Capital Flow Responses to Managed Exchange Rate Moves: Daily Evidence from China

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Abstract

We study how cross-border equity flows respond to changes in the managed exchange rate, using China's daily RMB fixing announcements. We measure fixing news from offshore currency repricing around the 9:15 a.m. announcement, before continuous onshore trading begins. We examine how this affects changes in stock-level foreign holdings through the China-Connect Stock Trading Program within the trading day. The key finding is that a one-standard-deviation RMB appreciation shock generates about 0.25 percentage points higher growth in foreign-held shares, and the increase persists over the following two weeks. The response to depreciation news is weaker and imprecisely estimated, and the appreciation response is larger when the RMB is already weak. Appreciation news also predicts a stronger subsequent RMB and coincides with higher equity returns, consistent with an expectations channel. The results suggest that fixing communication shapes foreign portfolio demand, a capital-flow margin of exchange-rate management.

Keywords: Exchange Rate, Capital Flows, RMB Central Parity, High-Frequency Identification

JEL Classification: F31, F32, F21, G15, E58

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1 Introduction

Few emerging-market central banks let their currencies float freely. Managed and intermediate arrangements remain the norm rather than the exception (Calvo and Reinhart, 2002; Ilzetzki, Reinhart and Rogoff, 2019), and a central motive for managing the exchange rate is the capital account: policymakers lean against currency movements in part to contain the volatility of international capital flows that accompanies them. Recent policy frameworks make this motive explicit. The integrated policy framework of Basu et al. (2020) and theories of foreign-exchange intervention under financial frictions (Cavallino, 2019; Fanelli and Straub, 2021) treat exchange-rate management as a tool for addressing capital-flow externalities. Yet the quantity at the heart of these frameworks has proved difficult to measure: when a central bank moves its managed exchange rate, how do international portfolio flows respond, how quickly, and in which direction?

Answering this question empirically is hard. Exchange rates, capital flows, and policy actions are all endogenous and often jointly determined. A depreciation accompanied by foreign selling could reflect outflows that weaken the currency, investors responding to currency news, a common deterioration in fundamentals, or a policy response to any of these. The way these variables are measured compounds the challenge. Standard capital-flow data are available at monthly or quarterly frequency and in aggregate, while exchange rates and policy signals can move within the day. At these frequencies, the response of capital flows to currency policy is hard to separate from the many other forces that move both.

This paper estimates the response of cross-border equity flows to changes in a managed exchange rate at daily frequency, using a precisely timed announcement set by the policy authority. We exploit two institutional features of China's nominal exchange-rate management system. The first is the daily CNY/USD central parity, or "fixing," which the People's Bank of China (PBOC) announces at 9:15 a.m. on each trading day (see the description of the two-pillar framework in Jermann, Wei and Yue, 2022). The fixing anchors the onshore exchange rate trading band and is the primary instrument through which the exchange rate is managed. Note that the "fixing" os announced before continuous trading begins in both the onshore spot exchange rate and A-share stock trading markets. The second is the China-Connect Program, through which international investors hold mainland stocks via Hong Kong, and which, until August 2024, disclosed foreign holdings of each eligible stock at the end of every trading day.

We measure RMB exchange rate fixing shocks using changes in offshore RMB instruments—non-deliverable forwards across the term structure and the CNH spot rate—within a twenty-minute window around the fixing announcement. These market-based measures capture investors' reassessment of the currency around the announcement, and follows in spirit the high-frequency identification approach developed for monetary policy by Gertler and Karadi (2015) and Nakamura and Steinsson (2018). We complement them with the gap between the announced fixing and the pre-announcement Bloomberg consensus forecast. Because the survey collects commercial banks' estimates of the fixing implied by the two-pillar rule, this gap isolates the component of the announced fixing that departs from the rule-implied benchmark—the discretionary component of exchange-rate management. We then relate these measures to net northbound purchases and to stock-level changes in foreign share holdings during the ensuing trading session.

Our central finding is that foreign equity flows respond in a statistically and economically significant way to news about the managed exchange rate within the same trading day. A one-standard-deviation depreciation shock measured from NDF prices is associated with RMB 0.37 billion lower daily net northbound purchases (i.e., net non-resident purchase of mainland Chinese stocks), and with a 0.026 percentage-point decline in the growth of cumulative net purchases—about one-sixth of its daily average of 0.16 percent.

The stock-level data show active portfolio rebalancing: growth in the number of shares held by foreign investors falls by about 0.11 percentage points, after controlling for firm characteristics, recent returns, global risk sentiment, and the onshore–offshore exchange-rate differential. A weaker-than-expected fixing relative to banks' rule-implied benchmark produces a response of the same sign, with statistically significant declines in the growth of both foreign-held shares and their market value. The timing of the response points to the announcement itself. About three-quarters of the variance of the window shock comes from repricing immediately following the 9:15 a.m. fixing announcement, the flow response is concentrated in this post-announcement component. In comparison, comparable windows outside the announcement window yield statistically insignificant flow estimates.

The response is asymmetric, and the asymmetry is informative about exchange-rate management. Favorable fixing news—an RMB appreciation shock—is followed by significantly greater increase in foreign-held Chinese shares, of approximately 0.25 percentage points per

standard deviation for both market-based measures. Depreciation news is followed by lower holdings growth, but this response is smaller and statistically insignificant. The appreciation response is substantially stronger when the RMB is already weak before the announcement, although this weak-currency state is concentrated in a small number of episodes, so we view this last pattern of state-dependence as suggestive. The increase in holdings also persists, with foreign positions remaining elevated two trading weeks after appreciation news. To the extent that fixing news reflects exchange-rate management or communication, these findings suggest that favorable currency news can encourage a sustained increase in foreign holdings, with a stronger announcement-day response when support for the RMB is particularly relevant.

We then look into the mechanisms underlying these empirical findings. Investors appear to respond because the fixing changes their outlook for the currency. Depreciation shocks predict further depreciation of the onshore market exchange rate over the following two weeks, as well as weaker subsequent fixings. They also coincide with lower aggregate Chinese A-share stock returns. For an unhedged foreign investor, both lower the expected foreign-currency return on mainland equities. Interestingly, domestic interest rates, by contrast, respond little, so the evidence does not point to news about future monetary tightening. The flow response survives removing the component of the shock that is predictable from the inputs of the fixing rule and from observable macro-financial conditions, which together explain only about 1–2 percent of its variation. The results also hold across alternative event windows and fixed-effect structures, after retaining stock-days with unchanged positions, and for holdings routed through foreign custodians, which account for over 90 percent of recorded northbound holdings. Positions routed through these custodians adjust frequently, supporting the use of daily holdings to study investors' responses to fixing news.

Related Literature. Our estimates contribute to four strands of literature. First, a large literature studies the drivers of portfolio flows to emerging markets, distinguishing global "push" factors from domestic "pull" factors (Fratzscher, 2012; Forbes and Warnock, 2012; Koepke, 2019) and documenting the role of the global financial cycle (Rey, 2015; Miranda-Agrippino and Rey, 2020). We provide announcement-based evidence that domestic exchange-rate communication shapes foreign equity demand at a daily frequency. Stock-level share quantities reveal active portfolio adjustment within a single trading session, separately from equity-price valuation effects. Our findings highlight exchange-rate management as a domestic influence on foreign investment alongside the global factors emphasized in this literature.

Second, we contribute to research on exchange rates and portfolio flows. In equilibrium models, investors rebalance in response to currency risk, and their rebalancing moves exchange rates (Hau and Rey, 2006; Gabaix and Maggiori, 2015; Itskhoki and Mukhin, 2021; Camanho, Hau and Rey, 2022). Empirical work examines how order flow and international portfolio rebalancing affect currency prices (Evans and Lyons, 2002; Camanho, Hau and Rey, 2022). We provide evidence on the reverse link, from currency news to foreign equity allocation, using repricing around a scheduled policy announcement before continuous domestic trading begins. Our estimates quantify the magnitude, direction, and persistence of the portfolio response and show how it varies with the initial state of the currency.

Third, research on exchange-rate management and foreign-exchange intervention evaluates effectiveness through currency movements, examining the expectations channel, intervention endogeneity, and accompanying communication (Dominguez and Frankel, 1993; Kearns and Rigobon, 2005; Fratzscher et al., 2019; Candian, De Leo and Gemmi, 2023). Closely related, Chen and Qiu (2023) show how regime changes in the RMB fixing rule can shape expectations and deter self-fulfilling depreciation. We provide complementary evidence on the portfolio-allocation margin by measuring foreign equity responses to fixing shocks. Appreciation news is followed by a persistent increase in foreign holdings, with a stronger announcement-day response when the RMB is weak. These findings provide suggestive evidence of a stabilizing feedback, through which fixing communication attracts foreign demand that may complement efforts to contain depreciation pressure.

Finally, research on China's exchange-rate regime, parallel onshore and offshore currencies, and selective market access examines how China accommodates international investment while retaining control over its currency and capital account (Frankel and Wei, 2007; Jermann, Wei and Yue, 2022; Clayton et al., 2022; Bahaj and Reis, 2024). Studies of the Connect programs document their implications for market efficiency and information transmission (Ma, Rogers and Zhou, 2019; Bian et al., 2023). We connect these lines of work by showing how the daily fixing announcement shapes the portfolio decisions of foreign investors admitted through China's financial opening. The fixing thereby links exchange-rate management to foreign demand for RMB assets within a partially open financial system.

The remainder of the paper proceeds as follows. Section 2 describes the institutional setting. Section 3 presents the data and empirical strategy. Section 4 reports the flow responses, their timing, asymmetry, persistence, and robustness. Section 5 examines what fixing news predicts for the currency, equity returns, and domestic interest rates, and what investors may learn from it. Section 6 concludes. Appendix E reports evidence that exposure to fixing news is priced in the cross-section of A-share returns.

2 Institutional Details

This section provides an overview of the institutional framework underlying China's financial system, focusing on two key components: the China-Connect Program, which facilitates cross-border equity flows, and the mechanism for determining the daily central parity rate of the RMB.

2.1 China-Connect Stock-Trading Program

The China-Connect Program represents a landmark liberalization of China's stock market, establishing direct investment channels between the mainland and Hong Kong exchanges, and representing a partial capital account liberalization.

On April 10, 2014, the China Securities Regulatory Commission (CSRC) and the Hong Kong Securities and Futures Commission jointly announced the initiative, which officially commenced on November 17, 2014. Initially, qualified stocks on the Shanghai Stock Exchange (large and medium capitalization member stocks of the local stock index) became accessible to Hong Kong investors. The program expanded to include the Shenzhen Stock Exchange in December 2016. The program operates in both directions. Northbound trading allows Hong Kong and overseas investors to purchase eligible mainland-listed stocks, while southbound trading allows eligible mainland investors to purchase eligible Hong Kong-listed stocks. Our analysis focuses primarily on northbound equity flows, with aggregate southbound flows providing complementary evidence on mainland investors' cross-border portfolio adjustment.

Northbound trading provides both institutional and retail investors from Hong Kong and overseas with access to eligible Chinese A-shares. The eligible stock universe expanded during

our sample period. On March 13, 2023, the program extended Northbound eligibility to qualifying constituents of the SSE A Share Index and the SZSE Composite Index.[1]

The program has experienced remarkable growth since its inception. Figure 1 illustrates the evolution of aggregate capital inflows into the mainland stock market through the China-Connect Program. Panel (a) plots cumulative net northbound purchases, which expanded from approximately 200 billion RMB to nearly 2 trillion RMB over the plotted period. The daily percentage change in this cumulative series averages around 0.16%, with a standard deviation of around 0.46%. Previous research documents the impact of foreign participation on domestic market efficiency (Ma, Rogers and Zhou, 2019).

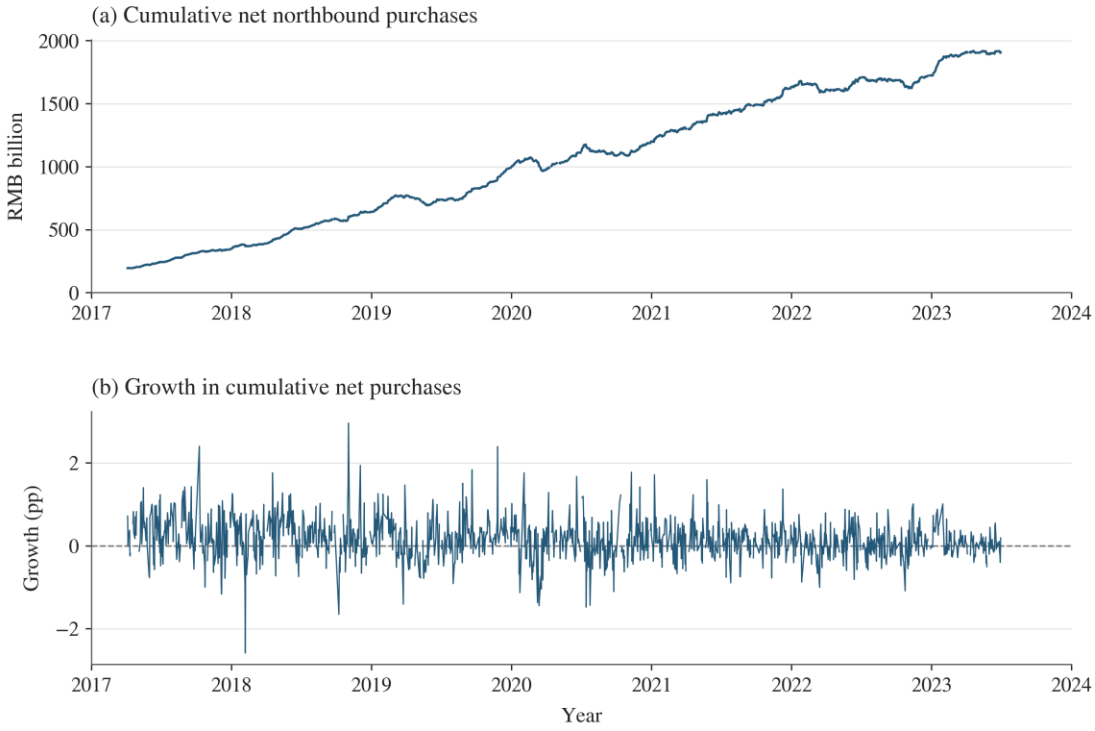


Figure 1: Equity Inflows to the Mainland from the China-Connect Program

Notes: This figure presents capital inflows to the mainland A-share market from the China-Connect Program. Panel (a) shows cumulative net northbound purchases in billions of RMB. Panel (b) shows the daily percentage change in that cumulative series.

International investors access A-shares through intermediaries in Hong Kong, with cross-border clearing and settlement handled through the link between Hong Kong Securities Clearing Company Limited (HKSCC) and China Securities Depository and Clearing Corporation Limited

[1]See HKEX, *Expansion of Stock Connect Eligible Stocks to Take Effect 13 March*, March 3, 2023.

(ChinaClear). The underlying shares are denominated in RMB, so their returns in an investor's home currency remain exposed to exchange rate movements unless hedged, regardless of the currency used to fund the investment.[2]

During our sample period, daily stock-level records report the end-of-day number of shares held through Northbound Stock Connect.[3] We obtain these holdings records from WIND and combine them with daily closing prices from CSMAR to construct the market value of each position. These data allow us to examine daily changes in investors' share positions and their market value following exchange rate news.

2.2 The RMB Fixing Mechanism

We follow the institutional description and policy-rule representation in Jermann, Wei and Yue (2022) (JWY hereafter). The central parity rate is announced at 9:15 a.m. each business day and sets the midpoint of the onshore RMB/U.S. dollar interbank trading band, which is ±2% throughout our sample. Before the announcement, quoting banks, which are market makers in the onshore FX market, consider the previous closing rate, reflecting market supply and demand, together with overnight movements of the dollar against the reference currency basket. The China Foreign Exchange Trade System (CFETS) aggregates their quotes and publishes the fixing under the authorization of the PBOC.[4]

Figure 2 shows that the observed onshore spot rate generally lies well inside the fixing's ±2% trading band during our sample, although it approaches the depreciation-side boundary on a few dates in 2022. This pattern is consistent with the generally small closing-rate deviations documented by Jermann, Wei and Yue (2022) in their Figure 1. Away from the boundaries, a change in the fixing does not mechanically require a corresponding adjustment in the spot

[2]Northbound trades are executed and settled in RMB. HKSCC settles with both participants in its Central Clearing and Settlement System (CCASS) and ChinaClear in RMB. Investors' funding and currency conversion arrangements are distinct from this clearing process. Under the arrangement described in the HKMA's June 2019 guidance, investors may fund Northbound investments with offshore RMB or foreign currencies. Those using foreign currencies can access conversion services through eligible brokers and designated Hong Kong settlement banks; the bank providing conversion also handles the broker's related money settlement with HKSCC. See HKEX's *Information Book for Investors*, Sections 3.7, 4.1, and 4.6, and the HKMA's *Currency Conversion Arrangement Involving Onshore RMB under Northbound Stock Connect* (June 21, 2019). Appendix Figure A1 illustrates the trading and settlement links.

[3]Northbound shareholding disclosure subsequently changed from daily to quarterly in 2024. See HKEX, *Adjustments to Market Data Dissemination in relation to Northbound and Southbound Trading under Stock Connect*.

[4]CFETS describes the fixing as a weighted average of market-maker quotes after excluding the highest and lowest quotes. CFETS determines the aggregation weights using trading volumes and other indicators of market-making performance. See its *Parity Rate Formation Mechanism*.

transaction price. The announcement can nevertheless affect market prices by conveying information about the currency outlook and policy intentions. This gives the fixing a potential informational role even when the trading-band constraint is not binding.

JWY represent the two-pillar rule as

$$S_{t+1}^{CP} = (S_t^{CL})^{1-\omega_{NT}} (S_{t+1}^{NT})^{\omega_{NT}} \quad (1)$$

Here, S_t^{CL} is the closing-rate reference at 4:30 p.m. on day t, and S_{t+1}^{NT} is the nighttime component of the basket pillar. Following their equation (8), this component is constructed as

$$S_{t+1}^{NT} = S_t^{CP} \left(\frac{X_{t+1,7:30am}}{X_{t,4:30pm}}\right)^{1-w_{USD}}$$

where X is the U.S. dollar index implied by the reference currency basket and w_{USD} is the dollar's weight in that basket. The nighttime component adjusts the previous fixing for movements of the dollar against the basket's non-dollar currencies between 4:30 p.m. on the previous business day and 7:30 a.m.[5] JWY construct the reference using half-hourly Bloomberg BFIX exchange rates and find that the rule fits fixing changes well. For the CFETS basket, most adjusted R^2s are above 85%.

A good empirical fit still leaves room for information to be revealed at the announcement. The individual quotes submitted by market makers and their aggregation weights are not publicly observed. The announced fixing reveals the aggregate outcome of this process. It may convey information about market-wide currency conditions reflected in banks' assessments, as well as the authorities' approach to exchange-rate management.

The two-pillar representation does not capture all adjustments to the fixing. During our sample, PBOC can use a "countercyclical factor" to deviate from the rate implied by the two-pillar framework, intended to dampen procyclical market sentiment. The factor was introduced in May 2017, suspended in January 2018, reintroduced in August 2018, and reportedly phased out by quoting banks in October 2020. Its exact calibration were not publicly disclosed, so adjustments of this kind—together with other departures of the announced fixing from the rule-implied benchmark—are a natural source of the news revealed at the announcement.

[5]This 15-hour reference window has applied since February 20, 2017, which covers our sample period.

Market commentary also treats fixing announcements as informative. Bloomberg News describes this interpretation explicitly:[6]

> "A reference rate that's significantly stronger or weaker than the market's expectations is typically considered a signal from Beijing."

Publishing the fixing can thus change expectations even in the absence of a contemporaneous FX purchase or sale by the PBOC. Its scheduled release before continuous onshore trading provides an opportunity to identify the information reaching investors through this mechanism. In Section 3.1, we measure offshore repricing around the announcement and, under the event-window identifying assumption, use it to study the response of international equity flows.

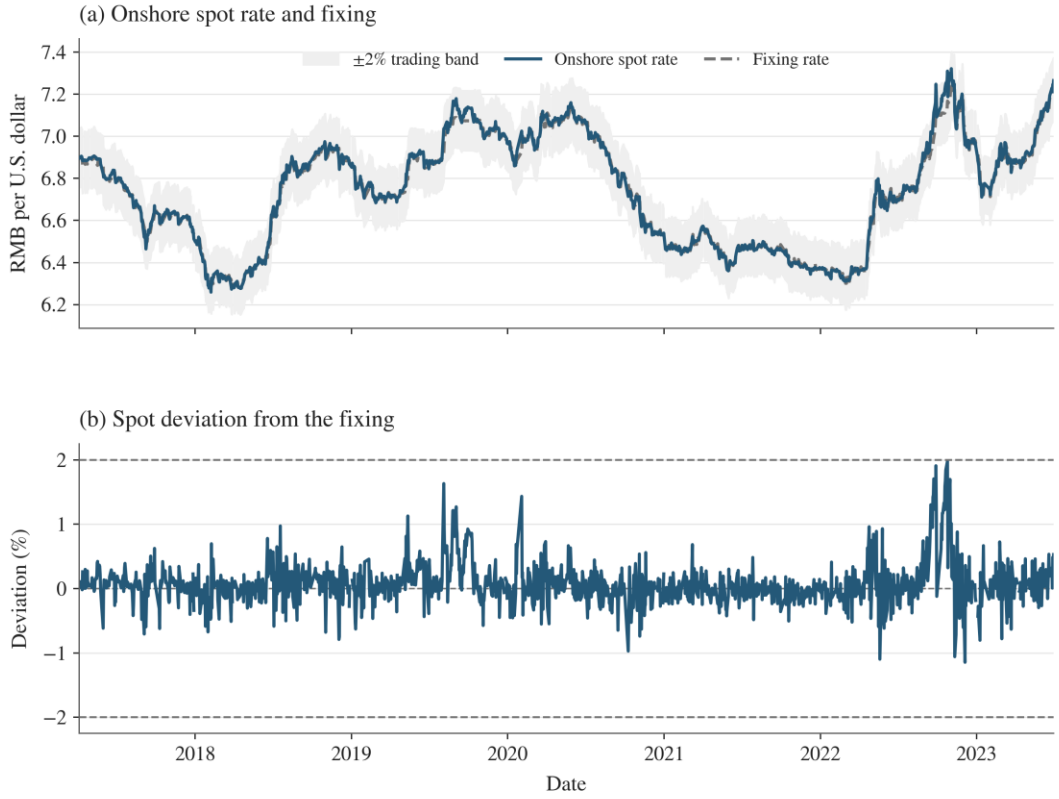


Figure 2: The Onshore Spot Rate, the Fixing, and the Trading Band

Notes: Panel (a) plots the daily onshore USD/CNY spot midpoint and the announced fixing, expressed as RMB per U.S. dollar. The shaded area indicates the fixing's ±2% trading band. Panel (b) plots $100(S_t/S_t^{CP} - 1)$, where S_t is the spot rate and S_t^{CP} is the fixing. Positive values indicate a weaker spot RMB relative to the fixing. Dashed horizontal lines mark the band boundaries. The sample covers April 2017–June 2023.

[6]Bloomberg News, "Here Are the Tools That China Uses to Manage the Yuan: QuickTake," January 9, 2025, Section 1.

3 Empirical Strategy

This section describes the empirical strategy, including the construction of exchange rate shocks, the measurement of equity flows, and the econometric specification.

3.1 Construction of Exchange Rate Shocks

We measure exchange-rate news around the daily fixing announcement using high-frequency movements in offshore RMB prices. Following the high-frequency identification approach of Nakamura and Steinsson (2018), we construct announcement-window measures from market exchange rate changes between 9:05 a.m. and 9:25 a.m. and relate them to foreign investors' equity-position adjustments during the same trading day.

The identifying assumption is that, conditional on the controls, other news arriving within the event window does not systematically drive both offshore exchange-rate repricing and same-day equity flows. Several institutional features support this identifying assumption. First, the 9:15 a.m. fixing announcement precedes continuous onshore spot exchange rate and A-share stock trading, which begin at 9:30 a.m., limiting contemporaneous feedback from these markets. Second, northbound orders can be submitted from 9:10 a.m. and enter the opening call auction from 9:15 a.m. to 9:25 a.m. Orders are collected during this period and matched at its close, so no executed equity prices are formed before 9:25 a.m. These arrangements limit feedback from executed equity trades during most of our event window. Identification also requires that auction-order information unrelated to the fixing does not systematically drive both offshore exchange-rate repricing and same-day equity flows.

Other markets are also active during our window. Hong Kong index futures begin their day session at 9:15 a.m., and indicative matching prices from the A-share opening call auction are disseminated between 9:15 and 9:25 a.m. Equity news arriving through these channels could move offshore RMB prices and foreign flows together. Three features of our evidence limit this concern. The flow response loads on post-announcement repricing rather than on repricing before 9:15 a.m. (Section 4.4). A weaker-than-expected fixing relative to the pre-announcement survey benchmark, a measure tied to the fixing by construction, produces a response of the same sign (Section 4.3). And comparable windows outside the announcement show no relationship with flows (Section 4.8.3). Controlling directly for same-window movements in Hong Kong index futures and regional currencies is a natural further check.

We use changes in USD/CNY non-deliverable forward (NDF) prices and the USD/CNH spot rate to measure offshore RMB repricing around the fixing announcement. Positive changes denote RMB depreciation. These offshore prices can adjust while the onshore spot market is still closed, allowing us to capture investors' immediate response to the announcement. We interpret this repricing as a market-based measure of news conveyed through exchange-rate management, including signals about the PBOC's exchange-rate stance and the future path of the RMB.

These offshore markets have substantial trading activity, making them suitable venues for measuring the response to fixing news before onshore trading begins. Appendix Figures A2 and A3 document their market activity. Within the overlap between the Hong Kong Trade Repository (HKTR) data and our estimation period, reported USD/CNY NDF new-trade turnover averages about USD 27 billion per week. Hong Kong dealers report USD/RMB spot turnover of USD 23.9 billion per day in April 2019 and USD 45.7 billion in April 2022. These figures provide context for the liquidity of the instruments used in our high-frequency identification. The availability of intraday observations and price updates around 9:15 a.m. further indicates that prices can adjust during the fixing window itself.

Our first measure is based on USD/CNY NDF contracts.[7] For each maturity m, we define the fixing-window price change as

$$\Delta p_{t,m}^{NDF} = P_{t,9:25,m}^{NDF} - P_{t,9:05,m}^{NDF} \tag{2}$$

where $P_{t,9:05,m}^{NDF}$ and $P_{t,9:25,m}^{NDF}$ denote the logarithms of the recorded prices selected for the pre- and post-announcement endpoints for maturity m. Appendix A describes details in data processing.

We use NDF contracts with maturities of 1 week, 1 month, 2 months, 3 months, 6 months, and 12 months from Bloomberg.[8] Because the fixing announcement may affect the entire forward term structure, we summarize the six maturity-specific log price changes using their first principal component. We estimate PCA from the correlation matrix on dates with all six changes available, standardizing each maturity before extracting the common component. We orient the component

[7]Standard USD/CNY NDF contracts are cash-settled against the official RMB central parity rate on the contractual valuation date. This settlement reference is defined as CNY SAEC (CNY01) in the 1998 FX and Currency Option Definitions, Annex A, amendment dated March 6, 2006. The direct contractual link to the fixing makes NDF prices particularly suitable for measuring revisions in market expectations about future fixings in response to information conveyed through the fixing formation mechanism.

[8]We focus on contracts with maturities up to one year, as longer-tenor contracts are generally less liquid. For example, see https://www.gfma.org/wp-content/uploads/0/83/91/192/1342a6c0-4d3c-4fd0-882a-712d44ce4703.pdf.

so that a higher value represents an RMB depreciation and denote the resulting standardized measure by

$$\Delta e_t^{s,NDF} = PC1(\Delta p_{t,1W}^{NDF}, \Delta p_{t,1M}^{NDF}, \Delta p_{t,2M}^{NDF}, \Delta p_{t,3M}^{NDF}, \Delta p_{t,6M}^{NDF}, \Delta p_{t,12M}^{NDF}) \quad (3)$$

Our second measure uses the offshore USD/CNH spot exchange rate. We construct the CNH-based shock from the change in the CNH spot rate over the same window from 9:05 a.m. to 9:25 a.m.:

$$\Delta e_t^{s,CNH} = log\ S_{t,9:25}^{CNH} - log\ S_{t,9:05}^{CNH} \quad (4)$$

where $S_{t,\tau}^{CNH}$ denotes the USD/CNH spot exchange rate at time τ. Since the exchange rate is quoted as RMB per U.S. dollar, a positive value of the exchange rate shock corresponds to an RMB depreciation. We standardize both shock series before estimation.

Both measures capture high-frequency market repricing around the fixing announcement, but they rely on different segments of the offshore RMB market. The NDF-based measure aggregates information across the forward term structure, whereas the CNH-based measure captures contemporaneous spot-market repricing. We report both measures in the core flow regressions to assess whether the results are consistent across offshore forward and spot markets.

Figure 3 plots the two shock series and their distributions. Both series are centered near zero and have little serial correlation. At the same time, their correlation on common dates is 0.86, which shows that the two measures capture similar systematic movements in exchange rates around fixing announcements.

Figure 4 shows that price updates in both the NDF and CNH markets increase sharply immediately after the 9:15 a.m. fixing announcement and gradually subside thereafter. This concentration of repricing supports attributing the price movements within our event window to the announcement.

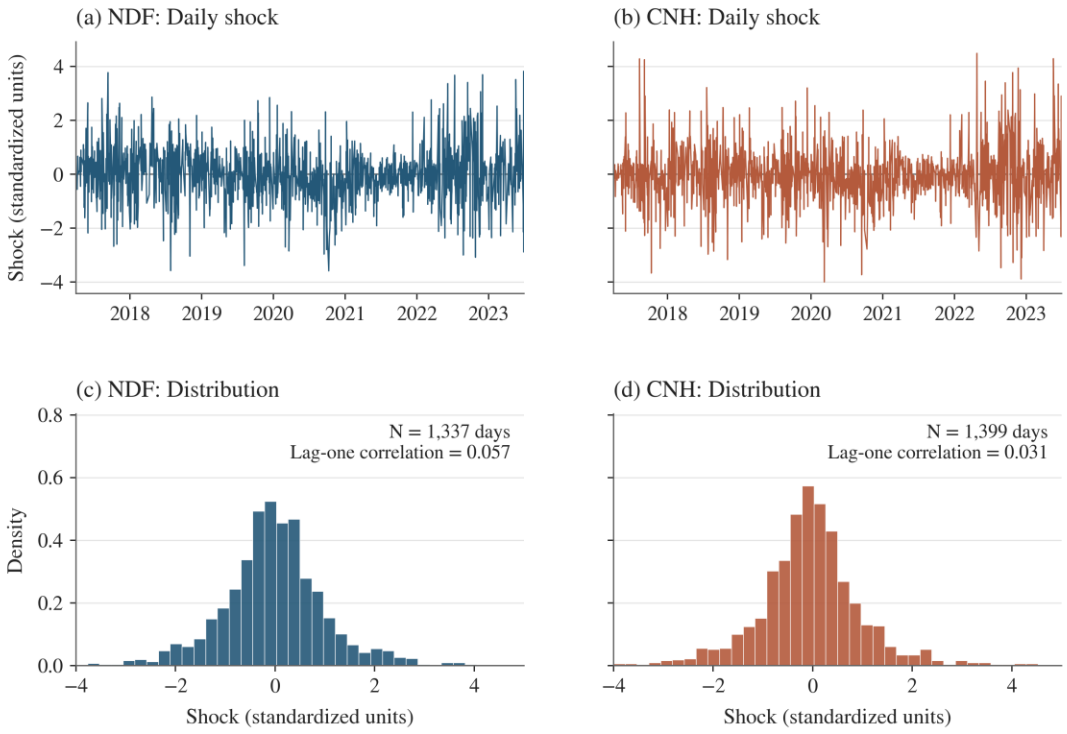


Figure 3: NDF and CNH Announcement-Window Shocks

Notes: Panels (a) and (b) plot the daily standardized NDF and CNH shocks over April 2017–June 2023. Panels (c) and (d) report their density histograms using common bin boundaries. Positive values denote RMB depreciation. Each series uses all available daily observations over this period and retains the normalization of its regression measure. The lag-one correlations use adjacent observations in the daily trading-date sample.

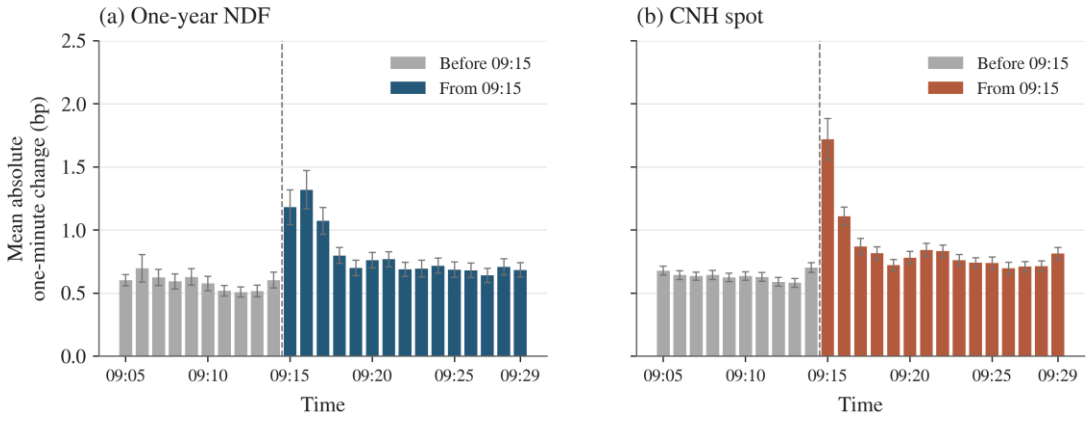


Figure 4: Mean Absolute Price Updates around the Fixing Announcement

Notes: This figure plots average absolute one-minute price changes, in basis points, for the one-year USD/CNY NDF and the offshore USD/CNH spot rate. The vertical dashed line marks the 9:15 a.m. fixing announcement. Appendix A describes five-minute Bloomberg bars.

3.2 Empirical Model

Our baseline specification relates changes in foreign holdings of stock i on date t to the exchange rate shock:

$$\Delta Y_{i,t} = \beta \Delta e_t^s + X'_{i,t}\xi + FEs + \varepsilon_{i,t} \quad (5)$$

Here, $\Delta Y_{i,t}$ is the daily percentage change in either the number of shares held by international investors or the market value of their holdings of stock i through the China-Connect Program. We also report aggregate time-series regressions using net northbound purchases. The exchange rate shock Δe_t^s varies by date and is common across stocks. The shocks are standardized, so in the stock-level regressions β measures the percentage-point change in the daily growth rate of foreign holdings associated with a one-standard-deviation depreciation shock. The baseline includes firm-by-year-quarter fixed effects; aggregate regressions include year-quarter fixed effects. The vector $X_{i,t}$ includes firm-level characteristics and common macro-financial controls, described below. In the stock-level regressions, standard errors are clustered by firm and date. Aggregate flow regressions use heteroskedasticity-robust standard errors.

3.3 Data

We collect daily net northbound purchases and cumulative net northbound purchases from WIND. The aggregate level measure is daily net purchases in billions of RMB. The percentage measure is $100(A_t - A_{t-1})/A_{t-1}$, where A_t is cumulative net northbound purchases. At the stock level, WIND reports the number of shares held through the China-Connect Program. We measure daily changes in these share quantities and in their market values using log differences expressed in percent. Market values are calculated using CSMAR closing prices.

We use a common set of macro-financial controls, denoted by M_t, to account for conditions associated with cross-border equity flows. The controls include: (i) the change in the effective federal funds rate; (ii) the log change in the VIX; (iii) the lagged log change in the market CNY/USD exchange rate, expressed in percentage points; (iv) the change in overnight SHIBOR; and (v) the lagged log differential between the onshore and offshore RMB/USD exchange rates (Bahaj and Reis, 2024). The U.S. interest-rate and VIX series come from FRED, and the exchange-rate series from Datastream. Because the fixing is announced at 9:15 a.m. Beijing time, before the U.S. trading day that shares its calendar date, the changes in the effective federal funds rate and the VIX are measured over the U.S. trading day ending before the announcement. These controls

capture domestic and global funding conditions, risk sentiment, and recent currency-market developments. We report the differential as $CNHCNY_{t-1} = 100[log\ S_{t-1}^{CNY} - log\ S_{t-1}^{CNH}]$, with both rates quoted as RMB per U.S. dollar.

The stock-level controls include: (i) lagged one-week stock return; (ii) lagged one-year stock volatility; (iii) lagged one-year stock turnover; (iv) lagged one-month stock value; (v) quarterly change of fund holding ratio; (vi) quarterly change of QFII holding ratio; and indicators for state ownership and Shanghai-Connect eligibility. These characteristics and daily closing prices come from CSMAR. Appendix A provides further details on data cleaning. The flow sample runs from April 2017 through June 2023.

4 Empirical Results

We examine how exchange-rate news around the fixing announcement shapes foreign demand for RMB equities. Appreciation news is followed by higher foreign holdings through China Connect. Aggregate net purchases establish the scale of the response, while stock-level holdings reveal the underlying portfolio adjustment. Survey-based estimates connect portfolio adjustment directly to the announced fixing. We then examine how the response varies with the timing of repricing, the direction of the news, the initial state of the currency, and the role of custodians. The findings remain robust under several different checks. The results show that appreciation news is associated with stronger foreign demand for RMB assets, particularly when the currency is weak.

4.1 Aggregate Results

We first examine aggregate northbound and southbound flows to compare the responses of international investors purchasing mainland equities and mainland investors purchasing Hong Kong equities.

Northbound flows. Table 1 reports the aggregate counterpart of equation (5). A one-standard-deviation depreciation shock is associated with declines in daily net northbound purchases of RMB 0.37 billion using NDF prices and RMB 0.42 billion using CNH spot prices. Growth in cumulative net purchases falls by 0.026 and 0.036 percentage points, respectively, relative to its daily average of 0.16%. Repricing within the twenty-minute fixing window is therefore followed by an economically meaningful adjustment in the capital foreign investors allocate to mainland equities during the trading day.

Table 1: Exchange Rate Shocks and Aggregate Capital Flows

	Net Purchases (RMB billion)		Growth in Cumulative Purchases (pp)	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^S	−0.368**	−0.415***	−0.026*	−0.036**
	(0.157)	(0.146)	(0.016)	(0.015)
Other control	Yes			
Fixed Effect	Year-Quarter			
N	1,279	1,369	1,260	1,345
R^2	0.11	0.12	0.14	0.15

Notes: The dependent variables are daily net northbound purchases and $100(A_t - A_{t-1})/A_{t-1}$, where A_t is cumulative net northbound purchases. Each column uses the indicated standardized shock; positive values denote RMB depreciation. Each measure uses dates with available observations. Controls are defined in Section 3.3. $*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$. Heteroskedasticity-robust standard errors are in parentheses.

Figure 5 compares the full-sample relationships with estimates excluding shocks between the 40th and 60th percentiles. For both NDF and CNH, the negative slopes remain similar in magnitude: larger depreciation surprises are associated with lower foreign net purchases.

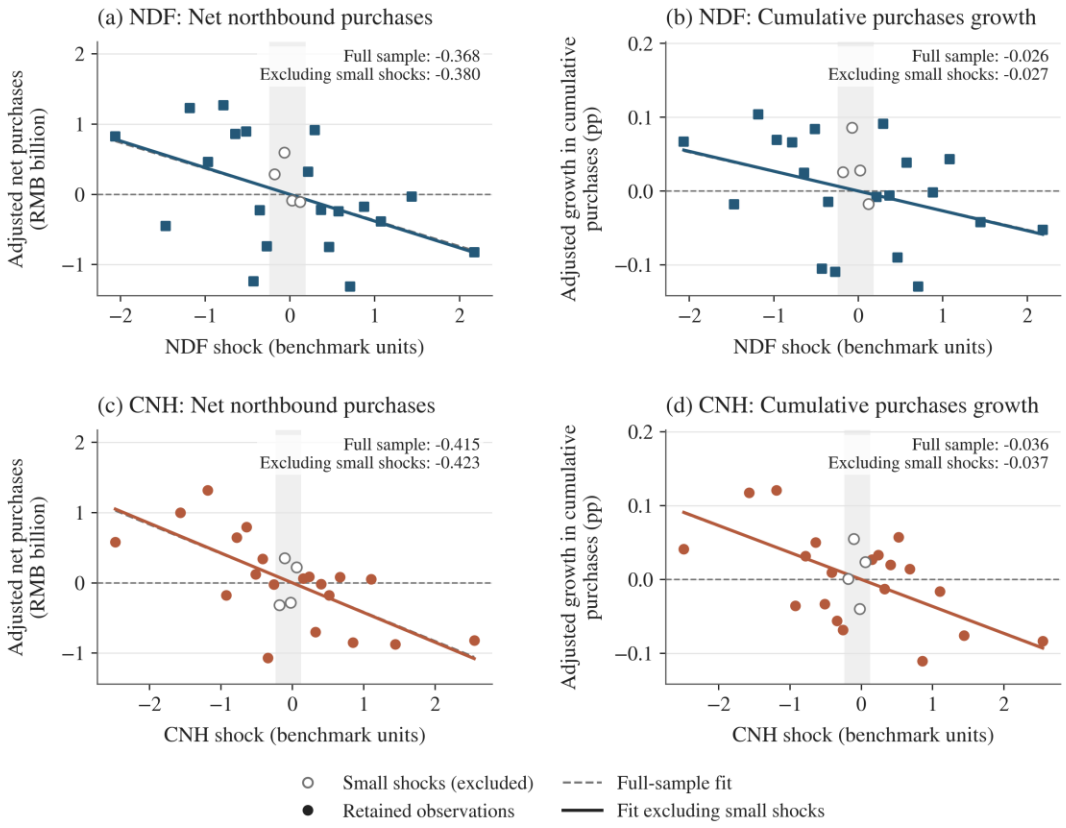


Figure 5: Exchange Rate Shocks and Aggregate Capital Flows

Notes: Rows use NDF and CNH shocks, respectively; columns use daily net purchases in RMB billions and cumulative-purchases growth in percentage points. Shading marks the fixed market-specific 40th–60th percentile screen in Table 4. Hollow points show four equal-count bins of excluded observations; filled points show ten bins on each retained side. Outcomes are adjusted for the macro-financial controls and year-quarter effects using the respective samples. Dashed and solid lines show the full-sample and screened fits. Each date receives equal weight.

Southbound flows (or purchase of HK-listed stocks by Mainland Chinese investors). Table 2 shows that depreciation news is associated with greater net purchases of Hong Kong equities. The net-purchase estimates are marginally significant for both measures, while the estimates for growth in cumulative purchases are not statistically significant. Northbound and southbound purchases thus respond in opposite directions to the same currency news.

Investor composition may help explain the less precise southbound response. Ma, Rogers and Zhou (2019) emphasize foreign investors' information advantage and contribution to price efficiency. Bian et al. (2023) characterize northbound trading as driven by international institutional investors and southbound trading as more retail-oriented, with greater dispersion in beliefs. Greater heterogeneity in how southbound investors interpret fixing news may produce a less uniform aggregate response. We focus on northbound flows in the remaining analysis.

Table 2: Exchange Rate Shocks and Southbound Capital Flows

	Net Purchases (RMB billion)		Growth in Cumulative Purchases (pp)	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^S	0.141*	0.118**	0.003	0.003
	(0.084)	(0.071)	(0.007)	(0.006)
Other control		Yes		
Fixed Effect		Year-Quarter		
N	1,251	1,342	1,225	1,316
R^2	0.21	0.20	0.28	0.27

Notes: The dependent variables are daily net southbound purchases of Hong Kong equities by mainland investors and $100(A_t^{SB} - A_{t-1}^{SB})/A_{t-1}^{SB}$, where A_t^{SB} is cumulative net southbound purchases. Each column uses the indicated standardized shock; positive values denote RMB depreciation. Each measure uses dates with available observations. Controls are defined in Section 3.3. $***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$. Heteroskedasticity-robust standard errors are in parentheses.

4.2 Firm-Level Results

We next examine foreign investors' adjustments to individual stock positions following fixing news. Stock-level share quantities provide a direct measure of the portfolio adjustments underlying the aggregate flow response.

Table 3 shows that, with controls, a one-standard-deviation NDF depreciation shock is associated with declines of 0.107 percentage points in foreign-held share growth and 0.171 percentage points in market-value growth. The CNH estimates show the same pattern. The quantity response captures a reduction in investors' share positions, while the market-value response also incorporates equity-price movements.

The control-variable estimates capture familiar patterns of international portfolio allocation. Foreign holdings growth increases with recent stock returns, consistent with the return chasing documented by Froot, O'Connell and Seasholes (2001). The positive coefficient on $CNHCNY_{t-1}$ indicates stronger foreign demand when the onshore RMB trades at a discount to its offshore counterpart, consistent with relative currency valuations creating incentives for cross-border investment (Funke et al., 2015). Foreign demand declines as the VIX rises, reflecting the sensitivity of international capital flows to the global financial cycle emphasized by Rey (2015). Fixing-window news predicts portfolio adjustment alongside these return, valuation, and global-risk considerations.

Table 3: Exchange Rate Shocks and Firm-Level Capital Flows

	NDF		CNH	
	(1)	(2)	(3)	(4)
*Panel A: Foreign-Held Shares**				
Δe_t^S	−0.126***	−0.107***	−0.142***	−0.118***
	(0.042)	(0.039)	(0.039)	(0.036)
$Ret_{t-5,t}^i$		0.026***		0.024***
		(0.006)		(0.006)
$CNHCNY_{t-1}$		0.514***		0.438**
		(0.177)		(0.170)
ΔVIX_t		−0.860**		−0.668
		(0.431)		(0.443)
Other control	No	Yes	No	Yes
Fixed Effect		Firm×Year-Quarter		
N	1,366,857	1,176,199	1,434,965	1,238,517
R^2	0.04	0.04	0.04	0.04
*Panel B: Market Value**				
Δe_t^S	−0.196***	−0.171***	−0.211***	−0.180***
	(0.073)	(0.066)	(0.068)	(0.063)
$Ret_{t-5,t}^i$		0.235***		0.233***
		(0.009)		(0.009)
$CNHCNY_{t-1}$		1.032***		0.921***
		(0.303)		(0.292)
ΔVIX_t		−2.019***		−1.568**
		(0.750)		(0.775)
Other control	No	Yes	No	Yes
Fixed Effect		Firm×Year-Quarter		
N	1,366,857	1,176,199	1,434,965	1,238,517
R^2	0.04	0.06	0.03	0.05

Notes: The dependent variables are daily percentage changes in foreign-held shares (Panel A) and their market value (Panel B) through the China-Connect Program. Each column uses the indicated standardized shock; positive values denote RMB depreciation. Samples depend on shock and control availability. Columns 1 and 3 omit controls; columns 2 and 4 include them. Returns and the CNH/CNY differential are expressed in percentage points. Controls are defined in Section 3.3. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors clustered by firm and date are in parentheses.

To assess sensitivity to small fixing-window price movements, Figure 6 compares the full-sample relationship with estimates excluding shocks between the 40th and 60th percentiles. With the baseline controls and firm-by-year-quarter fixed effects, the share-quantity and market-value responses remain negative and significant for both NDF and CNH (Table 4). Foreign investors thus adjust their positions in the same direction following larger fixing-window movements.

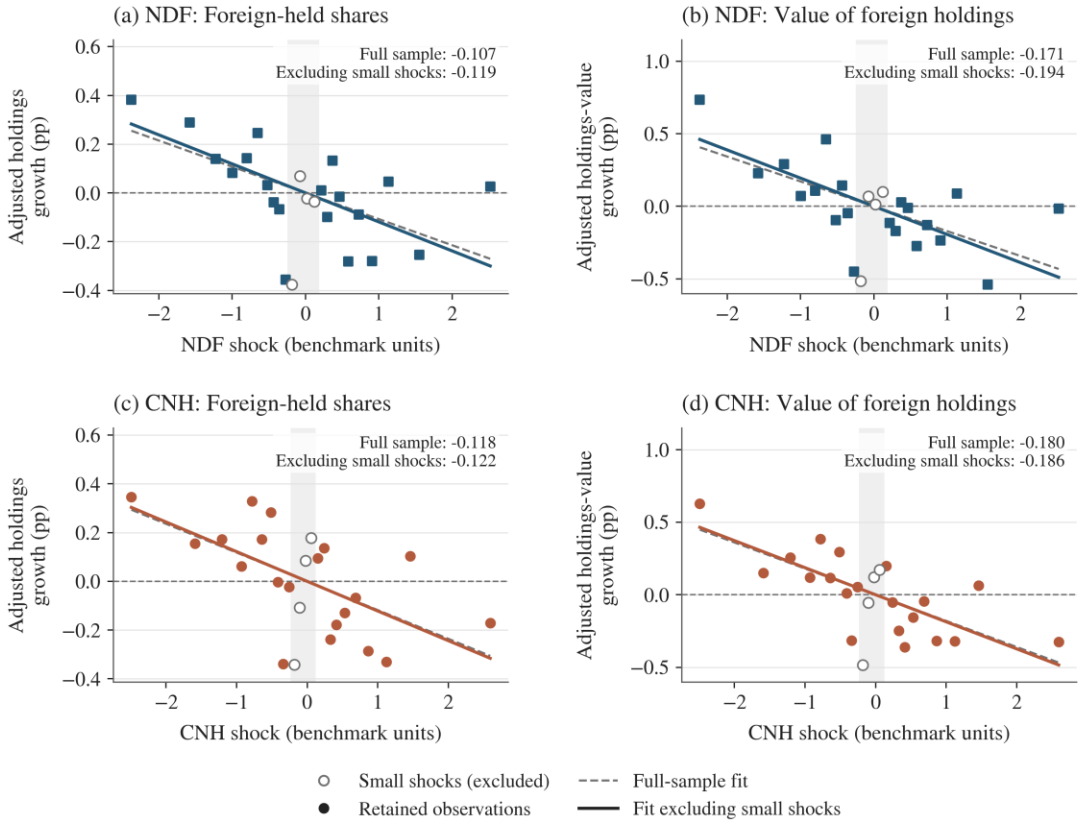


Figure 6: Exchange Rate Shocks and Stock-Level Foreign Holdings

Notes: Rows use NDF and CNH shocks, respectively; columns use growth in foreign-held shares and their market value, in percentage points. Shading marks the fixed market-specific 40th–60th percentile screen in Table 4. Hollow points show four equal-count bins of excluded observations; filled points show ten bins on each retained side. Outcomes are adjusted for baseline controls and firm-by-year-quarter effects using the respective samples. Dashed and solid lines show the full-sample and screened fits (Tables 3 and 4). Each stock-day receives equal weight.

Table 4: Capital Flows: Excluding Small Exchange Rate Shocks

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^s	−0.119***	−0.122***	−0.194***	−0.186***
	(0.039)	(0.036)	(0.066)	(0.063)
Other control	Yes			
Fixed Effect	Firm×Year-Quarter			
N	945,248	1,011,324	945,248	1,011,324
R^2	0.05	0.04	0.06	0.06

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. Each column uses the indicated benchmark shock; positive values denote RMB depreciation. The fixed 40th and 60th percentile cutoffs in the original stock-day panel are −0.233 and 0.172 for NDF and −0.222 and 0.109 for CNH. Observations within each interval are excluded before adjustment for controls and fixed effects. Controls are defined in Section 3.3. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors clustered by firm and date are in parentheses.

4.3 Survey-Based Fixing News

Our baseline NDF and CNH shocks measure the market repricing of RMB exposure around the fixing announcement. They incorporate investors' interpretation of the announcement in light of their prior information and prevailing market conditions. To link the flow results more directly to the policy setting, we also examine the announced fixing relative to a pre-announcement survey benchmark.

Under the two-pillar framework described in Section 2, market participants can estimate a rule-implied fixing using the previous closing rate and overnight currency-basket movements. Bloomberg's FCCNYFIX survey collects commercial banks' estimates of this benchmark at around 9:05 a.m., before the 9:15 a.m. fixing announcement. The fixing–survey gap therefore isolates the component of the announced fixing that departs from banks' assessment of the rule—the discretionary component of exchange-rate management, including adjustments such as the countercyclical factor described in Section 2.2. A stronger fixing relative to this benchmark can convey the authorities' willingness to lean against RMB depreciation.

Following Chen, Jiao and Wu (2025), we use the mean survey estimate available by 9:05 a.m., $S^{BBG}_{t,9:05}$, to construct

$$\Delta e_t^{S,BBG} = \frac{log\ S^{CP}_{t,9:15} - log\ S^{BBG}_{t,9:05}}{\sigma_{BBG}} \tag{6}$$

where σ_{BBG} is the standard deviation of the screened percentage-point log gap in the reference survey series. A positive value denotes a fixing weaker than the survey benchmark. We replace the market-based shock with this measure in the firm-level baseline regression, retaining the same controls and fixed effects.[9]

Table 5 shows that a stronger fixing relative to the survey benchmark is followed by higher growth in both foreign-held Mainland Chinese shares and their market value. Both estimates are statistically significant at the 5% level. The per-standard-deviation coefficients are larger than those for the market-based shocks. Because each measure is normalized by its own standard deviation, and the survey gap captures only the fixing's departure from the rule-implied benchmark

[9]For this survey-based exercise, we exclude August 25–November 4, 2022, when the announced fixing abnormally remained persistently stronger than the survey benchmark (Appendix Figure C1). Contemporary accounts describe repeated strong-side fixings intended to contain depreciation pressure; see ING (August 25, 2022) and the U.S. Treasury's November 2022 foreign exchange report, pp. 20–21. In this setting, the fixing–survey gap may include a persistent, anticipated policy component, complicating its interpretation as day-specific announcement news. The market-based baseline estimates retain this interval.

rather than the market's full repricing of the currency, the magnitudes are not directly comparable across measures. The increase in share quantities indicates that foreign investors add to their RMB equity exposure. These survey-based estimates provide further evidence that foreign equity flows respond to policy news conveyed through the fixing mechanism.

Table 5: Capital Flows: Survey-Based Fixing News

	Shares	Market Value
	(1)	(2)
$\Delta e_t^{s,BBG}$	−0.397**	−0.545**
	(0.164)	(0.268)
$Ret_{t-5,t}^{i}$	0.026***	0.237***
	(0.006)	(0.010)
$CNHCNY_{t-1}$	0.615***	1.021***
	(0.200)	(0.338)
ΔVIX_t	−0.904*	−2.119***
	(0.468)	(0.816)
Other control	Yes	
Fixed Effect	Firm×Year-Quarter	
N	1,096,509	1,096,509
R^2	0.039	0.055

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. The survey measure is defined in equation (6); positive values denote a weaker fixing relative to commercial banks' mean estimate of the two-pillar-implied fixing in the Bloomberg survey. The normalization uses the reference-series standard deviation. The sample excludes August 25–November 4, 2022 and ends on June 30, 2023. Returns and the CNH/CNY differential are expressed in percentage points. Controls are defined in Section 3.3. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Standard errors clustered by firm and date are in parentheses.

4.4 Pre- versus Post-Announcement Repricing

We next relate the portfolio response to the timing of currency repricing. Section 3.1 shows that exchange-rate adjustments increase after the 9:15 a.m. fixing. We separate each NDF and CNH shock into a pre-announcement component, Δe_t^{pre}, and a post-announcement component, Δe_t^{post}. For both measures, the pre-announcement component runs from the last available price before 9:05 a.m. to the last price before 9:15 a.m., capturing price discovery ahead of the fixing. The post-announcement component runs from the first available price at or after 9:15 a.m. to the first price at or after 9:25 a.m., capturing repricing following the announcement. We separately examine the intervening jump between the last pre-announcement price and the first post-announcement price.

Post-announcement repricing accounts for most of the variation in the measured shock. On the daily sample underlying Table 6, the NDF post component contributes 75.5% of total-shock variance, compared with 23.3% for the pre component and 1.3% for the intervening jump.[10] The corresponding post-announcement contribution for CNH is 76.9%. Both measures therefore primarily capture the market's reassessment of the currency after the fixing becomes public.

We include the two components jointly in the firm-level regression:[11]

$$\Delta Y_{i,t} = \beta^{pre}\Delta e_t^{pre} + \beta^{post}\Delta e_t^{post} + X'_{i,t}\xi + FEs + \varepsilon_{i,t} \quad (7)$$

In both markets, the flow response is concentrated in post-announcement repricing (Table 6), while the pre-announcement estimates are statistically insignificant. The timing links foreign portfolio adjustment to currency repricing following the fixing announcement.

Table 6: Pre- and Post-Announcement Repricing and Capital Flows

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^{pre}	−0.083	0.051	−0.153	0.077
	(0.086)	(0.070)	(0.146)	(0.115)
Δe_t^{post}	−0.134***	−0.168***	−0.199**	−0.256***
	(0.047)	(0.040)	(0.086)	(0.071)
Other control	Yes			
Fixed Effect	Firm×Year-Quarter			
N	1,030,857	1,238,517	1,030,857	1,238,517
R^2	0.04	0.04	0.06	0.05

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. Each column uses the indicated market measure. Components use the endpoints defined in Section 4.4, enter jointly, and retain the benchmark daily normalization in Section 3.1. Samples reflect component and control availability. Controls are defined in Section 3.3. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Standard errors clustered by firm and date are in parentheses.

4.5 Asymmetric Flow Responses

We examine how foreign portfolio responses depend on the direction of fixing-window news and the initial state of the currency. This distinction is relevant to whether fixing announcements

[10] For each component k, its contribution is $Cov(\Delta e_t^k, \Delta e_t^{total})/Var(\Delta e_t^{total})$. Because the pre, jump, and post components sum to the total shock, these contributions sum to one before rounding and account for covariance across components. Each date receives equal weight.

[11] The post-announcement results also hold after controlling for the jump term. See Tables B1 and D1.

can attract foreign capital when the RMB is weak. We first allow the response to differ between appreciation and depreciation shocks:

$$\Delta Y_{i,t} = \beta^{dep}\Delta e_t^s 1\{\Delta e_t^s > 0\} + \beta^{app}\Delta e_t^s 1\{\Delta e_t^s < 0\} + \gamma 1\{\Delta e_t^s > 0\} + X'_{i,t}\xi + FEs + \varepsilon_{i,t} \quad (8)$$

Both signed components enter jointly with the baseline controls and fixed effects, using the same benchmark standard-deviation scaling. Because an appreciation shock is negative, a negative appreciation-side coefficient implies higher holdings growth following favorable currency news.

Table 7 shows that a one-standard-deviation appreciation shock is associated with increases of 0.252 and 0.265 percentage points in foreign-held share growth for NDF and CNH, respectively. Market-value growth also rises. The depreciation-side estimates are negative but statistically insignificant. Foreign demand responds most clearly to appreciation news. We next examine how this response varies with the RMB's initial strength.

Table 7: Capital Flows following Appreciation and Depreciation News

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^{dep}	−0.072	−0.104	−0.144	−0.176
	(0.074)	(0.069)	(0.120)	(0.115)
Δe_t^{app}	−0.252***	−0.265***	−0.404***	−0.397***
	(0.088)	(0.084)	(0.153)	(0.147)
Other control	Yes			
Fixed Effect	Firm×Year-Quarter			
N	1,172,050	1,152,021	1,172,050	1,152,021
R^2	0.04	0.04	0.06	0.06

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. Each column uses the indicated market measure. The signed components are $\Delta e_t^{dep} = \Delta e_t^s 1\{\Delta e_t^s > 0\}$ and $\Delta e_t^{app} = \Delta e_t^s 1\{\Delta e_t^s < 0\}$. Both components enter jointly with a depreciation-day indicator and retain the benchmark daily normalization defined in Section 3.1. Exactly zero shocks are excluded for the corresponding measure. Controls are defined in Section 3.3. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Standard errors clustered by firm and date are in parentheses.

To assess whether appreciation news attracts more foreign capital when the RMB is weak, we interact both signed shock components with an indicator for the pre-announcement exchange-rate level. Let $D_t^{7.1} = 1\{S_{t-}^{market} > 7.1\}$, where S_{t-}^{market} is the last available daily CNY market quote strictly before the announcement date, expressed as RMB per U.S. dollar. This sample-specific cutoff is motivated by the fixing–market relationship in Figure 2: larger gaps emerge when the

market rate exceeds 7.1, with the fixing typically stronger than the market quote.[12] We use this weak-RMB state to examine whether appreciation news attracts more foreign demand when official support for the currency may be particularly salient. The focus on state dependence is consistent with the regime-varying fixing rules studied by Jermann, Wei and Yue (2022) and Chen and Qiu (2023). We estimate

$$\Delta Y_{i,t} = \beta^{dep}\Delta e_t^{dep} + \beta^{app}\Delta e_t^{app} + \theta^{dep}\Delta e_t^{dep} D_t^{7.1} + \theta^{app}\Delta e_t^{app} D_t^{7.1} + \delta D_t^{7.1} + \gamma 1\{\Delta e_t^s > 0\} + \kappa 1\{\Delta e_t^s > 0\} D_t^{7.1} + X'_{i,t}\xi + FEs + \varepsilon_{i,t} \quad (9)$$

Both signed shock components enter jointly with their state interactions and all lower-order terms. A negative θ^{app} indicates a stronger positive holdings response to appreciation news in the weak-RMB state.

Table 8 shows a substantially stronger appreciation response when the RMB is already weak. For a one-standard-deviation appreciation shock, the implied increase in foreign-held share growth rises from 0.161 to 0.764 percentage points for NDF and from 0.187 to 0.757 percentage points for CNH. Market-value estimates show the same pattern. The depreciation interactions are statistically insignificant, while the equal-slope tests reject equal appreciation- and depreciation-side slopes within the weak-RMB state. The larger share-quantity response shows that appreciation news is associated with greater increases in foreign investors' mainland equity exposure especially when the currency is weak.

[12] Reuters (September 22, 2022) also reported that some traders viewed 7.1 as resistance for onshore USD/CNY.

Table 8: Asymmetric Flow Responses and the Prior RMB Exchange-Rate Level

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^{dep}	−0.107	−0.137*	−0.224*	−0.237*
	(0.080)	(0.079)	(0.136)	(0.134)
Δe_t^{app}	−0.161*	−0.187**	−0.264*	−0.278*
	(0.088)	(0.084)	(0.158)	(0.150)
$\Delta e_t^{dep} \times D_t^{7.1}$	0.098	0.080	0.328	0.211
	(0.234)	(0.180)	(0.307)	(0.268)
$\Delta e_t^{app} \times D_t^{7.1}$	−0.603**	−0.570**	−0.876**	−0.812*
	(0.243)	(0.243)	(0.423)	(0.432)
$D_t^{7.1}$	−0.292	−0.243	−0.287	−0.174
	(0.284)	(0.278)	(0.473)	(0.468)
p: equal slopes, $D_t^{7.1} = 0$	0.655	0.677	0.852	0.842
p: equal slopes, $D_t^{7.1} = 1$	0.018	0.013	0.011	0.024
Other Controls		Yes		
Direction Intercept Controls		Yes		
Fixed Effect		Firm×Year-Quarter		
N	1,172,050	1,152,021	1,172,050	1,152,021
Dates	1,271	1,249	1,271	1,249
R^2	0.039	0.040	0.056	0.057

Notes: $D_t^{7.1} = 1\{S_{t-} > 7.1\}$, where S_{t-} is the last daily CNY market quote strictly before the announcement date. The signed components are $\Delta e_t^{dep} = \Delta e_t^s 1\{\Delta e_t^s > 0\}$ and $\Delta e_t^{app} = \Delta e_t^s 1\{\Delta e_t^s < 0\}$. Each column estimates both slopes, both exchange-rate-level interactions, the level dummy, a depreciation-day dummy, and depreciation-day × level dummy jointly, with the baseline controls. A negative appreciation interaction implies a larger positive holdings response to a negative (appreciation) shock when $D_t^{7.1} = 1$. State-specific equal-slope tests are linear Wald tests using the same joint covariance matrix. The sample ends on June 30, 2023 and retains 2022. Standard errors are clustered by firm and date. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$.

A caveat applies to this state-dependence. As the weak-RMB state is concentrated in a relatively small number of episodes, we view these estimates as suggestive. To the extent fixing-window repricing reflects exchange-rate management, appreciation news is associated with larger increases in foreign demand for RMB equities during periods of currency weakness. Such responses would complement the authorities' efforts to contain depreciation pressure.

4.6 Persistence of Foreign Portfolio Responses

We next examine whether the increase in foreign holdings following appreciation news persists over subsequent trading days. At each horizon $h = 0, \ldots, 10$, we estimate:

$$\Delta_h Y_{i,t} = \beta_h^{dep} \Delta e_t^{dep} + \beta_h^{app} \Delta e_t^{app} + \gamma_h 1\{\Delta e_t^s > 0\} + X'_{i,t} \xi_h + \alpha_{i,q(t)}^h + \varepsilon_{i,t,h} \quad (10)$$

where $Y_{i,t}$ denotes foreign-held shares of stock i at the close of date t, and $\Delta_h Y_{i,t}$ is the cumulative log change in these holdings from $t-1$ through $t+h$, expressed in percent.

Figure 7 shows a persistent increase in foreign holdings following appreciation news. At horizon five, a one-standard-deviation appreciation shock is associated with cumulative increases of 0.448 and 0.426 percentage points for NDF and CNH, respectively, both significant at the 5% level. At horizon ten, the corresponding increases are 0.568 and 0.446 percentage points, significant at the 5% and 10% levels. The depreciation-side estimates are negative but statistically insignificant after two trading weeks.

The sustained increase in foreign holdings indicates that the portfolio response to appreciation news persists beyond the announcement day. A persistent increase is consistent with fixing news shifting investors' desired RMB equity exposure rather than prompting only short-lived trading.

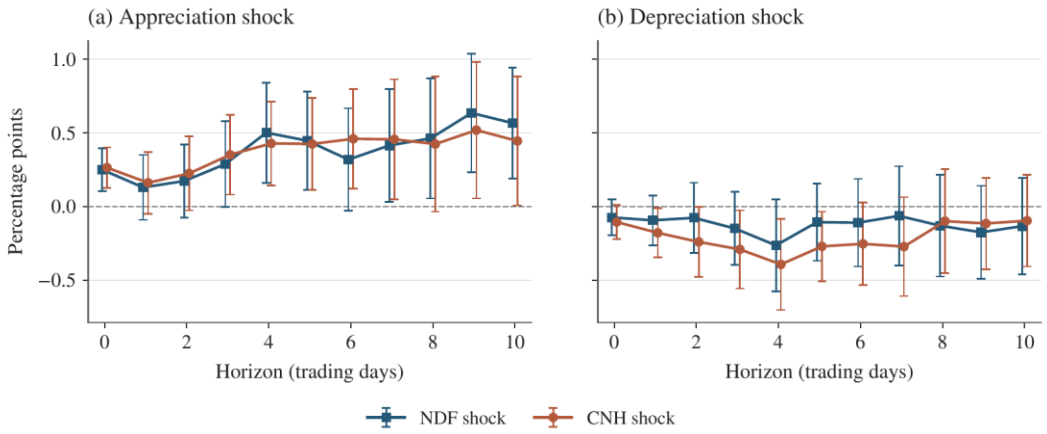


Figure 7: Cumulative Foreign-Holding Responses to Fixing-Window News

Notes: The figure reports cumulative log changes in foreign-held shares, expressed in percent, from equation (10). The left and right panels plot $-\beta_h^{app}$ and β_h^{dep}, the responses to one-standard-deviation appreciation and depreciation shocks, respectively. Horizons are measured in trading days, with $h = 0$ denoting the announcement day. All specifications include baseline controls and firm-by-year-quarter fixed effects. Bars indicate pointwise 90% confidence intervals based on standard errors clustered by firm and date.

4.7 Holdings through Foreign Custodians

Northbound investors hold mainland equities through custodians, whose stock-level holdings records allow us to examine the frequency and composition of investors' portfolio adjustments.

Using HKEX custodian-stock data, we distinguish foreign, Hong Kong, and mainland custodians. Share quantities change on 62.3% of observed custodian-stock days for foreign custodians, compared with 8.3% for Hong Kong custodians and 24.1% for mainland custodians. Foreign custodians also account for an average of 91.24% of recorded northbound holdings, compared with 1.33% for Hong Kong custodians and 7.14% for mainland custodians.

This frequent rebalancing makes daily holdings changes informative about investors' responses to fixing news released before continuous mainland trading. Together with the announcement-day responses below, the evidence points to an investor base that actively adjusts its exposure as information arrives. It supports matching narrow-window currency news to same-day portfolio changes in our empirical design and documents a daily adjustment margin of cross-border equity investment.

We further examine which custodian groups account for the response to fixing news. He, Wang and Zhu (2023) document mainland insiders trading through Stock Connect to exploit regulatory differences between mainland China and Hong Kong, particularly through less prestigious foreign custodians and mainland custodians operating in both markets. They find that the information advantage of these flows weakened following the 2018 Northbound Investor Identification reform, which enabled regulators to identify the beneficial owners behind northbound trades. Their findings motivate comparing groups with different exposure to this round-tripping channel.

Following He, Wang and Zhu (2023), we identify prestigious foreign custodians and mainland custodians without cross-border operations. Table 9 reports estimates for all foreign custodians; prestigious foreign custodians; the remaining foreign custodians together with all Hong Kong and mainland custodians; and Hong Kong custodians together with mainland custodians without cross-border operations. The prestigious-foreign group captures intermediaries less associated with the round-tripping channel.

We regress daily log changes in the number of shares held by each custodian in each stock on the NDF shock and controls, and report effects in percentage points. Table 9 shows a negative response among all foreign custodians. The prestigious-foreign point estimate is similar in magnitude but statistically insignificant — revise if the significance marker in column 2 is corrected. The response among the foreign custodians that dominate northbound holdings connects

the frequent portfolio adjustments documented above to currency news around the fixing announcement.

Table 9: Exchange Rate Shocks and Holdings by Custodian Group

	All Foreign	Prestigious Foreign	Other Foreign, HK and Mainland	HK and Non-Cross-Border Mainland
	(1)	(2)	(3)	(4)
Δe_t^s	−0.299*	−0.284*	−0.089*	−0.033**
	(0.154)	(0.160)	(0.054)	(0.016)
Other control	Yes			
Fixed Effect	Custodian×Stock×Year-Quarter			
N	14,697,910	11,676,009	20,385,492	12,030,950
R^2	0.01	0.01	0.02	0.03

Notes: The dependent variable is the daily log change in the number of shares held by a custodian in a stock. Coefficients and standard errors are expressed in percentage points. The NDF shock, Δe_t^s, is standardized; positive values denote RMB depreciation. The groups follow the classification described above and overlap. All columns use unweighted OLS. Controls are defined in Section 3.3. $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. Standard errors clustered by custodian, stock, and date are in parentheses.

4.8 Robustness Checks

We assess robustness to alternative fixed effects and announcement windows and examine placebo windows outside the fixing announcement. Appendix D collects the CNH-market checks.

4.8.1 Alternative Fixed Effects

Our baseline specification uses daily variation within each stock and quarter. We also consider firm-by-week fixed effects, which absorb each stock's weekly holdings-growth component, and separate firm and year-quarter fixed effects. The fixing-shock coefficients remain negative and similar in magnitude under both specifications (Tables 10 and 11).

Table 10: Capital Flows: Firm-by-Week Fixed Effects

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^s	−0.092**	−0.117***	−0.158**	−0.195***
	(0.039)	(0.038)	(0.066)	(0.064)
$Ret_{t-5,t}^i$	0.018**	0.016*	0.300***	0.298***
	(0.008)	(0.008)	(0.014)	(0.013)
$CNHCNY_{t-1}$	0.302	0.277	0.880**	0.875***
	(0.208)	(0.192)	(0.349)	(0.324)
ΔVIX_t	−0.630	−0.273	−1.540**	−0.736
	(0.435)	(0.454)	(0.767)	(0.783)
Other control	Yes			
Fixed Effect	Firm×Week			
N	1,152,814	1,216,331	1,152,814	1,216,331
R^2	0.28	0.28	0.29	0.28

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. Each column uses the indicated standardized shock; positive values denote RMB depreciation. Returns and the CNH/CNY differential are expressed in percentage points. Controls are defined in Section 3.3. $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. Standard errors clustered by firm and date are in parentheses.

Table 11: Capital Flows: Firm and Year-Quarter Fixed Effects

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^s	−0.107***	−0.124***	−0.172**	−0.195***
	(0.039)	(0.036)	(0.067)	(0.062)
$Ret_{t-5,t}^i$	0.027***	0.024***	0.228***	0.226***
	(0.006)	(0.005)	(0.009)	(0.008)
$CNHCNY_{t-1}$	0.533***	0.480***	1.046***	0.967***
	(0.179)	(0.172)	(0.306)	(0.294)
ΔVIX_t	−0.902**	−0.674	−2.073***	−1.494**
	(0.435)	(0.447)	(0.751)	(0.761)
Other control	Yes			
Fixed Effect	Firm + Year-Quarter			
N	1,176,836	1,238,284	1,176,836	1,238,284
R^2	0.01	0.01	0.02	0.02

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. Each column uses the indicated standardized shock; positive values denote RMB depreciation. Returns and the CNH/CNY differential are expressed in percentage points. Controls are defined in Section 3.3. $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. Standard errors clustered by firm and date are in parentheses.

4.8.2 Different Announcement Windows

We construct shocks over 9:10–9:25 a.m., 9:00–9:25 a.m., and 8:55–9:25 a.m. Across all three windows, depreciation news predicts lower foreign holdings growth, with estimates similar to the baseline (Table 12).

Table 12: Capital Flows: Alternative Announcement Windows

	Shares	Shares	Shares	Value	Value	Value
	15 min	25 min	30 min	15 min	25 min	30 min
	(1)	(2)	(3)	(4)	(5)	(6)
Δe_t^s	−0.103***	−0.076**	−0.092**	−0.167***	−0.124*	−0.145**
	(0.036)	(0.038)	(0.037)	(0.064)	(0.067)	(0.063)
Other control	Yes					
Fixed Effect	Firm×Year-Quarter					
N	1,175,669	1,166,219	1,163,355	1,175,669	1,166,219	1,163,355
R^2	0.04	0.04	0.04	0.06	0.06	0.06

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. The NDF shock, Δe_t^s, is standardized; positive values denote RMB depreciation. The 15-, 25-, and 30-minute windows begin at 9:10, 9:00, and 8:55 a.m., respectively, and end at 9:25 a.m. Controls are defined in Section 3.3. $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. Standard errors clustered by firm and date are in parentheses.

4.8.3 Placebo Tests: Windows outside the Fixing Announcement

We construct placebo measures over 8:45–9:05 a.m. and 9:35–9:55 a.m., before and after the fixing window. The coefficients for both NDF and CNH are small and statistically insignificant (Table 13). Together with the post-announcement results, this concentration around the fixing links foreign portfolio adjustment to the market's interpretation of the announcement.

Table 13: Capital Flows: Placebo Windows

	NDF		CNH	
Window (a.m.)	8:45–9:05	9:35–9:55	8:45–9:05	9:35–9:55
	(1)	(2)	(3)	(4)
$\Delta e_t^{s,pl}$	0.031	−0.052	0.001	−0.045
	(0.039)	(0.040)	(0.037)	(0.036)
$Ret_{t-5,t}^{i}$	0.027***	0.027***	0.024***	0.023***
	(0.006)	(0.006)	(0.006)	(0.006)
$CNHCNY_{t-1}$	0.513***	0.464**	0.322*	0.394**
	(0.181)	(0.181)	(0.170)	(0.176)
ΔVIX_t	−1.155**	−0.843*	−0.674	−0.629
	(0.451)	(0.433)	(0.442)	(0.439)
Other control	Yes			
Fixed Effect	Firm×Year-Quarter			
N	1,075,351	1,120,982	1,224,614	1,223,548
R^2	0.04	0.04	0.04	0.04

Notes: The dependent variable is the daily percentage change in foreign-held shares through the China-Connect Program. Each column uses the standardized placebo measure over the indicated window; positive values denote RMB depreciation. Boundary prices follow the benchmark selection convention. For each NDF window, the measure is the first principal component of the six maturity-specific log changes, estimated separately for that window. The CNH measure is the log change in the spot rate. Each measure is standardized by its own daily standard deviation after the corresponding tail screen. Returns and the CNH/CNY differential are expressed in percentage points. Controls are defined in Section 3.3. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Standard errors clustered by firm and date are in parentheses.

5 Market Implications and Interpretation of Fixing News

We first examine how fixing news relates to subsequent currency movements and announcement-day equity returns. We then consider what investors may learn from the fixing, using observable macro-financial conditions, domestic interest rates, and policy statements and market commentary. These results help interpret the foreign-demand responses in Section 4.

5.1 Market Implications of Fixing News

For an unhedged foreign investor, the value of mainland equity holdings depends on both equity prices in RMB and the currency's value at conversion. We examine how fixing-window news relates to these two components. Appendix E shows, in addition, that exposure to fixing news is associated with systematic differences in average stock returns across A-shares. These results help interpret the foreign portfolio adjustments documented in Section 4.

5.1.1 Subsequent Exchange-Rate Movements

We estimate local projections relating the NDF shock to subsequent changes in the onshore market exchange rate and the central-parity fixing. The market-rate outcome is the cumulative percentage change from $t-1$ to $t+h$, for $h=0,\ldots,10$. The fixing outcome is the cumulative percentage change from t to $t+h$, for $h=1,\ldots,10$, measuring adjustment after the current announcement. Newey–West standard errors account for serial dependence across overlapping horizons.

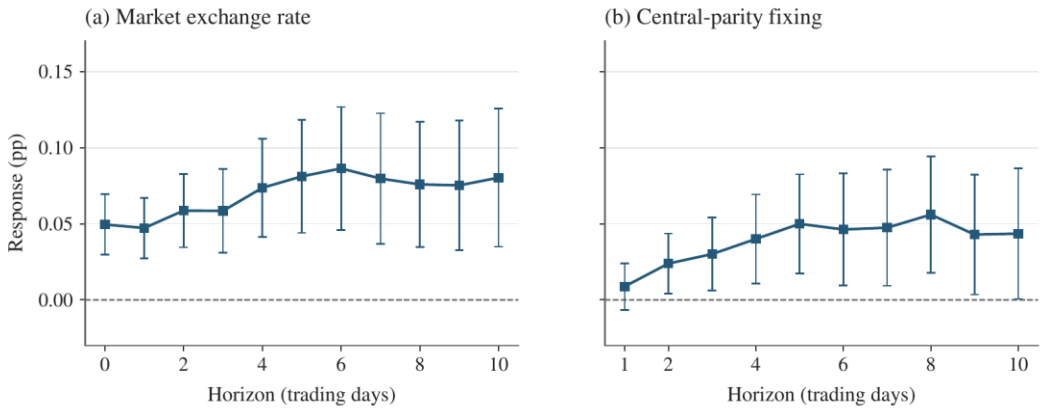


Figure 8: NDF Shocks and Subsequent Exchange-Rate Changes

Notes: The figure reports local-projection coefficients in benchmark daily NDF-shock units. The estimation sample uses the overlap with the fixing-rule data and required controls. The left panel measures cumulative changes in the onshore RMB/USD market rate from $t-1$ to $t+h$; the right panel measures changes in the central-parity fixing from t to $t+h$. Positive responses denote RMB depreciation. Controls are the macro-financial set defined in Section 3.3, excluding overnight SHIBOR. Bars denote 90% confidence intervals based on Newey–West standard errors, using $h+1$ lags for market-rate changes and h lags for fixing changes.

Figure 8 shows that depreciation news is followed by a persistently weaker onshore RMB and further depreciation in subsequent fixings over the following ten trading days. Part of the fixing response in panel (b) could be mechanical: under the two-pillar rule, today's fixing enters the closing-rate and nighttime pillars that determine subsequent fixings, so a weaker fixing today implies weaker fixings tomorrow even without new information. The market-rate response in panel (a) is not subject to this mechanism. Repricing in the offshore announcement window is therefore associated with the subsequent path of both the onshore market exchange rate and the managed reference rate. The fixing-window measure captures news relevant to currency conditions beyond the immediate announcement.

These movements matter for the currency exposure associated with foreign equity investment. For an unhedged investor, a weaker RMB reduces the foreign-currency value of a given RMB

payoff. The relationship with subsequent exchange rates thus connects fixing news to the currency conditions investors face when holding mainland equities. Together with the holdings responses in Section 4, the evidence is consistent with investors adjusting their RMB equity exposure as the fixing announcement changes their assessment of the currency outlook.

5.1.2 Equity-Market Returns

We next examine aggregate A-share returns, the local-currency component of foreign investors' equity payoffs. This exercise complements the exchange-rate results by examining whether fixing news also accompanies changes in the valuation of the underlying RMB assets.

Table 14: Fixing-Window Shocks and Equity-Market Returns

	NDF	CNH
	(1)	(2)
Δe_t^s	−0.072**	−0.094**
	(0.036)	(0.039)
Other control	Yes	
Fixed Effect	None	
N	1,238	1,235
R^2	0.05	0.05

Notes: The dependent variable is the daily log total return on the A-share market, multiplied by 100. Each column uses the indicated shock in its benchmark daily normalization; positive values denote RMB depreciation. The regressions include the macro-financial controls defined in Section 3.3 and the JWY pillars. $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. Heteroskedasticity-robust standard errors are in parentheses.

Table 14 shows that a one-standard-deviation depreciation shock is associated with declines in the daily market return of 0.072 percentage points for NDF and 0.094 percentage points for CNH. Depreciation news therefore accompanies lower equity valuations as well as a weaker subsequent RMB. In the present-value framework of Campbell (1991), equity repricing can reflect revisions to expected corporate payoffs or the returns investors require for holding RMB assets.

For foreign investors, these results connect fixing news to both the local-currency value of their equity positions and the conversion value of RMB payoffs. The share-quantity results in Section 4 demonstrate active portfolio adjustment, with the clearest announcement-day response following appreciation news. The market-value response thus combines equity repricing with active portfolio adjustment. Taken together, the price and holdings results link fixing-window news to the valuation of RMB assets and foreign investors' willingness to hold them.

We next examine what investors may learn from fixing announcements and how the information conveyed through the fixing framework relates to their portfolio adjustments.

5.2 Interpreting Fixing News

The preceding market and portfolio responses are consistent with the expectations channel of exchange-rate policy (Dominguez and Frankel, 1993): fixing communication can change investors' assessment of the currency outlook and their willingness to hold RMB assets. We next examine the information underlying these expectation revisions. The evidence provides limited support for explanations based on measured common macro-financial information or signals about future monetary policy, motivating a discussion of other information conveyed by the fixing.

5.2.1 Observable Information and Fixing-Rule Inputs

A first possibility is that fixing-window repricing and equity flows reflect policymakers' and investors' responses to the same observable macro-financial news. We assess this explanation using the projection approach of Bauer and Swanson (2023), relating each shock to the closing-rate and nighttime pillars of the two-pillar framework described in Section 2, collected in P_t, and the macro-financial controls M_t defined in Section 3.3:

$$\Delta e_t^s = a + b'P_t + d'M_t + \eta_t \tag{11}$$

The residual $\hat{\eta}_t$ captures announcement-window repricing conditional on these observable inputs and retains the original shock's benchmark units.

Table 15 shows that the closing-rate and nighttime pillars positively predict both shocks. The included variables explain 2.07% and 1.31% of NDF- and CNH-shock variation, respectively. Most announcement-window repricing therefore remains unexplained by these measured conditions and rule inputs.

Table 15: Observable Components of Fixing-Window Shocks

	NDF Shock	CNH Shock
	(1)	(2)
JWY Closing-Rate Pillar	0.325**	0.365**
	(0.165)	(0.179)
JWY Nighttime Pillar	0.710***	0.421**
	(0.187)	(0.192)
Lagged Exchange-Rate Change	−0.200	−0.212
	(0.179)	(0.180)
Change in Overnight SHIBOR	0.048	0.009
	(0.132)	(0.143)
Change in Effective Federal Funds Rate	0.812	0.680
	(0.700)	(0.607)
Change in VIX	0.132	0.251
	(0.352)	(0.359)
Lagged CNH/CNY Spread	0.329	0.201
	(0.201)	(0.194)
Constant	−0.034	−0.060**
	(0.029)	(0.029)
N	1,238	1,235
R^2	0.021	0.013

Notes: Each column uses the indicated shock in its benchmark daily units. JWY pillars, the lagged exchange-rate change, and the CNH/CNY differential are expressed in percentage-point log changes. Interest-rate changes are in percentage points, and the VIX control is a log change. Macro-financial controls are defined in Section 3.3. All regressors and the constant are reported. Estimation dates are held fixed across the alternative projection specifications. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Heteroskedasticity-robust standard errors are in parentheses.

We next replace the original shocks with $\hat{\eta}_t$ in the flow, market-return, and exchange-rate regressions. The outcome samples, fixed effects, and standard-error estimators are held fixed. We retain the original macro-financial and firm-level controls and use the same pillar set as in the projection wherever fixing-rule inputs enter the outcome regression. Table 16 shows that residualized depreciation shocks remain associated with lower foreign holdings growth and aggregate purchases, lower market returns, and RMB depreciation. The portfolio response therefore survives conditioning on these observable inputs, providing limited support for responses to measured common information as its main explanation.

Table 16: Residualized Shocks, Capital Flows, Returns, and Exchange Rates

	Firm-Level Flow	Aggregate Flow	Market Return	Market FX Change
	(1)	(2)	(3)	(4)
*Panel A: NDF**				
$\hat{\eta}_t$	−0.095**	−0.034**	−0.072**	0.034***
	(0.040)	(0.014)	(0.036)	(0.009)
Other control		Yes		
Fixed Effect	Firm×Year-Quarter	Year-Quarter	None	None
N	1,143,041	1,238	1,238	1,238
R^2	0.039	0.165	0.045	0.337
*Panel B: CNH**				
$\hat{\eta}_t$	−0.126***	−0.039***	−0.094**	0.031***
	(0.038)	(0.014)	(0.040)	(0.009)
Other control		Yes		
Fixed Effect	Firm×Year-Quarter	Year-Quarter	None	None
N	1,140,291	1,235	1,235	1,235
R^2	0.039	0.167	0.049	0.342

Notes: The outcomes are daily percentage changes in foreign-held shares, growth in cumulative net northbound purchases, log total market returns, and market exchange-rate changes. Returns and exchange-rate changes are in percentage points. Panels A and B use residualized NDF and CNH shocks, respectively. Residuals are obtained directly from the regressions in Table 15. The original shock normalization and outcome samples are retained. All columns control for the macro-financial variables in Section 3.3. Columns 1, 3, and 4 additionally include the projection pillars; column 1 also includes the baseline firm-level controls. $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. Standard errors in parentheses are clustered by firm and date in column 1 and heteroskedasticity robust in columns 2–4.

5.2.2 Signals about Domestic Monetary Policy

A second possibility is that fixing communication signals the PBOC's future monetary-policy stance. Such signals could affect anticipated interest-rate differentials and the currency outlook. We examine this possibility through domestic interest-rate responses to fixing shocks. China's monetary policy combines quantity- and price-based instruments, with heterogeneous transmission across financial institutions, market segments, and maturities (He et al., 2023). We therefore examine a range of domestic interest rates, covering overnight, three-month, and one-year SHIBOR and one-, three-, and five-year government bond yields. These series capture bank funding conditions and the government yield curve, providing complementary evidence on the interest-rate response to fixing news.

Figure 9 shows that most responses over the following ten trading days are small and statistically insignificant. The evidence provides limited support for information about future domestic monetary-policy changes as the main source of the portfolio response to fixing communication. The PBOC has also influenced the currency through offshore funding conditions,

so responses of CNH interbank rates would provide a complementary test of whether fixing news reflects anticipated tightening of offshore RMB liquidity.

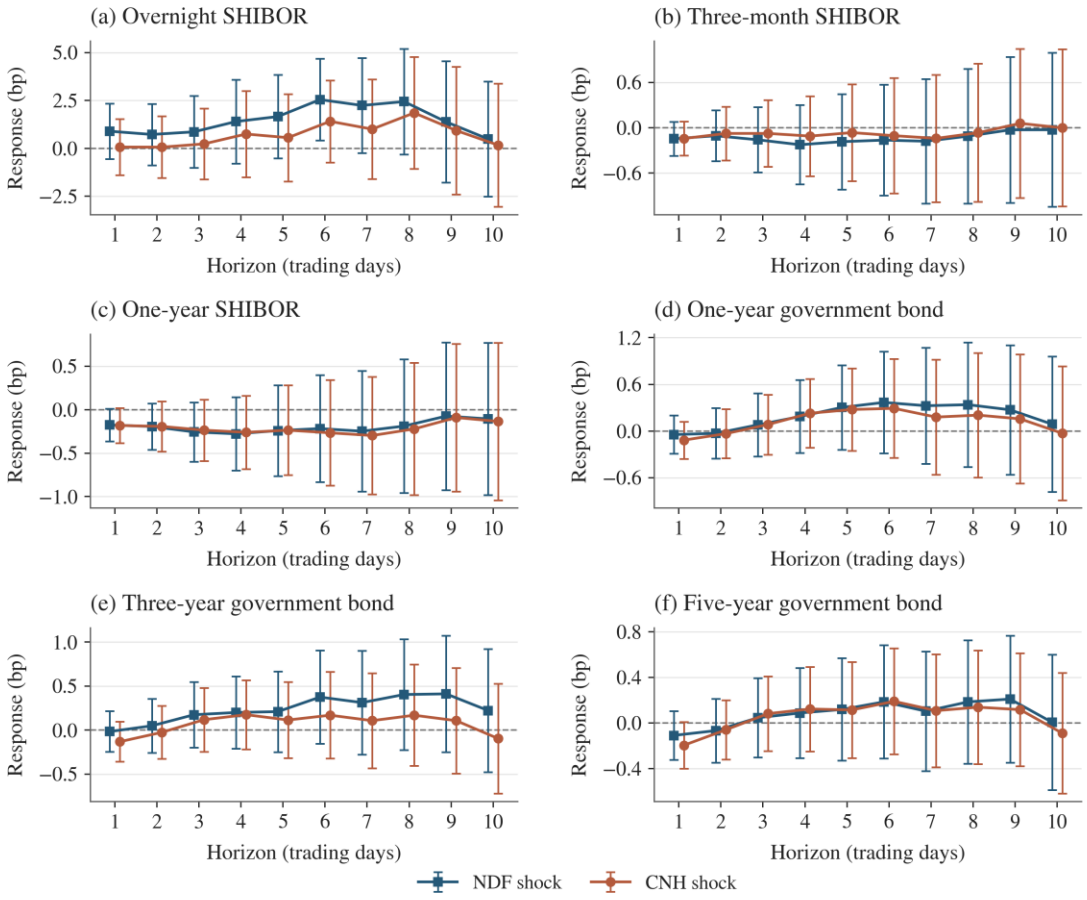


Figure 9: Fixing-Window Shocks and Domestic Interest Rates

Notes: The figure reports pooled local-projection coefficients for NDF shocks (blue squares) and CNH shocks (orange circles). Responses are in basis points per one-standard-deviation depreciation shock, with each shock standardized on the common daily estimation sample. The sample uses available fixing-rule, interest-rate, and control observations over April 2017–June 2023. Future interest-rate levels at horizons $h = 1, \ldots, 10$ are regressed on the shock, conditional on the preceding day's rate and macro-financial variables. Bars denote 90% confidence intervals based on Newey–West standard errors with h lags.

5.2.3 Interpreting Exchange-Rate Communication

Beyond measured public information and monetary-policy signals, the fixing may convey news about currency conditions and the authorities' response to them. A stronger-than-expected fixing can signal greater official resistance to further depreciation; market commentary interpreted the June 27, 2023 fixing in this way (Reuters, 2023). The fixing may also aggregate information contained in market makers' quotes, which are not publicly disclosed. Our estimates do not separate these sources of news. Each can shift the perceived currency outlook and, through it,

foreign demand for RMB assets, consistent with the expectations channel of Dominguez and Frankel (1993).

6 Conclusion

We study how foreign equity investors respond to news conveyed through China's daily RMB fixing. Combining announcement-window repricing in offshore currency markets with daily stock-level holdings through the China-Connect Program, we link fixing news to subsequent portfolio adjustment. Aggregate purchases and individual share positions show that favorable currency news is followed by greater foreign demand for mainland equities. Foreign investors also increase their holdings when the announced fixing is stronger than commercial banks' pre-announcement estimates of the rate implied by the two-pillar rule.

Our findings provide high-frequency evidence that the fixing mechanism shapes foreign portfolio demand. RMB appreciation news is followed by higher foreign equity investment within a single trading day, and the increase in holdings persists over the following two trading weeks. The response is larger when the RMB is already weak before the announcement, although this state is concentrated in a few episodes and the evidence on it is suggestive.

The market and portfolio evidence is consistent with the expectations channel of exchange-rate policy discussed by Dominguez and Frankel (1993). Fixing-window news predicts subsequent movements in the onshore exchange rate and accompanies changes in equity valuations. The flow response remains after removing the component predictable from measured macro-financial conditions and fixing-rule inputs, while domestic interest-rate responses provide limited support for monetary-policy signaling. The fixing may convey the authorities' willingness to resist currency movements, information aggregated from market makers' quotes, or both.

Our findings highlight foreign portfolio adjustment as a policy-relevant dimension of exchange-rate management. Communication that is followed by greater foreign investment in RMB assets can generate a potentially stabilizing capital-flow response, complementing efforts to contain depreciation pressure. Quantifying the contribution of such flows to exchange-rate dynamics, and separating the discretionary and rule-based components of fixing news, are a potential fruitful topic for future research.

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A Data Appendix

We collect five-minute Bloomberg price bars for USD/CNY NDF contracts with maturities of 1 week, 1 month, 2 months, 3 months, 6 months, and 12 months. Price selection uses recorded five-minute bar prices. The benchmark uses the close of the bar beginning at 9:00 a.m. (that is, the last available price before 9:05 a.m.) and the open of the bar beginning at 9:25 a.m. (the first available price at or after 9:25 a.m.). If an endpoint bar is unavailable, the construction selects the nearest available earlier close or later open, respectively. We take log differences and require all six maturities to be available for the correlation-matrix PCA. We exclude shocks in the outer 0.5% of each tail. The CNH measure follows the same endpoint-selection and fallback rules.

We collect firm-level outstanding shares held by international investors through the China-Connect Program from the WIND database. We calculate the market value of each position as the number of shares held multiplied by the daily closing price from CSMAR, and use its daily log change, expressed in percent, as the firm-level market-value outcome. In our baseline regressions, we exclude the following samples:

1. Stocks that are listed after 2017;
2. Stocks with daily price change > 10% or < −10%;
3. Stock-day observations with no change in recorded foreign-held shares;
4. Samples whose total share amount held by international investors is in the bottom 5% of all samples;
5. Observations in the outer 1% of each tail of the percentage change in shares held;
6. After all previous procedures, stocks with fewer than 50 valid records throughout our sample period.

Zero changes in recorded northbound holdings are concentrated in stocks whose positions adjust infrequently. Before the holding-size and tail screens, more than three-quarters of zero-change observations come from stocks with unchanged positions on more than half of their valid trading days. This indicates relatively infrequent net position adjustments, although unchanged end-of-day holdings do not necessarily imply an absence of intraday trading. The baseline zero-change exclusion restricts the firm-level estimates to stock-days with recorded position adjustments. In regressions controlling for lagged 5-day stock returns, we also exclude observations in the outer 1% of each tail of that control.

To assess whether excluding zero changes drives our findings, we use an alternative sample that removes stocks with very small northbound positions and retains zero-change observations for the remaining stocks. Specifically, we rank stocks by their average lagged northbound share holdings over the sample period and exclude the bottom 5%, corresponding to approximately 78,000 shares. This stock-level screen replaces the baseline observation-level holding-size screen; the remaining filters and the baseline flow and return cutoffs are unchanged. With the baseline controls and firm-by-year-quarter fixed effects, the negative response remains statistically significant for both share quantities and market values when unchanged positions are retained. Table A1 reports these estimates.

Table A1: Capital Flows: Retaining Unchanged Positions

	Shares		Market Value	
Shock measure	NDF	CNH	NDF	CNH
	(1)	(2)	(3)	(4)
Δe_t^s	−0.081**	−0.094***	−0.143**	−0.160***
	(0.032)	(0.030)	(0.061)	(0.056)
Other control	Yes			
Fixed Effect	Firm×Year-Quarter			
N	1,543,987	1,620,854	1,543,987	1,620,854
R^2	0.03	0.03	0.05	0.04

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value. Stocks in the bottom 5% of average lagged northbound share holdings, approximately 78,000 shares, are excluded. Zero-change observations are retained for the remaining stocks. This stock-level screen replaces the baseline observation-level holdings-size screen; other filters and the baseline flow and return cutoffs are unchanged. Each column uses the indicated benchmark shock in its original normalization. Controls are defined in Section 3.3. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors clustered by firm and date are in parentheses.

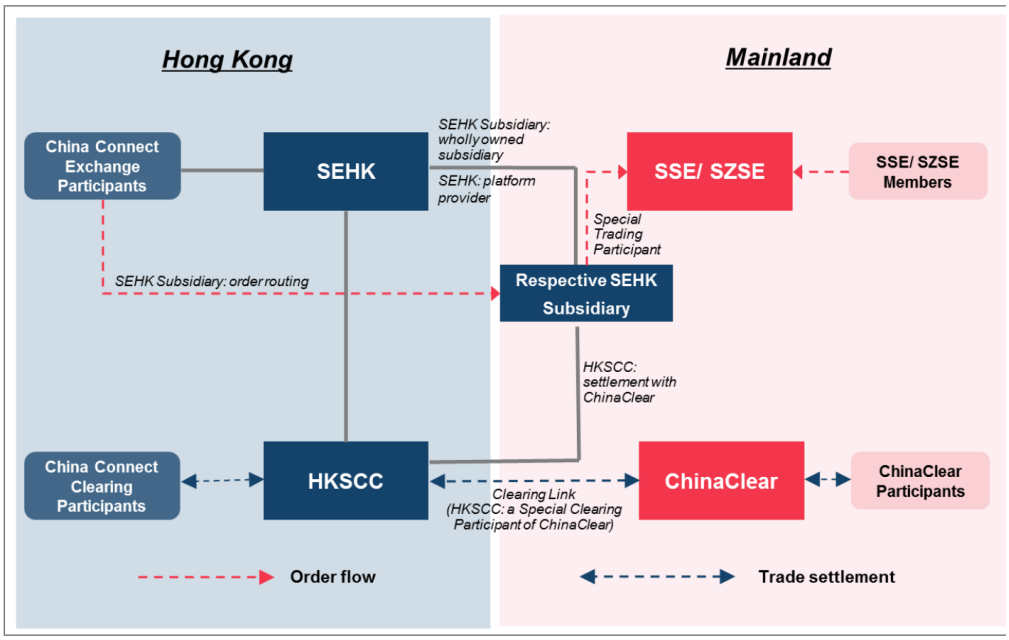


Figure A1: Northbound Trading and Settlement Arrangements

Notes: This figure is reproduced as a screenshot from HKEX's Stock Connect documentation. It depicts the Northbound order-routing and clearing links. Source: HKEX, *Information Book for Investors*, Section 3.1. For the discussion of currency funding and settlement, see Section 2, footnote 2.

A.1 Activity in Offshore RMB Markets

Figures A2 and A3 report the market-activity series used in the institutional discussion. The HKTR series begins in April 2018; its 274 weekly observations through June 2023 imply average USD/CNY NDF new-trade turnover of USD 26.9 billion per week. The Hong Kong spot series provides a locational proxy for offshore CNH activity. The graphs show broader historical context beyond the regression sample. These weekly and survey-based daily aggregates describe market scale; they are not measurements of turnover within the 9:05–9:25 a.m. fixing window.

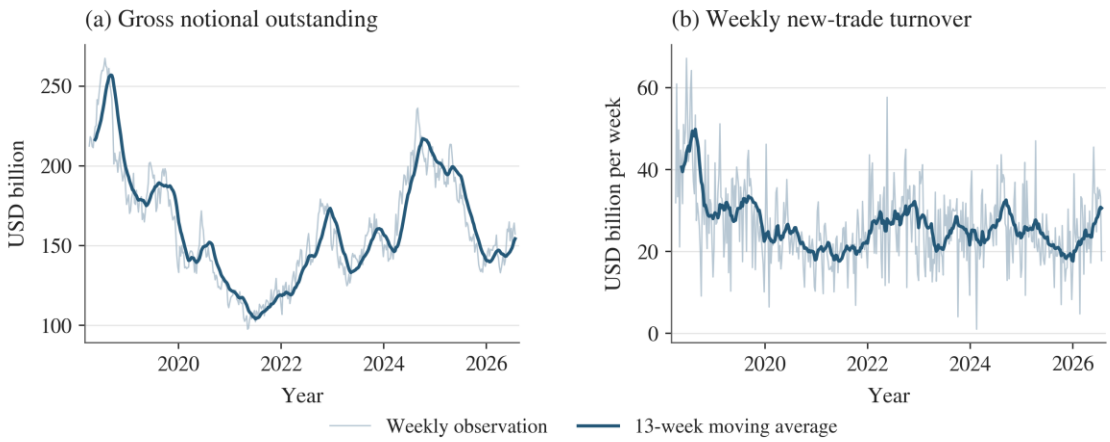


Figure A2: USD/CNY NDF Market Activity

Notes: Panel (a) reports gross notional outstanding in USD billions. Panel (b) reports new-trade turnover in USD billions per week. Pale lines show weekly observations and dark lines show 13-week moving averages. The data cover the Hong Kong Trade Repository reporting perimeter and are not global totals. Source: HKMA, HKTR Data Disclosure: Foreign Exchange Derivatives.

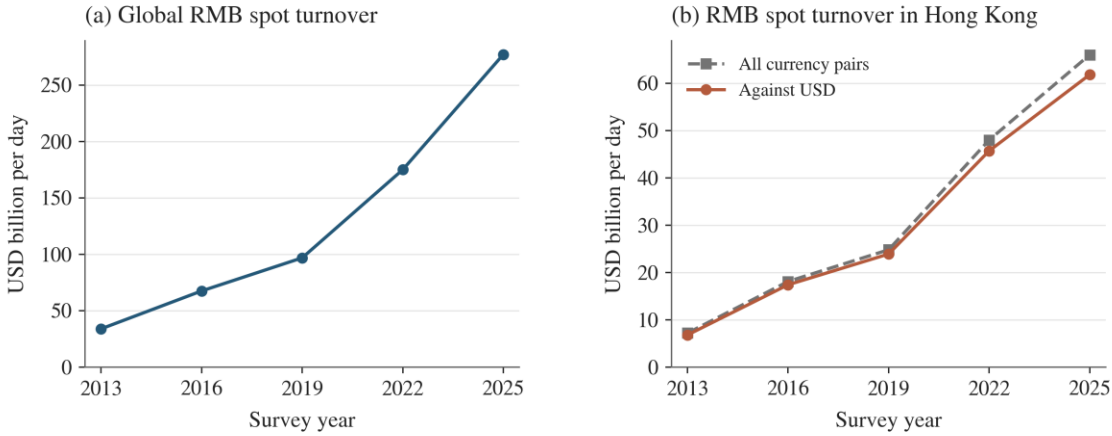


Figure A3: RMB Spot Turnover and Offshore Market Activity

Notes: The figure reports average daily turnover in April of each survey year, in USD billions. Panel (a) covers global RMB spot transactions, including onshore CNY and offshore CNH. Panel (b) reports RMB spot transactions booked by dealers in Hong Kong, separately for all currency pairs and against the U.S. dollar. The Hong Kong series is a locational proxy for CNH activity, not a pure CNH classification. Sources: BIS Triennial Central Bank Survey and HKMA, *The Foreign Exchange and Derivatives Markets in Hong Kong*, December 2019, 2022, and 2025.

B Supplementary NDF Timing Results

Table B1 includes all three timing components jointly. The negative post-announcement response remains present for both share quantities and market values. The coefficient on the jump component is positive but imprecisely estimated. The jump accounts for only about 1.3 percent of the variance of the NDF shock (Section 4.4), so it carries little identifying variation.

Table B1: Pre-Announcement, Jump, and Post-Announcement NDF Repricing

	Shares	Market Value
	(1)	(2)
Δe_t^{pre}	−0.051	−0.108
	(0.084)	(0.142)
Δe_t^{jump}	0.615	0.666
	(0.498)	(0.764)
Δe_t^{post}	−0.131***	−0.197**
	(0.042)	(0.077)
Other control	Yes	
Fixed Effect	Firm×Year-Quarter	
N	1,148,911	1,148,911
R^2	0.04	0.06

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. Components enter jointly using common fixed PCA loadings and retain the benchmark daily NDF-shock units defined in Section 3.1. NDF endpoints are the close of the 9:00 a.m. bar, close of the 9:10 a.m. bar, and opens of the 9:15 and 9:25 a.m. bars, subject to the endpoint selection rules above. Controls are defined in Section 3.3. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Standard errors clustered by firm and date are in parentheses.

C Bloomberg Survey and Expectation Gap

Figure C1 compares the announced fixing with the Bloomberg survey forecast used in Section 4.3 and marks the interval excluded from the survey-based regressions.

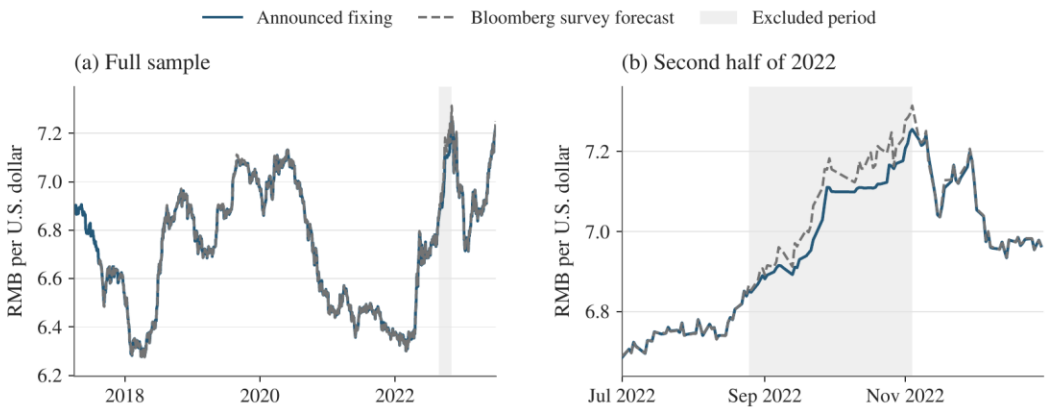


Figure C1: Announced Fixing and Bloomberg Survey Forecast

Notes: Panel (a) shows the announced fixing and the Bloomberg survey forecast over the main sample period; Panel (b) zooms in on the second half of 2022. Rates are expressed in RMB per U.S. dollar. Shading marks August 25 to November 4, 2022, the interval excluded from the survey-based regressions.

D Robustness Checks Related to the CNH Market

This section reports joint CNH timing components and estimates excluding CNH bill roll-off dates.

D.1 Joint CNH Timing Components

Table D1 includes the pre-announcement change, jump, and post-announcement change jointly using firm-by-year-quarter fixed effects. The negative post-announcement response also appears with CNH spot prices.

Table D1: Pre-Announcement, Jump, and Post-Announcement CNH Repricing

	Shares	Market Value
	(1)	(2)
$\Delta e_t^{pre,CNH}$	0.054	0.081
	(0.071)	(0.116)
$\Delta e_t^{jump,CNH}$	5.159	6.032
	(4.918)	(8.444)
$\Delta e_t^{post,CNH}$	−0.167***	−0.255***
	(0.040)	(0.071)
Other control	Yes	
Fixed Effect	Firm×Year-Quarter	
N	1,238,517	1,238,517
R^2	0.04	0.05

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. CNH components enter jointly and retain the benchmark daily CNH-shock units defined in Section 3.1. Both markets use the last available price before 9:05 a.m. and before 9:15 a.m., and the first available price at or after 9:15 a.m. and at or after 9:25 a.m. The four endpoints also define the total announcement-window shock. Controls are defined in Section 3.3. $***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$. Standard errors clustered by firm and date are in parentheses.

D.2 Excluding CNH Bill Roll-off Dates

We exclude nine CNH bill roll-off dates that could affect offshore liquidity independently of fixing news. Table D2 continues to show negative NDF-shock coefficients for shares and market values.

Table D2: Capital Flows: Excluding CNH Bill Roll-off Dates

	Shares	Market Value
	(1)	(2)
Δe_t^s	−0.105***	−0.169**
	(0.039)	(0.066)
$Ret_{t-5,t}^i$	0.026***	0.234***
	(0.006)	(0.009)
$CNHCNY_{t-1}$	0.515***	1.035***
	(0.177)	(0.303)
ΔVIX_t	−0.830*	−1.972***
	(0.432)	(0.751)
Other control	Yes	
Fixed Effect	Firm×Year-Quarter	
N	1,170,584	1,170,584
R^2	0.04	0.06

Notes: The dependent variables are daily percentage changes in foreign-held shares and their market value through the China-Connect Program. The NDF shock, Δe_t^s, is standardized; positive values denote RMB depreciation. The nine roll-off dates listed in the original sample construction are excluded. Controls are defined in Section 3.3. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors clustered by firm and date are in parentheses.

E Cross-Sectional Pricing of Fixing-News Exposure

This appendix reports evidence that exposure to fixing news is priced in the cross-section of A-share returns. It describes the estimation of predetermined exposures and Fama–MacBeth prices of risk, and reports portfolio sorts, portfolio characteristics, within-industry comparisons, weighting and size checks, and portfolio transitions.

E.1 Predetermined FX-Shock Exposures

We measure exposure using predetermined FX betas. Let $r_{i,t}^{e} = r_{i,t} - r_{f,t}$ denote stock i's daily total return in excess of the risk-free rate, and let F_t^{CH4} contain the market, size (SMB), value (VMG), and turnover-based sentiment (PMO) factors of Liu, Stambaugh and Yuan (2019). PMO is the pessimistic-minus-optimistic factor constructed from abnormal turnover. We estimate two historical FX betas:

$$r_{i,\tau}^{e} = \alpha_{i,q}^{U} + \beta_{i,q}^{FX,U} \Delta e_{\tau}^{s} + \varepsilon_{i,\tau}^{U} \tag{E1}$$

$$r_{i,\tau}^{e} = \alpha_{i,q}^{CH4} + \beta_{i,q}^{FX,CH4} \Delta e_{\tau}^{s} + b'_{i,q} F_{\tau}^{CH4} + \varepsilon_{i,\tau}^{CH4}, \ \ \tau \in W_{i,q} \tag{E2}$$

The window $W_{i,q}$ covers the preceding 252 trading days at stock i's formation date in the previous quarter, excluding the formation date itself, and requires at least 120 observations. We form the loadings at quarter end and hold them fixed throughout the following quarter. Both beta definitions use the same estimation windows and eligible stocks.

E.2 Fama–MacBeth Estimation

We estimate Fama–MacBeth regressions on the predetermined loadings. For each trading day t in quarter $q(t)$, the second-pass cross-sectional regressions are

$$r_{i,t}^{e} = \lambda_{0,t}^{U} + \lambda_{t}^{FX,U} \beta_{i,q(t)}^{FX,U} + u_{i,t}^{U} \tag{E3}$$

$$r_{i,t}^{e} = \lambda_{0,t}^{CH4} + \lambda_{t}^{FX,CH4} \beta_{i,q(t)}^{FX,CH4} + \lambda_{t}^{CH4\prime} \hat{b}_{i,q(t)} + u_{i,t}^{CH4} \tag{E4}$$

We estimate each second pass separately for all-market, China-Connect, and non-Connect stocks. China-Connect membership is defined by whether a stock ever appears in our foreign-holdings flow sample; the non-Connect group consists of the remaining stocks. The estimated price of FX-shock risk is the time-series average $\bar{\lambda}^{FX,g} = T^{-1} \sum_{t=1}^{T} \lambda_t^{FX,g}$, for $g \in \{U, CH4\}$. We report it in annualized percentage points, using Newey–West standard errors with five lags.

Table E1 reports a negative and statistically significant price of fixing-news exposure for all-market, China-Connect, and non-Connect stocks. Under a hedging interpretation, stocks with greater positive exposure provide protection when depreciation news reduces the value of other RMB investments, allowing investors to accept lower expected returns (Lustig and Verdelhan, 2007; Lettau, Maggiori and Weber, 2014). The pricing evidence complements the aggregate market response in Section 5.1.2 by showing that exposure to fixing news is associated with systematic differences in average stock returns.

Table E1: The Cross-Sectional Price of Exchange-Rate-Shock Risk

	All-Market Stocks	China-Connect Stocks	Non-China-Connect Stocks
	(1)	(2)	(3)
Univariate	−13.767***	−19.298**	−10.750**
	(4.721)	(8.067)	(4.359)
CH4-Adjusted	−13.010***	−17.262***	−10.515***
	(3.866)	(5.873)	(3.699)
FM Dates	1,172	1,172	1,172
Mean Stocks per Date	3,938	1,905	2,033

Notes: The dependent variable in the daily Fama–MacBeth regressions is the stock excess return. Entries report the price of predetermined NDF-shock beta; coefficients and standard errors are annualized. The univariate row uses shock-only historical betas in both passes. The CH4-adjusted row uses CH4-conditioned historical FX betas and also includes exposures to the market, size, value, and turnover-based sentiment factors in the second pass. Columns 1–3 use all-market stocks, China-Connect stocks in the flow panel, and the remaining stock universe, respectively. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Newey–West standard errors with five lags are in parentheses.

E.3 Portfolio Sorts

We separately sort stocks on each historical beta, forming equal-count quintiles within each daily eligible universe. Portfolios are equally weighted, and H–L is Q5 minus Q1.

Table E2: Portfolios Sorted on Predetermined NDF-Shock Betas

	Q1 (Low)	Q2	Q3	Q4	Q5 (High)	H–L
*Panel A: Univariate***						
Average Beta	−0.38	−0.17	−0.08	0.01	0.20	0.58***
						(0.083)
Average Excess Return	7.15	9.15	7.87	5.29	−1.37	−8.52**
	(11.75)	(10.88)	(10.64)	(10.72)	(11.63)	(3.38)
Mean Stocks per Date	787	788	788	788	788	1,575
*Panel B: CH4**						
Average Beta	−0.29	−0.09	0.00	0.08	0.27	0.57***
						(0.083)
CH4 Alpha	6.00***	5.98***	3.61***	0.69	−5.86***	−11.87***
	(1.58)	(1.18)	(1.24)	(1.28)	(1.70)	(2.36)
MKT	1.011***	0.981***	0.965***	0.980***	1.022***	0.011
	(0.006)	(0.005)	(0.006)	(0.005)	(0.007)	(0.008)
SMB	0.802***	0.805***	0.780***	0.813***	0.857***	0.054***
	(0.015)	(0.011)	(0.010)	(0.011)	(0.011)	(0.019)
VMG	−0.226***	−0.026**	0.017	0.014	−0.119***	0.107***
	(0.013)	(0.011)	(0.011)	(0.012)	(0.014)	(0.019)
PMO	−0.030**	0.000	0.028**	0.073***	0.142***	0.172***
	(0.013)	(0.011)	(0.012)	(0.014)	(0.018)	(0.023)
R^2	0.98	0.99	0.99	0.98	0.98	0.19
Mean Stocks per Date	787	788	788	788	788	1,575
Formation Quarters			22			
Return Dates			1,172			

Notes: Panel A estimates historical FX betas from shock-only regressions, sorts stocks on those betas, and reports average portfolio excess returns. Panel B estimates historical FX betas jointly with LSY four factors (CH4), sorts stocks on those conditional betas, and reports portfolio CH4 alphas and factor loadings. Both use the same eligible stocks and dates. Historical betas use the preceding 252 trading days, require 120 observations, and are held fixed in the next quarter. Equal-count quintiles are formed daily within the eligible universe and equally weighted. Average betas use the first available trading date of each quarter and are multiplied by 100. The H–L average-beta standard error uses three quarterly Newey–West lags for overlapping windows, following Wang (2023), and is reported in parentheses. Average excess returns and alphas are annualized percent. H–L is Q5 minus Q1. Stars on average beta refer only to H–L. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Newey–West standard errors with five daily lags are in parentheses for returns, alphas, and factor loadings.

Table E2 shows that the univariate H–L portfolio earns an annualized excess return of −8.52% (Panel A). Sorting on CH4-conditioned betas and adjusting portfolio returns for the four factors yields an H–L alpha of −11.87% (Panel B), with a market loading close to zero. The negative spread also appears in the within-industry comparisons below. Average foreign-revenue shares are similar across quintiles (Table E3), suggesting that exposure to fixing news captures a broader dimension of risk than direct foreign sales.

The negative H–L alpha is consistent with investors valuing protection against depreciation news. High-beta stocks cushion losses on RMB investments when such news arrives, while low-

beta stocks add to those losses. Under this hedging interpretation, investors accept lower expected returns on high-beta stocks and require higher returns on low-beta stocks.

Section E.4 reports value weighting and a screen excluding the smallest 30% of cap-covered stocks. Univariate return spreads remain negative across these comparisons, and the CH4 alphas remain negative and significant.

Table E3: Characteristics of FX-Shock-Beta Portfolios

	Q1 (Low)	Q2	Q3	Q4	Q5 (High)
*Panel A: Portfolios Sorted on Shock-Only Betas**					
Median Market Capitalization (RMB bn)	5.51	5.37	5.14	5.10	4.66
Median Total Assets (RMB bn)	3.85	4.43	4.48	4.58	3.34
Mean Formation Market Beta	1.05	1.02	1.00	0.99	1.02
Median Turnover	1.69	1.27	1.17	1.20	1.61
Median Return Volatility	0.473	0.422	0.406	0.412	0.462
Mean Foreign-Revenue Ratio (%)	16.21	15.77	15.63	15.52	16.11
Positive Foreign Revenue (%)	71.3	70.2	68.8	66.8	68.2
China-Connect Sample (%)	51.6	56.9	55.9	55.8	47.8
Median Return on Assets (%)	1.96	1.82	1.83	1.76	1.77
Median Liabilities/Assets (%)	41.3	41.6	41.3	41.6	40.1
Stock-Quarter Snapshots	14,543	14,162	13,955	13,938	14,329
*Panel B: Portfolios Sorted on CH4-Adjusted Betas**					
Median Market Capitalization (RMB bn)	5.26	5.23	5.37	5.20	4.74
Median Total Assets (RMB bn)	3.65	4.47	4.83	4.60	3.34
Mean Formation Market Beta	1.01	1.00	0.99	1.00	1.06
Median Turnover	1.69	1.24	1.16	1.21	1.64
Median Return Volatility	0.470	0.417	0.403	0.415	0.468
Mean Foreign-Revenue Ratio (%)	16.37	15.62	15.38	15.39	16.46
Positive Foreign Revenue (%)	71.1	69.5	68.1	67.4	69.1
China-Connect Sample (%)	50.5	56.8	57.7	56.1	47.2
Median Return on Assets (%)	1.92	1.79	1.77	1.79	1.87
Median Liabilities/Assets (%)	40.9	41.8	42.0	41.8	39.5
Stock-Quarter Snapshots	14,542	14,063	13,858	14,033	14,431

Notes: The table describes the first trading date of each return quarter in 2018–2022, the period covered by the matched firm-characteristics data. Non-revenue characteristics use exact stock-date matches. Foreign-revenue ratios use the most recent valid annual or semiannual report, with conservative reporting lags: annual values enter in July of the following year and semiannual values in October of the same year. Reports remain eligible for one year after this availability date. Missing ratios and values outside 0–100% are excluded; zero is retained when the reported domestic-revenue ratio is approximately 100%. Panels A and B follow the corresponding historical-beta sorts in Table E2. Each statistic uses its available observations. Market capitalization and assets are in RMB billions; membership shares, foreign-revenue ratios, ROA, and leverage are in percent. Turnover and return volatility retain source-series units. Formation market betas are estimated jointly with CH4 in both panels. China-Connect membership indicates stocks ever included in the flow panel.

E.3.1 Within-Industry Portfolios

We also sort stocks on the CH4-conditioned FX beta within industries. For each quarter, we retain industries with at least ten stocks, form equal-weighted quintile portfolios within each

industry, and combine them using common industry-size weights across quintiles. We repeat the exercise with a minimum of twenty stocks. The all-market comparisons use the same eligible stocks.

Table E4 shows negative FX-beta return spreads with industry weights held fixed across quintiles. With the ten-stock threshold, the H–L portfolio earns an annualized excess return of −4.48% and a CH4 alpha of −5.50%. Greater positive exposure to fixing news is therefore associated with lower average returns among firms in the same industry.

Table E4: FX-Beta Return Spreads within Industries

	All-Market Min. 10	Within-Industry Min. 10	All-Market Min. 20	Within-Industry Min. 20
	(1)	(2)	(3)	(4)
Annualized Excess Return	−9.340***	−4.482***	−9.096***	−4.689***
	(2.650)	(1.599)	(2.677)	(1.643)
Annualized CH4 Alpha	−11.486***	−5.495***	−11.288***	−5.730***
	(2.423)	(1.531)	(2.450)	(1.573)

Notes: Entries report annualized high-minus-low FX-beta excess returns and CH4 alphas, in percent. Minimum industry sizes are ten stocks in columns 1–2 and twenty in columns 3–4. All-market and within-industry sorts use the CH4-conditioned historical beta and identical eligible stocks for each threshold. Within-industry portfolios are equally weighted and aggregated using common industry-size weights across quintiles. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Newey–West standard errors with five lags are in parentheses.

E.4 Weighting and Market-Capitalization Screens

Table E5 examines portfolio weighting and firm size for both beta definitions. The cap-matched equal-weighted portfolios provide a common-sample comparison for value weighting. We also exclude the smallest 30% of cap-covered A-share stocks before sorting, following the concern about shell values in Liu, Stambaugh and Yuan (2019). All weights and size screens use capitalization observed before the return month.

Table E5: FX-Beta Return Spreads: Weighting and Market-Capitalization Screens

	Univariate: Average Excess Return	CH4: Alpha
Equal Weight: Full Sample	−8.52**	−11.87***
	(3.38)	(2.36)
Equal Weight: Cap-Matched	−8.52**	−11.89***
	(3.42)	(2.39)
Value Weight: Cap-Matched	−9.05	−15.30***
	(6.32)	(4.19)
Equal Weight: Exclude Smallest 30%	−9.82**	−12.11***
	(3.93)	(2.70)
Value Weight: Exclude Smallest 30%	−8.16	−15.19***
	(6.65)	(4.42)
Dates	1,172	

Notes: Entries describe Q5 minus Q1. The univariate column uses shock-only historical betas for sorting and reports average excess returns; the CH4 column uses conditional historical betas for sorting and reports four-factor alphas. These match Panels A and B of Table E2. Cap-matched comparisons retain stocks with positive market capitalization observed before the return month and no more than 62 days old, covering 94.6% of baseline stock-days. Value weights are proportional to prior capitalization and normalized within each daily eligible quintile. The smallest-30% screen uses the preceding market-cap distribution of all cap-covered A-share stocks; eligible stocks are reranked on their corresponding FX beta. Returns and alphas are annualized percent. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$. Newey–West standard errors with five daily lags are in parentheses.

E.5 Persistence of Portfolio Membership

Table E6 describes portfolio membership in adjacent quarters. Both sorts show substantial persistence in the tails. Overlapping estimation windows contribute to this persistence.

Table E6: Quarterly Transitions between FX-Beta Portfolios

	Next Q1	Next Q2	Next Q3	Next Q4	Next Q5
*Panel A: Portfolios Sorted on Shock-Only Betas**					
Q1	64.7	22.6	8.1	3.3	1.3
Q2	21.2	40.6	24.7	10.4	3.1
Q3	7.4	24.2	36.0	24.5	7.9
Q4	3.0	10.5	25.0	40.1	21.3
Q5	1.1	3.5	8.0	23.0	64.4
*Panel B: Portfolios Sorted on CH4-Adjusted Betas**					
Q1	63.9	22.6	8.3	3.7	1.4
Q2	21.6	40.4	24.2	10.6	3.2
Q3	7.5	24.2	36.4	24.0	7.9
Q4	3.5	10.9	24.7	39.6	21.4
Q5	1.1	3.3	8.3	23.4	63.9

Notes: Rows indicate the current quarter and columns the next quarter. Entries are percentages among stocks observed on the first trading dates of both adjacent quarters from January 2018 through June 2023. Each stock-quarter receives equal weight. Panels use the corresponding historical-beta definitions in Table E2. Adjacent 252-day estimation windows overlap.