nonfarm Payrolls	132	60	12	132	Monthly	8:30 am
IP	132	60	12	121	Monthly	9:15 am
PMI	132	60	12	131	Monthly	10:00 am
Personal Income	131	60	13	98	Monthly	8:30 am
Retail Sales	132	59	12	116	Monthly	8:30 am
Unemployment Rate	132	60	12	98	Monthly	8:30 am
Consumption						
Existing Home Sales	132	61	12	128	Monthly	10:00 am
New Home Sales	131	61	13	131	Monthly	10:00 am
Personal Consumption	131	60	13	118	Monthly	8:30 am
Personal Spending	131	60	13	90	Monthly	8:30 am
Investment						
Business Inventories	132	59	12	69	Monthly	8:30 am
Construction Spending	131	60	12	128	Monthly	10:00 am
Durable Goods Orders	217	121	25	177	Monthly Full Report (advanced report since December, 2015)	10:00 am - Full Report 8:30 am – Advanced Report
Factory Orders	131	60	12	115	Monthly	10:00 am
Wholesale Inventories	206	110	22	185	Monthly Full Report (advanced report since August, 2016)	10:00 am - Full Report 8:30 am – Advanced Report

Trade						
Trade Balance	132	60	12	128	Monthly	8:30 am
Prices						
CPI	132	60	12	79	Monthly	8:30 am
Chicago PMI	132	61	14	131	Monthly	9:45 am
PCE Core Deflator	131	60	13	53	Monthly	8:30 am
PPI	132	60	12	110	Monthly	8:30 am
Forward-Looking						
Consumer Confidence	132	61	13	129	Monthly	10:00 am
Housing Starts	130	60	12	129	Monthly	8:30 am
Leading Economic Index	132	61	13	102	Monthly	10:00 am
Philly Fed Index	132	61	13	130	Monthly	10:00 am before and 8:30 am since November 2015
MCSI	264	121	25	262	Twice monthly	9:55 to10:00 am
Weekly Frequency News						
Continuing Claims	574	264	55	566	Weekly	8:30 am
Initial Jobless Claims	574	264	55	557	Weekly	8:30 am
FOMC						
FOMC Rate Decision	89	42	9	2	Irregular	

Notes: For each of the 11 Chinese and 32 US macroeconomic news items, the table presents the number of announcements a) in the full sample (under the column labeled "Full"), b) in periods when the Fed funds rate is positive (>0) and larger than 2% (>2), and c) with non-zero macroeconomic surprises (A≠E). The announcement frequency and time are reported under the columns labeled "Frequency" and "Announcement Time."

Appendix C: Four Alternative Measures of Global Financial Expansion and Contraction Subsamples

	[1] Global financial return factors				[2] The US Treasury premium				[3] Financial intermediary returns				[4] The return on the S&P 500 index			
	Contraction		Expansion		Contraction		Expansion		Contraction		Expansion		Contraction		Expansion	
	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.
Chinese macro news																
GDP	-0.0152**	(0.006)	-0.0115***	(0.004)	0.0672***	(0.013)	-0.0115	(0.007)	-0.0130	(0.008)	-0.0172***	(0.003)	-0.0081	(0.007)	-0.0222***	(0.004)
IPI	-0.0135***	(0.004)	-0.0119***	(0.003)	-0.0021	(0.003)	-0.0122***	(0.005)	-0.0108*	(0.006)	-0.0129***	(0.003)	-0.0116**	(0.006)	-0.0181***	(0.004)
Retail Sales	-0.0163***	(0.005)	-0.0077***	(0.003)	-0.0449***	(0.005)	-0.0134**	(0.005)	-0.0186**	(0.008)	-0.0094***	(0.003)	-0.0092*	(0.005)	-0.0154***	(0.005)
Trade Balance	-0.0130**	(0.006)	-0.0090**	(0.004)	0.0039	(0.030)	-0.0109***	(0.004)	-0.0138***	(0.005)	-0.0063	(0.005)	-0.0134***	(0.004)	-0.0076	(0.006)
CPI	-0.0070*	(0.004)	-0.0012	(0.003)	-0.0015	(0.012)	-0.0037	(0.003)	-0.0054	(0.003)	-0.0037	(0.004)	-0.0062*	(0.003)	-0.0014	(0.004)
PMI	-0.0100*	(0.005)	-0.0083	(0.010)	-0.0971*	(0.054)	-0.0076***	(0.003)	-0.0049***	(0.001)	-0.0331***	(0.013)	-0.0088**	(0.004)	-0.0186	(0.014)
PPI	-0.0029	(0.006)	0.0033	(0.002)	-0.0084	(0.016)	0.0049*	(0.003)	-0.0030	(0.005)	0.0034	(0.003)	0.0038	(0.003)	-0.0039	(0.006)
Aggregate Financing	-0.0068*	(0.004)	0.0013	(0.003)	-0.0019	(0.009)	-0.0031	(0.003)	-0.0057	(0.004)	-0.0036	(0.003)	-0.0037	(0.004)	-0.0052*	(0.003)
Foreign Reserves	-0.0082	(0.007)	-0.0011	(0.002)	-0.0053	(0.017)	-0.0033	(0.003)	-0.0049	(0.006)	-0.0018	(0.001)	-0.0078*	(0.005)	0.0025	(0.003)
M2	0.0015	(0.004)	-0.0028	(0.002)	-0.0174	(0.012)	-0.0015	(0.002)	0.0016	(0.003)	-0.0020	(0.002)	-0.0039	(0.004)	-0.0003	(0.002)
New CNY lending	-0.0026	(0.003)	-0.0019	(0.007)	-0.0187**	(0.009)	-0.0020	(0.005)	-0.0063	(0.006)	-0.0008	(0.003)	0.0046	(0.005)	-0.0100***	(0.003)
US macro news																
GDP Advance	0.0247**	(0.012)	0.0141***	(0.004)	0.0131	(0.010)	0.0103	(0.007)	0.0200*	(0.012)	0.0175**	(0.007)	0.0139***	(0.004)	0.0210**	(0.010)
GDP Second	0.0045	(0.003)	0.0089***	(0.003)	0.0234**	(0.010)	0.0056***	(0.002)	0.0040*	(0.002)	0.0101**	(0.005)	0.0049*	(0.003)	0.0087**	(0.004)
GDP Third	0.0076	(0.007)	0.0027	(0.002)	-0.0001	(0.005)	0.0038	(0.003)	0.0056	(0.006)	-0.0033	(0.003)	0.0133*	(0.008)	0.0022	(0.003)
Capacity Utilization	0.0009	(0.004)	0.0011	(0.004)	0.0077	(0.005)	0.0004	(0.003)	0.0041	(0.003)	-0.0016	(0.004)	0.0025	(0.005)	-0.0018	(0.004)
Nonfarm Payrolls	0.0050	(0.012)	0.2157***	(0.039)	0.2696**	(0.128)	0.0089	(0.011)	0.0870*	(0.047)	0.0067	(0.019)	0.1794**	(0.071)	0.0247	(0.025)
IP	0.0024	(0.004)	0.0033	(0.003)	-0.0010	(0.008)	0.0039	(0.003)	0.0010	(0.003)	0.0052	(0.004)	0.0002	(0.004)	0.0075*	(0.004)
PMI	0.0105**	(0.004)	0.0125***	(0.003)	0.0241***	(0.005)	0.0085***	(0.002)	0.0081**	(0.004)	0.0143***	(0.003)	0.0115***	(0.003)	0.0116***	(0.004)
Personal Income	0.0048***	(0.001)	-0.0130	(0.011)	-0.0339	(0.029)	0.0036***	(0.001)	0.0071***	(0.002)	-0.0048	(0.009)	-0.0095	(0.010)	0.0055***	(0.002)
Retail Sales	0.0060**	(0.003)	-0.0008	(0.005)	0.0622***	(0.012)	0.0046**	(0.002)	0.0055	(0.005)	0.0023	(0.002)	0.0101*	(0.006)	0.0017	(0.002)
Unemployment Rate	-0.0013	(0.013)	-0.0348	(0.024)	-0.0355	(0.043)	0.0032	(0.011)	0.0248	(0.024)	-0.0000	(0.020)	-0.0122	(0.015)	0.0186	(0.026)
Existing Home Sales	-0.0015	(0.002)	0.0016	(0.001)	-0.0013	(0.002)	0.0007	(0.001)	-0.0012	(0.001)	0.0017	(0.001)	-0.0002	(0.002)	0.0008	(0.001)
New Home Sales	0.0095*	(0.006)	0.0027	(0.002)	0.0019	(0.005)	0.0034*	(0.002)	0.0050	(0.006)	0.0083**	(0.004)	0.0122**	(0.005)	0.0013	(0.002)
Personal Consumption	-0.0034	(0.004)	-0.0000	(0.003)	0.0030	(0.008)	-0.0034	(0.004)	-0.0013	(0.008)	-0.0012	(0.002)	-0.0029	(0.007)	-0.0011	(0.003)
Personal Spending	0.0037	(0.004)	0.0069	(0.004)	0.0153*	(0.009)	0.0016	(0.002)	0.0120	(0.009)	-0.0002	(0.002)	0.0028	(0.004)	0.0073	(0.007)
Business Inventories	-0.0005	(0.003)	-0.0008	(0.001)	0.0005	(0.001)	-0.0001	(0.001)	-0.0010	(0.002)	-0.0004	(0.002)	-0.0008	(0.002)	-0.0003	(0.001)
Construction Spending	0.0055	(0.004)	0.0013	(0.002)	0.0106	(0.007)	0.0018	(0.002)	0.0034	(0.003)	0.0047	(0.003)	0.0030	(0.005)	0.0042	(0.003)
Durable Goods Orders	0.0038	(0.002)	0.0023	(0.002)	0.0079	(0.007)	0.0021	(0.001)	0.0032	(0.003)	0.0027*	(0.002)	0.0078*	(0.004)	0.0012	(0.001)
Factory Orders	0.0068**	(0.003)	0.0037***	(0.001)	0.0039	(0.006)	0.0036*	(0.002)	0.0109***	(0.003)	0.0027	(0.002)	0.0062*	(0.004)	0.0050***	(0.002)
Wholesale Inventories	-0.0000	(0.002)	-0.0026	(0.002)	-0.0082***	(0.003)	-0.0011	(0.002)	-0.0028	(0.002)	0.0000	(0.002)	-0.0052*	(0.003)	0.0012	(0.002)
Trade Balance	-0.0150	(0.010)	0.0008	(0.001)	-0.0016	(0.002)	-0.0032	(0.003)	-0.0045	(0.004)	-0.0006	(0.002)	-0.0029	(0.004)	-0.0026	(0.003)
CPI	0.0951***	(0.029)	0.0272***	(0.006)	0.0164***	(0.006)	0.0233***	(0.008)	0.0479***	(0.013)	0.0518**	(0.021)	0.0391***	(0.010)	0.0658***	(0.024)
Chicago PMI	-0.0060	(0.004)	0.0016	(0.002)	-0.0012	(0.003)	-0.0003	(0.002)	-0.0000	(0.003)	-0.0037	(0.004)	-0.0016	(0.002)	-0.0027	(0.004)
PCE Core Deflator	0.0039	(0.004)	0.0017	(0.004)	0.0049	(0.004)	-0.0021	(0.003)	0.0047	(0.003)	0.0000	(0.004)	0.0019	(0.003)	0.0062	(0.006)
PPI	0.0117*	(0.006)	0.0029	(0.003)	0.0032	(0.003)	0.0084***	(0.003)	0.0001	(0.003)	0.0117**	(0.005)	0.0049	(0.003)	0.0069	(0.006)

Consumer Confidence	0.0052**	(0.003)	0.0065***	(0.002)	0.0038*	(0.002)	0.0049***	(0.002)	0.0061***	(0.002)	0.0057***	(0.002)	0.0070***	(0.002)	0.0036*	(0.002)
Housing Starts	0.0024	(0.002)	0.0045**	(0.002)	0.0010	(0.002)	0.0061***	(0.002)	0.0066**	(0.003)	0.0027	(0.002)	0.0058**	(0.003)	0.0037	(0.003)
Leading Economic Index	0.0034	(0.002)	-0.0008	(0.002)	0.0046	(0.003)	0.0015	(0.001)	0.0008	(0.002)	0.0022	(0.002)	0.0035	(0.003)	-0.0011	(0.002)
Philly Fed Index	0.0074**	(0.003)	0.0029	(0.002)	0.0087*	(0.005)	0.0035*	(0.002)	0.0070**	(0.003)	0.0028	(0.002)	0.0057**	(0.003)	0.0049**	(0.002)
MCSI	0.0042	(0.003)	0.0015*	(0.001)	0.0017	(0.003)	0.0024*	(0.001)	0.0038	(0.003)	0.0018	(0.001)	0.0020	(0.003)	0.0031**	(0.001)
Continuing Claims	-0.0011	(0.001)	-0.0089	(0.006)	0.0064	(0.020)	-0.0008	(0.001)	-0.0020*	(0.001)	0.0024	(0.003)	-0.0005	(0.001)	-0.0016	(0.001)
Initial Jobless Claims	0.0008	(0.001)	-0.0126	(0.009)	-0.0623*	(0.036)	0.0009	(0.001)	0.0025**	(0.001)	0.0009	(0.002)	-0.0021	(0.009)	0.0007	(0.001)
FOMC Rate Decision	0.0358***	(0.005)	0.0000	(0.000)	0.0425***	(0.000)	0.0000	(.)	0.0359***	(0.005)	0.0000	(0.000)	0.0358***	(0.005)	0.0000	(0.000)
Observations	371260		455838		105224		590101		389531		437563		435001		392098	
Adj. R-squared	0.0047		0.0055		0.005		0.0025		0.0038		0.004		0.0037		0.0045	

Notes: The coefficient estimates of macroeconomic surprises from subsamples of global financial expansion (column "Expansion") and contraction (column "Contraction") defined by four alternative measures of the global financial conditions; namely global financial return factors (Miranda-Agrippino and Rey, 2020) in column [1], the US treasury premium (Du, *et al*., 2018) in column [2], financial intermediary returns (He, *et al*., 2017) in column [3], and the return of the S&P 500 index in column [4] are reported under the heading of "coefficient." The corresponding heteroskedasticity and autocorrelation consistent standard errors (Newey and West, 1987) are presented under the heading of "s.e.". Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *.

Appendix D: Contraction Subsample Defined by the US Fed Funds Rate Larger Than 2%

	0		>2	
	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news				
GDP	-0.0101*	(0.005)	-0.0456***	(0.008)
IPI	-0.0079***	(0.003)	0.0092	(0.006)
Retail Sales	-0.0069***	(0.002)	-0.0419***	(0.015)
Trade Balance	-0.0113***	(0.003)	-0.0073	(0.017)
CPI	-0.0019	(0.003)	-0.0495***	(0.007)
PMI	-0.0057***	(0.002)	-0.0640	(0.051)
PPI	0.0028	(0.002)	-0.0054	(0.006)
Aggregate Financing	-0.0037	(0.002)	-0.0142*	(0.008)
Foreign Reserves	-0.0003	(0.002)	0.0101	(0.011)
M2	-0.0008	(0.001)	0.0052	(0.012)
New CNY lending	-0.0006	(0.003)	0.0009	(0.010)
US macro news				
GDP Advance	0.0075*	(0.004)	0.0189	(0.034)
GDP Second	0.0055***	(0.002)	0.0748	(0.089)
GDP Third	0.0024	(0.003)	0.0279	(0.067)
Capacity Utilization	0.0017	(0.002)	0.0182	(0.016)
Nonfarm Payrolls	0.0207	(0.013)	0.5691**	(0.256)
IP	0.0006	(0.002)	-0.0044	(0.019)
PMI	0.0049**	(0.002)	0.0350***	(0.011)
Personal Income	0.0028**	(0.001)	-0.0110	(0.058)
Retail Sales	0.0015	(0.002)	0.0491**	(0.025)
Unemployment Rate	0.0138	(0.013)	-0.2513*	(0.134)
Existing Home Sales	0.0018	(0.001)	-0.0074	(0.006)
New Home Sales	0.0014	(0.002)	0.0229***	(0.007)
Personal Consumption	-0.0022	(0.003)	-0.0076	(0.066)
Personal Spending	0.0015	(0.002)	-0.0073	(0.025)
Business Inventories	0.0007	(0.001)	-0.0199***	(0.007)
Construction Spending	0.0017	(0.002)	0.0413	(0.025)
Durable Goods Orders	0.0006	(0.001)	0.0006	(0.016)
Factory Orders	0.0024	(0.002)	0.0170***	(0.005)
Wholesale Inventories	-0.0008	(0.001)	-0.0011	(0.008)
Trade Balance	-0.0009	(0.001)	-0.0033*	(0.002)
CPI	0.0142***	(0.005)	0.2176***	(0.053)
Chicago PMI	-0.0021	(0.002)	-0.0134	(0.012)
PCE Core Deflator	-0.0043*	(0.002)	0.0280**	(0.012)
PPI	0.0009	(0.002)	0.0190	(0.030)
Consumer Confidence	0.0028*	(0.002)	0.0091	(0.006)
Housing Starts	0.0016	(0.001)	-0.0024	(0.004)
Leading Economic Index	0.0022**	(0.001)	-0.0036	(0.005)
Philly Fed Index	0.0024	(0.002)	0.0135**	(0.006)
MCSI	0.0011	(0.001)	0.0152*	(0.008)
Continuing Claims	-0.0005	(0.001)	-0.0934	(0.089)
Initial Jobless Claims	0.0011	(0.001)	-0.0641	(0.098)
FOMC Rate Decision	0.0000	(0.000)	0.0000	(0.000)
Observations	448344		78414	
Adj. R-squared	0.0036		0.0202	

Notes: The table reports CNH responses to macroeconomic surprises for a) the subsample defined by the lower bound of the US Fed funds rate is zero (column "0)"), and b) the subsample defined by the lower bound of the US Fed funds rate is larger than 2% (column ">2"). The coefficient estimates are reported under the heading of "coefficient" and the corresponding heteroskedasticity and

autocorrelation consistent standard errors (Newey and West, 1987) are presented under the heading of "s.e.". Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *.

Appendix E: Effects of Macroeconomic Surprises: The 100-Minute Window Sample

Table E1. Effects of Macroeconomic Surprises

	[1] Full sample		[2] Global financial expansion		[3] Global financial contraction	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP	-0.0147***	(0.005)	-0.0099*	(0.005)	-0.0263**	(0.011)
IPI	-0.0132***	(0.003)	-0.0079***	(0.003)	-0.0086	(0.008)
Retail Sales	-0.0117***	(0.003)	-0.0072***	(0.002)	-0.0262***	(0.010)
Trade Balance	-0.0100***	(0.003)	-0.0113***	(0.003)	-0.0086	(0.006)
CPI	-0.0044*	(0.003)	-0.0020	(0.003)	-0.0068*	(0.004)
PMI	-0.0095**	(0.005)	-0.0055***	(0.002)	-0.0391**	(0.016)
PPI	0.0003	(0.003)	0.0026	(0.002)	-0.0030	(0.006)
Aggregate Financing	-0.0040	(0.003)	-0.0037	(0.003)	-0.0036	(0.004)
Foreign Reserves	-0.0032	(0.003)	-0.0002	(0.002)	-0.0208***	(0.007)
M2	-0.0004	(0.002)	-0.0008	(0.001)	-0.0033	(0.005)
New CNY lending	-0.0032	(0.003)	-0.0006	(0.003)	-0.0044	(0.005)
US macro news						
GDP Advance	0.0189***	(0.007)	0.0075*	(0.004)	0.0358***	(0.009)
GDP Second	0.0069***	(0.002)	0.0053***	(0.002)	0.0089	(0.007)
GDP Third	0.0035	(0.003)	0.0025	(0.003)	0.0151*	(0.009)
Capacity Utilization	0.0010	(0.003)	0.0016	(0.002)	-0.0034	(0.007)
Nonfarm Payrolls	0.0188	(0.014)	0.0210	(0.013)	0.5796***	(0.165)
IP	0.0030	(0.003)	0.0008	(0.002)	0.0135**	(0.007)
PMI	0.0114***	(0.002)	0.0049**	(0.002)	0.0230***	(0.004)
Personal Income	0.0046***	(0.001)	0.0032***	(0.001)	0.0243	(0.031)
Retail Sales	0.0037*	(0.002)	0.0015	(0.002)	0.0679***	(0.020)
Unemployment Rate	0.0101	(0.013)	0.0139	(0.013)	-0.1442**	(0.064)
Existing Home Sales	0.0001	(0.001)	0.0018	(0.001)	-0.0014	(0.002)
New Home Sales	0.0066*	(0.003)	0.0011	(0.002)	0.0127**	(0.006)
Personal Consumption	-0.0011	(0.003)	-0.0022	(0.003)	-0.0014	(0.007)
Personal Spending	0.0044	(0.003)	0.0017	(0.002)	0.0163	(0.016)
Business Inventories	-0.0007	(0.001)	0.0006	(0.001)	-0.0063	(0.004)
Construction Spending	0.0037	(0.003)	0.0017	(0.002)	0.0077	(0.005)
Durable Goods Orders	0.0028*	(0.001)	0.0006	(0.001)	0.0083**	(0.004)
Factory Orders	0.0054***	(0.002)	0.0023	(0.002)	0.0106***	(0.003)
Wholesale Inventories	-0.0014	(0.002)	-0.0009	(0.001)	-0.0022	(0.003)
Trade Balance	-0.0027	(0.002)	-0.0006	(0.001)	-0.0108	(0.010)
CPI	0.0499***	(0.012)	0.0142***	(0.005)	0.1072***	(0.027)
Chicago PMI	-0.0022	(0.002)	-0.0023	(0.002)	-0.0021	(0.005)
PCE Core Deflator	0.0026	(0.003)	-0.0044*	(0.002)	0.0131**	(0.006)
PPI	0.0063**	(0.003)	0.0011	(0.002)	0.0167*	(0.009)
Consumer Confidence	0.0057***	(0.001)	0.0026*	(0.002)	0.0107***	(0.003)
Housing Starts	0.0041**	(0.002)	0.0016	(0.001)	0.0051	(0.003)

Leading Economic Index	0.0017	(0.002)	0.0025**	(0.001)	0.0004	(0.004)
Philly Fed Index	0.0051***	(0.002)	0.0023	(0.002)	0.0095**	(0.004)
MCSI	0.0026**	(0.001)	0.0013	(0.001)	0.0057	(0.004)
Continuing Claims	-0.0012	(0.001)	-0.0004	(0.001)	-0.0286*	(0.017)
Initial Jobless Claims	0.0007	(0.001)	0.0012	(0.001)	-0.0884***	(0.028)
FOMC Rate Decision	0.0359***	(0.005)			0.0359***	(0.005)
Observations	68350		36699		31651	
Adj. R-squared	0.0202		0.0115		0.0487	

Notes: The table reports the estimation results of equation (2) in the "Coefficient" column. Columns [1], [2], and [3] show the results for the full sample, the global financial expansion subsample, and the global financial contraction subsample, respectively. Heteroskedasticity and autocorrelation consistent standard errors (Newey and West, 1987) are presented in the column "s.e." Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *.

Table E2. Effects of Positive Macroeconomic Surprises

	[1] Full sample		[2] Global financial expansion		[3] Global financial contraction	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP	-0.0078	(0.008)	-0.0043	(0.009)	-0.0077	(0.010)
IPI	-0.0037	(0.004)	0.0014	(0.002)	-0.0143	(0.009)
Retail Sales	0.0012	(0.004)	0.0003	(0.002)	0.0069	(0.014)
Trade Balance	-0.0075	(0.005)	-0.0163***	(0.004)	0.0025	(0.008)
CPI	0.0071	(0.005)	0.0081	(0.005)	0.0061	(0.008)
PMI	-0.0057***	(0.002)	-0.0045***	(0.001)	-0.0213*	(0.012)
PPI	0.0043*	(0.002)	0.0028	(0.003)	0.0057*	(0.003)
Aggregate Financing	-0.0036	(0.004)	-0.0055	(0.004)	-0.0013	(0.007)
Foreign Reserves	0.0010	(0.003)	0.0035	(0.003)	-0.0173	(0.013)
M2	0.0007	(0.003)	0.0009	(0.002)	-0.0018	(0.011)
New CNY lending	-0.0018	(0.006)	-0.0013	(0.004)	-0.0024	(0.009)
US macro news						
GDP Advance	0.0045	(0.007)	0.0103**	(0.004)	-0.0231	(0.023)
GDP Second	0.0065**	(0.003)	0.0048**	(0.002)	0.0091	(0.008)
GDP Third	0.0063	(0.004)	0.0052	(0.004)	0.0125	(0.012)
Capacity Utilization	-0.0018	(0.003)	0.0008	(0.004)	-0.0086	(0.008)
Nonfarm Payrolls	0.0071***	(0.002)	0.0058***	(0.001)	0.7512***	(0.240)
IP	0.0047	(0.003)	-0.0001	(0.003)	0.0147**	(0.007)
PMI	0.0101***	(0.003)	0.0029	(0.002)	0.0243***	(0.005)
Personal Income	0.0038***	(0.001)	0.0041***	(0.001)	0.0160	(0.090)
Retail Sales	0.0017	(0.002)	0.0009	(0.002)	0.0520	(0.035)
Unemployment Rate	-0.0898*	(0.046)	-0.0469	(0.047)	-0.3494***	(0.091)
Existing Home Sales	-0.0000	(0.001)	0.0017	(0.002)	-0.0034	(0.003)
New Home Sales	0.0049	(0.005)	0.0002	(0.003)	0.0090	(0.007)
Personal Consumption	-0.0084	(0.005)	-0.0122**	(0.005)	0.0017	(0.013)
Personal Spending	0.0098	(0.011)	0.0012	(0.005)	0.0265	(0.027)
Business Inventories	0.0016	(0.001)	0.0014*	(0.001)	-0.0051	(0.006)
Construction Spending	0.0024	(0.005)	0.0012	(0.002)	0.0233	(0.022)
Durable Goods Orders	0.0006	(0.001)	-0.0004	(0.000)	0.0053	(0.006)
Factory Orders	0.0045*	(0.003)	-0.0006	(0.002)	0.0112**	(0.005)
Wholesale Inventories	-0.0037*	(0.002)	-0.0022	(0.002)	-0.0039	(0.004)
Trade Balance	-0.0046	(0.004)	-0.0004	(0.002)	-0.0152	(0.013)
CPI	0.0489***	(0.014)	0.0171***	(0.005)	0.1179***	(0.033)
Chicago PMI	-0.0005	(0.002)	-0.0046*	(0.003)	0.0056*	(0.003)
PCE Core Deflator	-0.0026	(0.005)	-0.0089**	(0.004)	0.0105	(0.011)
PPI	0.0031	(0.003)	0.0006	(0.004)	0.0112	(0.007)
Consumer Confidence	0.0063***	(0.002)	0.0023	(0.002)	0.0131***	(0.003)
Housing Starts	0.0034*	(0.002)	0.0032*	(0.002)	0.0016	(0.004)
Leading Economic Index	0.0026**	(0.001)	0.0030***	(0.001)	0.0015	(0.004)
Philly Fed Index	0.0034*	(0.002)	0.0008	(0.001)	0.0076*	(0.004)
MCSI	0.0038*	(0.002)	0.0012	(0.002)	0.0088*	(0.005)
Continuing Claims	0.0006	(0.002)	0.0016	(0.002)	-0.0263	(0.028)
Initial Jobless Claims	0.0009	(0.001)	0.0011	(0.001)	-0.1178**	(0.056)

FOMC Rate Decision	0.0293***	(0.000)		0.0294***	(0.000)
Observations	68350		36699	31651	
Adj. R-squared	0.0115		0.0115	0.0301	

Notes: This table reports the coefficient estimates of the positive macroeconomic surprise variables from equation (5) in the "Coefficient" column. Columns [1], [2], and [3] show the results for the full sample, the global financial expansion subsample, and the global contraction subsample, respectively. Heteroskedasticity and autocorrelation consistent standard errors (Newey and West, 1987) are presented in the column "s.e." Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *.

Table E3. Effects of Negative Macroeconomic Surprises

	[1] Full sample		[2] Global financial expansion		[3] Global financial contraction	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Chinese macro news						
GDP	-0.0076	(0.007)	-0.0044	(0.005)	-0.0216***	-0.0044
IPI	-0.0153**	(0.008)	-0.0067	(0.006)	-0.0192	-0.0067
Retail Sales	-0.0072*	(0.004)	-0.0042**	(0.002)	-0.0208	-0.0042**
Trade Balance	-0.0128***	(0.004)	-0.0047	(0.003)	-0.0189***	-0.0047
CPI	-0.0099***	(0.003)	-0.0086**	(0.004)	-0.0117***	-0.0086**
PMI	-0.0351**	(0.015)	-0.0165***	(0.005)	-0.0581*	-0.0165***
PPI	-0.0028	(0.007)	0.0055	(0.004)	-0.0162**	0.0055
Aggregate Financing	-0.0048	(0.004)	-0.0009	(0.004)	-0.0098	-0.0009
Foreign Reserves	-0.0067*	(0.004)	-0.0034	(0.002)	-0.0226***	-0.0034
M2	0.0005	(0.002)	-0.0023	(0.002)	0.0022	-0.0023
New CNY lending	-0.0076**	(0.003)	0.0009	(0.006)	-0.0074	0.0009
US macro news						
GDP Advance	0.0284***	(0.008)	0.0088***	(0.003)	0.0481***	0.0088***
GDP Second	0.0134**	(0.006)	0.0118*	(0.007)	0.0152	0.0118*
GDP Third	0.0033	(0.003)	0.0020	(0.002)	0.0462***	0.0020
Capacity Utilization	0.0022	(0.004)	0.0022	(0.003)	-0.0019	0.0022
Nonfarm Payrolls	0.1749***	(0.046)	0.1491***	(0.046)	0.8005**	0.1491***
IP	0.0023	(0.003)	-0.0007	(0.003)	0.0159	-0.0007
PMI	0.0128***	(0.004)	0.0078*	(0.004)	0.0199***	0.0078*
Personal Income	-0.0120	(0.014)	-0.0110	(0.014)	-0.0159	-0.0110
Retail Sales	0.0092	(0.006)	0.0040	(0.003)	0.0440	0.0040
Unemployment Rate	-0.0064***	(0.002)	-0.0058***	(0.001)	-0.1301	-0.0058***
Existing Home Sales	-0.0000	(0.001)	0.0009	(0.002)	-0.0002	0.0009
New Home Sales	0.0083	(0.005)	0.0016	(0.002)	0.0195**	0.0016
Personal Consumption	-0.0005	(0.001)	0.0008	(0.001)	-0.0079*	0.0008
Personal Spending	0.0019	(0.002)	0.0020	(0.002)	0.0007	0.0020
Business Inventories	-0.0057**	(0.002)	-0.0017	(0.002)	-0.0134***	-0.0017
Construction Spending	-0.0007	(0.003)	-0.0003	(0.003)	-0.0021	-0.0003
Durable Goods Orders	0.0062**	(0.003)	0.0026*	(0.001)	0.0135**	0.0026*
Factory Orders	0.0065***	(0.002)	0.0049*	(0.003)	0.0096***	0.0049*
Wholesale Inventories	0.0016	(0.002)	0.0010	(0.002)	0.0034	0.0010
Trade Balance	-0.0007	(0.003)	-0.0008	(0.002)	-0.0029	-0.0008
CPI	0.0517**	(0.023)	0.0056	(0.005)	0.0932**	0.0056
Chicago PMI	-0.0044	(0.005)	0.0010	(0.003)	-0.0119	0.0010
PCE Core Deflator	0.0047	(0.004)	-0.0028	(0.003)	0.0168**	-0.0028
PPI	0.0093*	(0.005)	0.0015	(0.002)	0.0235	0.0015
Consumer Confidence	0.0044*	(0.002)	0.0032	(0.003)	0.0057	0.0032
Housing Starts	0.0027	(0.003)	-0.0014	(0.002)	0.0079**	-0.0014
Leading Economic Index	-0.0004	(0.004)	-0.0006	(0.001)	-0.0006	-0.0006
Philly Fed Index	0.0084**	(0.004)	0.0035	(0.004)	0.0208***	0.0035
MCSI	0.0016	(0.002)	0.0013	(0.001)	0.0028	0.0013
Continuing Claims	-0.0021**	(0.001)	-0.0022**	(0.001)	-0.0326	-0.0022**
Initial Jobless Claims	-0.0051	(0.008)	0.0104*	(0.006)	-0.1425***	0.0104*

FOMC Rate Decision	0.0425***	(0.000)		0.0424***	
Observations	63850		36699	31651	36699
Adj. R-squared	0.0137		0.0126	0.024	0.0126

Notes: This table reports the coefficient estimates of the negative macroeconomic surprise variables from equation (5) in the "Coefficient" column. Columns [1], [2], and [3] show the results for the full sample, the global financial expansion subsample, and the global contraction subsample, respectively. Heteroskedasticity and autocorrelation consistent standard errors (Newey and West, 1987) are presented in the column "s.e." Statistical significance at the 1%, 5% and 10% level is indicated, respectively, by ***, **, and *.