Following the Fed: Limits of Arbitrage and the Dollar

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Abstract

U.S. dollar exchange rates are predictable by U.S. bond yields in the weeks around monetary policy announcements, rising following an increase in yields. In the post-zero-lower-bound period, the information in the "path" factor that reflects forward guidance surprises is impounded in the exchange rate over five days following the FOMC meeting. Using data on currency order flows, we trace out the channel for the delayed adjustment of exchange rates to monetary news. Foreign exchange dealers increase dollar purchases immediately following a monetary tightening, while funds and non-bank financial institutions do so with a 3-5 day delay; banks serve as liquidity providers by supplying dollars. These flows explain much of the exchange rate predictability that we document. Decomposing the daily change of exchange rate into news about future interest rate differentials, excess returns, and inflation, we find that a surprise future tightening of U.S. monetary policy raises all components: expected future returns, interest rate differentials, and long-run differential between U.S. and foreign inflation.

Key words: Currency order flows, Exchange rates, Forward guidance, FX dealers, Limits of arbitrage, Monetary policy surprise, Risk premia, ZLB

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1. Introduction

The apparent disconnect of exchange rates from macroeconomic fundamentals is one of the central and long-standing puzzles in international economics.[1] The transmission of monetary policy to exchange rates, in particular, is not well-understood.[2] In this paper we provide novel evidence on the transmission of news about the path of U.S. monetary policy embedded in Treasury bond yields into the U.S. dollar exchange rate. In particular, we identify the channel of this transmission by linking monetary policy shocks to currency flows, which are known to predict exchange rates at high frequencies. We demonstrate that financial flows into the U.S. dollar build up over five days following the Federal Reserve policy announcement, resulting in a delayed reaction of the exchange rate, relative to that of the U.S. bond yields.

We begin by documenting a novel and surprising fact that U.S. dollar exchange rate vis-a-vis other developed currencies is strongly predictable at weekly frequency by lagged changes in the U.S. treasury bond yields. In particular, an increase in U.S. yields predicts an appreciation of the U.S. dollar over the subsequent five business days (Thursday to Wednesday). This evidence is puzzling, since the "traditional" view that assumes uncovered interest-rate parity (UIP) implies an on-impact appreciation of the dollar followed by a slow depreciation over time, while the "modern" view that time-varying currency risk premia explain the empirical failure of the UIP typically relies on predictive variables that fluctuate at business cycle frequencies, such as interest rate differentials (or forward discounts).[3]

A potential role for monetary policy is hinted by the fact that most of FOMC meetings in our sample end on Wednesdays. In fact, we show that our exchange rate predictability evidence only holds in weeks that span FOMC meetings, when weekly yield changes are mainly driven by the FOMC announcements. We employ the measures of monetary policy surprises of Nakamura and Steinsson (2018) and Gürkaynak, Sack and Swanson (2005) as well as Swanson (2021) to study the different dimensions of monetary policy transmission to exchange rates.[4] We find a very strong impact of US monetary policy shocks on the

[1] In a classic study Meese and Rogoff (1983) document that it is hard to forecast or even explain the change of exchange rates with macroeconomic fundamentals. Mark (1995) and Engel et al. (2007) document the medium- and long-horizon predictability of exchange rates with long-maturity interest-rate differentials. Evans and Lyons (2002) and Froot and Ramadorai (2005) find that net currency order flow can explain exchange rates, especially at very high frequencies. See Rossi (2013) for an extensive survey.

[2] Eichenbaum and Evans (1995) document that an easing monetary policy shock depreciates US dollar with a substantial delay. A number of authors study the effect of FOMC announcement on exchange rates directly (see Andersen et al. (2003, 2007), Faust et al. (2007), Wright (2012), Rogers, Scotti and Wright (2014, 2018), Swanson (2021)).

[3] A large literature following Fama (1984) demonstrates that higher interest rate currencies tend to appreciate in the future, which implies a violation of UIP and existence of time varying currency premia. Lustig, Roussanov and Verdelhan (2014) document counter-cyclical properties of currency risk premia from the perspective of a U.S. investor and substantial predictability of the U.S. dollar at monthly-to-yearly frequencies.

[4] One of the advantages of the monetary policy shocks in Swanson (2021), in particular, is the separation

U.S. dollar exchange rate at daily frequency, both "on-impact" and in the days immediately following FOMC announcements. The tightening shocks captured by either "target" or "path" monetary policy surprise measures are followed by appreciation of the U.S. dollar. More specifically, we find that "target" surprises can predict exchange rates over the following four days during the 2000-2008 time period, while "path" surprises can predict the USD outside of the period when zero lower bound (ZLB) on the interest rates is binding, specifically before 2008 and after 2015. In particular, we find strong predictability with the "path" factor after the ZLB period, which is strongest for the cumulative exchange rate change over five trading days after FOMC announcements.

In order to better understand this evidence of exchange rate predictability we use a novel dataset of currency order flows from CLS Group, one of the largest foreign exchange settlement systems.[5] Our aim is to trace out the pass-through of monetary policy shocks to exchange rate by analysing the trading behavior of institutional investors and other currency market participants following FOMC announcements. Our data, which is available at hourly frequency, starts in 2012 and ends in 2019, which means that we can analyze the pass-through of monetary policy shocks during both the ZLB and the "lift-off" periods.

In standard frictionless New-Keynesian models monetary policy is transmitted internationally immediately following policy decisions. In contrast, in the "intermediary" view, monetary shocks are propagated through the balance sheets of financial institutions that are marginal in the domestic and foreign capital markets. In our data we can identify high-frequency currency flows between foreign exchange dealers and several key classes of market participants: banks, non-financial corporations, funds (e.g. mutual funds or certain pension funds) and non-bank financial institutions (e.g. insurance companies, endowments, etc.) We find that the FX dealer flow responds strongly to the FOMC policy announcements. In particular, immediately following a tightening shock to the "path" of U.S. interest rates, the U.S. dollar flow out of banks, which serve as liquidity providers, is strongly negative, indicating a greater demand for U.S. dollars by global FX dealers (as well as their clients, such as hedge funds). As this increased demand continues over the several days following the FOMC announcements, other market participants, such as funds and non-banks, also show increasing demand for dollars that peaks between three and five days after the monetary announcement, flattening out afterwards. We show that these patterns are strongly dependent on the magnitude of the forward guidance surprise and, at the same time, predict exchange rate appreciation over the following days. This evidence indicates that the demand by financial institutions for the U.S. dollar increases following monetary tightening shocks, yet it is only partially anticipated by the intermediaries (FX dealers), which results in the delayed transmission of this demand into the exchange rates.

of forward guidance and QE effect during ZLB pointed out by Bernanke (2020).

[5]Based on this dataset, Cespa et al. (2022) find that FX volume predicts currency returns. Ranaldo and Somogyi (2021) also find currency predictability with order flow, especially from institutional investors in the FX market. Using higher frequency data from CLS, Hasbrouck and Levich (2019, 2021) highlight the central role of FX dealers in currency markets.

Finally, we decompose the change of exchange rate into different components based on a daily VAR estimation following Froot and Ramadorai (2005), Engel (2016) and Stavrakeva and Tang (2019). We find that the expected path of currency excess return news plays the dominant role in the impulse response of exchange rate changes to monetary shocks, while news about future real interest rate differentials and future long-run inflation differentials largely offset each other. Consistent with our currency-predictability as well as the flow-based evidence, the shape of impulse response of the change of the exchange rate attributed to changes in the future expected returns achieve its peak around five trading days after FOMC announcements.

Our paper is closely related to the classic literature on the forward premium/UIP puzzle and "delayed overshooting" of exchange rates, e.g. Eichenbaum and Evans (1995). Froot and Thaler (1990) suggest that gradual portfolio adjustment in response to interest rate changes could solve the UIP puzzle, while Eichenbaum and Evans (1995) show that exchange rates do react with a delay in the "right" direction (consistent with UIP) but end up "overshooting" in the longer run. Bacchetta and Van Wincoop (2010) further explain the forward discount puzzle and delayed overshooting of exchange rates by the infrequent portfolio adjustment of investors. However, we find that the time period over which the relevant investors (e.g. funds and non-bank financial institutions) adjust their portfolios is dramatically shorter, at least in response to monetary policy shocks, than is considered in this literature (a few days, as opposed to quarters).

Moreover, given the observed immediate response of FX dealers, which are typically large global banks and similarly well-capitalized financial institutions, it might appear puzzling that their actions are not enough to fully impound the relevant information into the exchange rates on impact. Our evidence appears to support theories of limits of arbitrage that build on Shleifer and Vishny (1997). In particular, Greenwood et al. (2020) and Gourinchas, Ray and Vayanos (2021) develop dynamic models to study the joint effect of monetary policy on bond term premia and currency premia based on investors' portfolio adjustment. Empirically, Evans and Lyons (2002) and Froot and Ramadorai (2005) find that net currency order flow can explain large proportion of variations of exchange rates. Hau and Rey (2006) and Hau, Massa and Peress (2010) provide the direct evidence that net equity flows into the US market are positively correlated with the appreciation of US dollar. Gabaix and Maggiori (2015) emphasize the central role of financial intermediaries with limited risk taking capacities in the determination of exchange rates. Similarly, Itskhoki and Mukhin (2021) also emphasize the role of FX dealers in the intermediation of currency markets. Mueller, Tahbaz-Salehi and Vedolin (2017) rely on a model based on Gabaix and Maggiori (2015) to explain the average excess returns of a host of different currencies against the U.S. dollar on FOMC announcement days.

Our paper is also related to a growing empirical literature on the impact of unconventional monetary policy on exchange rates. During the 2007-2009 global financial crisis, the Federal reserve lowered the federal fund rate in the response to extreme credit market disturbance. When the policy rate is close to the zero lower bound (ZLB), forward

guidance and quantitative easing (QE) are the two new tools used by Federal Reserve and other central banks (Bernanke (2020)). Bauer and Neely (2014) and Neely (2015) find that QE announcements spill over to international long-term bond yields and exchange rates for several developed economies vis-a-vis US dollar. Chari, Dilts Stedman and Lundblad (2021) examine the impact of QE and "taper tantrum" shocks on global capital flows and exchange rates in emerging markets. Miranda-Agrippino and Rey (2020) and Rogers, Scotti and Wright (2018) employ Bayes structural vector autoregression (SVAR) with external instruments to identify the effect of "forward guidance" on exchange rates. While Stavrakeva and Tang (2019) show some puzzling findings during global financial crisis, i.e., an easing "path" monetary surprise is associated with US dollar appreciating. They impute this finding to the "flight to safety" effect during the global financial crisis. To the best of our knowledge ours is the first paper to provide direct evidence of exchange rate predictability with monetary surprises, in particular related to forward guidance.

Compared to "target" or "LSAP" surprises, the "path" factor might be more difficult for market participates to interpret. This is consistent with the view in Gürkaynak, Sack and Swanson (2005), who find that it takes markets time to impound news about the future path of rates contained in FOMC statements, but it takes almost no time to impound news about the current target, or news about quantitative easing. The limits of arbitrage theory implies that the investors react to the path surprise gradually, which can explain the gradually growing of trading volume and associated gradual appreciation of U S dollar. Our findings are also consistent with the six puzzling empirical facts about the relationship between the exchange rates and bond yields listed in Bacchetta and Van Wincoop (2021). First, our finding is consistent with the forward discount puzzle: the currency experiencing a rise in interest rates tends to appreciate subsequently (albeit over a short time window). Second, we also find the delayed overshooting of exchange rates following a monetary surprise. Finally, we also find the forward guidance puzzle: the exchange rate is more strongly affected by expected interest rates in the near future than in the distant future, which is found in Galí (2020).

This paper proceeds as follows. Section 2 provides the basic data description and summary statistics. Section 3 presents the evidence of exchange rate predictability following monetary policy surprises across different sample periods. Section 4 links this predictability evidence to trading volume. Section 5 analyzes the predictability based on VAR estimation. Section 6 provides robustness checks for the main results. Section 7 concludes.

2. Data and Summary Statistics

In this section, we describe the source of data used in the paper and provide some basic data summary statistics. More related information can be found in the Appendix.

Our data of bond yields and exchange rates are from Datastream with the sample period from January 1994 through October 2023. The currency order flow data is from CLS

Group for sample period 09/03/2012-02/30/2020. We use the monetary surprises in Nakamura and Steinsson (2018) and Swanson (2021) to measure US monetary policy shocks. The following subsections provide a quick overview of variables construction, including yields change, currency excess returns, the information on FOMC meetings, normalized currency order flow and monetary policy shocks.

2.1 Exchange Rates and Yield Factors

We obtain US yields rates across different maturities and Thomson Reuters daily spot mid exchange rates of G10 currency pairs from Datastream over the period: 01/03/1994–02/28/2020. Following tradition, we focus on the G10 currency pairs: AUD, CAD, CHF, EUR, JPY, NOK, NZD, SEK and GBP quoted against the US dollar. The daily timestamp of Thomson Reuters currency data is 5pm EST. Since daily US bond yields data is released at 4:15pm from Monday through Friday by New York Fed, to avoid the time overlapping issue for predictive analysis, we use Thomson Reuters daily exchange rates data instead of WMR daily exchange rates data, which is usually collected at 11am EST.

We denote the log spot prices as s_t^i quoted in units of foreign currency i per one US dollar at time t. The arise of s_t^i stands for the appreciation of US dollar. The simple currency return of holding USD from $t-j$ to t is defined as the log difference of spot prices:

$$r_{t-j\to t}^i = s_t^i - s_{t-j}^i. \tag{1}$$

We define the US dollar index (USID) as the simple average of change of exchange rates across G10 currency pairs. Following Nakamura and Steinsson (2018), we further construct two yields factors to approximate daily monetary surprise over different horizons. The short-term yields factor is the equal-weighted average of daily US 3M, 6M, 1Y, 2Y yields changes, which measures the forward guidance of US monetary policy. The long-term yields factor is the the equal-weighted average of daily US 3Y, 5Y, and 10Y yields changes, which measures the surprise of future path rates beyond the near-term. Table 1 provides data summary statistics of daily yields and exchange rates.

[Insert Table 1 about here]

2.2 Monetary Policy Shocks and Regimes

The whole sample period for short-term yields is from 02/04/1994 to 01/19/2020, which includes 205 FOMC meetings (excluding 9 meetings between Aug 5th 2008 and Jun 24th 2009 during global financial crisis (GFC)). In this paper, we employ the monetary policy shocks in Nakamura and Steinsson (2018) and Swanson (2021) directly. For the monetary shocks in Nakamura and Steinsson (2018) (hereafter, NS), the sample period is from Feb 2nd 2000 to Sep 18th 2019, which includes 150 meetings. Swanson (2021) constructs three

monetary factors by extending the procedure in Gürkaynak, Sack and Swanson (2005) (hereafter, GSS) with the whole sample period is from Fed 4th 1994 through Jun 19th 2019 including 200 meetings. The first shock captures the surprised shocks of target rate, which is the "target" factor; the second one is the "path" factor, which can capture the forward guidance effect as NS monetary policy shock; the third one is new relative to Gürkaynak, Sack and Swanson (2005), which measures the effect of large scale asset purchase (LSAP) or QE announcements during ZLB. We match these two sets of monetary policy shocks based on NS time stamp since 2000.[6]

We further study the impact of monetary policy on exchange rates in several monetary policy regimes. Since the Fed began to use forward guidance since 2000,[7] we first divide the whole sample into the periods before and after 2000. We define the first Zero Lower Bound (ZLB) period from Dec 17th 2008 through Dec 16th 2015, and the second ZLB period from March 31th, 2020 to April 29th, 2022. Accordingly, the first post-ZLB period from Dec 17th 2015 until the onset of Covid-19 and the second post-ZLB period from May 1st 2022 until the end of sample period.

For the magnitude of monetary policy shocks, Nakamura and Steinsson (2018) rescale NS shock such that its effect on the one-year nominal Treasury yield is equal to one. Gürkaynak, Sack and Swanson (2005) and Swanson (2021) follow the standard practice of normalization in PCA such that each factor has unit variance and are positively correlated with yields changes. In this paper, to make the magnitude of regression results comparable from two sets of monetary policy shocks, we amplify NS shocks by 100 times and keep the original magnitude of GSS shocks. We also provide some summary statistics of monetary policy shocks in Table 1.

2.3 Currency Order Flow Data

Our currency order flow data is from CLS Group, a major foreign exchange settlement platform, accessed via Quandl. CLS Group categories market participants into price takers and market makers. Based on the documents from CLS, the term "price taker" is used interchangeably with the term "buy side", and the term "market maker" is used interchangeably with the term "sell side," the latter essentially representing FX dealers. In particular, CLS classifies market participants into "corporates," "funds," "non-bank financial firms," and "banks" based on static identity information. In addition, all corporates, funds and non-bank financial firms are labeled as price takers, while bank sector includes both price takers and market makers. However, while the vast majority of volume is transactions between banks, banks' order flow is not directly provided in order to avoid double counting of transactions, since much of the inter-dealer volume is transactions offsetting or

[6] we exclude 6 conference calls in GSS (01/03/2001, 04/18/2001, 08/10/2007, 08/17/2007, 01/22/2008 and 03/11/2008) and 9 meetings in GSS from Aug 5th 2008 to Jun 24th 2009, which is defined as GFC.

[7] https://www.federalreserve.gov/faqs/what-is-forward-guidance-how-is-it-used-in-the-federal-reserve-monetary-policy.htm

hedging end user flows. Instead, what is reported is transactions between a market maker (i.e. a dealer) and a price taker bank. The aggregate volume is thus the sum of the 3 "buy side" sectors' volume plus the "price taker bank" volume that is also counted as "buy side." We further aggregate the volume of fund and nonbanks sectors together and define it as "fund+nonbanks" sector, which results in six categories used in our empirical analysis: "aggregate", "banks", "corporates", "funds", "nonbanks," and "fund+nonbanks".

Similar to Evans and Lyons (2002), Froot and Ramadorai (2005) and Menkhoff et al. (2016), we calculate the net dollar buying as the difference of "buy" and "sale" order flows in units of USD for each category, separately. Specifically, for currency pairs in the CLS data, such as AUD/USD, EUR/USD, NZD/USD and GBP/USD, a "buy" order means "buying foreign currency and selling USD", while a "sell" order means "selling foreign currency and buying USD". Hence, after translating the units of order flows into USD, the net dollar buying volume of AUD/USD, EUR/USD, NZD/USD and GBP/USD is defined as "sell" minus "buy" order flow. See Appendix Section 8.1 for more detail.

Since daily order flow is rather volatile, we normalize the daily aggregate order flow data following Froot and Ramadorai (2005) and Menkhoff et al. (2016): with the associated standard deviations via a rolling scheme over a 60-day window as follows

$$\widetilde{vol}_{i,t} = \frac{vol_{i,t}}{\sigma\left(vol_{i,t-59;t}\right)}, \tag{2}$$

where $\widetilde{vol}_{i,t}$ denotes order flow for sector i standardized over a rolling window, $vol_{i,t}$ denotes the raw order flow data, and $\sigma\left(vol_{i,t-59;t}\right)$ is the rolling standard deviation of flows with over a 60-day window, skipping days without order flow data, such as Christmas and New Year. Finally, we provide summary statistics for the order flow data in Table 2.

[Insert Table 2 about here]

3. Exchange Rate Predictability

3.1 Weekly predictability

In this section, we consider the weekly (Wed to Wed) predictive regression of yields factors to USD and report the associated results in Table 3. We find the strong predictability of yields factors to USD. From the second panel in Table 3, the weekly predictability mainly comes from FOMC weeks instead of non-FOMC weeks. From the last panel in Table 3, we further notice that the predictability mainly comes from FOMC days instead of non-FOMC days within the corresponding FOMC weeks. More importantly, we can find the very strong weekly predictability Post ZLB. For the sample period before ZLB (2000-2008), the predictability is relatively weaker than the predictability post ZLB. While for FOMC weeks during ZLB period, the predictability is particularly strong before 2012, but

disappears after 2012. This is consistent with the findings in Swanson and Williams (2014) and Gilchrist, López-Salido and Zakrajšek (2015). They document that monetary policy was likely to have been about as effective as usual from 2008 to 2010, since one or two years maturity yields responded to economic news throughout this period. However, by the end of 2011, the two-year Treasury yield has largely stopped responding to news as result of the binding ZLB constraint.[8]

[Insert Table 3 about here]

Finally, from the unreported results, we find that there is no any predictability in quarterly and monthly frequency, weekly for other days (like Monday to Monday et.al) or daily horizons.

3.2 Daily Predictability

Motivated by the finding of weekly predictive regression in Table 3, we further estimate the IRFs of exchange rates to monetary surprises with local projection in Jordà (2005) as follows.

$$\Delta USD_{t,t+h} = \alpha_h + \beta_h x_t + \epsilon_{t+h}, \tag{3}$$

where $\Delta USD_{t,t+h}$ is the cumulative change of USD h days after a FOMC announcement at time t, and x_t is the change of yields factors or monetary policy shocks on FOMC days.

We report all the results in Table 4-5 with sample since 1994. First of all, for sample period after 2000, we can find very strong comovement of both NS and GSS "path" surprises with the change of exchange rates on the corresponding FOMC days. While there is no significant comovement before 2000. This is consistent with the fact that Fed began to use forward guidance since 2000 as mentioned above.

[Insert Table 4-5 about here]

Moreover, we find the strong predictability of "target" surprise after 2000 and before ZLB (August, 2008) in Table 4. The "target" factor can predict the next four following days' cumulative change of exchange rates and achieve the peak at the third day after the announcement. While, for the same period, "path" factor only predict one day following the announcements. It is worth noticing that NS monetary policy shocks also predict the next following three days' change of USD and achieve the peak, this is due to the fact that NS monetary surprise is the average of "target" factor and "path" factor in GSS, which is

[8] Swanson and Williams (2014) provide two explanations for this finding. First, up until August 2011, market participants expected the zero bound to constrain policy for only a few quarters, minimizing the zero bound's effects on medium- and longer-term yields. Second, the Fed's large-scale purchases of long-term bonds and management of monetary policy expectations may have helped offset the effects of the zero bound on medium- and longer-term interest rates.

emphasized in Bauer and Swanson (2021). Therefore, for the period after 2000 and before ZLB, we can conclude that the predictability of NS monetary surprise mainly comes from the component of GSS "target" factor , instead of GSS "path" factor.

Importantly, we find surprisingly strong prediction of "path" surprise to the change of USD Post ZLB period in Table 5, and the predictability spikes five trading days after the announcements. First of all, this finding can justify the weekly results in Table 3: the predictability post-ZLB is from the yields changes on FOMC announcement days. Second, by comparing the predictive results from GSS "target" with GSS "path" factors and recalling the fact that the shocks of NS shock is the average of GSS "target" and "path" factors, we can conclude that the predictability of NS shock mainly comes from "path" factor in GSS for the period Post ZLB. This can also explain the stronger predictability of GSS "path" factor to USD than NS shocks.

Unlike the pure monetary surprises from the high frequency data, the predictability of short-term factor achieves the peak four trading days after the announcements due to other noisy terms of daily yields factor changes. Finally, it is an interesting finding that long-term yields factor also has predictability, while the "LASP" factor cannot. This indicates that the predictability of long-term yields to USD comes from the Fed's forward guidance, which can affect the future path of fed fund rates. While it is not relevant to the Fed's purchase of long-term bond during this period. In the following sections, we will study the impact of monetary surprise on yields factors directly. This finding is consistent with Hanson and Stein (2015), where they find that the "path" factor can affect the risk premia of long-term bonds. In addition, this finding is consistent with the forward guidance exchange rate puzzle in Galí (2020): the exchange rate is more strongly affected by expected interest rates in the near future than the distant future.

We further find that the predictability of short term yields factor is stronger and longer than monetary surprises for the post-ZLB period. For instance, during this period, predictive horizon for short yields is six trading days, while predictive horizon of GSS path is five trading days. One of the explanations is that yields factor changes on FOMC days also include the information from other macro announcements or news, which can also lead to the prediction to USD.

Finally, our findings are related to and consistent with three puzzling facts in the literature: forward discount puzzle in Fama (1984): high interest rate currencies have higher expected returns over the near future; delayed overshooting puzzle in Eichenbaum and Evans (1995): a monetary contraction that raises the interest rate leads to a period of gradual appreciation, followed by gradual depreciation, albeit at a lower frequency than what we find; forward guidance exchange rate puzzle in Galí (2020): the exchange rate is more strongly affected by expected interest rates in the near future than the distant future.

4. Currency Order Flow and Exchange Rates

4.1 Currency order flows predictability

In particularly, we focus on the period of post-ZLB, when the predictability is the strongest. To further explain the predictability, we trace out the dynamic effect of monetary policy shocks on the normalized order flow volume by local projections as follows.

$$\widetilde{vol}_{i,t\to t+h} = \alpha_h + \beta_h x_t + \eta_{t+h}, \tag{4}$$

where $\widetilde{vol}_{i,t\to t+h}$ is the cumulative normalized order flows h days after FOMC days and x_t is the FOMC days' change of yields factors or monetary policy shocks. Since the order flow data is available since Sep 3rd, 2012, our analysis mainly focuses on this sample period.

[Insert Figure 1 about here]

In Figure 1, we report the IRFs of different variables to monetary policy shocks after announcement days.[9] The red solid line is the IRFs of USD to monetary policy shocks and short-term yields factor, and the dark area is the associated 95% confidence interval. The green and blue dashed lines are the IRFs of fund and non-bank and bank net dollar buying volume to monetary policy shocks and short-term yields factor, and the shade area is the respective 95% confidence interval area for order flows.[10]

The results in last column are consistent with the regression results in Table 5 for the same period (Post ZLB). We find that the IRFs of USD peak around five trading days after FOMC announcements. Similarly, we find that net dollar buying volumes of both the bank sector as well as the fund and non-bank sectors also strongly respond to the "path" monetary surprises. Across different proxies for the path surprise, we can always find that net trading volume of the bank sector achieves the trough around 5 trading days after FOMC announcement, then stays constant around 15 trading days and appears to revert to the trend around 25 trading days after FOMC announcement, although there is no significant reversal to zero for USD's impulse response to monetary policy shocks. Importantly, net dollar buying volume of the bank sector responses in the opposite direction, compared to the responses of USD and fund and non-bank sectors. That is, "banks" sell the US dollar following a tightening announcement, potentially providing liquidity for the buyers of dollar-denominated assets such as hedge funds and other "real money" institutions (while

[9] In the graph, to make the magnitude comparable, we amplify the coefficients of volume's IRF to MP shocks by 2.

[10] To make it comparable, the magnitude of coefficients of volume are amplified by 2 times. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

we do not observe who initiates the trades, it is possible that FX dealers - i.e. "market makers" in the CLS data - source US dollars from other banks in anticipation of demand from institutional clients such as hedge funds).

Figure 1 shows that the total net volume of fund and non-bank sectors responds to monetary policy in the same way as does the USD exchange rate. The peak of the effect can be observed about 20 days after the announcement. The effect of the Fed's announcements on the demand for US dollars and the trading volume of foreign exchange lasts longer for funds and non-banks than for banks, again suggesting that banks play the role of temporary providers of USD liquidity.

The effect of the Fed's announcements on the demand for US dollars is stronger when they are based on the expected path of future interest rates (GSS "path") than when they are based on the current level of interest rates (which is included in NS). This is because the expected path captures the pure effect of forward guidance, while the current level of interest rates may also reflect other macroeconomic information that affects the demand for US dollars. The effect of the Fed's announcements on the demand for US dollars and the trading volume during the post-FOMC days disappears, at least in terms of statistical significance, when the short-term interest rates are at zero (ZLB period), which is consistent with the finding in Table 5.

[Insert Figure 2 about here]

In Figure 2, we report the IRFs of USD, normalized net buying volume of US dollar for bank sectors and the sum of net dollar buying volume of fund and non-bank sectors. For FOMC days' USD and order flow volume, we only include the value after 2pm for each announcement. It is not surprising that the full impact of monetary policy shocks on all of the variables is larger if we include the value on FOMC announcement days, given the much stronger comovement on the FOMC announcement days. Similarly, we can also observe that increasing response of USD to "path" monetary surprises, which achieves the peak five trading days after announcements. An interesting finding is that the net bank trading volume responds to the monetary surprises significantly negatively for the five trading days and stays stable for 15 days before starting to recover, which is consistent with the evidence in Figure 1. Another interesting observation is that the response of USD to monetary shocks lasts longer than the responses of FX dealers' net dollar buying, which lasts for about 15 trading days after the announcement. This can be explained by the fact that the impulse response of trading volume of fund and non-bank sectors are more persistent.

Overall, this evidence is consistent with the view of an imperfect FX market that emphasizes the role of FX dealers in the determination of exchange rates, i.e., higher net dollar demand in currency market absorbed by FX dealers pushes up the relative value of the US dollar (e.g., Hau and Rey (2006) , Gabaix and Maggiori (2015), and Itskhoki and Mukhin (2021)). While the dealers might be reacting to the monetary policy "on impact," as ev-

idenced by the aggregate and bank flows on the FOMC announcement day, their actions are not sufficient to fully impound the news into the level of the exchange rate, leading to the drift in the subsequent several days.

4.2 Currency order flows and exchange rates

To further explore the source of predictability, we report the contemporaneous and predictive regression results in Table 6-12. As Froot and Ramadorai (2005) and Menkhoff et al. (2016), the value of order flow data is normalized by the past 60 days' standard deviation. Hence, the interpretation of the magnitude of order flows' responses to monetary policy surprise is meaningless. We only focus on the statistical significance of the regression results.

In Table 6, we find the strong comovement of USD with yields factors and also the "path" factor. The "LSAP" factor has a much larger impact on exchange rates during ZLB than Post ZLB, which is consistent with the fact that quantitative easing is a policy tool used by the Fed mainly during ZLB periods. Another important observation is that exchange rates' response to the short-term yields is stronger than the responses to extracted monetary policy shocks. One possible explanation can be that there is other macro information outside ZLB, which generates stronger predictability of exchange rates with short-term yield factors.

[Insert Table 6 about here]

More importantly, we conclude that the predictability of monetary policy to USD can be explained with the currency flow data as in Figure 1. First, we can find the strong comovement of order flows with yields factors and "path" factor. This can be explained by that the tightening monetary policy surprise raises the bond yields, which triggers the immediate capital inflows to US. The significant negative comovement between net trading volume of FX dealers and monetary surprises further verifies this point. This negative association is consistent with the role of FX dealers as liquidity providers, which means a tightening path surprise trigger the capital inflows from foreign investors to US, hence FX dealers provides more dollar liquidity inthe currency market. Meanwhile, there is a strong comovement between the net dollar buying volume of FX dealers and USD for both FOMC and non-FOMC announcement days. This finding is consistent with the empirical results in Evans and Lyons (2002) and Froot and Ramadorai (2005), where the net dollar buying volume can explain large proposition of variations of exchange rates.[11] At the same time, this finding also provides the direct empirical evidence of the model implication in Gabaix and Maggiori (2015) and Itskhoki and Mukhin (2021). We should notice that R^2 of net trading volume to USD for FOMC days is much larger than the non-FOMC days

[11] First, net dollar buying volume data, no matter sign or normalized one, can never predict USD, but they comove together. This is consistent with Evans and Lyons (2002) and Froot and Ramadorai (2005).

for both ZLB and Post ZLB period. On the FOMC days, 32.25% for ZLB and 13.60% for Post ZLB, indicate that net trading volume can explain larger proposition variations of exchange rates. The smaller R^2 Post ZLB indicates there are more other factors affecting exchange rates on FOMC days post-ZLB period.

For the first day after the announcements, we only find the predictability Post ZLB for "path" factors in Table 7. Again, the predictability of yields factors also comes from the impact of "path" factors. Meanwhile, path surprise has very strong predictability to the following day's net dollar buying volume of bank sectors, and the magnitude (-7.48) is even larger than FOMC announcement days (-6.41). The negative sign of the coefficient is consistent with the fact that the net positive capital inflows to US appreciate US dollar. This can also be reflected in the negative comovement between USD and banks' net dollar buying volume. Finally, we cannot find the significant reactions of other sectors' order flows to the monetary surprises.

[Insert Table 7 about here]

For the two to five days after the announcement reported in Table 8-11, we can also find strong reaction of USD following the path surprise, with the cumulative magnitude of coefficients growing from (32.02) to (56.30), and comovement between USD and net trading volume of banks becoming stronger (reaching -2.95 and then declining to -1.12). Again, the negative signs are consistent with the finding on FOMC announcement days. Moreover, since three days after announcements, monetary surprises can predict the following three days cumulative trading volume of fund and non-bank sectors, and meanwhile, the net dollar buying of fund and non-bank sectors comoves with USD positively. The predictability of monetary surprises to net dollar buying of fund and non-bank sectors become stronger, which is consistent with the IRFs in Figure 1 and Figure 2. Compared to bank sector, the slower reaction of fund and non-bank sectors to monetary policy surprises can be explained by the fact that most of hedge funds or currency speculators are not members of CLS, so CLS cannot record their trading volume in fund or non-bank sectors. Meanwhile, since the trading volume of fund and non-bank sectors is relatively small, both of these can help explain the predictability of fund and non-bank sectors trading volume to USD .

[Insert Table 8-11 about here]

In addition, we find that "target" factor can drive USD on FOMC days during ZLB period, however, the magnitude of yields change during this period is much smaller such that it does not induce any (detectable) capital flow.

[Insert Table 12 about here]

Finally, we also report the results from the 2pm-5pm window on FOMC announcements days in Table 12. We can also find the strong responses of USD to monetary path surprise both during the ZLB and the post-ZLB periods, which means exchange rates adjust to monetary policy without delay. We also observe strong predictability of the net trading volume of both bank and non-bank sectors with the monetary surprise, and the strong comovement of USD and these two sectors' net dollar buying. There is no any response to target or "LSAP" surprise of either USD or net trading volume even at the hourly frequency.

4.3 Post-announcement yield factors control

Given the strong comovement of USD and trading volume as seen in the bottom of Table 6, a natural question is: does the predictability of USD with the "path" factor of monetary policy come from the the delayed reaction of FX markets to yield changes, or by the delayed reaction of yields themselves? Put differently, does the predictability come from the investors' reaction to the post-announcement yields change induced by the monetary policy shocks? To answer this question, we consider the same regression as in (3) by controlling the contemporaneous short-term and long-term yields factors.

$$\Delta USD_{t,t+h} = \alpha_h + \beta_{1,h} x_t + \beta_{2,h} \Delta ys_{t,t+h} + \beta_{3,h} \Delta yl_{t,t+h} + \epsilon_t, \tag{5}$$

where $\Delta USD_{t,t+h}$ is the cumulative USD change h days after FOMC days, x_t is the FOMC days' yields factor change or monetary policy shocks, and $\Delta ys_{t,t+h}$ and $\Delta yl_{t,t+h}$ are the cumulative changes of short-term and long-term yields factors h days after FOMC days, respectively.

[Insert Table 13 about here]

We report the associated results in Table 13. Importantly, we find that the contemporaneous short-term or long-term yields cannot explain the change of exchange rate after FOMC announcements for the post ZLB period. First of all, "target" surprise cannot predict or even explain the fluctuation of exchange rates. Combining with the results based on NS shocks, we can conclude that predictability comes from "path" factor. Meanwhile, both short-term and long-term yields factors on FOMC days show very strong predictabilities because the large proportion of variations of yields factors on FOMC announcement days can be captured by monetary policy surprises. To further examine the source of predictability, we consider the following set of regressions:

$$\Delta y_{t,t+h} = \alpha_h + \beta_h x_t + \epsilon_t, \tag{6}$$

where $\Delta y_{t,t+h}$ is the h days after FOMC days' cumulative short-term or long-term yields change and x_t is the monetary policy shocks.

[Insert Table 14 and 15 about here]

We report the associated results in Table 14 and 15. By recalling that the three factors from GSS are orthogonal to each other, hence, we can conclude that large proportion of variations of yields factors on FOMC announcement days can be captured by monetary policy surprises. For instance, the three shocks can explain nearly 90% variations of short-term yields and almost all the variation of long-term bonds during ZLB period. In contrast, the shocks can explain around 70% of short-term yields' the variation and 60% of long-term yields Post ZLB. Meanwhile, "path" factor can explain much larger proportion variation of short-term bond yields than other shocks. However, we cannot find the evidence that the "path" factor can predict the following days' yields change, which means that the bond market absorbs the associated monetary shocks on FOMC announcement days immediately. During ZLB, "LSAP" factor can explain even higher proportion of long-term bond yields variation and can even predict the following days' yields change, which is reasonable since the Fed's "LSAP" mainly works during ZLB period. Overall, we can conclude that the predictability of yields factor comes from the "path" monetary surprise, which is uninformative about the following days' bond yields variations.

Finally, we consider the comovement of yields change and USD with the following regression:

$$\Delta USD_{t,t+h} = \alpha_h + \beta_h \Delta y_{t,t+h} + \epsilon_t, \tag{7}$$

where $\Delta USD_{t,t+h}$ is the cumulative USD change h days after FOMC days, $\Delta y_{t,t+h}$ is the h days after FOMC days' cumulative short-term or long-term yields changes.

[Insert Table 16 about here]

We report all the results in Table 16. It is easy to find that there is no any significantly statistical association between the yields changes and change of exchange rates for the following days after the announcements, although we find that strong comovement between net dollar buying volume for non-FOMC days in Table 6.

Hence, we can conclude that the predictability cannot be explained by the view that a tightening "path" surprise can rise the following days' bond yields, and appreciates US dollar by increasing the post-announcement yields. And, the channel should be that market participates gradually react a tightening "path" surprise of monetary policy in the following days after announcements, which turns to push up USD gradually. This can also be reflected in the growing trading volume of both bank or fund and non-bank sectors.

5. News Decomposition

In this section, we decompose the news in change of nominal exchange rates into interest differential news, excess return news and inflation news, and further study the response

of these components to monetary surprises, separately. It is easy to get the news decomposition by iterating the definition of currency excess returns recursively, which is given by

$$\Delta s_{t+1} - E_t \Delta s_{t+1} = -\underbrace{\sum_{k=0}^{\infty} \left(E_{t+1}\tilde{i}_{t+k+1} - E_t \tilde{i}_{t+k+1}\right)}_{\tilde{i}_{t+1}^{\Delta E}} - \underbrace{\sum_{k=0}^{\infty} \left(E_{t+1} rx_{t+k+1} - E_t rx_{t+k+1}\right)}_{rx_{t+1}^{\Delta E}}$$
$$+ \underbrace{\sum_{k=0}^{\infty} \left(E_{t+1}\tilde{\pi}_{t+k+1} - E_t \tilde{\pi}_{t+k+1}\right)}_{\tilde{\pi}_t^{\Delta E}},$$

where $\tilde{i}_t = i_t^* - i_t$ denotes the interest rate differential, $rx_t = E_t \Delta s_{t+1} - \tilde{i}_t$ denotes the excess return of holding US dollar, $\tilde{\pi}_t = \pi_t^* - \pi_t$ denotes the long-run inflation differential news. By following the traditions, we label the foreign variables with stars. More detailed calculations can be found in the Online Appendix.

Based on the calculation above, we can decompose the actual exchange rate change (Δs_{t+1}) into the following equivalent way:

$$\Delta s_{t+1} = \tilde{i}_t - \tilde{i}_{t+1}^{\Delta E} + rx_t - rx_{t+1}^{\Delta E} + \tilde{\pi}_t^{\Delta E}. \tag{8}$$

Hence, we have the coefficients of contemporaneous or predictive regression of exchange rates to monetary surprises as:

$$\beta^{\langle \Delta s_{t+1}, mp_t \rangle} = \beta^{\langle \tilde{i}_t - \tilde{i}_{t+1}^{\Delta E}, mp_t \rangle} + \beta^{\langle rx_t - rx_{t+1}^{\Delta E}, mp_t \rangle} + \beta^{\langle \tilde{\pi}_t^{\Delta E}, mp_t \rangle}. \tag{9}$$

To obtain the news decomposition, we consider the following daily VAR estimation by following Froot and Ramadorai (2005), Engel (2016) and Stavrakeva and Tang (2019).

$$\mathbf{z}_t = \bar{\mathbf{z}} + \mathbf{\Gamma} \mathbf{z}_{t-1} + \boldsymbol{\epsilon}_t,$$

with the vector of daily variables

$$\mathbf{z}_t = \begin{bmatrix} \tilde{s}_t \\ \tilde{\pi}_t \\ \tilde{i}_t \end{bmatrix}.$$

where $\tilde{s}_t = s_t + p_t - p_t^*$ denotes the real exchange rate. Here, we include the level real exchange rate to estimate a specification where a stable estimate of VAR implies that long-run PPP holds and VAR-based expectations of the long-run real exchange rates is constant.

There are several potential issues for daily estimation of VAR as pointed by Froot and Ramadorai (2005). First, we use the information criterion to determine that the optimal lag length for VAR is 25 trading days. To avoid the overfitting issue, as Froot and Ramadorai (2005), we impose the restriction that the coefficients for lagged days 2-5, 6-10, 11-25 are identical within each subperiod. Given the sample size, this restriction can improve

the overall estimation. Second, since inflation data in only available monthly or even quarterly, it is hard to have a good measure for daily inflation. Hence, we interpolate monthly inflation evenly into daily inflation, given the fact that inflation shocks are highly persistent. We further align the CPI's with their announcement dates by lagging their entry into the information set by 2 weeks. Finally, we do not have the concern for the inference of VAR estimation since all the estimate from VAR will appear as dependent variables in the following analysis. Hence, given the daily samples since 2000 when European forward discount data is available, it is statistically reliable to obtain consistent estimators for VAR estimation with 3 variables and 4 lagged blocks.

We report the IRFs for $\tilde{i}_t - \tilde{i}^{\Delta E}_{t+1}$, $rx_t - rx^{\Delta E}_{t+1}$, and $\tilde{\pi}^{\Delta E}_t$ to monetary policy surprises and yields factors in Figure 3 and 4. From Figure 3, we can find that $rx_t - rx^{\Delta E}_{t+1}$ has a stronger reaction to path factor than $\tilde{i}_t - \tilde{i}^{\Delta E}_{t+1}$ and $\tilde{\pi}^{\Delta E}_t$. Meanwhile, we should also notice that all the IRFs reach the peak five trading days after the announcements, which is consistent with the findings in Figure 1 and 2. Hence, our VAR analysis provides additional evidence to support the weekly predictability of monetary path surprise to USD. Moreover, the shape of IRFs of $rx_t - rx^{\Delta E}_{t+1}$ in Figure 3 and 4 is quite close to the IRFs of USD in Figure 1 and 2, which explains the largest proportions of the impulse of USD to path surprise.

[Insert Figure 3 and 4 about here]

More importantly, we can also observe the positive impulses of $\tilde{i}_t - \tilde{i}^{\Delta E}_{t+1}$ and $rx_t - rx^{\Delta E}_{t+1}$ to monetary surprises. This indicates that the effects of $-\tilde{i}^{\Delta E}_{t+1}$ and $-rx^{\Delta E}_{t+1}$ dominate the effects from $\tilde{i}_t$ and rx_t, separately. After a tightening path surprise, US interest rate rises immediately and then $\tilde{i}_t$ declines but $-\tilde{i}^{\Delta E}_{t+1}$ rises, which is consistent with the view that path surprise can affect the nearly future path of short-term rate. It is also consistent with the finding in Gürkaynak, Sack and Swanson (2005) that it takes markets time to impound news about the future path of rates contained in FOMC statements, but it takes almost no time to impound news about the current target. After a tightening monetary policy shock, $-rx^{\Delta E}_{t+1}$ increases, which implies that US dollar appreciates as in (8). The IRFs of inflation difference are relatively puzzling. The traditional New Keynesian DSGE model implies the lower inflation after a tightening monetary policy shocks, while we observe the opposite pattern in Figure 3 and 4. This finding is consistent with Nakamura and Steinsson (2018), Jarociński and Karadi (2020) and Stavrakeva and Tang (2019). Nakamura and Steinsson (2018) and Jarociński and Karadi (2020) find that long-run (five year) break-even inflation rates raise moderately after a tightening path surprise, which can be explained by the Fed's information effect. Stavrakeva and Tang (2019) document the same pattern based on quarterly VAR estimation during ZLB period. Our finding here says that a tightening monetary policy shock can lower US inflation given that the foreign inflation is fixed. Indeed, this finding is also consistent with the views of "Long-run Fisherism" in Cochrane (2022) that: raising interest rates will raise inflation at least in the long run.

To have a better understanding about our empirical findings, we report the associated results in Table **??-??**. In particular, we focus on the impulse of different components to

GSS path surprise. On FOMC announcement days, we can observe that a normalized tightening shock raises $\tilde{i}$ by 0.08 but lower rx by -0.38. This indicates that the depreciation of dollar ($E_t\Delta s_{t+1}$) is larger than the rising of interest differentials. Although the magnitude is pretty small, we find the weak evidence to support UIP on FOMC announcement days. However, the impact of news part is much larger than the variation of currency period. The magnitude of IRFs of $\tilde{i}_t - \tilde{i}_{t+1}^{\Delta E}$, $rx_t - rx_{t+1}^{\Delta E}$, and $\tilde{\pi}_t^{\Delta E}$ to monetary policy surprises are: 27.88, 50.85 and -34.88, which is much larger than the impulses of $\tilde{i}$ and rx (notice that $27.88 + 50.85 - 34.88 = 43.86$, which is exactly the corresponding number in Table 6 and, further, is consistent with the identity in (8)). Therefore, we can conclude that the large positive impulse of $-rx_{t+1}^{\Delta E}$ comes from the expectation of dollar's appreciation following the path surprise and also the expectation of rising of interest differentials, which can explain why the impulse of $rx_t - rx_{t+1}^{\Delta E}$ is larger than $\tilde{i}_t - \tilde{i}_{t+1}^{\Delta E}$. Finally, the whole effect is offset by the negative impulse of inflation differential news.

[Insert Table ??-?? about here]

For the following days after FOMC announcements, we can find that $\tilde{i}$ is significantly negative (-1.25), which indicates the path surprise can predict the following days' interest differentials. And, its magnitude increases from -1.25 to -1.51, and then decline to -1.04 five days after announcements. Here, we should recall that monetary surprise cannot predict the following days' yields change. For rx, we can observe significant negative magnitude after the announcements, which indicates that predictable components of change of exchange rate from VAR estimation reacts to monetary surprise negatively. Again, the larger positive magnitudes of $\tilde{i}_t - \tilde{i}_{t+1}^{\Delta E}$ and $rx_t - rx_{t+1}^{\Delta E}$ indicate the unpredictable news parts dominate the impulse response of change of exchange rate to monetary surprise. Moreover, from the second panel, we can also find the significant comovement of net trading volume of bank sector and different components. The related signs of coefficients are consistent with the view that FX dealers serve as liquidity providers or market maker in the currency market and that larger net positive net inflows to US implies larger net selling volume of FX dealers, which turns to appreciate US dollars.

Overall, we decompose the change of exchange rates into three different parts, and we can conclude that the impulse response of USD to monetary surprise is mainly driven by the news part instead of predictable parts. Among different components, we find that the excess return news play a dominated role, and part of its impulse response is offset by the impulse of inflation differential news.

6. Robustness

In the Online Appendix, we conduct several robust checks for the main results above. First of all, we replace the hourly data of order flows and exchange rates from 2pm-5pm on

FOMC days in Figure 2 with the data of whole FOMC days. We report the results in Figure 5, where the findings are consistent with Figure 2. This indicates that the FOMC days' impulse is mainly driven by the impulse from 2pm-5pm on FOMC days, i.e, impulse response of post-announcement.

Following Hasbrouck (1988) and Ranaldo and Somogyi (2021), we also separate the permanent (information) effects and temporary (inventory) effects in the trade volume. We define the permanent information of the trading volume v_t as follows.

$$v_t = \begin{cases} +1 & \text{if } \widetilde{Vol}_t > 0 \\ 0 & \text{if } \widetilde{Vol}_t = 0 \\ -1 & \text{if } \widetilde{Vol}_t < 0 \end{cases} \tag{10}$$

We then conduct the same set of analysis as in Table 6-11 and report the results in Table 17-23. We find that path surprise can predict the sign of trading volume (v_t) significantly. Similarly, path surprise predicts the sign of FX dealers' order flows negatively and significantly, and predict the signs of non-bank sector's order flows positively. Hence, all the conclusions are robust to the measurement of trading volume. However, we should notice the predictability of path surprise to signs of the trading volume becomes weaker four days after the announcements, which is different from the finding in Table 10.

We further report the predictability of yields factors and monetary policy shocks to exchange rates of individual G10 currency pairs Post ZLB in Table 24-25. We find that path surprise can predict all changes of individual exchange rates strongly, except CHF and JPY. For CHF and JPY, we find the strong comovement between path surprise and exchange rates, but the predictability for CHF is weak and there is no any significant predictability for JPY after FOMC announcements.

Finally, we report the IRFs of $-\tilde{i}^{\Delta E}$ and $-\tilde{rx}^{\Delta E}$ to the monetary policy surprise in Figure 6-11. The finding further indicates that the impulses to monetary surprises of $-\tilde{i}^{\Delta E}$ and $-\tilde{rx}^{\Delta E}$ dominate $\tilde{i}$ and $\tilde{rx}$.

7. Conclusion

We document the strong predictability of "path" factor measuring the forward guidance surprise of monetary policy can capture all the weekly prediction to USD after the ZLB period. Meanwhile, the daily predictive impulse response function of USD to "path" surprise shows that the response achieve the peak one week after the FOMC announcement days. Based on the private dataset of currency order flow, we find this weekly predictability can be mainly explained by the predictability of monetary policy shocks to FX dealers' order flows and comovement of order flows of FX dealers with USD. Finally, we decompose the daily change of exchange rate into: interest rate differential, excess return and inflation components. The "path" factor of monetary policy surprise can predict all of these

three components, which indicates that Fed's forward guidance can influence the whole future path of interest rate differential, excess return and inflation. The order flows also significantly comove with these three components.

Table 1: Daily Yields and Monetary Surprises Summary Statistics

	All periods				**Pre-2000**				**2000-2008**			
	Short-yields	Long-yields	FX	FX(+1)	Short-yields	Long-yields	FX	FX(+1)	Short-yields	Long-yields	FX	FX(+1)
mean (all)	-0.04	-0.06	-0.003	-0.003	0.13	0.07	0.19	0.19	-0.15	-0.12	-1.47	-1.43
std	3.77	5.38	46.23	46.23	4.33	5.63	36.16	36.16	4.57	5.91	45.18	45.13
AR(1)	0.07	0.01	0.00	0.00	0.05	0.07	-0.004	-0.004	0.10	0.01	0.01	0.01
mean(FOMC)	-1.24	-0.44	-8.23	2.96	-0.71	-0.36	0.03	-3.22	-2.19	-0.10	-7.32	-3.31
std	5.44	7.39	58.95	58.04	6.02	6.55	34.15	38.95	7.30	7.56	40.94	54.48
AR(1)	0.05	-0.07	0.03	-0.07	-0.21	-0.32	-0.13	-0.05	0.16	0.13	0.04	-0.13
mean(nonFOMC)	0.003	-0.05	0.27	-0.10	0.16	0.08	0.19	0.30	-0.08	-0.12	-1.27	-1.36
std	3.70	5.30	45.73	45.79	4.26	5.60	36.23	36.07	4.44	5.85	45.31	44.79
AR(1)	0.10	0.03	-0.003	-0.01	0.05	0.07	0.01	0.00	0.12	0.04	0.02	0.01
	NS	GSS target	GSS path	GSS LSAP	NS	GSS target	GSS path	GSS "LSAP"	NS	GSS target	GSS path	GSS "LSAP"
mean	-0.01	0.09	-0.02	0.002		0.02	0.15	-0.10	-0.26	0.08	-0.07	0.07
std	3.47	0.55	0.99	0.47		0.78	1.07	0.27	4.63	0.64	1.14	0.48
AR(1)	-0.08	-0.20	-0.08	0.003		-0.31	-0.19	-0.16	-0.11	-0.12	-0.02	0.12
	2008-2015				**2012-2015**				**2015-2020**			
	Short-yields	Long-yields	FX	FX(+1)	Short-yields	Long-yields	FX	FX(+1)	Short-yields	Long-yields	FX	FX(+1)
mean (all)	-0.09	-0.09	1.31	1.34	0.05	0.11	2.85	2.82	0.04	-0.08	0.36	0.28
std	2.98	5.35	57.51	57.51	1.09	3.86	41.76	41.78	1.98	3.69	37.86	37.80
AR(1)	0.05	-0.05	-0.01	-0.01	-0.05	-0.06	-0.06	-0.06	0.07	-0.03	-0.01	-0.01
mean(FOMC)	-0.64	-0.18	-14.23	17.11	-0.22	0.01	1.70	23.86	-1.02	-1.83	-11.67	-0.50
std	2.71	9.07	89.17	75.81	2.39	7.31	70.71	41.79	2.55	4.22	53.43	49.69
AR(1)	-0.02	-0.16	0.09	-0.13	-0.20	-0.16	0.17	0.40	-0.19	-0.09	-0.27	0.18
mean(nonFOMC)	-0.07	-0.09	1.82	0.84	0.06	0.12	2.88	2.16	0.07	-0.02	0.73	0.31
std	2.99	5.19	56.15	56.79	1.03	3.70	40.55	41.64	1.95	3.66	37.25	37.40
AR(1)	0.14	-0.03	-0.03	-0.02	-0.07	-0.07	-0.05	-0.03	0.06	-0.03	-0.01	-0.01
	NS	GSS target	GSS path	GSS LSAP	NS	GSS target	GSS path	GSS "LSAP"	NS	GSS target	GSS path	GSS "LSAP"
mean	0.24	0.14	-0.03	0.02	0.27	0.13	-0.01	0.05	0.13	0.14	-0.17	-0.01
std	1.90	0.13	0.81	0.65	1.71	0.15	0.90	0.79	2.41	0.17	0.78	0.24
AR(1)	-0.002	0.16	-0.19	-0.11	-0.08	0.09	-0.25	-0.22	0.05	-0.003	0.12	0.05

Notes: The whole sample is split into two subsamples before and after Aug 12th 2008 and Dec 16th 2015: ZLB and Post ZLB. All values are expressed in basis points.

Table 2: Daily Net Dollar Buying Volume Data Summary Statistics

Period	Normalized Volume data						Original Volume data					
3 hours Vol on FOMC days	Agg	Bank	Corp	Fund	Nonbank	F+NB	Agg	Bank	Corp	Fund	Nonbank	F+NB
Mean	-0.30	0.24	-0.04	-0.34	-0.16	-0.50	-9.13	9.55	-1.75	-10.2	-6.73	-16.93
Std	3.62	3.97	0.18	2.69	1.10	2.77	154.31	178.66	7.32	108.53	45.65	112.85
Mean (ZLB)	-0.28	-0.86	-0.02	0.59	0.02	0.61	-11.11	-37.83	-0.99	27.09	0.62	27.71
Std (ZLB)	3.15	3.61	0.18	1.73	0.80	1.73	158.14	182.68	7.34	82.31	40.19	83.24
Mean (Post ZLB)	-0.32	1.15	-0.06	-1.10	-0.31	-1.41	-7.51	48.32	-2.37	-40.71	-12.74	-53.46
Std (Post ZLB)	4.06	4.12	0.18	3.13	1.30	3.17	148.68	162.56	7.13	115.96	48.21	118.9
Vol on FOMC days	Agg	Bank	Corp	Fund	Nonbank	F+NB	Agg	Bank	Corp	Fund	Nonbank	F+NB
Mean	0.76	-0.49	-0.61	1.67	0.19	1.86	8.33	-3.28	-34.19	20.51	25.29	45.8
Std	10.26	10.78	2.97	6.97	3.75	7.18	617.3	562.92	134.51	419.06	195.03	452.04
Mean (ZLB)	-0.95	-5.07	0.12	4.12	-0.12	4.00	-188.57	-299.26	2.27	74.12	34.29	108.42
Std (ZLB)	8.99	10.32	1.84	6.10	2.76	6.81	572.38	499.69	59.91	535.35	84.2	554.13
Mean (Post ZLB)	2.15	3.26	-1.21	-0.34	0.44	0.10	169.44	238.89	-64.02	-23.36	17.93	-5.42
Std (Post ZLB)	11.13	9.77	3.56	7.09	4.43	7.10	613.92	496.97	168.53	294.12	253.47	348.22
Vol of one day after FOMC days	Agg	Bank	Corp	Fund	Nonbank	F+NB	Agg	Bank	Corp	Fund	Nonbank	F+NB
Mean	-1.92	-1.13	-0.06	-0.85	0.13	-0.72	-100.75	-74.58	-6.47	-32.86	13.16	-19.70
Std	10.38	10.83	1.77	6.87	3.31	7.33	579.06	539.45	76.17	372.85	118.55	379.61
Mean (ZLB)	-7.00	-7.44	0.27	0.00	0.18	0.17	-417.29	-388.44	7.28	-54.57	18.43	-36.14
Std (ZLB)	7.60	9.03	1.22	6.71	2.35	6.69	565.74	492.92	42.27	472.49	83.51	450.66
Mean (Post ZLB)	2.24	4.03	-0.33	-1.54	0.09	-1.46	158.24	182.21	-17.72	-15.11	8.85	-6.26
Std (Post ZLB)	10.75	9.64	2.12	7.12	4.01	7.95	434.24	418.27	92.90	255.33	139.22	301.78
Vol on nonFOMC days	Agg	Bank	Corp	Fund	Nonbank	F+NB	Agg	Bank	Corp	Fund	Nonbank	F+NB
Mean	0.92	-0.94	0.04	1.33	0.49	1.82	38.19	-35.85	-3.51	58.46	19.08	77.55
Std	10.92	10.61	2.78	6.64	3.09	6.90	556.38	530.86	85.49	301.78	97.96	320.92
Mean (ZLB)	-2.61	-4.86	0.53	1.46	0.26	1.72	-130.04	-229.19	14.3	68.29	16.56	84.86
Std (ZLB)	10.48	9.93	1.88	6.06	2.94	6.42	593.93	543.31	44.15	334.87	91.08	350.78
Mean (Post ZLB)	3.62	2.05	-0.34	1.23	0.67	1.90	170.54	116.92	-17.48	50.11	20.99	71.1
Std (Post ZLB)	10.47	10.13	3.26	7.05	3.19	7.24	485.93	467.32	105.17	272.99	103.02	295.48
Whole days	Agg	Bank	Corp	Fund	Nonbank	F+NB	Agg	Bank	Corp	Fund	Nonbank	F+NB
Mean	0.91	-0.93	0.02	1.34	0.48	1.83	37.26	-34.84	-4.46	57.29	19.27	76.56
Std	10.90	10.62	2.79	6.65	3.11	6.91	558.21	531.75	87.53	306	102.26	325.66
AR(1)	0.22	0.27	0.08	0.15	-0.02	0.16	0.26	0.29	0.07	0.12	-0.02	0.11
Mean (ZLB)	-2.56	-4.86	0.51	1.55	0.24	1.79	-131.88	-231.4	13.92	68.48	17.12	85.6
Std (ZLB)	10.44	9.94	1.88	6.08	2.93	6.44	591.44	540.93	44.6	341.68	90.58	357.59
AR(1) (ZLB)	0.17	0.16	0.10	0.13	-0.02	0.17	0.22	0.21	0.2	0.13	0.04	0.14
Mean (Post ZLB)	3.58	2.09	-0.36	1.19	0.66	1.85	171.39	121.03	-19.03	48.42	20.98	69.4
Std (Post ZLB)	10.49	10.11	3.27	7.05	3.23	7.24	490.8	469.29	108.09	274.28	110.67	297.89
AR(1) (Post ZLB)	0.13	0.20	0.04	0.17	-0.03	0.15	0.17	0.19	0.02	0.11	-0.06	0.08

Notes: We calculate the sample means and standard deviations for both normalized volume data and original volume data. And, the original volume data is in the unit of million US dollars. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Table 3: Predicting Weekly USD Change with Yield Changes

Whole weeks	**Whole Sample**	**Before 2000**	**After 2000**	**2000-2008**	**Whole ZLB**	**2012-2015**	**Post ZLB**
Short-term	0.86***	0.83	0.87**	0.70	0.94	0.27	2.75*
t	[2.63]	[1.62]	[2.18]	[1.57]	[0.98]	[0.09]	[1.91]
R^2	0.51	0.84	0.45	0.53	0.25	0.00	1.67
Long-term	0.51**	0.41	0.54*	0.79**	-0.10	-0.16	1.32*
t	[2.11]	[1.08]	[1.84]	[2.00]	[-0.18]	[-0.19]	[1.86]
R^2	0.33	0.37	0.32	0.85	0.01	0.02	1.58
FOMC weeks	**Whole Sample**	**Before 2000**	**After 2000**	**2000-2008**	**Whole ZLB**	**2012-2015**	**Post ZLB**
Short-term	1.89***	1.38	2.10***	1.62*	2.39**	1.86	10.54**
t	[3.24]	[1.16]	[3.15]	[1.81]	[2.11]	[0.43]	[2.52]
R^2	4.64	2.71	5.62	4.33	7.03	0.72	17.02
Long-term	1.44**	0.84	1.63**	2.25**	1.21*	0.88	5.49***
t	[2.54]	[0.84]	[2.42]	[2.27]	[1.90]	[0.66]	[2.81]
R^2	2.89	1.46	3.41	6.66	0.46	1.59	20.30
NonFOMC weeks	**Whole Sample**	**Before 2000**	**After 2000**	**2000-2008**	**Whole ZLB**	**2012-2015**	**Post ZLB**
Short-term	0.46	0.67	0.37	0.26	0.23	-0.20	1.78
t	[1.17]	[1.19]	[0.74]	[0.47]	[0.09]	[-0.05]	[1.18]
R^2	0.12	0.54	0.06	0.06	0.00	0.00	0.76
Long-term	0.32	0.31	0.33	0.67	-0.69	-0.42	0.78
t	1.22]	[0.75]	[1.01]	[1.57]	[-1.04]	[-0.41]	[1.04]
R^2	0.13	0.21	0.12	0.63	0.35	0.12	0.59
4 non-FOMC days	**Whole Sample**	**Before 2000**	**After 2000**	**2000-2008**	**Whole ZLB**	**2012-2015**	**Post ZLB**
Short-term	1.86***	2.62*	1.84***	1.46	2.27*	-13.25	3.63
t	[2.77]	[1.69]	[2.65]	[1.37]	[1.90]	[-1.50]	[0.63]
R^2	3.42	5.63	4.07	2.55	5.79	8.23	1.25
Long-term	1.17*	1.40	1.13	2.00**	-0.88	-2.09	4.44*
t	[1.81]	[1.11]	[1.62]	[2.07]	[-0.63]	[-0.86]	[1.78]
R^2	1.50	2.49	1.56	5.65	0.67	2.90	9.29

Notes: We run the regression: $\Delta USDX_{w,t+1} = \alpha + \beta x_{w,t} + \epsilon_{t+1}$. where $\Delta USDX_{w,t+1}$ is the $t+1$ week's cumulative USD change and $x_{w,t}$ is the t week's cumulative change of yields factors. The whole sample period is from 01/03/1994-02/28/2020 which includes 218 FOMC meetings. The whole sample is split into two subsamples before and after Aug 12th 2008, Sep 3rd 2012 and Dec 16th 2015: ZLB and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 4: Whole sample results since 1994

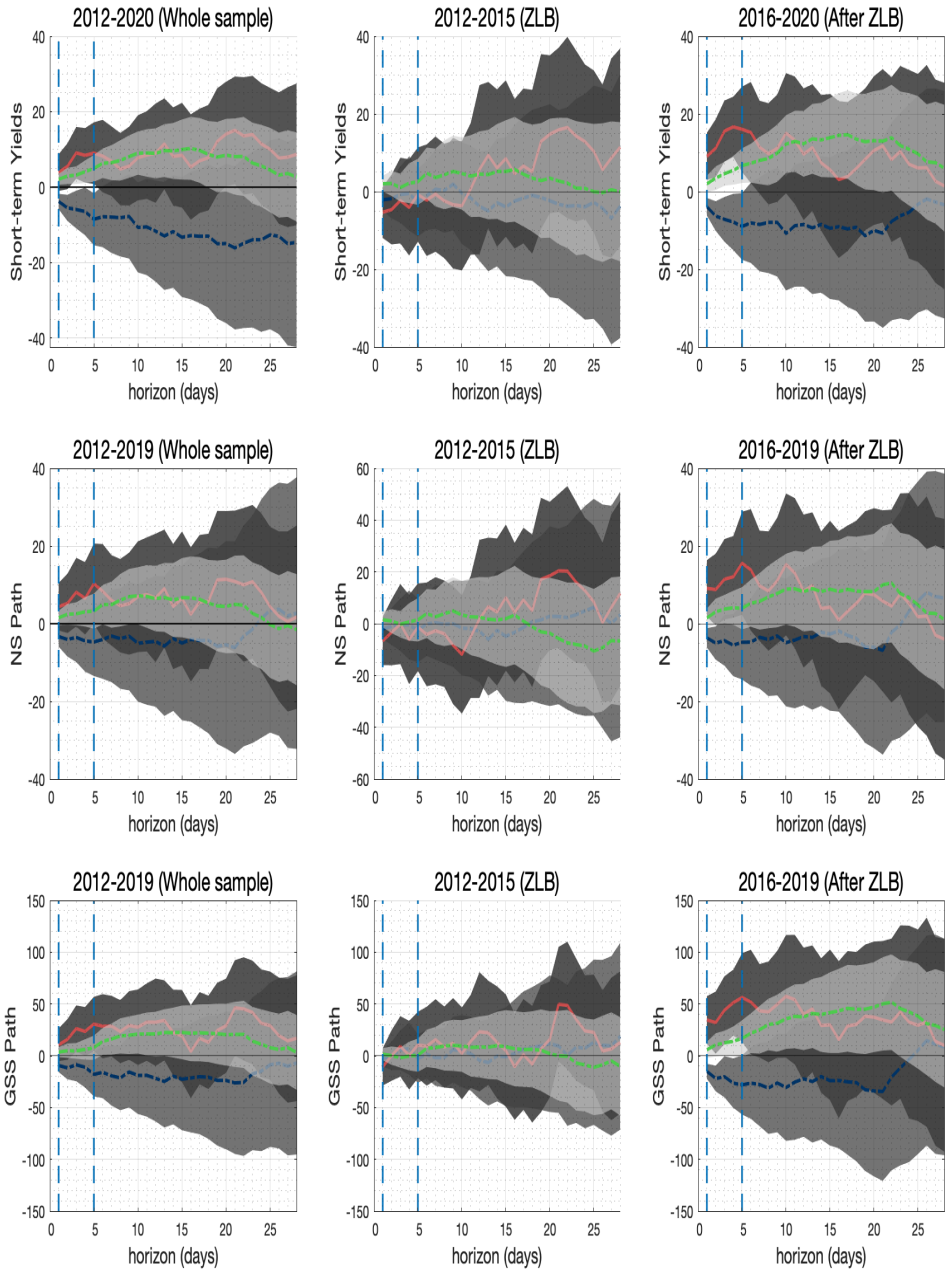
Before 2000	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day6**	**Day7**	**Day8**	**Day9**	**Day 10**
Short-term	0.89	-1.13	-0.74	-1.35	-1.20	-1.28	-2.10	-2.75	-3.77*	-3.22	-3.70
t	[1.11]	[-1.23]	[-0.56]	[-0.77]	[-0.66]	[-0.75]	[-1.11]	[-1.33]	[-1.78]	[-1.37]	[-1.44]
R^2	2.48	3.07	0.65	1.22	0.90	1.16	2.52	3.54	6.22	3.75	4.17
Long-term	0.41	-0.13	1.02	0.39	0.56	0.33	-0.44	-1.16	-2.51	-1.90	-2.41
t	[0.55]	[-0.16]	[0.84]	[0.24]	[0.33]	[0.21]	[-0.25]	[-0.60]	[-1.27]	[-0.87]	[-1.01]
R^2	0.63	0.05	1.46	0.12	0.23	0.09	0.13	0.75	3.26	1.54	2.09
GSS target	17.91***	-6.97	-12.39	-22.29*	-31.09**	-25.36**	-24.19*	-44.48***	-43.67***	-42.65**	-44.78**
t	[3.10]	[-0.97]	[-1.23]	[-1.68]	[-2.32]	[-2.00]	[-1.69]	[-2.97]	[-2.79]	[-2.43]	[-2.33]
R^2	16.65	1.94	3.04	5.53	10.08	7.66	5.60	15.51	13.92	10.99	10.20
GSS path	4.43	6.30	6.99	4.19	4.02	4.37	3.67	-1.31	-5.33	1.88	1.88
t	[0.97]	[1.22]	[0.95]	[0.42]	[0.39]	[0.46]	[0.34]	[-0.11]	[-0.44]	[0.14]	[0.13]
R^2	1.94	3.01	1.84	0.37	0.32	0.43	0.25	0.03	0.40	0.04	0.03
GSS LSAP	6.40	-13.49	-14.06	-28.43	-30.56	-38.44	-3.74	-41.81	-71.24	-91.18*	-99.95*
t	[0.35]	[-0.64]	[-0.47]	[-0.72]	[-0.75]	[-1.01]	[-0.09]	[-0.89]	[-1.48]	[-1.74]	[-1.75]
R^2	0.25	0.86	0.46	1.06	1.15	2.08	0.02	1.62	4.37	5.93	6.00
Since 2000	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day6**	**Day7**	**Day8**	**Day9**	**Day 10**
Short-term	5.94***	4.02***	4.70***	4.96***	3.60*	2.96	2.45	1.30	3.59	3.59	3.77
t	[5.58]	[3.37]	[3.16]	[2.81]	[1.83]	[1.38]	[1.05]	[0.52]	[1.37]	[1.30]	[1.27]
R^2	17.11	6.99	6.20	4.97	2.18	1.25	0.72	0.18	1.23	1.11	1.06
Long-term	4.00***	1.11	1.76**	2.06*	1.67	1.29	1.45	0.16	1.21	1.51	2.16
t	[6.55]	[1.53]	[1.96]	[1.95]	[1.43]	[1.01]	[1.04]	[0.10]	[0.78]	[0.92]	[1.23]
R^2	22.14	1.53	2.48	2.46	1.33	0.67	0.72	0.01	0.40	0.56	1.00
NS	5.83***	4.42***	5.26***	5.81***	4.09*	3.87*	2.13	0.65	3.36	4.14	3.91
t	[5.03]	[3.45]	[3.30]	[3.08]	[1.93]	[1.68]	[0.84]	[0.24]	[1.19]	[1.40]	[1.22]
R^2	14.59	7.45	6.85	6.02	2.46	1.88	0.48	0.04	0.95	1.30	1.00
GSS target	13.08	19.78*	31.59**	31.75**	28.54*	16.37	9.28	17.05	23.77	21.48	16.06
t	[1.35]	[1.92]	[2.50]	[2.12]	[1.72]	[0.90]	[0.47]	[0.81]	[1.08]	[0.92]	[0.64]
R^2	1.23	2.47	4.10	2.98	1.99	0.56	0.15	0.44	0.79	0.58	0.28
GSS path	23.27***	11.26**	11.13*	12.82*	7.03	9.10	5.11	-3.31	4.17	9.86	9.11
t	[5.65]	[2.36]	[1.87]	[1.83]	[0.90]	[1.08]	[0.55]	[-0.33]	[0.40]	[0.91]	[0.78]
R^2	17.92	3.68	2.34	2.23	0.55	0.79	0.21	0.08	0.11	0.56	0.42
GSS LSAP	-0.47	-16.15*	-9.35	-15.28	-9.94	-7.97	-4.88	-0.70	-9.87	-1.96	-11.81
t	[-0.05]	[-1.78]	[-0.83]	[-1.15]	[-0.68]	[-0.50]	[-0.28]	[-0.04]	[-0.51]	[-0.10]	[-0.54]
R^2	0.00	2.14	0.47	0.89	0.31	0.17	0.05	0.00	0.18	0.01	0.20
Since 2000 before ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day6**	**Day7**	**Day8**	**Day9**	**Day 10**
Short-term	2.99***	3.60***	4.19**	4.09*	2.45	1.05	0.19	-0.88	1.97	2.13	1.87
t	[3.32]	[2.91]	[2.33]	[1.89]	[0.95]	[0.39]	[0.07]	[-0.28]	[0.62]	[0.62]	[0.51]
R^2	14.32	11.39	7.61	5.14	1.36	0.23	0.01	0.12	0.57	0.58	0.39
Long-term	1.76**	1.88**	2.37*	2.25	1.42	-0.01	-0.66	-2.01	0.63	0.91	1.43
t	[2.54]	[1.98]	[1.73]	[1.38]	[0.74]	[-0.01]	[-0.32]	[-0.87]	[0.26]	[0.35]	[0.52]
R^2	8.87	5.60	4.36	2.81	0.82	0.00	0.15	1.13	0.10	0.19	0.41
NS	3.32***	4.33***	5.25***	6.12***	4.27	2.45	1.08	-0.42	2.12	3.05	2.55
t	[3.53]	[3.39]	[2.82]	[2.76]	[1.60]	[0.86]	[0.37]	[-0.13]	[0.63]	[0.84]	[0.66]
R^2	15.89	14.80	10.74	10.36	3.71	1.11	0.20	0.02	0.59	1.07	0.65
GSS target	14.37**	20.02**	34.45**	35.95**	34.54*	19.67	13.86	21.84	27.36	25.14	20.75
t	[2.01]	[2.08]	[2.55]	[2.22]	[1.81]	[0.96]	[0.66]	[0.93]	[1.14]	[0.97]	[0.75]
R^2	5.76	6.15	8.97	6.94	4.72	1.39	0.65	1.29	1.92	1.41	0.83
GSS path	9.82**	13.27**	10.82	12.38	4.48	1.04	-3.22	-14.56	-4.39	1.80	0.49
t	[2.45]	[2.46]	[1.37]	[1.32]	[0.40]	[0.09]	[-0.27]	[-1.09]	[-0.32]	[0.12]	[0.03]
R^2	8.36	8.39	2.75	2.56	0.25	0.01	0.11	1.78	0.15	0.02	0.00
GSS LSAP	-25.30***	-4.58	-3.74	-33.64	-20.76	-13.97	-11.76	-1.39	-4.58	-3.49	-16.87
t	[-2.70]	[-0.34]	[-0.20]	[-1.52]	[-0.80]	[-0.51]	[-0.42]	[-0.04]	[-0.14]	[-0.10]	[-0.45]
R^2	9.98	0.18	0.06	3.39	0.95	0.39	0.26	0.00	0.03	0.02	0.31

Table 5: continued

ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day6**	**Day7**	**Day8**	**Day9**	**Day 10**
Short-term	22.27***	-3.31	-3.17	-3.52	-4.48	0.96	1.98	2.20	3.21	0.55	0.91
t	[5.71]	[-0.75]	[-0.66]	[-0.6]	[-0.73]	[0.15]	[0.26]	[0.26]	[0.37]	[0.06]	[0.10]
R^2	39.47	1.10	0.86	0.72	1.06	0.04	0.14	0.14	0.28	0.01	0.02
Long-term	5.56***	-1.04	-0.38	-0.01	0.14	1.56	2.62	1.70	1.23	1.29	1.72
t	[4.76]	[-0.84]	[-0.28]	[-0.01]	[0.08]	[0.87]	[1.25]	[0.73]	[0.51]	[0.51]	[0.66]
R^2	31.16	1.39	0.16	0.00	0.01	1.48	3.02	1.05	0.51	0.53	0.85
NS	17.18***	-0.98	0.21	-3.10	-6.05	2.39	-2.63	-1.96	4.71	3.02	1.30
t	[3.92]	[-0.22]	[0.04]	[-0.53]	[-1.00]	[0.37]	[-0.35]	[-0.24]	[0.55]	[0.34]	[0.14]
R^2	23.55	0.10	0.00	0.56	1.94	0.27	0.24	0.11	0.60	0.23	0.04
GSS target	-35.82	-9.53	-63.86	-76.86	-140.05*	-135.45	-194.86*	-144.16	-105.92	-86.74	-129.27
t	[-0.51]	[-0.15]	[-0.95]	[-0.94]	[-1.66]	[-1.52]	[-1.89]	[-1.25]	[-0.88]	[-0.69]	[-0.98]
R^2	0.51	0.05	1.77	1.74	5.22	4.41	6.65	3.02	1.51	0.95	1.90
GSS path	47.69***	-7.48	-0.10	-3.44	-8.67	7.35	2.75	2.43	8.71	11.70	7.05
t	[4.94]	[-0.72]	[-0.01]	[-0.25]	[-0.60]	[0.49]	[0.15]	[0.12]	[0.43]	[0.56]	[0.32]
R^2	32.82	1.02	0.00	0.13	0.72	0.47	0.05	0.03	0.37	0.62	0.20
GSS LSAP	17.99	-26.17**	-13.24	-2.86	-2.92	-3.89	0.23	0.21	-15.44	0.20	-7.53
t	[1.24]	[-2.09]	[-0.95]	[-0.17]	[-0.16]	[-0.21]	[0.01]	[0.01]	[-0.61]	[0.01]	[-0.27]
R^2	3.00	8.01	1.76	0.06	0.05	0.08	0.00	0.00	0.74	0.00	0.15
GFC	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day6**	**Day7**	**Day8**	**Day9**	**Day 10**
Short-term	29.07***	12.22	6.39	9.87	10.86	9.77	4.34	-4.62	-10.00	-5.26	-3.91
t	[4.68]	[1.50]	[0.60]	[0.70]	[0.73]	[0.65]	[0.27]	[-0.27]	[-0.6]	[-0.28]	[-0.20]
R^2	75.78	24.43	4.97	6.55	7.08	5.68	1.05	1.03	4.92	1.10	0.59
Long-term	5.95**	5.08***	5.07**	4.56	2.14	3.12	4.19	1.25	-0.31	3.51	5.91
t	[2.26]	[3.00]	[2.23]	[1.26]	[0.52]	[0.77]	[1.02]	[0.27]	[-0.07]	[0.70]	[1.23]
R^2	42.22	56.22	41.62	18.57	3.66	7.73	13.05	1.00	0.06	6.54	17.81
GSS target	69.88	49.69	-27.72	-69.29	-109.73*	-116.45*	-111.48*	-123.57*	-129.77*	-114.80	-78.46
t	[1.25]	[1.19]	[-0.53]	[-1.05]	[-1.74]	[-1.89]	[-1.69]	[-1.77]	[-1.93]	[-1.41]	[-0.88]
R^2	18.34	16.93	3.91	13.51	30.27	33.78	29.07	30.83	34.68	22.03	9.89
GSS path	72.13**	59.96***	38.05	0.38	-7.80	-9.88	8.70	-16.24	-20.86	11.56	38.74
t	[2.28]	[2.85]	[1.16]	[0.01]	[-0.15]	[-0.19]	[0.16]	[-0.29]	[-0.37]	[0.18]	[0.62]
R^2	42.56	53.67	16.05	0.00	0.33	0.53	0.39	1.16	1.95	0.49	5.25
GSS LSAP	36.26	30.95	24.87	42.19	24.65	24.56	31.35	4.07	-11.23	6.45	15.51
t	[1.32]	[1.59]	[1.01]	[1.33]	[0.68]	[0.67]	[0.85]	[0.10]	[-0.27]	[0.14]	[0.33]
R^2	19.97	26.58	12.73	20.26	6.18	6.08	9.30	0.14	1.05	0.28	1.56
Post ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day6**	**Day7**	**Day8**	**Day9**	**Day 10**
Short-term	15.42***	9.07***	11.18***	15.59***	16.67***	16.03***	15.21**	11.41*	9.74	11.18	15.04*
t	[6.07]	[2.93]	[2.94]	[3.88]	[4.21]	[2.86]	[2.29]	[1.87]	[1.47]	[1.59]	[1.91]
R^2	54.33	21.71	21.82	32.74	36.36	20.91	14.49	10.13	6.48	7.52	10.49
Long-term	9.06***	4.79**	6.36***	8.34***	9.01***	7.58**	7.06*	4.95	5.59	6.49	7.91
t	[5.71]	[2.48]	[2.73]	[3.27]	[3.57]	[2.13]	[1.70]	[1.3]	[1.39]	[1.52]	[1.63]
R^2	51.26	16.56	19.33	25.63	29.08	12.79	8.54	5.20	5.85	6.94	7.93
NS	15.12***	9.09**	8.78*	11.44**	12.07**	15.56**	13.84*	9.73	8.41	11.08	15.25
t	[4.63]	[2.45]	[1.87]	[2.17]	[2.25]	[2.30]	[1.74]	[1.34]	[1.07]	[1.34]	[1.64]
R^2	43.40	17.65	11.06	14.37	15.37	15.89	9.71	6.04	3.95	6.02	8.75
GSS target	29.80	-5.24	-7.84	-24.74	-27.33	17.14	20.20	-38.96	-60.61	-78.28	-59.72
t	[0.48]	[-0.09]	[-0.11]	[-0.29]	[-0.32]	[0.16]	[0.16]	[-0.36]	[-0.52]	[-0.63]	[-0.41]
R^2	0.89	0.03	0.04	0.33	0.39	0.09	0.10	0.48	1.03	1.49	0.66
GSS path	43.86***	34.59***	32.02**	44.03***	51.27***	56.30***	51.85**	43.41*	42.36*	49.66*	57.41*
t	[4.07]	[2.95]	[2.10]	[2.63]	[3.16]	[2.58]	[2.01]	[1.89]	[1.71]	[1.89]	[1.90]
R^2	38.92	25.02	14.45	21.04	27.74	20.44	13.48	12.04	10.09	12.05	12.20
GSS LSAP	-11.20	19.21	4.31	5.62	21.44	28.89	20.44	30.28	75.58	36.85	16.42
t	[-0.25]	[0.44]	[0.08]	[0.09]	[0.35]	[0.36]	[0.23]	[0.38]	[0.90]	[0.40]	[0.16]
R^2	0.24	0.73	0.02	0.03	0.46	0.51	0.20	0.55	3.02	0.62	0.09

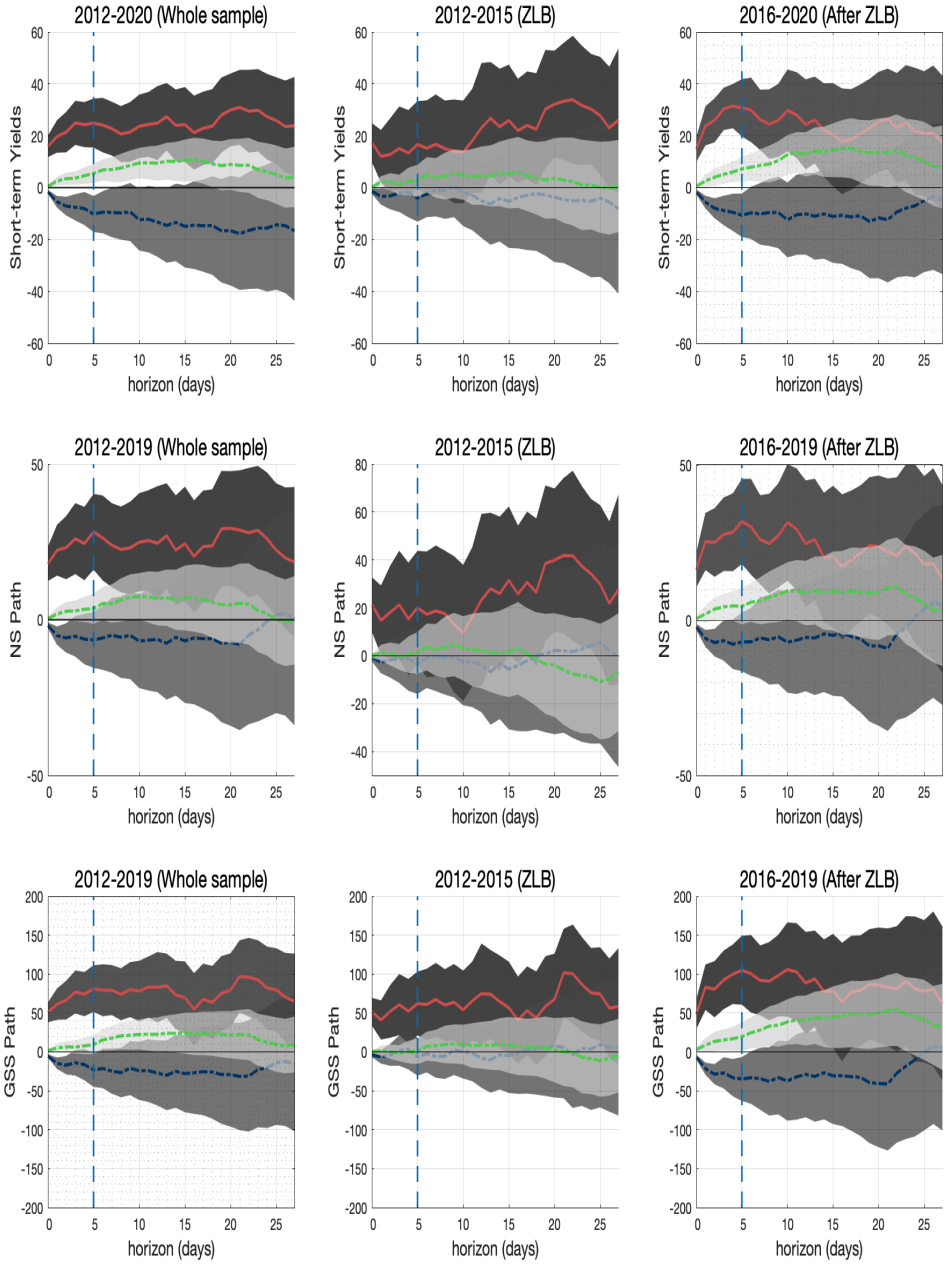
*Notes: We run the regression: $\Delta USDX_{t,t+h} = \alpha + \beta x_t + \epsilon_{t+h}$, where $\Delta USDX_{t,t+h}$ is the h days after FOMC days' cumulative USD change and x_t is the FOMC days' change of yields factors or monetary policy shocks. The whole sample period for short-term yields is from 02/04/1994-01/19/2020 which includes 205 FOMC meetings (exclude 9 meetings Aug 5th 2008- Jun 24th 2009 for GFC). For NS, it is from Fed 2nd 2000 - Sep 18th 2019 (150 meetings). For GSS, the whole sample period is from Fed 4th 1994 - Jun 19th 2019 (200 meetings). The whole sample is split into the following subsamples: Before 2000 (Feb 4th 1994-Feb 2nd 2000 with 50 meetings), Since 2000 (Feb 2nd 2000-Jan 19th 2020), Since 2000 before ZLB (Feb 2nd 2000-Jun 25th 2008 with 68 meetings), ZLB (Aug 12th 2009-Dec 16th 2015 with 52 meetings), GFC (Aug 5th 2008- Jun 24th 2009 with 9 meetings) and Post ZLB (Jan 27th 2016-). t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.*

Figure 1: Impulse response function of USD and fund+nonbank and bank order flow to monetary policy shocks and short-term yields factor excluding FOMC day



Notes: The red solid line is the IRF of USD to monetary policy shocks and short-term yields factor. The green and blue dash lines are the IRF of fund+nonbank and bank net dollar buying volume to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for USDX and the shade area is 95% confidence interval area for order flow. To make it comparable, the magnitude of coefficients of volume are amplified by 2 times. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 2: Impulse response function of USD and fund+nonbank and bank order flow to monetary policy shocks and short-term yields factor including FOMC days with 3 hours USDX and vol for FOMC days



Notes: The red solid line is the IRF of USD to monetary policy shocks and short-term yields factor. The green and blue dash lines are the IRF of fund+nonbank and bank net dollar buying volume to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for DI and the shade area is 95% confidence interval area for order flow. To make it comparable, the magnitude of coefficients of volume are amplified by 2 times. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Table 6: USD flows on FOMC days

Variable	Whole							ZLB							Post ZLB						
	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB
Short-term	17.36***	-1.45***	-1.84***	0.08	0.17	0.14	0.31	20.12***	-2.00***	-1.90**	-0.01	-0.10	0.00	-0.10	15.42***	-0.95	-1.41**	0.07	0.12	0.27	0.40
t	[7.52]	[-2.87]	[-3.59]	[0.52]	[0.48]	[0.70]	[0.83]	[4.64]	[-3.14]	[-2.45]	[-0.04]	[-0.19]	[0.00]	[-0.17]	[6.07]	[-1.24]	[-2.21]	[0.28]	[0.25]	[0.89]	[0.80]
R^2	49.34	12.41	18.16	0.46	0.39	0.83	1.17	46.28	28.27	19.35	0.01	0.14	0.00	0.11	54.34	4.72	13.65	0.26	0.19	2.47	2.02
Long-term	7.70***	-0.55**	-0.78***	0.09	0.11	0.03	0.14	7.15***	-0.60***	-0.56**	0.03	-0.03	-0.03	-0.06	9.06***	-0.34	-1.00***	0.19	0.25	0.22	0.47
t	[8.11]	[-2.51]	[-3.58]	[1.40]	[0.71]	[0.36]	[0.88]	[5.49]	[-2.76]	[-2.16]	[0.57]	[-0.17]	[-0.47]	[-0.34]	[5.71]	[-0.73]	[-2.68]	[1.30]	[0.84]	[1.19]	[1.61]
R^2	53.15	9.82	18.06	3.27	0.87	0.22	1.32	54.66	23.39	15.73	1.27	0.12	0.86	0.47	51.26	1.70	18.78	5.15	2.20	4.34	7.72
NS	17.1***	-1.91***	-1.98***	-0.14	0.34	-0.13	0.21	21.22***	-2.36**	-2.06*	0.01	-0.07	-0.24	-0.32	15.12***	-1.67**	-1.86***	-0.23	0.48	-0.07	0.41
t	[5.14]	[-3.17]	[-3.06]	[-0.80]	[0.76]	[-0.53]	[0.47]	[3.00]	[-2.51]	[-1.81]	[0.06]	[-0.10]	[-0.76]	[-0.40]	[4.63]	[-2.07]	[-2.64]	[-0.88]	[0.86]	[-0.19]	[0.75]
R^2	32.42	15.41	14.54	1.14	1.05	0.51	0.40	26.41	20.18	11.64	0.01	0.04	2.28	0.63	43.39	13.27	19.97	2.66	2.58	0.13	1.98
GSS target	34.26	0.62	5.54	-3.35	-0.50	-1.07	-1.58	41.99	-10.35	-2.18	0.38	-7.41	-1.14	-8.54	29.80	8.61	10.67	-6.05*	5.08	-1.09	3.99
t	[0.65]	[0.07]	[0.61]	[-1.45]	[-0.08]	[-0.33]	[-0.26]	[0.46]	[-0.90]	[-0.16]	[0.16]	[-0.95]	[-0.32]	[-0.99]	[0.48]	[0.72]	[0.97]	[-1.67]	[0.63]	[-0.21]	[0.49]
R^2	0.78	0.01	0.69	3.82	0.01	0.21	0.13	0.84	3.14	0.11	0.10	3.50	0.40	3.74	0.89	1.94	3.50	9.70	1.49	0.17	0.93
GSS path	47.01***	-5.02***	-5.31***	-0.09	0.77	-0.39	0.38	48.54***	-4.21**	-3.64*	0.16	-0.08	-0.65	-0.73	43.86***	-5.70**	-6.41***	-0.58	1.25	0.04	1.30
t	[5.80]	[-3.37]	[-3.25]	[-0.19]	[0.67]	[-0.62]	[0.32]	[3.92]	[-2.31]	[-1.67]	[0.38]	[-0.06]	[-1.07]	[-0.48]	[4.07]	[-2.31]	[-2.97]	[-0.69]	[0.69]	[0.04]	[0.72]
R^2	38.83	17.65	16.62	0.07	0.84	0.73	0.20	38.01	17.65	10.03	0.59	0.01	4.41	0.92	38.92	17.08	25.39	1.80	1.82	0.00	1.98
GSS LSAP	39.76***	-1.49	-1.96	1.04	0.12	-0.69	-0.57	43.96***	-2.67	-1.34	0.49	-1.16	-0.66	-1.82	-11.20	12.54	-3.95	6.07**	10.91**	-0.49	10.42*
t	[2.81]	[-0.62]	[-0.75]	[1.59]	[0.07]	[-0.75]	[-0.33]	[2.80]	[-1.20]	[-0.51]	[1.07]	[-0.75]	[-0.96]	[-1.07]	[-0.25]	[1.48]	[-0.49]	[2.43]	[1.97]	[-0.13]	[1.89]
R^2	12.96	0.72	1.06	4.55	0.01	1.06	0.20	23.83	5.44	1.05	4.40	2.22	3.57	4.41	0.24	7.78	0.91	18.45	12.97	0.07	12.05
DI(FOMC)	.	-2.03***	-2.71***	-0.62	1.78	1.44	2.06*	.	-3.32**	-3.89***	-2.65	3.78*	1.85	3.33*	.	-1.27	-2.02**	-0.87	3.40	1.50	0.92
t	.	[-2.74]	[-4.10]	[-0.23]	[1.56]	[0.67]	[1.88]	.	[-2.33]	[-3.45]	[-0.35]	[1.72]	[0.36]	[1.69]	.	[-1.52]	[-2.21]	[-0.32]	[0.25]	[0.70]	[0.69]
R^2	.	11.48	22.51	0.09	4.02	0.77	5.77	.	17.88	32.25	0.48	10.60	0.52	10.30	.	6.97	13.60	0.34	0.20	1.54	1.49
DI(nonFOMC)	.	-3.08***	-3.95***	-5.33	0.11	19.59***	2.09**	.	-2.35**	-3.39***	-25.90**	-0.97	41.93***	1.94	.	-3.79***	-4.72***	-4.49	0.91	11.22***	2.19
t	.	[-5.11]	[-6.31]	[-1.58]	[0.10]	[6.12]	[2.03]	.	[-2.51]	[-3.34]	[-2.07]	[-0.58]	[6.97]	[1.21]	.	[-4.5]	[-5.44]	[-1.27]	[0.63]	[2.98]	[1.63]
R^2	.	1.35	2.04	0.13	0.00	1.92	0.22	.	0.75	1.33	0.51	0.04	5.54	0.18	.	1.84	2.67	0.15	0.04	0.81	0.25

Notes: We run the regression: $y_t = \alpha_0 + \beta_0 x_t + \epsilon_t$. where y_t is the FOMC days' USD change (ΔDX_t) or net dollar buying volume ($vol_{i,t}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression ΔDX_t on $vol_{i,t}$ for both FOMC days (DI(FOMC)) and nonFOMC days (DI(nonFOMC)). Both of yields change and DI index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 7: USD flows: one day after FOMC announcement

Variable	Whole							ZLB							Post ZLB						
	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB
Short-term	3.86	-0.87	-1.91***	0.00	0.72**	0.32*	1.03***	-5.32	-0.10	-1.05	-0.06	0.65	0.37**	1.01*	9.07***	-0.93	-1.95***	0.02	0.71	0.29	1.00*
t	[1.56]	[-1.61]	[-3.68]	[0.05]	[2.03]	[1.85]	[2.82]	[-1.57]	[-0.16]	[-1.45]	[-0.61]	[1.18]	[2.01]	[1.94]	[2.93]	[-1.27]	[-3.36]	[0.12]	[1.46]	[1.05]	[1.89]
R^2	4.01	4.30	18.94	0.00	6.63	5.58	12.09	9.02	0.11	7.79	1.45	5.30	13.87	13.08	21.72	4.92	26.75	0.05	6.46	3.42	10.29
Long-term	0.93	-0.24	-0.55**	0.02	0.21	0.08	0.29*	-1.14	-0.03	-0.21	0.00	0.17	0.01	0.19	4.79**	-0.33	-0.88**	0.06	0.24	0.24	0.48
t	[0.87]	[-1.02]	[-2.33]	[0.59]	[1.35]	[1.07]	[1.77]	[-1.00]	[-0.12]	[-0.86]	[-0.11]	[0.96]	[0.20]	[1.04]	[2.48]	[-0.74]	[-2.32]	[0.70]	[0.79]	[1.48]	[1.47]
R^2	1.28	1.76	8.59	0.59	3.06	1.93	5.13	3.88	0.06	2.85	0.04	3.55	0.16	4.13	16.56	1.72	14.75	1.57	1.96	6.61	6.49
NS	4.39	-0.92	-1.66**	-0.02	0.51	0.25	0.76	-6.65	-0.29	-1.00	-0.06	0.35	0.42	0.77	9.10**	-1.09	-1.82***	0.00	0.57	0.17	0.74
t	[1.41]	[-1.38]	[-2.49]	[-0.14]	[1.15]	[1.16]	[1.62]	[-1.40]	[-0.33]	[-0.96]	[-0.43]	[0.45]	[1.60]	[1.00]	[2.45]	[-1.35]	[-2.85]	[-0.01]	[1.01]	[0.54]	[1.19]
R^2	3.49	3.36	10.17	0.04	2.34	2.39	4.55	7.24	0.43	3.57	0.75	0.79	9.33	3.86	17.67	6.15	22.49	0.00	3.53	1.03	4.82
GSS target	-9.35	-3.36	-0.20	-1.31	-4.74	2.89	-1.85	-11.99	2.50	-11.16	-0.01	6.39	7.27***	13.66*	-5.24	-8.54	7.11	-2.24	-12.99	-0.43	-13.42
t	[-0.22]	[-0.39]	[-0.02]	[-0.87]	[-0.80]	[1.04]	[-0.29]	[-0.22]	[0.25]	[-0.97]	[-0.01]	[0.74]	[2.71]	[1.66]	[-0.09]	[-0.73]	[0.68]	[-0.92]	[-1.62]	[-0.09]	[-1.51]
R^2	0.09	0.29	0.00	1.40	1.18	1.98	0.16	0.19	0.26	3.62	0.00	2.15	22.74	9.89	0.03	1.99	1.74	3.12	9.17	0.03	8.09
GSS path	10.61	-2.98*	-4.67***	-0.09	1.45	0.33	1.78	-10.74	-0.76	-1.33	-0.21	0.54	0.23	0.77	34.59***	-4.63*	-7.48***	-0.04	2.40	0.48	2.88
t	[1.32]	[-1.83]	[-2.82]	[-0.31]	[1.26]	[0.60]	[1.48]	[-1.17]	[-0.45]	[-0.67]	[-0.77]	[0.36]	[0.44]	[0.52]	[2.95]	[-1.86]	[-4.05]	[-0.07]	[1.32]	[0.47]	[1.45]
R^2	3.17	5.95	13.06	0.19	2.93	0.68	3.97	5.19	0.81	1.74	2.31	0.52	0.77	1.07	25.02	11.79	38.71	0.02	6.27	0.83	7.49
GSS LSAP	-3.14	0.19	-0.30	-0.14	0.77	-0.14	0.63	-6.62	-0.11	-0.43	-0.05	0.76	-0.40	0.36	19.21	8.10	7.06	-1.43	-0.07	2.54	2.47
t	[-0.26]	[0.08]	[-0.12]	[-0.32]	[0.45]	[-0.18]	[0.35]	[-0.62]	[-0.06]	[-0.19]	[-0.15]	[0.45]	[-0.67]	[0.21]	[0.44]	[0.95]	[0.93]	[-0.80]	[-0.01]	[0.76]	[0.37]
R^2	0.13	0.01	0.03	0.19	0.39	0.06	0.23	1.51	0.01	0.14	0.09	0.79	1.77	0.18	0.73	3.39	3.25	2.43	0.00	2.17	0.52
DI	.	-0.92	-0.85	-3.26	-0.34	2.52	0.21	.	-0.15	1.33	-6.88	-2.91***	4.36	-2.40**	.	-0.56	-1.46*	-4.03	1.14	1.93	1.40
t	.	[-1.55]	[-1.51]	[-0.93]	[-0.37]	[1.35]	[0.25]	.	[-0.14]	[1.48]	[-1.01]	[-2.60]	[1.25]	[-2.05]	.	[-0.68]	[-1.65]	[-0.97]	[0.92]	[0.88]	[1.28]
R^2	.	4.00	3.78	1.46	0.24	3.06	0.11	.	0.07	8.09	3.92	21.34	5.86	14.34	.	1.48	8.04	2.94	2.66	2.42	5.04

Notes: We run the regression: $y_{t,t+1} = \alpha_1 + \beta_1 x_t + \epsilon_t$. where $y_{t,t+1}$ is the one day after FOMC days' cumulative USD change ($\Delta DX_{t,t+1}$) or cumulative net dollar buying volume ($vol_{i,t,t+1}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta DX_{t,t+1}$ on $vol_{i,t,t+1}$. Both of yields change and DI index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 8: USD flows: two days after FOMC announcement

Variable	Whole							ZLB							Post ZLB						
	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB
Short-term	5.52*	-1.26	-2.75***	0.02	1.24**	0.23	1.47***	-4.63	0.19	-0.92	0.05	0.88	0.17	1.06	11.18***	-1.44	-3.14***	-0.03	1.44*	0.29	1.73**
t	[1.78]	[-1.35]	[-3.11]	[0.17]	[2.33]	[1.04]	[2.68]	[-1.01]	[0.14]	[-0.71]	[0.29]	[1.20]	[0.53]	[1.29]	[2.94]	[-1.29]	[-3.24]	[-0.16]	[1.83]	[0.93]	[2.23]
R^2	5.17	3.05	14.28	0.05	8.56	1.84	10.98	3.94	0.08	1.99	0.34	5.48	1.12	6.22	21.82	5.06	25.24	0.08	9.75	2.74	13.86
Long-term	2.18	-0.36	-0.83**	0.01	0.34	0.12	0.46*	-0.09	0.07	-0.14	-0.01	0.16	0.07	0.23	6.36***	-0.67	-1.68***	0.03	0.71	0.27	0.98**
t	[1.64]	[-0.89]	[-2.10]	[0.16]	[1.45]	[1.28]	[1.90]	[-0.06]	[0.17]	[-0.34]	[-0.19]	[0.65]	[0.64]	[0.83]	[2.73]	[-0.98]	[-2.76]	[0.23]	[1.47]	[1.44]	[2.07]
R^2	4.43	1.35	7.06	0.04	3.51	2.73	5.87	0.01	0.11	0.46	0.15	1.66	1.60	2.68	19.33	3.02	19.75	0.17	6.56	6.24	12.17
NS	5.23	-0.82	-2.03*	-0.01	1.05	0.16	1.21*	-3.35	0.06	-0.52	0.07	0.47	0.03	0.50	8.78*	-1.03	-2.50**	-0.06	1.29	0.23	1.52*
t	[1.34]	[-0.72]	[-1.80]	[-0.07]	[1.58]	[0.60]	[1.78]	[-0.52]	[0.03]	[-0.29]	[0.32]	[0.45]	[0.06]	[0.43]	[1.87]	[-0.86]	[-2.29]	[-0.25]	[1.44]	[0.65]	[1.75]
R^2	3.18	0.94	5.59	0.01	4.34	0.65	5.42	1.06	0.00	0.33	0.41	0.81	0.02	0.72	11.06	2.56	15.80	0.23	6.92	1.48	9.83
GSS target	-50.72	7.31	-1.22	-0.98	7.25	2.26	9.51	-104.35	13.25	-14.91	1.78	21.87**	4.52	26.38**	-7.84	1.54	7.63	-3.00	-3.60	0.52	-3.08
t	[-0.98]	[0.50]	[-0.08]	[-0.47]	[0.81]	[0.63]	[1.03]	[-1.50]	[0.64]	[-0.75]	[0.70]	[2.01]	[0.91]	[2.19]	[-0.11]	[0.09]	[0.45]	[-0.94]	[-0.26]	[0.10]	[-0.23]
R^2	1.76	0.47	0.01	0.41	1.22	0.75	1.96	8.30	1.63	2.19	1.90	13.93	3.18	16.13	0.04	0.03	0.76	3.31	0.26	0.04	0.20
GSS path	15.80	-3.72	-5.88**	-0.27	1.78	0.65	2.44	0.22	-0.34	-0.05	-0.35	-0.41	0.48	0.07	32.02**	-5.98	-10.99***	-0.27	4.32	0.95	5.28*
t	[1.58]	[-1.32]	[-2.10]	[-0.67]	[1.02]	[0.94]	[1.36]	[0.02]	[-0.09]	[-0.02]	[-0.81]	[-0.20]	[0.55]	[0.03]	[2.10]	[-1.62]	[-3.47]	[-0.37]	[1.47]	[0.83]	[1.86]
R^2	4.50	3.18	7.69	0.85	1.94	1.63	3.39	0.00	0.04	0.00	2.54	0.16	1.21	0.00	14.45	9.21	31.70	0.54	7.66	2.57	11.70
GSS LSAP	6.46	0.68	-0.84	-0.64	0.84	1.32	2.16	5.18	0.78	-0.72	-0.53	0.78	1.25	2.02	4.31	7.97	7.49	-2.24	0.35	2.37	2.72
t	[0.43]	[0.16]	[-0.20]	[-1.09]	[0.33]	[1.31]	[0.82]	[0.37]	[0.19]	[-0.18]	[-1.06]	[0.34]	[1.29]	[0.79]	[0.08]	[0.64]	[0.60]	[-0.97]	[0.03]	[0.63]	[0.28]
R^2	0.35	0.05	0.07	2.20	0.20	3.12	1.24	0.53	0.15	0.13	4.29	0.46	6.28	2.47	0.02	1.54	1.39	3.49	0.00	1.50	0.29
DI	.	-1.45***	-1.29***	1.40	-0.76	2.07	-0.40	.	-0.97	0.10	-7.48	-2.67**	-1.76	-2.39**	.	-2.14**	-2.95***	-0.24	-0.42	2.15**	-0.49
t	.	[-3.62]	[-3.21]	[0.43]	[-1.03]	[1.11]	[-0.55]	.	[-1.45]	[0.14]	[-1.39]	[-2.39]	[-0.62]	[-2.40]	.	[-2.18]	[-3.64]	[-0.25]	[-0.44]	[2.28]	[-0.48]
R^2	.	18.46	15.06	0.32	1.79	2.10	0.52	.	7.78	0.08	7.15	18.66	1.51	18.72	.	13.62	30.64	0.21	0.64	14.75	0.78

Notes: We run the regression: $y_{t,t+2} = \alpha_2 + \beta_2 x_t + \epsilon_t$. where $y_{t,t+2}$ is the two days after FOMC days' cumulative USD change ($\Delta DX_{t,t+2}$) or cumulative net dollar buying volume ($vol_{i,t,t+2}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta DX_{t,t+2}$ on $vol_{i,t,t+2}$. Both of yields change and DI index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 9: USD flows: three days post-FOMC

Variable	Whole							ZLB							Post ZLB						
	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB
Short-term	9.08***	-1.37	-2.97**	0.01	1.67***	-0.08	1.59***	-2.31	0.27	-0.38	0.14	0.49	0.02	0.51	15.59***	-1.42	-3.57**	-0.15	2.46***	-0.16	2.30***
t	[2.59]	[-1.12]	[-2.32]	[0.05]	[2.99]	[-0.31]	[2.68]	[-0.41]	[0.15]	[-0.21]	[0.65]	[0.60]	[0.07]	[0.55]	[3.89]	[-0.97]	[-2.43]	[-0.59]	[3.21]	[-0.42]	[2.93]
R^2	10.36	2.10	8.50	0.00	13.34	0.17	11.04	0.67	0.09	0.17	1.68	1.41	0.02	1.20	32.75	2.96	15.95	1.11	24.93	0.57	21.68
Long-term	3.67**	-0.15	-0.66	0.01	0.48*	0.01	0.49*	1.19	0.31	0.12	0.01	0.12	0.05	0.18	8.34***	-0.29	-1.46	-0.02	1.29***	-0.10	1.19**
t	[2.44]	[-0.29]	[-1.17]	[0.20]	[1.94]	[0.10]	[1.89]	[0.65]	[0.52]	[0.20]	[0.10]	[0.46]	[0.48]	[0.59]	[3.27]	[-0.32]	[-1.56]	[-0.13]	[2.66]	[-0.42]	[2.42]
R^2	9.28	0.15	2.30	0.07	6.07	0.02	5.79	1.66	1.07	0.16	0.04	0.84	0.92	1.35	25.64	0.34	7.29	0.05	18.64	0.55	15.90
NS	8.11*	-0.61	-1.77	-0.12	1.41**	-0.14	1.28*	-0.15	-0.12	-0.22	0.21	0.02	-0.13	-0.11	11.45**	-0.57	-2.17	-0.28	2.02**	-0.14	1.88**
t	[1.80]	[-0.40]	[-1.09]	[-0.60]	[2.02]	[-0.44]	[1.70]	[-0.02]	[-0.05]	[-0.08]	[0.68]	[0.02]	[-0.28]	[-0.09]	[2.17]	[-0.36]	[-1.31]	[-1.04]	[2.25]	[-0.32]	[2.02]
R^2	5.55	0.29	2.13	0.64	6.89	0.35	4.99	0.00	0.01	0.03	1.83	0.00	0.31	0.03	14.38	0.46	5.81	3.69	15.28	0.37	12.74
GSS target	-83.00	3.78	-4.90	-0.06	3.25	5.49	8.74	-156.43*	9.12	-11.46	1.50	14.68	4.40	19.08	-24.74	-2.00	-1.99	-1.15	-5.18	6.31	1.13
t	[-1.38]	[0.19]	[-0.23]	[-0.02]	[0.34]	[1.34]	[0.87]	[-1.91]	[0.33]	[-0.40]	[0.44]	[1.18]	[0.84]	[1.37]	[-0.29]	[-0.09]	[-0.08]	[-0.28]	[-0.37]	[1.00]	[0.08]
R^2	3.45	0.07	0.10	0.00	0.22	3.30	1.41	12.75	0.42	0.64	0.75	5.27	2.72	6.95	0.33	0.03	0.03	0.30	0.51	3.73	0.02
GSS path	26.24**	-2.29	-4.36	-0.28	2.67	-0.33	2.34	9.02	2.03	2.72	0.22	-0.86	-0.05	-0.91	44.03***	-4.97	-10.14**	-1.06	6.92**	-0.69	6.23**
t	[2.30]	[-0.60]	[-1.07]	[-0.53]	[1.47]	[-0.41]	[1.21]	[0.60]	[0.42]	[0.56]	[0.37]	[-0.39]	[-0.06]	[-0.37]	[2.63]	[-1.01]	[-2.00]	[-1.19]	[2.42]	[-0.48]	[2.08]
R^2	9.07	0.68	2.13	0.53	3.92	0.32	2.67	1.44	0.71	1.23	0.55	0.61	0.01	0.54	21.04	3.81	13.34	5.20	18.34	0.90	14.32
GSS LSAP	14.23	2.39	0.33	-0.35	0.65	1.76	2.41	13.31	2.70	0.76	-0.46	0.93	1.47	2.40	5.62	10.58	8.95	0.29	-3.53	4.86	1.33
t	[0.82]	[0.43]	[0.05]	[-0.45]	[0.24]	[1.52]	[0.84]	[0.78]	[0.49]	[0.13]	[-0.69]	[0.37]	[1.46]	[0.86]	[0.09]	[0.66]	[0.51]	[0.10]	[-0.34]	[1.07]	[0.13]
R^2	1.24	0.35	0.01	0.38	0.11	4.17	1.32	2.40	0.96	0.07	1.86	0.55	7.89	2.86	0.03	1.63	0.98	0.04	0.45	4.19	0.06
DI	.	-0.91**	-0.91***	-0.43	0.12	3.02	0.61	.	-0.25	0.16	-2.55	-1.60	-1.09	-1.39	.	-1.11**	-1.43***	-0.87	0.74	4.89**	1.65*
t	.	[-2.43]	[-2.65]	[-0.15]	[0.15]	[1.62]	[0.79]	.	[-0.40]	[0.25]	[-0.51]	[-1.20]	[-0.33]	[-1.18]	.	[-1.98]	[-2.95]	[-0.25]	[0.76]	[2.30]	[1.74]
R^2	.	9.25	10.78	0.04	0.04	4.32	1.06	.	0.63	0.26	1.01	5.42	0.44	5.30	.	11.26	21.87	0.20	1.81	14.57	8.93

Notes: We run the regression: $y_{t,t+3} = \alpha_3 + \beta_3 x_t + \epsilon_t$. where $y_{t,t+3}$ is the three days after FOMC days' cumulative USD change ($\Delta DX_{t,t+3}$) or cumulative net dollar buying volume ($vol_{i,t,t+3}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta DX_{t,t+3}$ on $vol_{i,t,t+3}$. Both of yields change and DI index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 10: USD flows: four days post-FOMC

Variable	Whole							ZLB							Post ZLB						
	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB
Short-term	8.42**	-1.18	-3.23**	0.00	2.22***	-0.17	2.05***	-4.07	0.83	-0.24	-0.02	0.99	0.10	1.09	16.67***	-1.25	-3.91**	-0.08	3.08***	-0.34	2.74***
t	[2.28]	[-0.77]	[-2.01]	[0.01]	[3.01]	[-0.54]	[2.69]	[-0.64]	[0.36]	[-0.10]	[-0.07]	[0.84]	[0.25]	[0.83]	[4.21]	[-0.70]	[-2.12]	[-0.27]	[3.22]	[-0.70]	[2.92]
R^2	8.25	1.01	6.48	0.00	13.53	0.51	11.09	1.63	0.51	0.04	0.02	2.74	0.24	2.69	36.37	1.56	12.62	0.24	25.04	1.56	21.54
Long-term	3.59**	0.09	-0.67	-0.04	0.79**	0.01	0.81**	1.14	0.80	0.32	-0.08	0.42	0.13	0.55	9.01***	-0.42	-1.79	-0.04	1.67***	-0.25	1.42**
t	[2.28]	[0.14]	[-0.95]	[-0.48]	[2.46]	[0.10]	[2.45]	[0.55]	[1.07]	[0.40]	[-0.79]	[1.10]	[1.08]	[1.32]	[3.57]	[-0.39]	[-1.56]	[-0.25]	[2.80]	[-0.86]	[2.41]
R^2	8.23	0.04	1.53	0.39	9.44	0.02	9.41	1.20	4.38	0.64	2.43	4.59	4.42	6.49	29.08	0.48	7.26	0.21	20.13	2.31	15.81
NS	6.54	-0.93	-2.22	-0.24	1.89**	-0.37	1.52	-6.11	0.01	-0.25	-0.09	0.81	-0.46	0.34	12.07**	-1.04	-2.76	-0.32	2.37**	-0.32	2.05*
t	[1.37]	[-0.49]	[-1.10]	[-0.98]	[2.04]	[-0.96]	[1.58]	[-0.69]	[0.00]	[-0.07]	[-0.21]	[0.48]	[-0.88]	[0.18]	[2.26]	[-0.54]	[-1.35]	[-1.07]	[2.08]	[-0.58]	[1.84]
R^2	3.32	0.44	2.15	1.70	7.04	1.65	4.33	1.89	0.00	0.02	0.17	0.92	2.99	0.14	15.37	1.04	6.15	3.96	13.41	1.19	10.78
GSS target	-113.85*	-10.18	-21.51	-2.17	7.82	5.68	13.50	-226.92***	-4.54	-25.91	-2.60	21.53	2.44	23.97	-27.33	-16.53	-20.53	-1.71	-2.37	8.08	5.71
t	[-1.84]	[-0.42]	[-0.83]	[-0.68]	[0.62]	[1.12]	[1.04]	[-2.59]	[-0.13]	[-0.69]	[-0.57]	[1.19]	[0.41]	[1.19]	[-0.32]	[-0.63]	[-0.70]	[-0.38]	[-0.13]	[0.99]	[0.33]
R^2	6.01	0.34	1.29	0.86	0.71	2.30	2.01	21.10	0.06	1.89	1.28	5.32	0.67	5.40	0.39	1.49	1.84	0.57	0.07	3.67	0.41
GSS path	23.5**	-2.84	-5.51	-0.38	3.53	-0.49	3.05	0.53	3.38	3.42	0.10	-0.12	-0.01	-0.13	51.27***	-7.41	-13.20**	-1.20	8.02**	-1.02	7.00*
t	[1.96]	[-0.61]	[-1.10]	[-0.61]	[1.45]	[-0.48]	[1.21]	[0.03]	[0.55]	[0.53]	[0.12]	[-0.04]	[-0.01]	[-0.04]	[3.16]	[-1.29]	[-2.17]	[-1.25]	[2.17]	[-0.55]	[1.92]
R^2	6.74	0.70	2.23	0.69	3.82	0.44	2.69	0.00	1.19	1.12	0.06	0.01	0.00	0.01	27.74	6.02	15.33	5.64	15.30	1.17	12.46
GSS LSAP	8.34	4.67	-0.22	-1.09	3.63	2.35	5.98	6.33	6.46	1.57	-0.99	3.87	2.00*	5.87	21.44	-0.31	-3.82	-3.07	0.19	6.38	6.57
t	[0.46]	[0.68]	[-0.03]	[-1.21]	[1.01]	[1.64]	[1.64]	[0.33]	[0.93]	[0.21]	[-1.12]	[1.08]	[1.81]	[1.52]	[0.35]	[-0.02]	[-0.18]	[-0.96]	[0.01]	[1.08]	[0.52]
R^2	0.40	0.87	0.00	2.69	1.88	4.83	4.82	0.43	3.32	0.18	4.77	4.48	11.61	8.42	0.46	0.00	0.12	3.44	0.00	4.33	1.04
DI	.	-0.60*	-0.68**	-0.43	0.45	2.04	0.74	.	-0.02	0.10	2.52	-0.46	-1.78	-0.52	.	-1.09**	-1.36***	-3.19	1.00	3.47**	1.83**
t	.	[-1.87]	[-2.33]	[-0.17]	[0.70]	[1.29]	[1.20]	.	[-0.04]	[0.19]	[0.59]	[-0.43]	[-0.54]	[-0.55]	.	[-2.40]	[-3.60]	[-1.03]	[1.27]	[2.03]	[2.36]
R^2	.	5.66	8.55	0.05	0.84	2.80	2.41	.	0.01	0.14	1.38	0.74	1.15	1.18	.	15.68	29.49	3.31	4.92	11.78	15.24

Notes: We run the regression: $y_{t,t+4} = \alpha_4 + \beta_4 x_t + \epsilon_t$. where $y_{t,t+4}$ is the four days after FOMC days' cumulative USD change ($\Delta DX_{t,t+4}$) or cumulative net dollar buying volume ($vol_{i,t,t+4}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta DX_{t,t+4}$ on $vol_{i,t,t+4}$. Both of yields change and DI index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 11: USD flows: five days post-FOMC

Variable	Whole							ZLB							Post ZLB						
	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB	DI	Agg	Bank	Corp	Fund	Nonbank	F+NB
Short-term	9.01**	-1.47	-4.26**	0.32	2.52***	-0.05	2.48***	-0.75	-0.21	-1.41	-0.06	1.01	0.25	1.26	16.03***	-0.77	-4.48**	0.36	3.58***	-0.23	3.35***
t	[2.16]	[-0.87]	[-2.42]	[1.11]	[2.86]	[-0.13]	[2.75]	[-0.12]	[-0.09]	[-0.63]	[-0.17]	[0.74]	[0.55]	[0.83]	[2.86]	[-0.35]	[-2.05]	[0.91]	[3.03]	[-0.45]	[2.94]
R^2	7.45	1.28	9.20	2.08	12.35	0.03	11.52	0.06	0.04	1.57	0.11	2.15	1.21	2.70	20.91	0.40	11.94	2.61	22.86	0.65	21.82
Long-term	3.28*	-0.42	-1.36*	-0.03	0.92**	0.06	0.98**	1.52	0.20	-0.36	-0.13	0.51	0.17	0.68	7.58**	-0.55	-2.24*	-0.01	1.88**	-0.18	1.70**
t	[1.82]	[-0.57]	[-1.77]	[-0.27]	[2.40]	[0.40]	[2.52]	[0.76]	[0.28]	[-0.49]	[-1.11]	[1.17]	[1.17]	[1.41]	[2.13]	[-0.41]	[-1.66]	[-0.05]	[2.55]	[-0.60]	[2.37]
R^2	5.43	0.56	5.14	0.13	9.05	0.27	9.87	2.26	0.30	0.94	4.72	5.19	5.19	7.38	12.80	0.54	8.13	0.01	17.32	1.13	15.39
NS	10.31**	-0.68	-2.36	0.06	1.74	-0.13	1.61	-1.38	-0.66	-1.30	-0.10	0.90	-0.15	0.75	15.57**	-0.31	-2.39	0.09	2.10	-0.11	1.98
t	[1.96]	[-0.32]	[-1.05]	[0.19]	[1.55]	[-0.31]	[1.40]	[-0.16]	[-0.22]	[-0.42]	[-0.21]	[0.47]	[-0.25]	[0.35]	[2.30]	[-0.13]	[-0.98]	[0.22]	[1.45]	[-0.20]	[1.43]
R^2	6.52	0.19	1.98	0.06	4.17	0.17	3.42	0.10	0.18	0.69	0.17	0.87	0.24	0.49	15.90	0.06	3.30	0.17	6.98	0.14	6.77
GSS target	-78.36	-5.62	-6.77	-3.87	0.36	4.66	5.02	-204.47**	6.27	-13.13	-1.43	17.77	3.05	20.83	17.14	-17.06	-4.92	-5.37	-12.59	5.82	-6.77
t	[-1.10]	[-0.21]	[-0.24]	[-0.87]	[0.02]	[0.87]	[0.32]	[-2.35]	[0.18]	[-0.38]	[-0.26]	[0.84]	[0.44]	[0.89]	[0.16]	[-0.52]	[-0.14]	[-0.87]	[-0.57]	[0.71]	[-0.32]
R^2	2.22	0.08	0.11	1.40	0.00	1.41	0.20	18.13	0.14	0.57	0.26	2.74	0.78	3.06	0.09	1.02	0.08	2.86	1.23	1.88	0.39
GSS path	30.56**	-5.00	-8.98*	0.09	3.67	0.22	3.89	10.43	-1.23	-1.36	-0.16	-0.31	0.60	0.29	56.3***	-5.87	-14.07*	-0.14	8.51*	-0.16	8.34*
t	[2.27]	[-0.97]	[-1.65]	[0.11]	[1.25]	[0.21]	[1.30]	[0.64]	[-0.21]	[-0.23]	[-0.17]	[-0.08]	[0.51]	[0.07]	[2.58]	[-0.80]	[-1.93]	[-0.10]	[1.82]	[-0.09]	[1.86]
R^2	8.88	1.76	4.91	0.02	2.86	0.08	3.09	1.60	0.18	0.21	0.11	0.03	1.01	0.02	20.44	2.42	12.53	0.04	11.26	0.03	11.77
GSS LSAP	11.27	-0.47	-5.31	-2.09*	4.24	2.69*	6.93	9.36	1.95	-3.09	-1.78*	4.31	2.51**	6.82	28.89	-9.77	-9.61	-7.56*	2.46	4.94	7.40
t	[0.55]	[-0.06]	[-0.65]	[-1.67]	[0.98]	[1.80]	[1.59]	[0.50]	[0.29]	[-0.45]	[-1.72]	[1.05]	[1.99]	[1.53]	[0.36]	[-0.41]	[-0.38]	[-1.77]	[0.15]	[0.83]	[0.48]
R^2	0.56	0.01	0.80	5.00	1.79	5.74	4.58	0.99	0.34	0.82	10.61	4.19	13.66	8.54	0.51	0.63	0.55	10.71	0.09	2.57	0.87
DI	.	-0.55*	-0.69**	-0.73	0.60	2.33	0.87	.	-0.31	-0.38	-0.34	0.39	-1.48	0.19	.	-0.83*	-1.12**	-1.46	0.71	4.02*	1.41*
t	.	[-1.69]	[-2.32]	[-0.37]	[1.00]	[1.41]	[1.49]	.	[-0.56]	[-0.70]	[-0.10]	[0.43]	[-0.53]	[0.24]	.	[-1.68]	[-2.54]	[-0.52]	[0.85]	[1.92]	[1.67]
R^2	.	4.68	8.52	0.24	1.68	3.29	3.66	.	1.24	1.91	0.04	0.75	1.13	0.22	.	8.35	17.28	0.86	2.30	10.62	8.26

Notes: We run the regression: $y_{t,t+5} = \alpha_5 + \beta_5 x_t + \epsilon_t$. where $y_{t,t+5}$ is the five days after FOMC days' cumulative USD change ($\Delta DX_{t,t+5}$) or cumulative net dollar buying volume ($vol_{i,t,t+5}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta DX_{t,t+5}$ on $vol_{i,t,t+5}$. Both of yields change and DI index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 12: Empirical results for FOMC days (2pm-5pm window)

Variable	Whole							ZLB							Post ZLB						
	DI	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**DI**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**DI**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
NS	17.96***	-0.75***	-0.88***	-0.03**	-0.12	0.28***	0.16	21.43***	-0.53	-0.36	-0.05**	-0.20	0.07	-0.13	16.27***	-0.85***	-1.10***	-0.02	-0.10	0.37***	0.27
t	[6.39]	[-3.43]	[-3.76]	[-2.48]	[-0.65]	[4.49]	[0.89]	[3.69]	[-1.51]	[-0.86]	[-2.51]	[-1.01]	[0.76]	[-0.65]	[5.62]	[-2.91]	[-4.16]	[-1.36]	[-0.39]	[4.65]	[1.06]
R^2	42.60	17.60	20.46	10.04	0.77	26.81	1.41	35.32	8.35	2.85	20.13	3.93	2.27	1.65	52.97	23.25	38.24	6.17	0.55	43.62	3.88
GSS target	46.10	-0.53	2.61	-0.07	-3.85*	0.78	-3.07	56.76	-5.61	-2.08	-0.24	-4.27**	0.98	-3.29	39.32	3.28	5.95	0.07	-3.41	0.67	-2.74
t	[0.95]	[-0.18]	[0.78]	[-0.43]	[-1.76]	[0.84]	[-1.30]	[0.72]	[-1.43]	[-0.45]	[-1.05]	[-2.06]	[0.96]	[-1.54]	[0.65]	[0.81]	[1.34]	[0.33]	[-0.96]	[0.45]	[-0.73]
R^2	1.68	0.06	1.12	0.35	5.51	1.33	3.10	2.00	7.53	0.79	4.25	14.48	3.55	8.61	1.60	2.43	6.48	0.42	3.45	0.77	2.02
GSS path	50.76***	-1.91***	-2.63***	-0.08***	0.13	0.67***	0.79*	51.78***	-1.86***	-1.85***	-0.08**	-0.29	0.36**	0.07	48.55***	-1.96**	-3.33***	-0.08*	0.45	1.01***	1.46*
t	[7.84]	[-3.88]	[-4.76]	[-2.80]	[0.29]	[4.22]	[1.75]	[5.72]	[-3.12]	[-2.60]	[-2.14]	[-0.76]	[2.23]	[0.19]	[5.00]	[-2.34]	[-4.24]	[-1.95]	[0.57]	[3.77]	[1.84]
R^2	53.70	22.14	29.94	12.89	0.16	25.17	5.47	56.70	28.01	21.22	15.50	2.26	16.53	0.15	49.03	17.43	40.93	12.74	1.22	35.37	11.53
GSS LSAP	47.39***	-2.35***	-2.39***	0.02	-0.28	0.31	0.03	51.19***	-2.8***	-2.74***	0.02	-0.52	0.45**	-0.08	1.55	2.56	2.46	0.00	1.44	-1.34	0.09
t	[3.85]	[-3.13]	[-2.64]	[0.37]	[-0.43]	[1.17]	[0.05]	[4.29]	[-4.88]	[-3.71]	[0.34]	[-1.22]	[2.44]	[-0.17]	[0.03]	[0.87]	[0.75]	[-0.01]	[0.55]	[-1.28]	[0.03]
R^2	21.83	15.60	11.61	0.25	0.35	2.53	0.00	42.35	48.78	35.53	0.46	5.65	19.24	0.12	0.00	2.81	2.11	0.00	1.16	5.89	0.00
DI	.	-7.15***	-8.24***	-55.42	1.67	21.57***	4.96*	.	-9.82***	-9.92***	-70.93	4.59	31.87**	11.48*	.	-5.86***	-7.37***	-51.29	0.08	17.77***	3.05
t	.	[-3.98]	[-5.50]	[-1.35]	[0.61]	[3.56]	[1.93]	.	[-2.89]	[-3.56]	[-1.04]	[0.65]	[2.28]	[1.70]	.	[-2.89]	[-4.05]	[-1.00]	[0.03]	[2.77]	[1.06]
R^2	.	21.42	34.28	3.03	0.64	17.90	6.02	.	25.09	33.70	4.16	1.65	17.17	10.32	.	21.17	34.63	3.11	0.00	19.87	3.49

Notes: We run the regression: $y^h_{t,2\to5} = \alpha + \beta x_t + \epsilon_t$. where $y^h_{t,2\to5}$ is the FOMC days' 2pm to 5pm cumulative USD change ($\Delta DX^h_{t,2\to5}$) or cumulative net dollar buying volume ($vol_{i,t,2\to5}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta DX^h_{t,2\to5}$ on $vol_{i,t,2\to5}$. DI index is in the original unit, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 13: Forecasting USD change with yield changes, controlling for post-FOMC yields

Post ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Short-term factor	8.89***	10.83***	15.76***	16.82***	16.52***
t	[2.80]	[2.76]	[3.78]	[4.26]	[2.95]
Short-term yields control	0.93	3.94	4.91	5.47	-2.24
t	[0.17]	[0.66]	[0.95]	[1.25]	[-0.40]
Long-term yields control	1.18	0.00	-1.21	-0.68	2.97
t	[0.40]	[0.00]	[-0.42]	[-0.33]	[1.11]
R^2	23.61	24.38	35.67	42.21	26.31
Post ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Long-term factor	4.64**	5.99**	8.21***	8.92***	8.58**
t	[2.32]	[2.44]	[2.95]	[3.40]	[2.38]
Short-term yields control	0.85	4.06	1.79	3.55	-5.52
t	[0.15]	[0.66]	[0.31]	[0.74]	[-0.94]
Long-term yields control	1.11	-0.90	-0.29	-0.04	4.25
t	[0.37]	[-0.30]	[-0.09]	[-0.02]	[1.50]
R^2	18.21	20.74	26.13	32.79	19.94
Post ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS shock	9.52**	9.25*	12.13**	13.7***	15.75**
t	[2.53]	[1.92]	[2.22]	[2.59]	[2.23]
Short-term yields control	3.11	5.66	8.42	9.75*	-0.87
t	[0.48]	[0.77]	[1.21]	[1.67]	[-0.12]
Long-term yields control	1.29	-0.16	-3.08	-2.55	2.49
t	[0.36]	[-0.05]	[-0.78]	[-0.90]	[0.73]
R^2	22.01	14.97	19.69	25.95	20.89
Post ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
GSS target shock	-17.29	-16.68	-8.88	-13.90	-18.11
t	[-0.28]	[-0.22]	[-0.10]	[-0.16]	[-0.16]
Short-term yields control	4.56	8.83	7.21	8.51	-5.10
t	[0.57]	[0.88]	[0.78]	[1.09]	[-0.52]
Long-term yields control	2.44	-0.42	-4.13	-2.65	4.17
t	[0.55]	[-0.11]	[-0.89]	[-0.79]	[1.03]
R^2	5.35	3.97	3.74	5.09	5.47
Post ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
GSS path shock	33.06***	29.79*	43.12**	50.04***	53.96**
t	[2.72]	[1.82]	[2.48]	[2.99]	[2.40]
Short-term yields control	3.75	4.45	4.19	6.44	-5.44
t	[0.53]	[0.46]	[0.51]	[0.97]	[-0.63]
Long-term yields control	1.18	-0.11	-3.46	-2.65	3.41
t	[0.30]	[-0.03]	[-0.85]	[-0.94]	[0.97]
R^2	27.36	15.45	23.34	30.80	23.65

Notes: We run the regression: $\Delta DX_{t,t+h} = \alpha_h + \beta_{1,h} x_t + \beta_{2,h} \Delta ys_{t,t+h} + \beta_{3,h} \Delta yl_{t,t+h} + \epsilon_t$. where $\Delta DX_{t,t+h}$ is the h days after FOMC days' cumulative USD change. x_t is the FOMC days' yields factor change or monetary policy shocks, and $ys_{t,t+h}$ and $yl_{t,t+h}$ is the h days after FOMC days' cumulative change of short-term and long-term yields controls, respectively. The Post ZLB sample period is from 12/16/2015-01/19/2020 which includes 33 FOMC meetings. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 14: Monetary Policy Shocks to Short-term Yields

Whole	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS	0.95***	-0.03	-0.01	-0.11	-0.11	-0.10
t	[9.23]	[-0.27]	[-0.07]	[-0.55]	[-0.52]	[-0.39]
R^2	60.75	0.13	0.01	0.55	0.48	0.27
GSS target	2.17	2.10*	1.12	0.78	0.98	2.28
t	[1.01]	[1.77]	[0.85]	[0.43]	[0.46]	[0.95]
R^2	1.90	5.60	1.35	0.35	0.41	1.66
GSS path	2.36***	0.13	0.38	0.46	0.64	0.68
t	[8.74]	[0.56]	[1.51]	[1.32]	[1.58]	[1.46]
R^2	59.05	0.58	4.14	3.19	4.48	3.86
GSS LSAP	0.85	0.28	0.56	0.94*	1.10*	1.02
t	[1.40]	[0.82]	[1.52]	[1.90]	[1.88]	[1.51]
R^2	3.59	1.26	4.18	6.39	6.27	4.11
ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS	1.12***	0.07	0.14	0.32	0.33	0.42
t	[6.69]	[0.47]	[0.81]	[1.41]	[1.31]	[1.63]
R^2	64.17	0.88	2.58	7.33	6.42	9.64
GSS target	7.53***	3.64**	1.00	3.53	3.56	5.04*
t	[2.77]	[2.42]	[0.51]	[1.38]	[1.29]	[1.78]
R^2	23.54	18.98	1.03	7.09	6.23	11.25
GSS path	1.96***	0.01	0.22	0.44	0.67	0.72
t	[5.42]	[0.05]	[0.67]	[0.99]	[1.43]	[1.44]
R^2	54.07	0.01	1.76	3.80	7.52	7.70
GSS LSAP	1.07*	0.45	0.56	0.93*	1.13**	0.97*
t	[1.87]	[1.43]	[1.51]	[1.92]	[2.20]	[1.74]
R^2	12.24	7.56	8.32	12.83	16.26	10.77
Post ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS	0.87***	-0.08	-0.09	-0.32	-0.32	-0.34
t	[6.63]	[-0.51]	[-0.49]	[-1.12]	[-1.03]	[-0.91]
R^2	61.06	0.90	0.85	4.31	3.62	2.85
GSS target	-1.80	0.98	1.25	-1.26	-0.93	0.20
t	[-0.60]	[0.55]	[0.71]	[-0.50]	[-0.29]	[0.05]
R^2	1.36	1.14	1.88	0.96	0.33	0.01
GSS path	2.79***	0.23	0.51	0.42	0.55	0.64
t	[7.06]	[0.59]	[1.33]	[0.75]	[0.79]	[0.76]
R^2	65.75	1.32	6.33	2.13	2.34	2.20
GSS LSAP	-1.84	-1.63	0.30	0.85	0.66	1.62
t	[-0.85]	[-1.29]	[0.23]	[0.47]	[0.29]	[0.59]
R^2	2.68	6.00	0.20	0.84	0.31	1.32

Notes: We run the regression: $\Delta y_{t,t+h} = \alpha + \beta x_t + \epsilon_t$. where $\Delta y_{t,t+h}$ is the h days after FOMC days' cumulative short-term yields change and x_t is the monetary policy shocks. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 15: Monetary Policy Shocks to Long-term Yields

Whole	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS	1.40***	0.04	-0.01	-0.16	-0.07	0.26
t	[4.21]	[0.14]	[-0.03]	[-0.36]	[-0.12]	[0.44]
R^2	24.38	0.04	0.00	0.24	0.03	0.35
GSS target	1.05	5.71**	4.28	4.84	5.41	11.50*
t	[0.21]	[1.98]	[1.03]	[0.98]	[0.87]	[1.72]
R^2	0.08	6.90	1.95	1.76	1.39	5.26
GSS path	4.87***	0.38	0.86	1.32	1.78	2.08
t	[6.71]	[0.66]	[1.06]	[1.38]	[1.48]	[1.58]
R^2	45.94	0.81	2.07	3.46	3.95	4.51
GSS LSAP	6.09***	0.55	2.70**	3.84***	4.88***	4.55**
t	[5.17]	[0.65]	[2.36]	[2.89]	[2.93]	[2.44]
R^2	33.54	0.79	9.53	13.64	13.93	10.10
ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS	2.23***	0.31	0.48	0.78	0.92	1.12
t	[3.05]	[0.72]	[0.74]	[0.98]	[1.08]	[1.30]
R^2	27.16	2.02	2.13	3.71	4.46	6.37
GSS target	12.34	9.44**	3.24	9.42	10.41	15.64*
t	[1.35]	[2.12]	[0.45]	[1.07]	[1.10]	[1.67]
R^2	6.76	15.29	0.80	4.41	4.62	9.98
GSS path	5.53***	-0.02	0.93	1.85	1.93	1.98
t	[4.63]	[-0.02]	[0.75]	[1.24]	[1.20]	[1.20]
R^2	46.21	0.00	2.22	5.78	5.41	5.47
GSS LSAP	6.35***	0.54	2.30*	3.66**	4.78***	4.46***
t	[4.67]	[0.57]	[1.71]	[2.29]	[2.91]	[2.59]
R^2	46.56	1.29	10.42	17.31	25.35	21.13
Post ZLB	**FOMC day**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
NS	1.00***	-0.12	-0.27	-0.64	-0.60	-0.19
t	[3.62]	[-0.41]	[-0.69]	[-1.30]	[-0.92]	[-0.25]
R^2	31.82	0.59	1.68	5.66	2.92	0.22
GSS target	-7.32	3.11	5.27	1.64	2.09	8.70
t	[-1.55]	[0.97]	[1.16]	[0.33]	[0.28]	[0.94]
R^2	8.42	3.47	4.92	0.42	0.31	3.28
GSS path	3.90***	0.55	0.47	0.24	0.88	1.71
t	[4.90]	[0.76]	[0.45]	[0.22]	[0.53]	[0.82]
R^2	48.02	2.18	0.77	0.18	1.09	2.55
GSS LSAP	2.66	-0.67	5.74*	4.12	3.22	3.48
t	[0.75]	[-0.28]	[1.80]	[1.17]	[0.60]	[0.51]
R^2	2.10	0.30	11.03	5.01	1.38	0.99

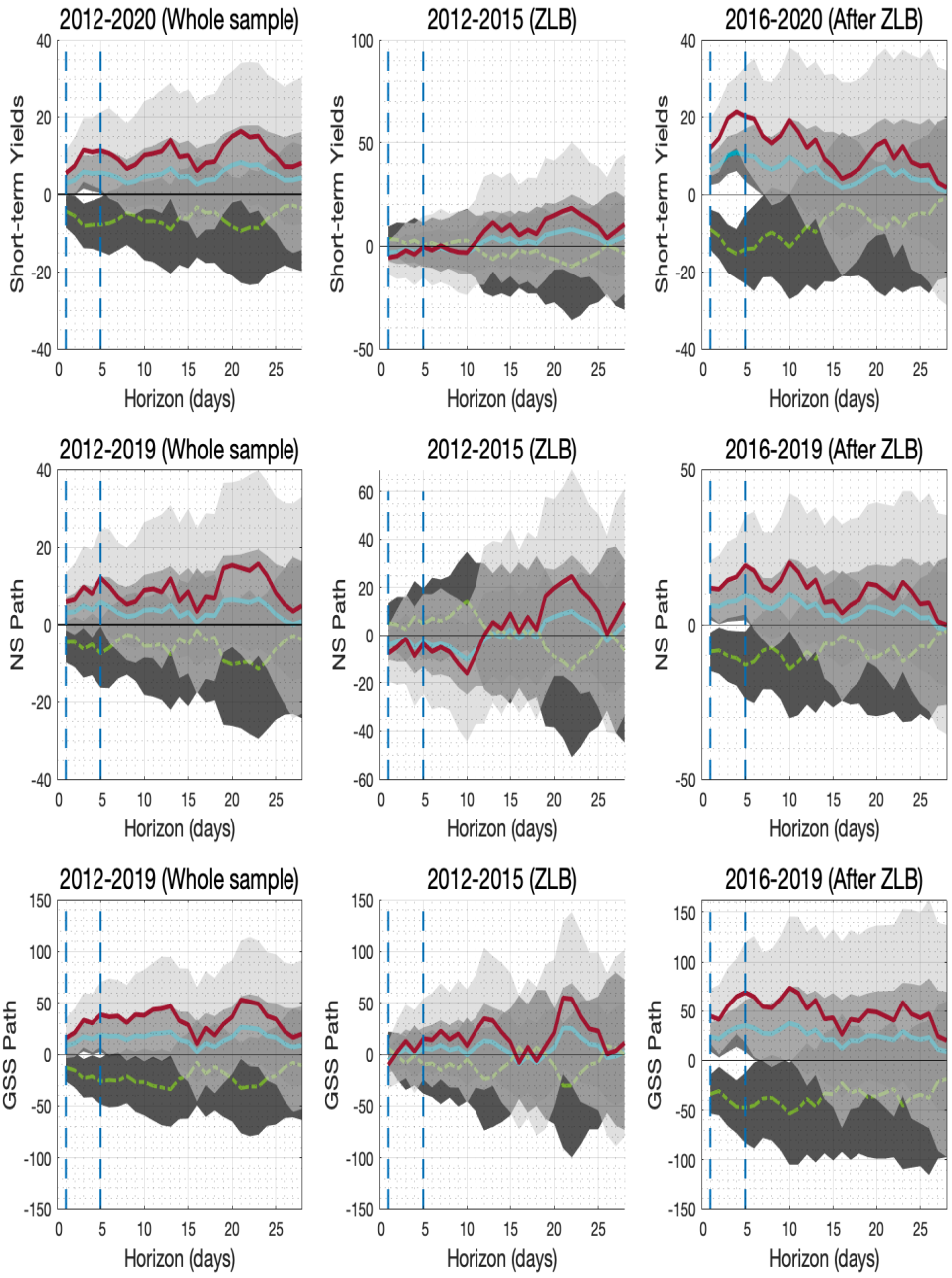
Notes: We run the regression: $\Delta y_{t,t+h} = \alpha_h + \beta_h x_t + \epsilon_t$. where $\Delta y_{t,t+h}$ is the h days after FOMC days' cumulative long-term yields change and x_t is the monetary policy shocks. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 16: Post-FOMC Yields change and USD change comovement

Whole	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Short-term	4.38	5.45	3.18	4.41	2.58
t	[1.38]	[1.53]	[1.05]	[1.54]	[0.91]
R^2	3.19	3.86	1.87	3.91	1.41
Long-term	2.86**	3.10**	1.64	1.89*	1.84
t	[2.01]	[2.22]	[1.24]	[1.71]	[1.57]
R^2	6.52	7.84	2.59	4.80	4.07
ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Short-term	1.31	-0.60	3.19	5.24	4.26
t	[0.2]	[-0.08]	[0.48]	[0.77]	[0.67]
R^2	0.16	0.03	0.93	2.29	1.78
Long-term	2.31	3.50*	2.34	3.26*	2.11
t	[1.04]	[1.87]	[1.23]	[1.69]	[1.12]
R^2	4.11	12.23	5.72	10.20	4.74
Post ZLB	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Short-term	3.56	4.97	1.76	3.74	2.18
t	[0.94]	[1.15]	[0.5]	[1.17]	[0.64]
R^2	2.77	4.10	0.81	4.26	1.29
Long-term	1.82	1.34	-0.28	0.74	1.75
t	[0.88]	[0.61]	[-0.15]	[0.49]	[1.08]
R^2	2.46	1.18	0.07	0.78	3.60

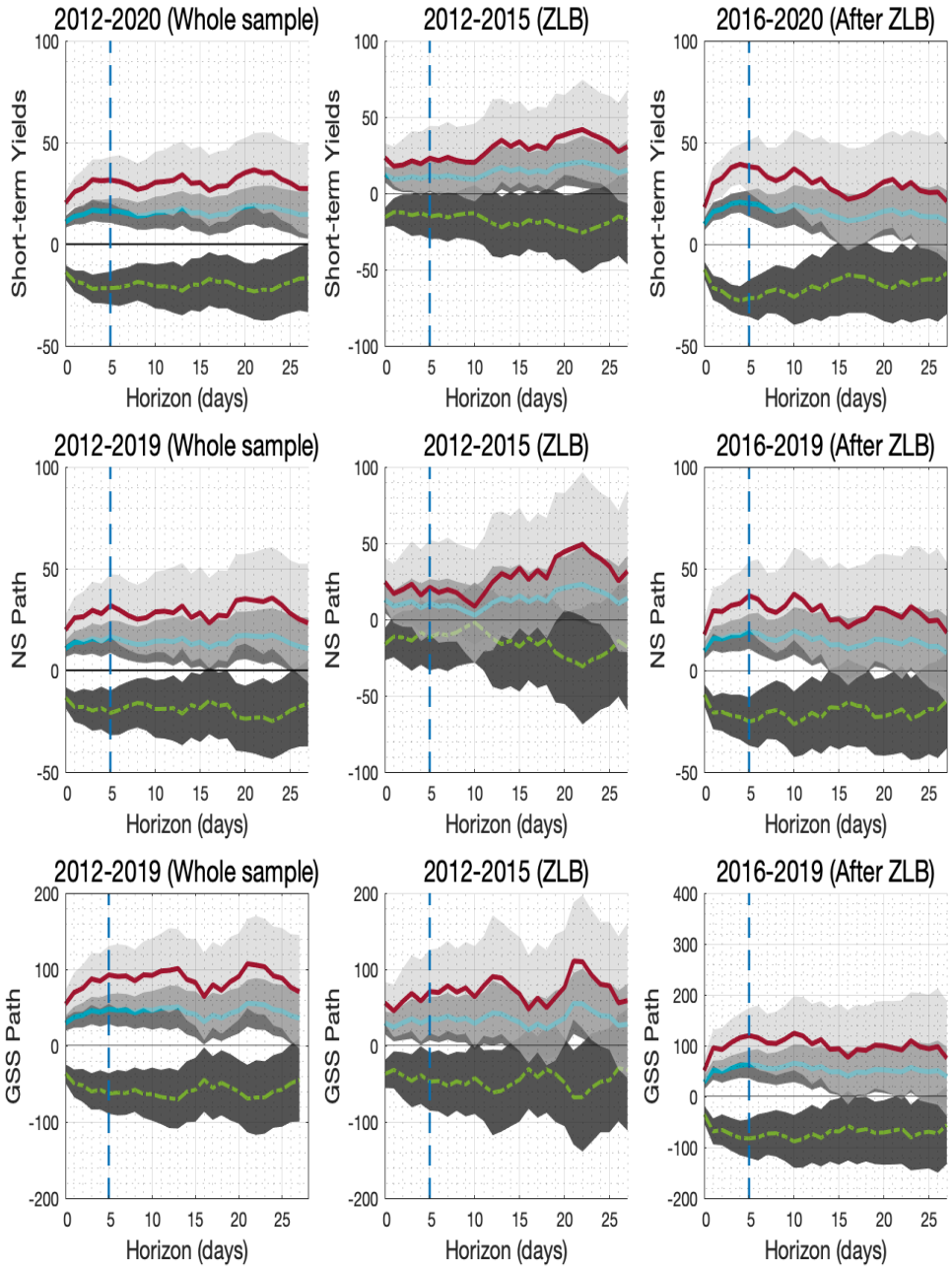
Notes: We run the regression: $\Delta USD_{t,t+h} = \alpha + \beta x_{t,t+h} + \epsilon_t$. where $\Delta USD_{t,t+h}$ is the h days after FOMC days' cumulative USD change and $x_{t,t+h}$ is the h days after FOMC days' cumulative change of yields factors. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Figure 3: Impulse response function of three components in USD to monetary policy shocks and short-term yields factor excluding FOMC day



Notes: The dark red line, light blue line and dash green line are the IRFs of $rx - rx^{\Delta E}$, $\tilde{i} - \tilde{i}^{\Delta E}$ *and* $\pi^{\Delta E}$ *to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.*

Figure 4: Impulse response function of three components in USD to monetary policy shocks and short-term yields factor including FOMC day



Notes: The dark red line, light blue line and dash green line are the IRFs of $rx - rx^{\Delta E}$, $\tilde{i} - \tilde{i}^{\Delta E}$ and $\pi^{\Delta E}$ to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

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8. Appendix

8.1 Data Description and Source

Our data of bond yields and exchange rates are from Datastream with the period from January 1994 through February 2020. We obtain the CLS currency order flow data from Quandl, which is from 09/03/2012-02/28/2020. The following subsections provide a quick overview of the data source and variables construction, including definitions of yields change, dollar returns, FOMC meetings, currency order flows and monetary policy shocks.

8.1.1 Bond Yields

We obtain daily bond yields over 01/03/1994–02/28/2020 from Datastream. We focus on the yields of US treasury bond with maturities: 3M, 6M, 1Y, 2Y, 3Y, 5Y, and 10Y, which is released Monday through Friday at 4:15pm by New York Fed. Finally, we calculate the bond yields with maturity n as follows

$$r_t^n = \log(1 + R_t^n/100), \tag{11}$$

where R_t^n is the original yields from Datastream.

8.1.2 Dollar Returns

We obtain Thomson Reuters daily spot mid exchange rates of G10 currency pairs from Datastream over the period: 01/03/1994–02/28/2020. We focus on the G10 currency pairs (AUD, CAD, CHF, EUR, JPY, NOK, NZD, SEK, GBP) quoted against the U.S. dollar (USD). The daily collected time of Thomson Reuters currency data is 5pm EST of the US. As bond yields data is released Monday through Friday at 4:15pm by New York Fed, to avoid the time overlapping issue of predictive regression, we use Thomson Reuters daily data instead of WMR daily currency data (collected at 11am EST of the US).

The log spot prices s_t^i are quoted in units of foreign currency i per 1 USD. Thus, positive currency return stands for dollar appreciation. We write the simple currency return from $t-j$ to t as the log difference of spot prices,

$$r_{t-j\to t}^i = s_t^i - s_{t-j}^i. \tag{12}$$

We denote the forward discount as $f_{t-j}^i - s_{t-j}^i$, where f_{t-j}^i is the currency log forward price at $t-j$. The forward discount indicates by how much do market participants anticipate the spot price to change from $t-j$ to t. We write the currency excess returns from $t-j$ to t as the difference between the spot return and the forward discount rate,

$$rx_{t-j\to t}^i = (s_t^i - s_{t-j}^i) - (f_{t-j}^i - s_{t-j}^i) = s_t^i - f_{t-j}^i. \tag{13}$$

Further, we approximate the daily interest differential with

$$i_t^* - i_t \approx \frac{1}{5}(f_t - s_t). \tag{14}$$

Finally, we define the USD as the simple average of change of exchange rates across G10 currency pairs.

8.1.3 Currency Order Flow Data

CLS group categorises market participants into price takers and market makers. Based on the documents from CLS, the term "price taker" is interchangeably used with the term "buy side", and the term "market maker" is used interchangeably with the term "sell side". More specifically, CLS classifies market participants into corporates, funds, non-bank financial firms and banks based on static identity information, however banks' volume is only provided for flows between "buy side" (price-taker banks) and "sell side" (market makers). All corporates, funds and non-bank financial firms are labeled as price takers. Finally, we aggregate the volume of fund and nonbanks sectors together and define it as "fund+nonbanks" sector, which results in the six categories: "aggregate", "banks", "corporate", "fund", "non-banks" and "fund+nonbanks" used in the figures and tables.

From Ranaldo and Somogyi (2021), we know that corporate/bank, fund/bank and non-bank/bank account for about 10 - 15% of the total activity in the FX market, while the trading volume among bank/bank accounts for 85 - 90% of total volume. Hence, most trading in this market is through bank/bank with the following three reasons. First, many hedge funds and proprietary trading firms settle their FX trades through prime brokers, where CLS classifies these types of trading as bank/bank transactions. If those prime brokers are also market makers, which they typically are as these are often the major dealer banks, the transactions would be excluded from the order flow dataset. Second, CLS has relatively sparce coverage of corporates and institutions that trade FX infrequently and do not need a dedicated third-party settlement service. Third, while market maker banks may engage in price taking activity (e.g. in a dealer-to-dealer transaction) but price taker banks are unlikely to ever engage in market making activity.

Similar to Evans and Lyons (2002), Froot and Ramadorai (2005) and Menkhoff et al. (2016), we calculate the net dollar buying as the difference of "buy side" and "sale side" of dollar trading volume data for each 6 categories. Specially, for currency pairs: AUD/USD, EUR/USD, NZD/USD and GBP/USD, "buy side" means "buy foreign currency and sell USD", while "sell side" means "sell foreign currency and buy USD". Hence, the net dollar buying of AUD/USD, EUR/USD, NZD/USD and GBP/USD is defined as "sell volume minus buy volume".

Moreover, for currency pairs: AUD/USD, EUR/USD, NZD/USD and GBP/USD, the hourly trading volume data is reported in the unit of foreign currencies instead of USD dollar in London time. To translate the volume into the units of USD, we match the hourly

order flow data with hourly frequency exchange rates data reported in UTC time from CLS by translateing both London time and UTC time into US EST time with accounting for the summer hour adjustment. In particular, we use the average of hourly close bid and close ask spot rate as the approximation of hourly exchange rate for each currency pair. For the left currency pairs, we translate the volume data recorded in London time to EST time of the US directly.

For daily data, we follow the tradition and define the daily FX trading trading time as 10 PM to 10 PM London time, which is exactly corresponding to 5 PM to 5 PM New York time.

Because the daily order flow data is quite volatile, as Froot and Ramadorai (2005) and Menkhoff et al. (2016), we normalize the daily aggregate order flow data of sector i with the standard deviation of flows via a rolling scheme over a 60-day window as follows

$$\widetilde{vol}_{i,t} = \frac{vol_{i,t}}{\sigma\left(vol_{i,t-59;t}\right)}, \tag{15}$$

where $\widetilde{vol}_{i,t}$ denotes order flow standardized over a rolling window and $vol_{i,t}$ denotes the raw order flow. And, $\sigma\left(vol_{i,t-59;t}\right)$ is the standard deviation of flows with a rolling scheme over a 60-day window, skipping days without order flow data, like Christmas and New Year.

For FOMC days' hourly volume data from 2pm to 5pm, we normalize it with daily standard deviation in (4) divided by 8, where we assume that hourly volume data is i.i.d. implicitly.

Finally, as a robust check, we use the sign of net dollar buying as an alternative measure, where the similar idea is also used in Hasbrouck (1988) and Ranaldo and Somogyi (2021).

8.1.4 Monetary Policy Shocks and Regimes

We download the monetary policy shocks from Emi Nakamura's and Eric Swanson's website directly, which are the updated monetary policy shocks used in Nakamura and Steinsson (2018), Gürkaynak, Sack and Swanson (2005) and Swanson (2021). In details, NS's monetary policy shock captures the effect of forward guidance, which expands from 02/02/2000 to 09/18/2019 and includes 150 scheduled FOMC meetings. While GSS's three monetary policy shocks are available from 02/04/1994-06/19/2019 with totally 213 FOMC meetings. We match these two sets of monetary policy shocks based on NS's time stamp since 2000.[12] For GSS, the first shock captures the surprised shocks of target rate, which is the "target" factor. The second one is the "path" factor, which can capture the forward guidance effect as NS's monetary policy shock. The third one is proposed in Swan-

[12] we exclude 6 conference calls in GSS (01/03/2001, 04/18/2001, 08/10/2007, 08/17/2007, 01/22/2008 and 03/11/2008) and 9 meetings in GSS from Aug 5th 2008 to Jun 24th 2009, which is defined as GFC.

son (2021) to capture the effect of large scale asset purchase (LSAP) or QE announcements during zero lower bound period.

To study the effect of monetary policy on FX market, we define several monetary policy regimes. First, we distinguish the time periods before and after 2000 because Fed began to use forward guidance since 2000. Second, we specify the ZLB period as 17 Dec 2008 - 16 Dec 2015, and further the regimes before ZLB and Post ZLB. Finally, to avoid to include Covid-19 period since March 2020, our sample period ends on 02/28/2020.

Since the available order flow data starting on 09/13/2012, for NS's monetary policy shock until 09/18/2019, we totally have 57 FOMC meetings, which implies 30 meetings Post ZLB And, for GSS's monetary policy shock until 06/19/2019, we totally have 55 FOMC meetings, which implies 28 meetings Post ZLB.

For the magnitude of monetary policy shocks, NS rescale it such that its effect on the one-year nominal Treasury yield is equal to one. GSS follow the standard practice of normalization in PCA such that each factor has unit variance and positive effects on yields. In this paper, to make the magnitude of regression results comparable from two sets of monetary policy shocks, we amplify NS's shocks by 100 times to make the magnitude comparable to GSS's shocks.

8.1.5 CPI and Inflation

Inflation is defined as the differences in monthly log CPI, which is from Fred with index 100 at 2015. AS, we assume inflation occurs smoothly within the month, hence, we interpolate the monthly inflation series to get the daily inflation series. Following, we lag their entry into the information set by 2 weeks to better align the CPI's with their announcement dates.

8.1.6 Factor Construction and Weekly Frequency Data

To simplify the tables reported, we construct the short-term and long-term yields factors. The short-term yields factor is the simple average of 3M, 6M, 1Y, 2Y daily yields changes, and the long-term yields factor is the simple average of 3Y, 5Y, and 10Y daily yields change. The daily short-term yields factor can approximate the "path" factor as NS and capture the forward guidance effect of the monetary policy, where the literature agrees on that forward guidance effect can last one or two years. In contrast, the long-term yields factor can capture the effects of the monetary policy beyond the horizon of two years.

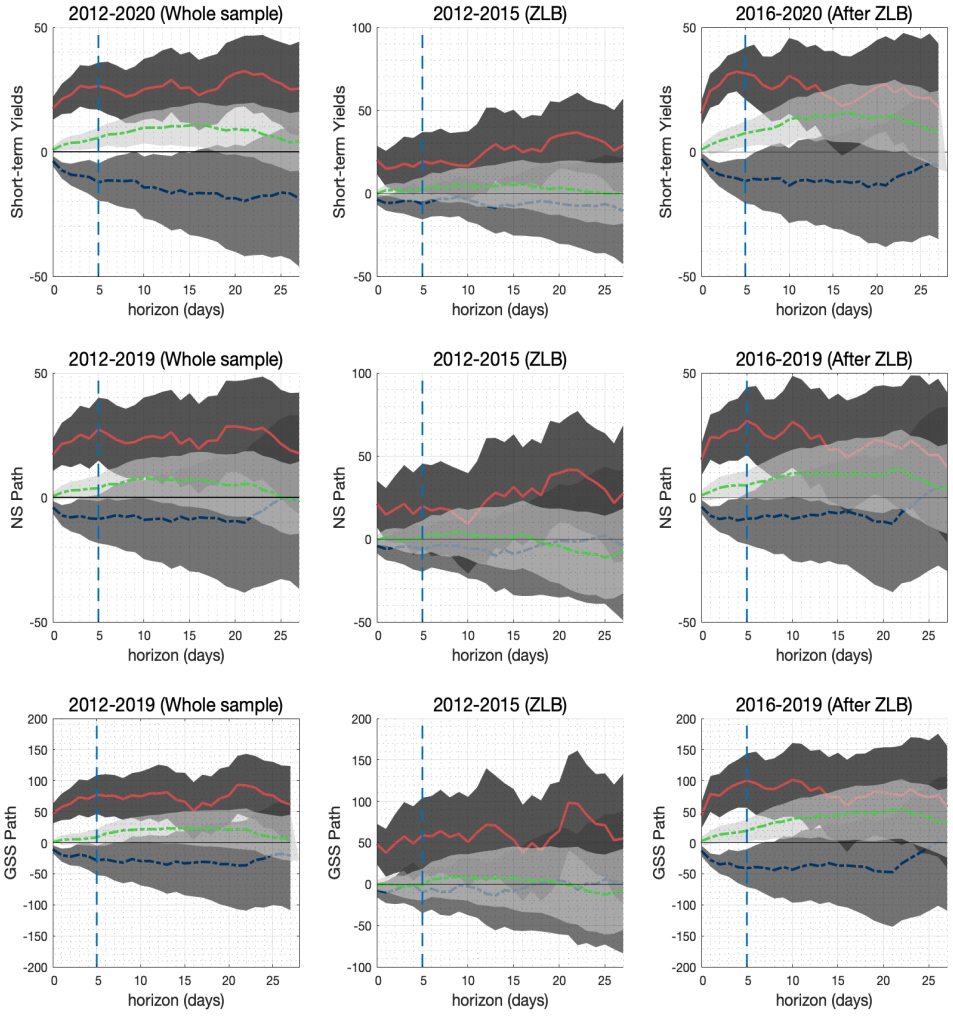
For the weekly frequency analysis, we consider the change of yields and exchange rates from each Wednesday to the following Wednesday. By following Campbell, Lo and MacKinlay, we can avoid the missing data issue caused by US banking holidays, because most of the banking holidays are not on Wednesday. More importantly, because most of FOMC announcement meetings happen on Wednesday, and it turns out that we can only

find the weekly prediction of yields change to weekly exchange rate change based on the calculation from Wed to Wed, not for any other day, like Monday to Monday.

For the order flow data, we aggregate the daily flow data in (4) across G10 currencies to weekly order flow data from each Wednesday to the following Wednesday.

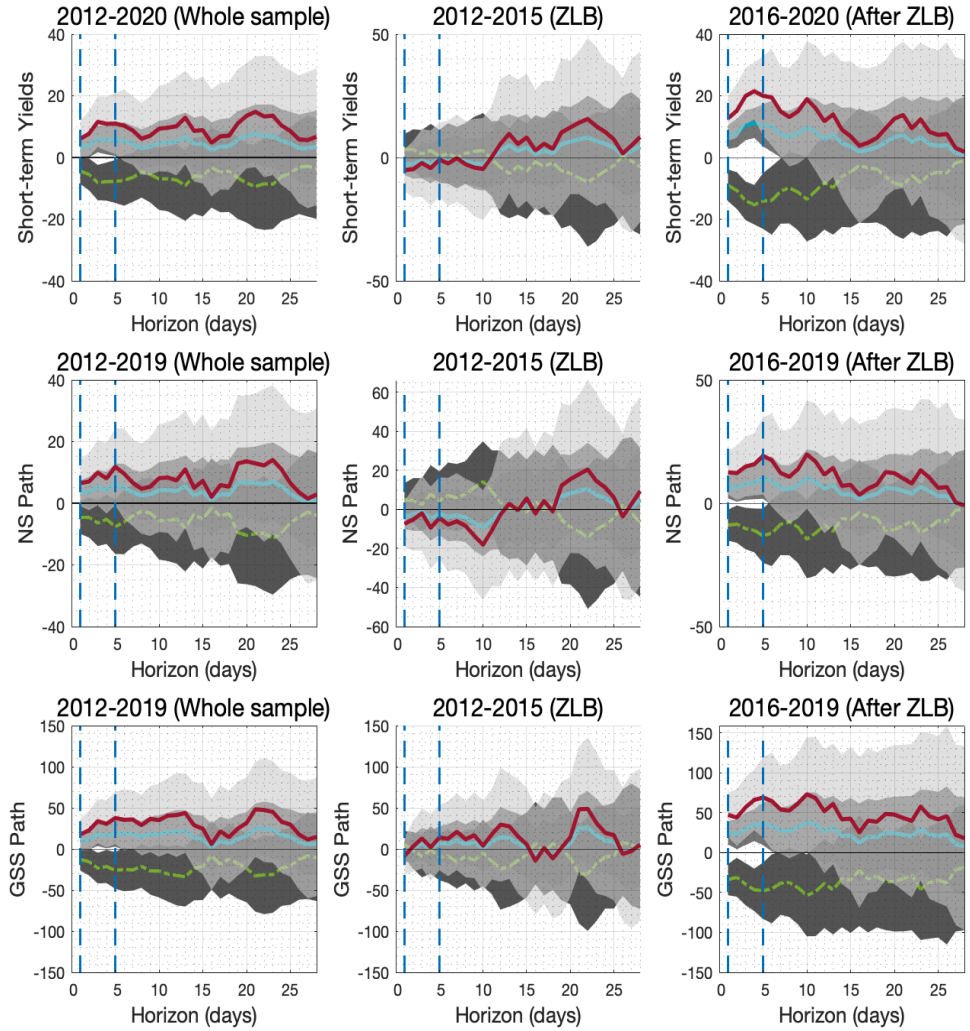
8.2 Additional Figures and Tables

Figure 5: Impulse response function of USD and Fund+nonbank and bank order flow to monetary policy shocks and short-term yields factor including FOMC days



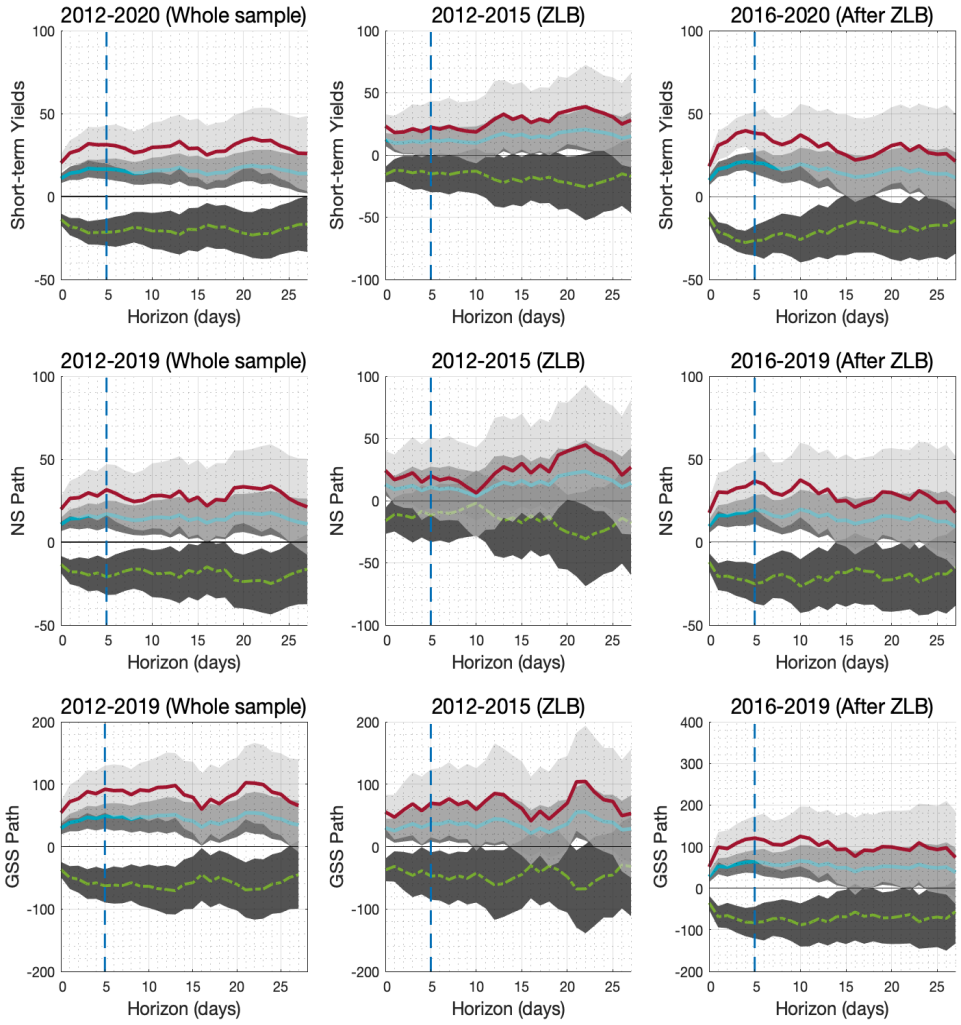
Notes: The red solid line is the IRF of USD to monetary policy shocks and short-term yields factor. The green and blue dash lines are the IRF of Fund and bank order flow to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for USD and the shade area is 95% confidence interval area for order flow. For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings) . For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 6: Impulse response function of USD and fund+nonbank and bank order flow to monetary policy shocks and short-term yields factor excluding FOMC day



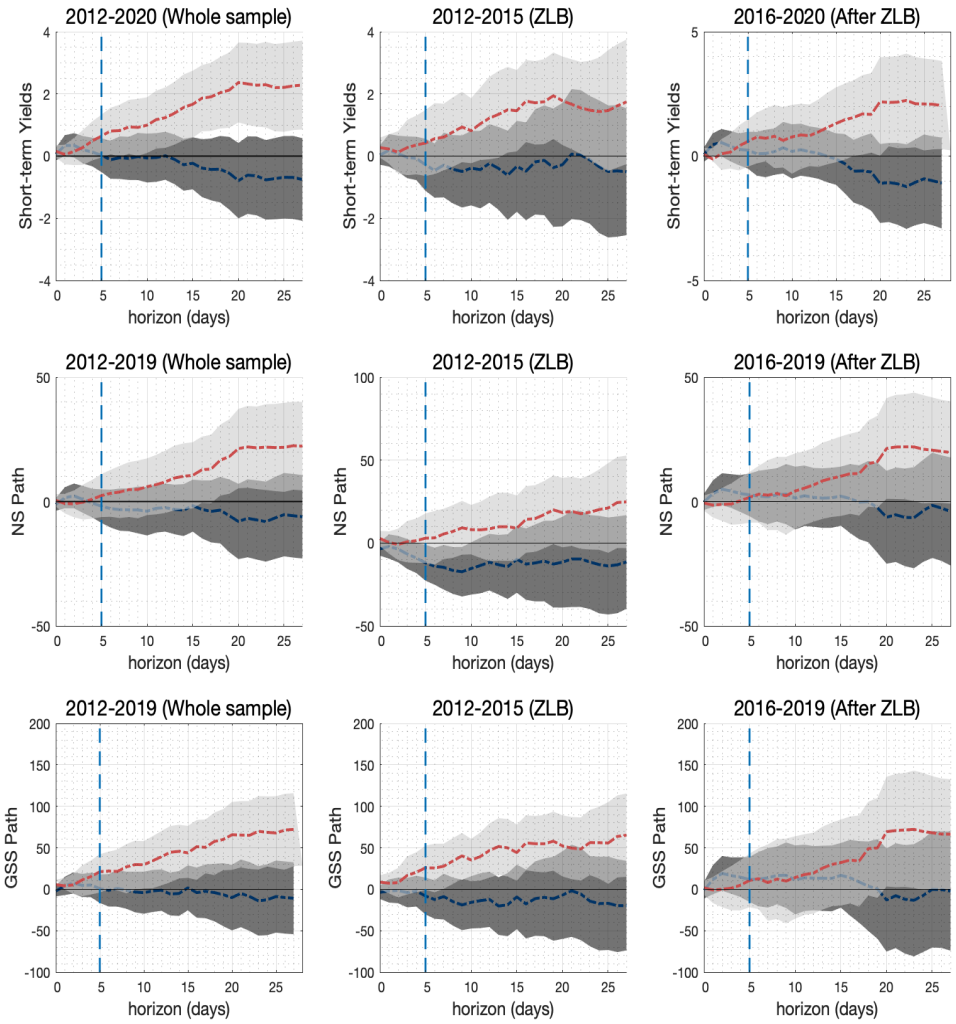
Notes: The dark red line, light blue line and dash green line are the IRFs of $-rx^{\Delta E}$, $-\tilde{i}^{\Delta E}$ and $\pi^{\Delta E}$ to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 7: Impulse response function of USD and fund+nonbank and bank order flow to monetary policy shocks and short-term yields factor excluding FOMC day



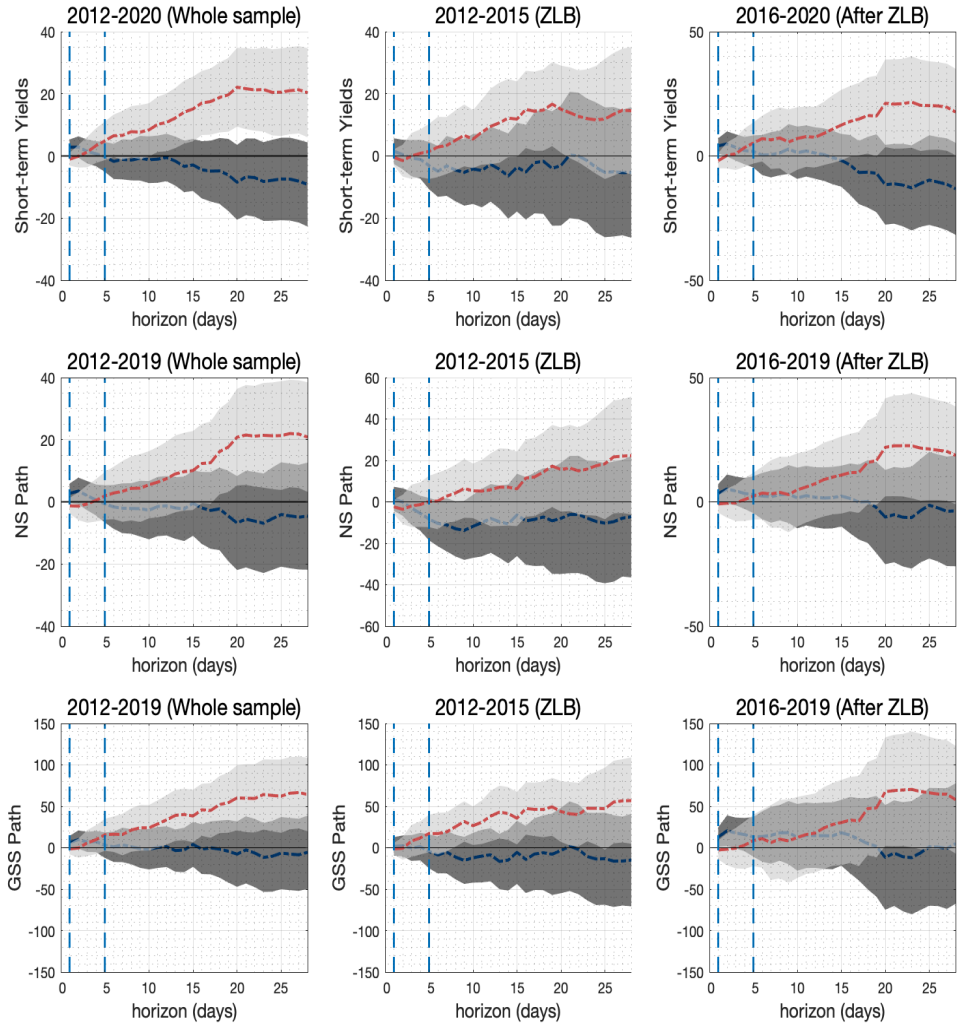
Notes: The dark red line, light blue line and dash green line are the IRFs of $-rx^{\Delta E}$, $-\tilde{i}^{\Delta E}$ and $\pi^{\Delta E}$ to monetary policy shocks and short-term yields factor. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 8: Impulse response function of USD and fund+nonbank and bank forward order flow to monetary policy shocks and short-term yields factor including FOMC day



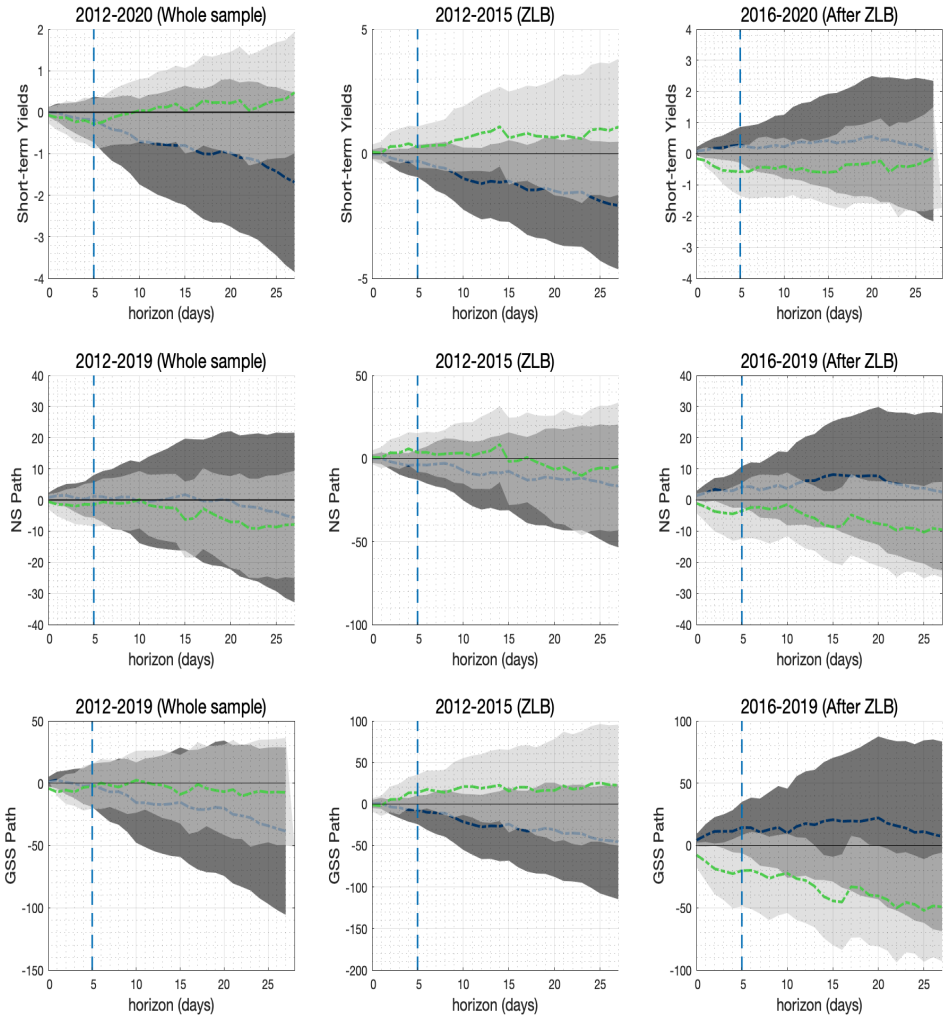
Notes: The blue and red dash lines are IRFs of bank and fund+nonbank sectors' responses, separately. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 9: Impulse response function of USD and fund+nonbank and bank forward order flow to monetary policy shocks and short-term yields factor excluding FOMC day



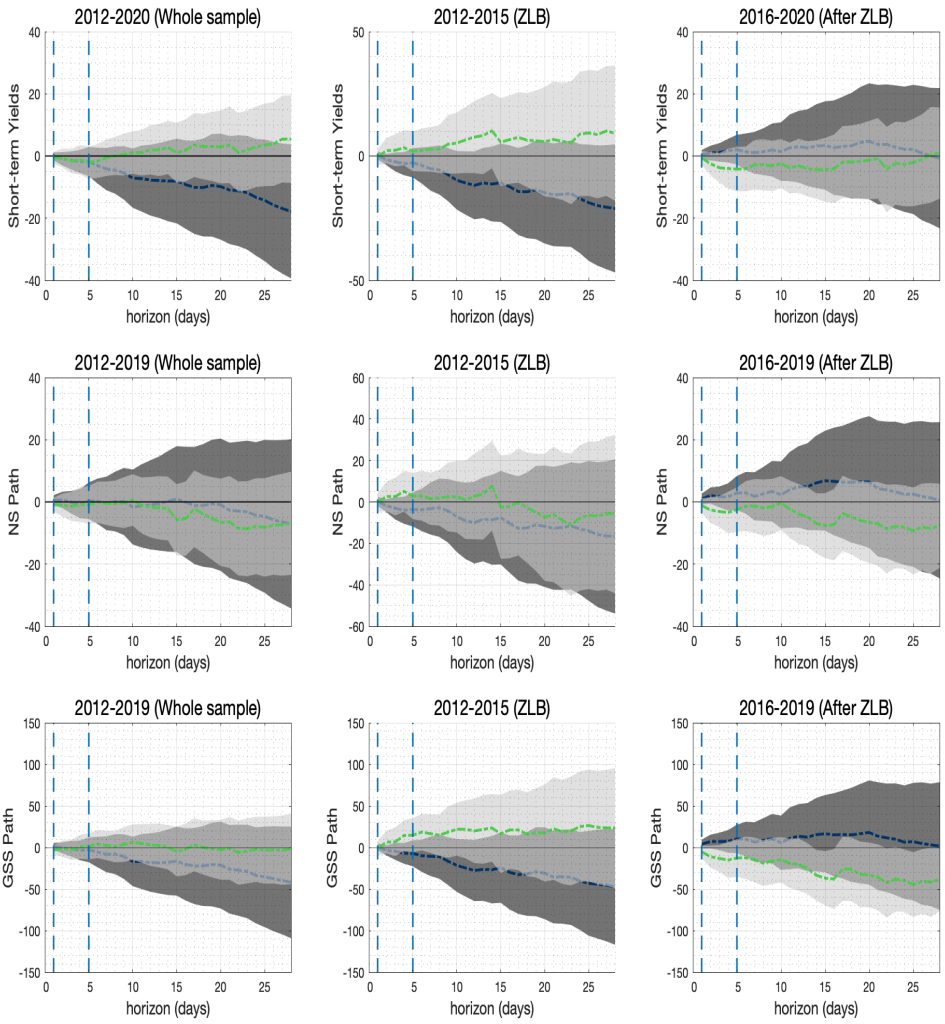
Notes: The blue and red dash lines are IRFs of bank and fund+nonbank sectors' responses, separately. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 10: Impulse response function of USD and fund+nonbank and bank swap order flow to monetary policy shocks and short-term yields factor including FOMC day



Notes: The blue and green dash lines are IRFs of bank and fund+nonbank sectors' responses, separately. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Figure 11: Impulse response function of USD and fund+nonbank and bank swap order flow to monetary policy shocks and short-term yields factor excluding FOMC day



Notes: The blue and green dash lines are IRFs of bank and fund+nonbank sectors' responses, separately. The dark area is 95% confidence interval for the estimators. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For short-term yields, the whole sample is from Sep 13th 2012 -Jan 29th 2020 (60 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB.

Table 17: FOMC days empirical results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
Short-term	17.36***	-0.13**	-0.12**	-0.01	0.05	0.01	0.09*	20.12***	-0.19**	-0.10	-0.03	0.06	0.01	0.06	15.42***	-0.08	-0.10	-0.02	0.02	0.00	0.08
t	[7.52]	[-2.51]	[-2.31]	[-0.28]	[0.97]	[0.10]	[1.76]	[4.64]	[-2.43]	[-1.29]	[-0.43]	[0.76]	[0.13]	[0.90]	[6.07]	[-1.18]	[-1.51]	[-0.31]	[0.27]	[-0.02]	[1.11]
R^2	49.34	9.78	8.41	0.13	1.59	0.02	5.07	46.28	19.15	6.26	0.72	2.26	0.06	3.11	54.34	4.27	6.87	0.32	0.23	0.00	3.85
Long-term	7.7***	-0.05**	-0.05**	0.03	0.03	-0.01	0.04*	7.15***	-0.05*	-0.04	0.02	0.01	-0.01	0.01	9.06***	-0.05	-0.07	0.04	0.04	-0.01	0.08*
t	[8.11]	[-2.37]	[-2.40]	[1.19]	[1.14]	[-0.39]	[1.69]	[5.49]	[-1.90]	[-1.44]	[0.59]	[0.37]	[-0.29]	[0.37]	[5.71]	[-1.29]	[-1.63]	[0.89]	[0.98]	[-0.34]	[1.95]
R^2	53.15	8.85	9.02	2.39	2.19	0.26	4.70	54.66	12.67	7.69	1.35	0.55	0.33	0.55	51.26	5.07	7.91	2.51	3.01	0.37	10.89
NS	17.10***	-0.17***	-0.16***	-0.07	0.05	-0.04	0.06	21.22***	-0.24**	-0.15	-0.07	0.05	-0.05	0.06	0.15***	-0.14*	-0.16**	-0.07	0.05	-0.04	0.06
t	[5.14]	[-2.86]	[-2.67]	[-1.03]	[0.84]	[-0.66]	[1.02]	[3.00]	[-2.26]	[-1.40]	[-0.62]	[0.48]	[-0.40]	[0.56]	[4.63]	[-1.86]	[-2.30]	[-0.87]	[0.61]	[-0.52]	[0.77]
R^2	32.42	12.94	11.48	1.88	1.26	0.80	1.87	26.41	17.00	7.27	1.52	0.93	0.64	1.24	43.39	11.04	15.89	2.62	1.31	0.94	2.09
GSS target	34.26	0.11	0.35	-1.31	-0.69	0.35	-0.88	41.99	-1.56	0.28	-0.44	-0.94	-0.84	-1.13	0.30	1.36	0.35	-1.94*	-0.46	1.25	-0.64
t	[0.65]	[0.13]	[0.41]	[-1.59]	[-0.84]	[0.44]	[-1.08]	[0.46]	[-1.22]	[0.22]	[-0.35]	[-0.82]	[-0.68]	[-1.05]	[0.48]	[1.21]	[0.32]	[-1.81]	[-0.40]	[1.20]	[-0.56]
R^2	0.78	0.03	0.31	4.58	1.31	0.37	2.17	0.84	5.60	0.20	0.48	2.65	1.82	4.21	0.89	5.37	0.39	11.24	0.62	5.23	1.21
GSS path	47.01***	-0.44***	-0.43***	0.02	0.11	-0.11	0.15	48.54***	-0.35	-0.27	0.10	0.00	-0.08	0.01	0.44***	-0.55**	-0.55**	-0.13	0.19	-0.16	0.25
t	[5.80]	[-2.86]	[-2.74]	[0.13]	[0.69]	[-0.74]	[0.92]	[3.92]	[-1.63]	[-1.31]	[0.48]	[-0.02]	[-0.37]	[0.03]	[4.07]	[-2.37]	[-2.49]	[-0.52]	[0.76]	[-0.67]	[1.00]
R^2	38.83	13.34	12.44	0.03	0.88	1.02	1.57	38.01	9.58	6.39	0.90	0.00	0.55	0.00	38.92	17.82	19.24	1.03	2.15	1.69	3.69
GSS LSAP	39.76***	-0.10	-0.23	0.37	-0.19	-0.05	-0.20	43.96***	-0.18	-0.17	0.32	-0.30	-0.08	-0.33	-0.11	0.75	-0.55	0.64	0.69	0.27	0.86
t	[2.81]	[-0.41]	[-0.95]	[1.57]	[-0.80]	[-0.23]	[-0.84]	[2.80]	[-0.69]	[-0.69]	[1.35]	[-1.35]	[-0.34]	[-1.58]	[-0.25]	[0.91]	[-0.69]	[0.78]	[0.84]	[0.35]	[1.05]
R^2	12.96	0.32	1.69	4.42	1.19	0.10	1.32	23.83	1.86	1.88	6.83	6.81	0.46	9.13	0.24	3.10	1.82	2.28	2.63	0.47	4.09
USD	.	-14.59*	-23.70***	-3.98	12.50	7.65	15.59*	.	-17.99	-34.54***	-15.73	30.22**	12.77	31.76**	.	-11.12	-15.48*	2.44	-0.25	3.24	5.31
t	.	[-1.87]	[-3.21]	[-0.49]	[1.56]	[0.92]	[1.95]	.	[-1.33]	[-2.66]	[-1.11]	[2.06]	[0.88]	[2.06]	.	[-1.20]	[-1.64]	[0.26]	[-0.03]	[0.33]	[0.56]
R^2	.	5.70	15.05	0.42	4.02	1.43	6.15	.	6.64	22.02	4.69	14.57	3.01	14.48	.	4.46	8.02	0.21	0.00	0.35	1.02

Notes: We run the regression: $y_t = \alpha + \beta x_t + \epsilon_t$. where y_t is the FOMC days' USD change (ΔUSD_t) or signs of net dollar buying volume ($vol_{i,t}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression ΔUSD_t on $vol_{i,t}$ for FOMC days. To report the coefficients with suitable magnitude, yields change is the unit of percentage of basic point, USD index is in the unit of basic point, and the NS monetary policy shocks are amplified by 100 times. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 18: One day after FOMC days empirical results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
Short-term	3.86	-0.10*	-0.15***	-0.04	0.13**	0.09*	0.12**	-5.32	-0.02	-0.10	-0.14*	0.13	0.07	0.14*	9.07***	-0.11	-0.14**	0.00	0.11*	0.10	0.10
t	[1.56]	[-1.95]	[-3.08]	[-0.76]	[2.49]	[1.77]	[2.36]	[-1.57]	[-0.30]	[-1.52]	[-1.82]	[1.63]	[0.82]	[1.68]	[2.93]	[-1.60]	[-2.30]	[0.06]	[1.67]	[1.49]	[1.52]
R^2	4.01	6.15	14.09	0.98	9.67	5.12	8.79	9.02	0.36	8.41	11.70	9.63	2.62	10.19	21.72	7.61	14.61	0.01	8.25	6.67	6.91
Long-term	0.93	-0.03	-0.04*	-0.02	0.05**	0.02	0.04	-1.14	-0.01	-0.01	-0.05**	0.05**	0.00	0.03	4.79**	-0.03	-0.06	0.01	0.04	0.07	0.04
t	[0.87]	[-1.29]	[-1.77]	[-1.12]	[2.39]	[0.84]	[1.60]	[-1.00]	[-0.46]	[-0.56]	[-1.96]	[2.13]	[-0.13]	[1.15]	[2.48]	[-0.76]	[-1.59]	[0.21]	[0.89]	[1.63]	[0.94]
R^2	1.28	2.77	5.10	2.11	9.00	1.19	4.22	3.88	0.84	1.23	13.38	15.31	0.07	5.06	16.56	1.81	7.51	0.14	2.48	7.90	2.79
NS	4.39	-0.11*	-0.14**	-0.02	0.09	0.04	0.09	-6.65	-0.06	-0.12	-0.15	0.09	0.00	0.08	9.10**	-0.12*	-0.14**	0.04	0.09	0.06	0.09
t	[1.41]	[-1.74]	[-2.27]	[-0.23]	[1.45]	[0.69]	[1.43]	[-1.40]	[-0.75]	[-1.22]	[-1.37]	[0.76]	[0.02]	[0.67]	[2.45]	[-1.65]	[-2.14]	[0.51]	[1.19]	[0.80]	[1.23]
R^2	3.49	5.24	8.56	0.10	3.66	0.85	3.57	7.24	2.18	5.65	6.94	2.24	0.00	1.77	17.67	8.83	14.08	0.92	4.81	2.23	5.14
GSS target	-9.35	-0.25	-0.34	-0.47	-0.44	0.20	-0.63	-11.99	-0.32	-1.77*	0.16	1.06	0.85	0.48	-5.24	-0.28	0.66	-0.91	-1.55	-0.28	-1.46
t	[-0.22]	[-0.30]	[-0.40]	[-0.56]	[-0.52]	[0.24]	[-0.75]	[-0.22]	[-0.34]	[-1.70]	[0.13]	[0.81]	[0.65]	[0.37]	[-0.09]	[-0.25]	[0.64]	[-0.81]	[-1.43]	[-0.24]	[-1.34]
R^2	0.09	0.17	0.30	0.59	0.50	0.11	1.05	0.19	0.47	10.35	0.06	2.57	1.64	0.54	0.03	0.24	1.55	2.44	7.32	0.23	6.50
GSS path	10.61	-0.29*	-0.4**	-0.18	0.3*	0.02	0.24	-10.74	-0.06	-0.16	-0.46**	0.25	-0.13	0.13	34.59***	-0.45**	-0.58***	0.13	0.35	0.20	0.36
t	[1.32]	[-1.85]	[-2.55]	[-1.10]	[1.90]	[0.11]	[1.51]	[-1.17]	[-0.40]	[-0.85]	[-2.41]	[1.11]	[-0.59]	[0.60]	[2.95]	[-1.98]	[-2.87]	[0.50]	[1.45]	[0.79]	[1.51]
R^2	3.17	6.07	10.93	2.22	6.39	0.02	4.12	5.19	0.62	2.83	18.80	4.72	1.35	1.41	25.02	13.15	24.11	0.95	7.52	2.34	8.10
GSS LSAP	-3.14	0.02	-0.10	-0.30	0.33	-0.13	0.06	-6.62	-0.05	-0.11	-0.25	0.38	-0.22	0.07	19.21	1.29*	0.54	-1.08	-0.34	0.77	-0.17
t	[-0.26]	[0.10]	[-0.39]	[-1.28]	[1.40]	[-0.53]	[0.23]	[-0.62]	[-0.26]	[-0.50]	[-1.04]	[1.55]	[-0.86]	[0.26]	[0.44]	[1.71]	[0.72]	[-1.34]	[-0.42]	[0.95]	[-0.20]
R^2	0.13	0.02	0.29	3.00	3.56	0.53	0.10	1.51	0.27	0.97	4.18	8.80	2.90	0.28	0.73	10.09	1.97	6.49	0.67	3.32	0.16
USD	.	-5.81	-7.43	-5.66	-2.04	17.48***	-6.41	.	3.62	13.28	-6.88	-13.82*	15.13*	-20.1***	.	-0.18	-11.51	-10.31	4.88	17.57**	3.04
t	.	[-0.92]	[-1.20]	[-0.91]	[-0.33]	[2.98]	[-1.02]	.	[0.31]	[1.38]	[-0.79]	[-1.76]	[1.95]	[-2.76]	.	[-0.02]	[-1.23]	[-1.19]	[0.55]	[2.09]	[0.34]
R^2	.	1.45	2.43	1.40	0.18	13.25	1.78	.	0.38	7.06	2.44	11.05	13.25	23.38	.	0.00	4.67	4.40	0.95	12.32	0.37

Notes: We run the regression: $y_{t,t+1} = \alpha + \beta x_t + \epsilon_t$. where $y_{t,t+1}$ is the one day after FOMC days' cumulative USD change ($\Delta USD_{t,t+1}$) or signs of cumulative net dollar buying volume ($vol_{i,t,t+1}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta USD_{t,t+1}$ on $vol_{i,t,t+1}$. Both of yields change and USD index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 19: Two days after FOMC days empirical results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
Short-term	5.52*	-0.04	-0.16***	0.04	0.07	-0.03	0.04	-4.63	0.02	-0.09	0.09	-0.04	-0.04	-0.04	11.18***	-0.05	-0.16***	-0.02	0.14**	-0.03	0.09
t	[1.78]	[-0.78]	[-3.18]	[0.86]	[1.38]	[-0.54]	[0.73]	[-1.01]	[0.22]	[-1.30]	[1.25]	[-0.46]	[-0.44]	[-0.46]	[2.94]	[-0.67]	[-2.61]	[-0.23]	[2.18]	[-0.46]	[1.36]
R^2	5.17	1.03	14.82	1.26	3.16	0.49	0.90	3.94	0.19	6.36	5.89	0.83	0.78	0.83	21.82	1.43	17.99	0.18	13.24	0.69	5.66
Long-term	2.18	-0.01	-0.05**	0.01	0.01	-0.01	0.00	-0.09	0.00	-0.01	0.00	-0.02	-0.02	-0.02	6.36***	-0.02	-0.09**	-0.01	0.08**	0.01	0.04
t	[1.64]	[-0.66]	[-2.18]	[0.43]	[0.56]	[-0.30]	[-0.01]	[-0.06]	[-0.04]	[-0.64]	[0.19]	[-0.68]	[-0.61]	[-0.68]	[2.73]	[-0.41]	[-2.37]	[-0.12]	[2.02]	[0.20]	[1.04]
R^2	4.43	0.74	7.58	0.31	0.54	0.15	0.00	0.01	0.01	1.62	0.14	1.82	1.49	1.82	19.33	0.55	15.33	0.05	11.68	0.12	3.38
NS	5.23	-0.05	-0.11*	0.03	0.07	-0.06	0.05	-3.35	0.03	-0.12	0.07	-0.10	-0.09	-0.10	8.78*	-0.08	-0.10	0.00	0.15*	-0.05	0.12
t	[1.34]	[-0.78]	[-1.74]	[0.42]	[1.09]	[-0.97]	[0.84]	[-0.52]	[0.32]	[-1.22]	[0.70]	[-0.84]	[-0.81]	[-0.84]	[1.87]	[-1.10]	[-1.32]	[0.01]	[1.95]	[-0.62]	[1.62]
R^2	3.18	1.10	5.23	0.32	2.13	1.68	1.28	1.06	0.41	5.58	1.91	2.74	2.58	2.74	11.06	4.11	5.88	0.00	12.00	1.36	8.56
GSS target	-50.72	0.54	-0.48	0.46	0.30	-0.58	0.76	-104.35	0.99	-1.74*	1.55	1.50	-1.24	1.50	-7.84	0.14	0.40	-0.32	-0.59	-0.07	0.22
t	[-0.98]	[0.63]	[-0.57]	[0.56]	[0.35]	[-0.70]	[0.90]	[-1.50]	[0.83]	[-1.66]	[1.47]	[1.16]	[-0.99]	[1.16]	[-0.11]	[0.13]	[0.37]	[-0.28]	[-0.52]	[-0.06]	[0.19]
R^2	1.76	0.75	0.60	0.59	0.23	0.90	1.52	8.30	2.67	9.96	7.93	5.13	3.78	5.13	0.04	0.06	0.52	0.30	1.04	0.01	0.14
GSS path	15.80	-0.18	-0.34**	-0.01	0.13	-0.19	0.02	0.22	0.04	-0.18	-0.05	-0.20	-0.24	-0.20	32.02**	-0.36	-0.44*	-0.04	0.53**	-0.15	0.28
t	[1.58]	[-1.09]	[-2.19]	[-0.05]	[0.77]	[-1.19]	[0.10]	[0.02]	[0.18]	[-0.99]	[-0.24]	[-0.92]	[-1.12]	[-0.92]	[2.10]	[-1.55]	[-1.93]	[-0.14]	[2.28]	[-0.59]	[1.14]
R^2	4.50	2.21	8.30	0.01	1.11	2.61	0.02	0.00	0.13	3.80	0.24	3.25	4.80	3.25	14.45	8.49	12.56	0.08	16.72	1.33	4.78
GSS LSAP	6.46	0.16	-0.09	-0.24	0.04	-0.21	0.13	5.18	0.11	-0.12	-0.14	0.09	-0.37	0.09	4.31	1.05	0.70	-1.57**	-0.63	1.31*	0.50
t	[0.43]	[0.66]	[-0.36]	[-1.02]	[0.15]	[-0.91]	[0.55]	[0.37]	[0.46]	[-0.56]	[-0.64]	[0.36]	[-1.53]	[0.36]	[0.08]	[1.36]	[0.89]	[-2.03]	[-0.78]	[1.66]	[0.61]
R^2	0.35	0.81	0.24	1.93	0.04	1.53	0.57	0.53	0.84	1.23	1.59	0.51	8.59	0.51	0.02	6.64	2.94	13.67	2.27	9.62	1.41
USD	.	-23.02***	-20.37***	-2.88	-5.05	13.35*	-8.60	.	-13.76	-0.04	-33.39***	-19.8*	5.24	-19.8*	.	-24.47**	-27.11***	5.53	4.44	17.33*	0.46
t	.	[-3.16]	[-2.74]	[-0.36]	[-0.64]	[1.71]	[-1.10]	.	[-1.18]	[0.00]	[-2.94]	[-1.94]	[0.46]	[-1.94]	.	[-2.37]	[-2.61]	[0.51]	[0.41]	[1.67]	[0.04]
R^2	.	14.72	11.50	0.22	0.71	4.82	2.05	.	5.26	0.00	25.72	13.05	0.86	13.05	.	15.30	18.02	0.84	0.53	8.22	0.01

Notes: We run the regression: $y_{t,t+2} = \alpha + \beta x_t + \epsilon_t$. where $y_{t,t+2}$ is the two days after FOMC days' cumulative USD change ($\Delta USD_{t,t+2}$) or signs of cumulative net dollar buying volume ($vol_{i,t,t+2}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta USD_{t,t+2}$ on $vol_{i,t,t+2}$. Both of yields change and USD index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 20: Three days after FOMC days empirical results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
Short-term	9.08***	-0.03	-0.04	0.08	-0.09*	0.03	-0.13**	-2.31	0.03	-0.01	0.09	-0.12	-0.09	-0.12	15.59***	-0.03	-0.16***	-0.16**	0.21***	-0.11	0.15**
t	[2.59]	[-0.58]	[-0.83]	[1.46]	[-1.75]	[0.63]	[-2.52]	[-0.41]	[0.39]	[-0.13]	[1.24]	[-1.41]	[-1.15]	[-1.52]	[3.89]	[-0.50]	[-2.66]	[-2.46]	[3.52]	[-1.62]	[2.26]
R^2	10.36	0.57	1.17	3.55	5.04	0.68	9.90	0.67	0.61	0.07	5.77	7.39	5.05	8.42	32.75	0.80	18.63	16.35	28.59	7.82	14.15
Long-term	3.67**	-0.01	-0.02	0.02	-0.02	0.01	-0.03	1.19	0.01	0.00	0.00	-0.02	-0.02	-0.03	8.34***	-0.02	-0.06	-0.09**	0.12***	-0.03	0.10**
t	[2.44]	[-0.32]	[-0.82]	[0.88]	[-0.98]	[0.28]	[-1.34]	[0.65]	[0.50]	[0.08]	[0.06]	[-0.75]	[-0.92]	[-1.09]	[3.27]	[-0.52]	[-1.62]	[-2.13]	[3.11]	[-0.80]	[2.46]
R^2	9.28	0.18	1.16	1.32	1.61	0.13	3.02	1.66	0.98	0.03	0.02	2.20	3.29	4.57	25.64	0.86	7.84	12.72	23.75	2.03	16.36
NS	8.11*	-0.01	-0.06	0.10	-0.11*	0.04	-0.09	-0.15	0.00	0.00	0.06	-0.14	-0.15	-0.13	11.45**	0.00	-0.12*	-0.12	0.20***	-0.10	0.11
t	[1.80]	[-0.10]	[-1.00]	[1.52]	[-1.87]	[0.55]	[-1.41]	[-0.02]	[0.02]	[-0.05]	[0.59]	[-1.22]	[-1.45]	[-1.13]	[2.17]	[-0.02]	[-1.68]	[-1.61]	[2.93]	[-1.33]	[1.45]
R^2	5.55	0.02	1.80	4.04	5.97	0.54	3.51	0.00	0.00	0.01	1.39	5.58	7.75	4.89	14.38	0.00	9.13	8.47	23.41	5.91	6.99
GSS target	-83.00	0.39	1.07	-0.01	0.08	0.15	-0.18	-156.43*	0.31	0.47	1.28	-0.34	-0.03	-0.06	-24.74	0.39	-0.75	0.93	0.24	0.20	0.30
t	[-1.38]	[0.46]	[1.34]	[-0.01]	[0.10]	[0.18]	[-0.21]	[-1.91]	[0.26]	[0.46]	[1.14]	[-0.25]	[-0.02]	[-0.04]	[-0.29]	[0.36]	[-0.71]	[0.83]	[0.21]	[0.17]	[0.26]
R^2	3.45	0.40	3.29	0.00	0.02	0.06	0.08	12.75	0.26	0.85	4.90	0.26	0.00	0.01	0.33	0.50	1.89	2.59	0.17	0.11	0.27
GSS path	26.24**	-0.05	-0.23	0.14	-0.32**	0.03	-0.27*	9.02	0.08	-0.05	-0.05	-0.30	-0.35*	-0.30	44.03***	-0.11	-0.43*	-0.50**	0.71***	-0.34	0.46*
t	[2.30]	[-0.30]	[-1.46]	[0.88]	[-2.09]	[0.19]	[-1.71]	[0.60]	[0.38]	[-0.26]	[-0.24]	[-1.35]	[-1.81]	[-1.37]	[2.63]	[-0.47]	[-1.95]	[-2.15]	[3.28]	[-1.38]	[1.93]
R^2	9.07	0.17	3.87	1.44	7.63	0.07	5.20	1.44	0.58	0.27	0.24	6.81	11.64	7.02	21.04	0.84	12.72	15.14	29.24	6.78	12.49
GSS LSAP	14.23	0.07	-0.24	0.01	0.00	0.14	-0.08	13.31	0.05	-0.08	-0.21	0.09	-0.12	0.05	5.62	0.76	0.37	-0.75	-0.75	0.98	1.12
t	[0.82]	[0.30]	[-1.05]	[0.05]	[-0.02]	[0.59]	[-0.34]	[0.78]	[0.20]	[-0.38]	[-0.93]	[0.33]	[-0.50]	[0.19]	[0.09]	[0.99]	[0.48]	[-0.93]	[-0.92]	[1.22]	[1.41]
R^2	1.24	0.17	2.04	0.01	0.00	0.66	0.22	2.40	0.15	0.57	3.36	0.43	0.98	0.15	0.03	3.65	0.88	3.19	3.13	5.39	7.12
USD	.	-19.32**	-19.40**	4.18	9.75	5.32	-21.93**	.	-10.05	-3.02	-33.19**	-8.13	-1.20	-5.41	.	-18.47	-25.41**	-18.29	13.19	12.62	14.86
t	.	[-2.19]	[-2.12]	[0.46]	[1.04]	[0.58]	[-2.51]	.	[-0.70]	[-0.18]	[-2.44]	[-0.62]	[-0.08]	[-0.41]	.	[-1.46]	[-2.08]	[-1.54]	[1.09]	[1.04]	[1.22]
R^2	.	7.67	7.18	0.36	1.85	0.57	9.79	.	1.92	0.13	19.29	1.51	0.03	0.66	.	6.46	12.23	7.07	3.70	3.36	4.60

Notes: We run the regression: $y_{t,t+3} = \alpha + \beta x_t + \epsilon_t$. where $y_{t,t+3}$ is the three days after FOMC days' cumulative USD change ($\Delta USD_{t,t+3}$) or signs of cumulative net dollar buying volume ($vol_{i,t,t+3}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta USD_{t,t+3}$ on $vol_{i,t,t+3}$. Both of yields change and USD index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 21: Four days after FOMC days empirical results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
Short-term	8.42**	-0.09*	-0.13***	-0.05	0.08	-0.05	0.09*	-4.07	-0.08	-0.10	-0.10	-0.05	-0.05	-0.03	16.67***	-0.07	-0.11*	-0.04	0.18***	-0.07	0.18***
t	[2.28]	[-1.81]	[-2.63]	[-0.91]	[1.56]	[-0.93]	[1.73]	[-0.64]	[-1.05]	[-1.44]	[-1.41]	[-0.53]	[-0.68]	[-0.38]	[4.21]	[-1.03]	[-1.75]	[-0.62]	[2.73]	[-1.01]	[2.89]
R^2	8.25	5.36	10.65	1.41	4.04	1.48	4.88	1.63	4.19	7.63	7.36	1.12	1.83	0.59	36.37	3.33	8.96	1.21	19.43	3.19	21.21
Long-term	3.59**	-0.02	-0.03	-0.05**	0.03	-0.01	0.03	1.14	-0.01	-0.01	-0.06**	0.01	-0.01	0.01	9.01***	-0.02	-0.05	-0.06	0.10***	-0.02	0.09**
t	[2.28]	[-0.91]	[-1.49]	[-2.21]	[1.57]	[-0.29]	[1.47]	[0.55]	[-0.24]	[-0.53]	[-2.53]	[0.31]	[-0.39]	[0.35]	[3.57]	[-0.63]	[-1.16]	[-1.44]	[2.62]	[-0.46]	[2.36]
R^2	8.23	1.40	3.68	7.75	4.10	0.15	3.59	1.20	0.22	1.12	20.38	0.39	0.60	0.48	29.08	1.27	4.17	6.30	18.11	0.69	15.27
NS	6.54	-0.09	-0.11*	-0.05	0.11*	-0.10*	0.09	-6.11	-0.08	-0.10	-0.06	-0.04	-0.14	-0.03	12.07**	-0.08	-0.11	-0.06	0.18**	-0.09	0.15**
t	[1.37]	[-1.40]	[-1.79]	[-0.86]	[1.77]	[-1.70]	[1.50]	[-0.69]	[-0.75]	[-1.02]	[-0.61]	[-0.31]	[-1.43]	[-0.26]	[2.26]	[-1.19]	[-1.53]	[-0.72]	[2.50]	[-1.20]	[2.07]
R^2	3.32	3.44	5.52	1.33	5.40	4.98	3.92	1.89	2.19	3.98	1.48	0.39	7.58	0.27	15.37	4.84	7.72	1.83	18.24	4.92	13.23
GSS target	-113.85*	-0.77	-0.94	-0.69	0.26	-0.22	0.19	-226.92***	-0.92	-1.10	-0.88	-1.00	-0.39	-0.67	-27.33	-0.71	-0.89	-0.50	1.22	-0.07	0.85
t	[-1.84]	[-0.91]	[-1.12]	[-0.83]	[0.31]	[-0.28]	[0.23]	[-2.59]	[-0.73]	[-0.97]	[-0.77]	[-0.77]	[-0.35]	[-0.51]	[-0.32]	[-0.69]	[-0.84]	[-0.43]	[1.09]	[-0.06]	[0.75]
R^2	6.01	1.55	2.31	1.29	0.18	0.15	0.10	21.10	2.07	3.59	2.32	2.30	0.49	1.04	0.39	1.79	2.64	0.72	4.35	0.01	2.10
GSS path	23.50**	-0.20	-0.28*	-0.17	0.14	-0.16	0.13	0.53	-0.05	-0.10	-0.15	-0.09	-0.21	-0.10	51.27***	-0.30	-0.39*	-0.26	0.43*	-0.15	0.41*
t	[1.96]	[-1.21]	[-1.72]	[-1.03]	[0.87]	[-1.03]	[0.76]	[0.03]	[-0.21]	[-0.52]	[-0.76]	[-0.38]	[-1.16]	[-0.43]	[3.16]	[-1.35]	[-1.73]	[-1.05]	[1.79]	[-0.59]	[1.67]
R^2	6.74	2.69	5.29	1.95	1.39	1.97	1.08	0.00	0.17	1.06	2.28	0.57	5.13	0.73	27.74	6.53	10.34	4.09	11.00	1.33	9.69
GSS LSAP	8.34	0.12	0.03	-0.57**	0.20	0.06	0.23	6.33	0.12	0.01	-0.45**	0.17	-0.08	0.10	21.44	0.50	0.62	-2.09***	0.52	1.31*	1.52**
t	[0.46]	[0.50]	[0.11]	[-2.53]	[0.83]	[0.28]	[0.94]	[0.33]	[0.48]	[0.06]	[-2.16]	[0.66]	[-0.36]	[0.39]	[0.35]	[0.66]	[0.80]	[-2.88]	[0.62]	[1.66]	[1.96]
R^2	0.40	0.47	0.02	10.80	1.29	0.15	1.65	0.43	0.92	0.01	15.79	1.70	0.52	0.59	0.46	1.66	2.42	24.24	1.48	9.62	12.88
USD	.	-12.65	-13.07	-12.12	10.96	10.77	18.93**	.	1.61	13.59	-8.42	7.06	-6.62	6.23	.	-22.15*	-28.89**	-20.93*	14.21	18.30	29.79***
t	.	[-1.34]	[-1.40]	[-1.27]	[1.16]	[1.08]	[2.04]	.	[0.10]	[0.81]	[-0.50]	[0.47]	[-0.37]	[0.42]	.	[-1.71]	[-2.37]	[-1.75]	[1.16]	[1.50]	[2.60]
R^2	.	3.02	3.25	2.72	2.29	1.96	6.71	.	0.04	2.54	0.98	0.89	0.54	0.69	.	8.58	15.35	8.99	4.17	6.77	17.93

Notes: We run the regression: $y_{t,t+4} = \alpha + \beta x_t + \epsilon_t$. where $y_{t,t+4}$ is the four days after FOMC days' cumulative USD change ($\Delta USD_{t,t+4}$) or signs of cumulative net dollar buying volume ($vol_{i,t,t+4}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta USD_{t,t+4}$ on $vol_{i,t,t+4}$. Both of yields change and USD index are in the unit of basic point, and NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 22: Five days after FOMC days empirical results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
Short-term	9.01**	-0.08	-0.14***	0.00	0.07	-0.01	0.09*	-0.75	-0.07	-0.10	-0.11	-0.06	-0.03	-0.05	16.03***	-0.04	-0.12*	0.04	0.16**	-0.02	0.19***
t	[2.16]	[-1.49]	[-2.83]	[-0.01]	[1.28]	[-0.29]	[1.75]	[-0.12]	[-1.00]	[-1.63]	[-1.44]	[-0.70]	[-0.38]	[-0.55]	[2.86]	[-0.60]	[-1.86]	[0.62]	[2.43]	[-0.26]	[3.03]
R^2	7.45	3.67	12.15	0.00	2.74	0.14	5.02	0.06	3.82	9.57	7.65	1.91	0.56	1.21	20.91	1.16	10.08	1.24	16.02	0.21	22.89
Long-term	3.28*	-0.03	-0.04**	-0.03	0.04*	0.00	0.04*	1.52	-0.01	-0.02	-0.05**	0.02	-0.01	0.02	7.58**	-0.03	-0.06	0.01	0.08**	0.00	0.10**
t	[1.82]	[-1.19]	[-2.00]	[-1.21]	[1.65]	[0.00]	[1.95]	[0.76]	[-0.49]	[-0.92]	[-2.38]	[0.73]	[-0.21]	[0.77]	[2.13]	[-0.69]	[-1.53]	[0.27]	[1.96]	[0.04]	[2.47]
R^2	5.43	2.39	6.44	2.46	4.50	0.00	6.15	2.26	0.96	3.24	18.43	2.07	0.18	2.33	12.80	1.53	7.03	0.23	11.07	0.00	16.41
NS	10.31**	-0.08	-0.09	-0.02	0.01	-0.02	0.03	-1.38	-0.10	-0.10	-0.07	-0.09	-0.02	-0.09	15.57**	-0.06	-0.08	-0.01	0.06	-0.02	0.08
t	[1.96]	[-1.21]	[-1.48]	[-0.35]	[0.20]	[-0.27]	[0.50]	[-0.16]	[-0.99]	[-1.08]	[-0.63]	[-0.79]	[-0.16]	[-0.74]	[2.30]	[-0.77]	[-1.11]	[-0.10]	[0.77]	[-0.25]	[1.10]
R^2	6.52	2.59	3.85	0.22	0.08	0.13	0.45	0.10	3.77	4.42	1.58	2.41	0.10	2.16	15.90	2.08	4.18	0.04	2.07	0.22	4.11
GSS target	-78.36	-0.35	-0.99	-0.48	-0.06	-0.13	0.05	-204.47**	-1.60	-1.17	-0.70	-0.81	-0.50	-0.48	17.14	0.52	-0.93	-0.28	0.50	0.17	0.46
t	[-1.10]	[-0.42]	[-1.20]	[-0.58]	[-0.08]	[-0.16]	[0.06]	[-2.35]	[-1.43]	[-1.17]	[-0.58]	[-0.62]	[-0.41]	[-0.37]	[0.16]	[0.48]	[-0.86]	[-0.25]	[0.44]	[0.15]	[0.40]
R^2	2.22	0.33	2.64	0.62	0.01	0.05	0.01	18.13	7.57	5.22	1.33	1.50	0.65	0.54	0.09	0.87	2.77	0.23	0.73	0.08	0.62
GSS path	30.56**	-0.19	-0.28*	-0.10	0.06	-0.06	0.11	10.43	-0.03	-0.15	-0.16	-0.07	-0.07	-0.08	56.30***	-0.30	-0.32	-0.10	0.23	-0.08	0.34
t	[2.27]	[-1.17]	[-1.73]	[-0.60]	[0.37]	[-0.35]	[0.65]	[0.64]	[-0.14]	[-0.85]	[-0.78]	[-0.31]	[-0.34]	[-0.37]	[2.58]	[-1.25]	[-1.35]	[-0.38]	[0.90]	[-0.29]	[1.40]
R^2	8.88	2.53	5.37	0.67	0.26	0.24	0.79	1.60	0.08	2.81	2.37	0.39	0.46	0.54	20.44	5.69	6.59	0.55	2.99	0.33	7.01
GSS LSAP	11.27	0.05	-0.08	-0.45*	0.45*	0.15	0.45*	9.36	-0.02	-0.05	-0.42*	0.40	0.05	0.33	28.89	1.19	0.09	-1.02	1.00	1.05	1.62**
t	[0.55]	[0.21]	[-0.35]	[-1.93]	[1.94]	[0.64]	[1.92]	[0.50]	[-0.09]	[-0.27]	[-1.91]	[1.63]	[0.21]	[1.34]	[0.36]	[1.56]	[0.11]	[-1.27]	[1.23]	[1.30]	[2.12]
R^2	0.56	0.08	0.23	6.55	6.61	0.76	6.52	0.99	0.03	0.29	12.73	9.56	0.17	6.75	0.51	8.56	0.05	5.87	5.50	6.08	14.73
USD	.	-0.88	-13.54	-9.66	13.11	12.54	24.19**	.	17.04	15.65	-10.80	24.07*	8.10	21.69	.	-11.17	-33.27**	-11.75	4.13	15.49	26.13*
t	.	[-0.08]	[-1.28]	[-0.90]	[1.24]	[1.16]	[2.33]	.	[1.05]	[0.85]	[-0.69]	[1.76]	[0.53]	[1.54]	.	[-0.68]	[-2.12]	[-0.74]	[0.26]	[0.99]	[1.71]
R^2	.	0.01	2.73	1.39	2.58	2.27	8.55	.	4.23	2.81	1.85	10.98	1.11	8.62	.	1.48	12.66	1.73	0.22	3.06	8.58

Notes: We run the regression: $y_{t,t+5} = \alpha + \beta x_t + \epsilon_t$. where $y_{t,t+5}$ is the five days after FOMC days' cumulative USD change ($\Delta USD_{t,t+5}$) or signs of cumulative net dollar buying volume ($vol_{i,t,t+5}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta USD_{t,t+5}$ on $vol_{i,t,t+5}$. Both of yields change and USD index are in the unit of basic point, an NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 23: FOMC days 2pm-5pm results with sign of net dollar buying

Variable	Whole							ZLB							Post ZLB						
	USD	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**	**USD**	**Agg**	**Bank**	**Corp**	**Fund**	**Nonbank**	**F+NB**
NS	17.96***	-0.17***	-0.21***	-0.09*	0.11*	0.20***	0.09	21.43***	-0.19*	-0.19*	-0.07	0.11	0.07	-0.02	16.27***	-0.16**	-0.21***	-0.10	0.11	0.26***	0.13*
t	[6.39]	[-2.85]	[-3.55]	[-1.81]	[1.81]	[3.35]	[1.42]	[3.69]	[-1.77]	[-1.89]	[-0.91]	[0.95]	[0.62]	[-0.15]	[5.62]	[-2.16]	[-3.14]	[-1.45]	[1.49]	[4.03]	[1.82]
R^2	42.60	12.84	18.66	5.64	5.62	16.92	3.54	35.32	11.15	12.51	3.21	3.45	1.52	0.09	52.97	14.29	26.09	6.95	7.33	36.68	10.63
GSS target	46.10	0.40	-0.42	-0.41	-0.47	0.89	-0.49	56.76	-0.99	-1.03	-0.79	-0.71	0.97	-0.55	39.32	1.42	-0.03	-0.13	-0.26	0.84	-0.40
t	[0.95]	[0.48]	[-0.50]	[-0.62]	[-0.56]	[1.07]	[-0.58]	[0.72]	[-0.78]	[-0.86]	[-0.90]	[-0.56]	[0.74]	[-0.44]	[0.65]	[1.28]	[-0.03]	[-0.14]	[-0.23]	[0.74]	[-0.35]
R^2	1.68	0.43	0.47	0.73	0.58	2.10	0.62	2.00	2.38	2.90	3.17	1.24	2.16	0.78	1.60	5.93	0.00	0.07	0.20	2.06	0.48
GSS path	50.76***	-0.44***	-0.50***	-0.16	0.25	0.38**	0.31*	51.78***	-0.39*	-0.43**	-0.04	0.00	0.05	0.04	48.55***	-0.48**	-0.50**	-0.28	0.53**	0.82***	0.59***
t	[7.84]	[-2.89]	[-3.32]	[-1.24]	[1.53]	[2.45]	[1.95]	[5.72]	[-1.88]	[-2.28]	[-0.25]	[-0.01]	[0.23]	[0.19]	[5.00]	[-2.04]	[-2.28]	[-1.36]	[2.25]	[4.15]	[2.66]
R^2	53.70	13.63	17.21	2.82	4.21	10.19	6.68	56.70	12.38	17.20	0.26	0.00	0.21	0.14	49.03	13.74	16.66	6.64	16.27	39.84	21.43
GSS LSAP	47.39***	-0.25	-0.25	0.31*	-0.29	0.01	0.07	51.19***	-0.36	-0.34	0.34**	-0.25	0.05	0.13	1.55	1.07	1.12	0.14	-0.91	-0.41	-0.82
t	[3.85]	[-1.04]	[-1.04]	[1.71]	[-1.21]	[0.05]	[0.30]	[4.29]	[-1.50]	[-1.52]	[2.11]	[-1.00]	[0.21]	[0.54]	[0.03]	[1.33]	[1.50]	[0.20]	[-1.12]	[-0.49]	[-1.03]
R^2	21.83	2.02	2.00	5.23	2.68	0.00	0.17	42.35	8.29	8.42	15.13	3.85	0.18	1.14	0.00	6.34	7.95	0.16	4.59	0.93	3.93
USD	.	-17.96**	-25.43***	-8.55	9.65	19.53***	19.72***	.	-23.73**	-29.9**	0.79	11.35	7.09	26.48**	.	-12.58	-23.38***	-11.94	6.73	29.8***	13.94
t	.	[-2.56]	[-3.89]	[-0.93]	[1.33]	[2.83]	[2.87]	.	[-2.04]	[-2.52]	[0.04]	[0.92]	[0.59]	[2.26]	.	[-1.42]	[-2.75]	[-1.16]	[0.74]	[4.00]	[1.52]
R^2	.	10.16	20.71	1.46	2.97	12.11	12.47	.	14.31	20.31	0.01	3.27	1.35	16.97	.	6.12	19.58	4.18	1.74	34.09	6.96

Notes: We run the regression: $y^h_{t,2\to5} = \alpha + \beta x_t + \epsilon_t$. where $y^h_{t,2\to5}$ is the FOMC days' 2pm to 5pm cumulative USD change ($\Delta USD^h_{t,2\to5}$) or signs of cumulative net dollar buying volume ($vol_{i,t,2\to5}$) and x_t is the FOMC days' change of yields factors or monetary policy shocks. In the bottom of table, we run contemporaneous regression $\Delta USD^h_{t,2\to5}$ on $vol_{i,t,2\to5}$. USD index is in the original unit, and the NS monetary policy shocks are amplified by 100. The whole sample period is from 09/13/2012-01/19/2020 which includes 60 FOMC meetings. For NS, it is from Sep 13th 2012 - Sep 18th 2019 (57 meetings). For GSS, the whole sample period is from Sep 13th 2012 - Jun 19th 2019 (55 meetings). The whole sample is split into two subsamples before and after Dec 16th 2015: ZLB (including 27 meeting) and Post ZLB. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

Table 24: Individual Currency Predictability Post ZLB

day0	**AUD**	**CAD**	**CHF**	**EUR**	**JPY**	**NOK**	**NZD**	**SEK**	**GBP**
Short-term	17.43***	16.06***	14.43***	14.76***	15.24***	17.63***	16.9***	14.41***	11.95***
t	[3.42]	[5.03]	[6.90]	[5.82]	[4.86]	[4.98]	[3.29]	[4.72]	[4.18]
R^2	27.35	44.90	60.53	52.20	43.25	44.44	25.86	41.85	36.06
Long-term	9.93***	7.66***	8.08***	9.26***	9.41***	10.94***	11.05***	9.38***	5.79***
t	[3.15]	[3.47]	[5.80]	[6.31]	[5.04]	[5.22]	[3.67]	[5.41]	[3.06]
R^2	24.30	27.95	52.01	56.25	45.09	46.78	30.24	48.56	23.17
NS	18.62***	16.34***	14.26***	13.82***	13.73***	18.4***	15.44**	15.35***	10.1***
t	[3.16]	[4.31]	[5.16]	[4.10]	[3.32]	[4.47]	[2.46]	[4.69]	[2.72]
R^2	26.28	39.85	48.69	37.48	28.29	41.60	17.81	43.98	20.95
GSS target	78.20	46.68	20.72	5.93	13.71	5.97	57.31	17.84	21.87
t	[0.79]	[0.66]	[0.37]	[0.10]	[0.19]	[0.08]	[0.58]	[0.30]	[0.36]
R^2	2.33	1.65	0.54	0.04	0.14	0.03	1.29	0.34	0.49
GSS path	54.61***	48.17***	42.14***	39.87***	45.11***	52.32***	40.08*	41.89***	30.51**
t	[2.78]	[3.77]	[4.59]	[3.70]	[3.37]	[4.10]	[1.94]	[3.96]	[2.47]
R^2	22.85	35.33	44.71	34.47	30.38	39.28	12.65	37.63	19.04
GSS LSAP	-44.26	-33.34	-5.61	8.25	44.55	6.28	-21.88	-2.83	-51.97
t	[-0.61]	[-0.65]	[-0.14]	[0.19]	[0.86]	[0.12]	[-0.30]	[-0.06]	[-1.19]
R^2	1.41	1.59	0.07	0.14	2.79	0.05	0.36	0.02	5.20
Day 1	**AUD**	**CAD**	**CHF**	**EUR**	**JPY**	**NOK**	**NZD**	**SEK**	**GBP**
Short-term	9.34**	5.76**	7.71*	6.29	9.25*	14.73***	8.64*	8.6**	11.3***
t	[2.33]	[2.19]	[1.90]	[1.59]	[1.73]	[2.94]	[1.88]	[1.99]	[2.59]
R^2	14.94	13.45	10.41	7.56	8.78	21.78	10.25	11.30	17.78
Long-term	5.48**	2.17	3.26	3.35	5.43*	6.57**	5.61**	5.35**	5.87**
t	[2.25]	[1.31]	[1.29]	[1.39]	[1.67]	[2.04]	[2.04]	[2.05]	[2.17]
R^2	14.07	5.24	5.08	5.88	8.26	11.85	11.84	11.97	13.15
NS	14.61***	6.86**	7.65	6.48	4.75	15.04**	12.23**	6.09	8.16
t	[3.52]	[2.26]	[1.60]	[1.39]	[0.75]	[2.52]	[2.41]	[1.16]	[1.53]
R^2	30.65	15.39	8.42	6.48	1.98	18.46	17.17	4.58	7.73
GSS target	16.73	31.42	-34.05	-21.90	-25.54	17.29	18.11	-97.37	48.13
t	[0.23]	[0.65]	[-0.47]	[-0.31]	[-0.28]	[0.18]	[0.22]	[-1.27]	[0.59]
R^2	0.21	1.59	0.83	0.36	0.30	0.12	0.18	5.82	1.33
GSS path	42.81***	22.22**	34.78**	28.37*	28.33	49.63**	39.76**	35.49**	29.93*
t	[3.10]	[2.22]	[2.34]	[1.90]	[1.43]	[2.54]	[2.38]	[2.19]	[1.73]
R^2	27.00	15.99	17.45	12.21	7.33	19.83	17.88	15.54	10.33
GSS LSAP	24.92	-8.41	-5.77	31.00	12.92	36.97	-8.79	60.16	29.86
t	[0.48]	[-0.24]	[-0.11]	[0.60]	[0.19]	[0.52]	[-0.15]	[1.07]	[0.50]
R^2	0.86	0.22	0.05	1.37	0.14	1.04	0.08	4.21	0.97
Day 2	**AUD**	**CAD**	**CHF**	**EUR**	**JPY**	**NOK**	**NZD**	**SEK**	**GBP**
Short-term	13.05***	4.95	8.36	9.03**	11.87	17.89***	11.51**	10.78**	13.21**
t	[2.67]	[1.19]	[1.51]	[2.01]	[1.40]	[3.03]	[1.99]	[1.96]	[2.44]
R^2	18.72	4.37	6.82	11.56	5.91	22.82	11.37	11.03	16.07
Long-term	6.74**	2.25	3.77	4.44	9.01*	8.22**	8.28**	5.84*	8.73***
t	[2.21]	[0.89]	[1.10]	[1.60]	[1.78]	[2.17]	[2.44]	[1.74]	[2.72]
R^2	13.66	2.47	3.79	7.64	9.30	13.17	16.10	8.85	19.22
NS	17.12***	6.28	4.76	5.22	-0.97	16.71**	13.31**	4.13	12.51**
t	[3.21]	[1.30]	[0.73]	[0.97]	[-0.10]	[2.42]	[2.04]	[0.63]	[2.07]
R^2	26.95	5.71	1.87	3.24	0.03	17.27	12.98	1.38	13.26
GSS target	21.70	10.27	-14.70	10.60	-58.71	54.72	-41.10	-63.18	9.81
t	[0.24]	[0.14]	[-0.16]	[0.13]	[-0.40]	[0.50]	[-0.41]	[-0.65]	[0.10]
R^2	0.22	0.07	0.09	0.07	0.62	0.96	0.63	1.60	0.04
GSS path	49.54***	20.03	29.11	19.19	17.66	42.56*	40.58*	25.38	44.09**
t	[2.79]	[1.26]	[1.45]	[1.08]	[0.54]	[1.86]	[1.91]	[1.19]	[2.24]
R^2	23.00	5.72	7.48	4.32	1.12	11.71	12.35	5.17	16.12
GSS LSAP	22.16	-29.47	-45.32	-10.20	97.19	10.70	-3.09	28.38	-31.58
t	[0.34]	[-0.55]	[-0.67]	[-0.17]	[0.93]	[0.13]	[-0.04]	[0.40]	[-0.45]
R^2	0.43	1.17	1.71	0.11	3.20	0.07	0.01	0.61	0.78

Table 25: Continued

Day 3	**AUD**	**CAD**	**CHF**	**EUR**	**JPY**	**NOK**	**NZD**	**SEK**	**GBP**
Short-term	21.25***	7.06	10.02	14.41***	7.14	23.3***	18.29***	20.74***	18.09***
t	[4.20]	[1.38]	[1.62]	[2.96]	[0.79]	[4.19]	[2.79]	[3.65]	[2.90]
R^2	36.22	5.75	7.82	22.09	1.95	36.17	20.05	30.01	21.36
Long-term	11.16***	3.97	5.32	7.44**	5.39	9.67**	11.26***	10.52***	10.32***
t	[3.42]	[1.27]	[1.41]	[2.44]	[0.99]	[2.52]	[2.85]	[2.88]	[2.70]
R^2	27.35	4.98	6.04	16.10	3.05	17.04	20.79	21.13	19.00
NS	22.75***	7.19	2.90	8.16	-3.37	19.51***	18.74**	11.34	15.79**
t	[3.83]	[1.21]	[0.39]	[1.31]	[-0.32]	[2.87]	[2.44]	[1.49]	[2.10]
R^2	34.33	4.93	0.54	5.78	0.36	22.73	17.51	7.33	13.57
GSS target	-26.40	-70.63	-46.12	24.07	-22.41	55.32	-61.79	-69.39	-5.30
t	[-0.25]	[-0.79]	[-0.45]	[0.26]	[-0.15]	[0.50]	[-0.50]	[-0.60]	[-0.04]
R^2	0.24	2.32	0.79	0.27	0.09	0.94	0.94	1.36	0.01
GSS path	68.04***	28.01	33.10	34.19*	11.88	52.69**	61.51**	52.54**	54.34**
t	[3.52]	[1.43]	[1.52]	[1.77]	[0.36]	[2.31]	[2.45]	[2.20]	[2.21]
R^2	32.32	7.34	8.17	10.76	0.49	17.07	18.77	15.73	15.79
GSS LSAP	23.37	-70.21	-14.50	4.69	117.97	0.82	-18.18	13.48	-6.87
t	[0.31]	[-1.09]	[-0.20]	[0.07]	[1.11]	[0.01]	[-0.20]	[0.16]	[-0.08]
R^2	0.36	4.34	0.15	0.02	4.51	0.00	0.15	0.10	0.02
Day 4	**AUD**	**CAD**	**CHF**	**EUR**	**JPY**	**NOK**	**NZD**	**SEK**	**GBP**
Short-term	21.99***	9.21*	12.36**	14.83***	10.24	23.57***	19.59***	21.73***	16.51**
t	[3.92]	[1.85]	[1.97]	[2.87]	[1.05]	[4.94]	[3.02]	[3.38]	[2.56]
R^2	33.18	9.95	11.10	21.04	3.45	44.07	22.70	26.97	17.45
Long-term	10.99***	4.30	7.11*	8.37***	6.77	11.07***	11.37***	12.03***	9.12**
t	[3.01]	[1.40]	[1.86]	[2.64]	[1.15]	[3.35]	[2.86]	[3.01]	[2.30]
R^2	22.67	5.92	10.05	18.34	4.12	26.58	20.93	22.62	14.56
NS	27.11***	9.45	1.98	7.22	-1.93	19.76***	20.58***	11.60	12.87
t	[4.38]	[1.62]	[0.26]	[1.10]	[-0.17]	[3.22]	[2.67]	[1.37]	[1.62]
R^2	40.65	8.57	0.23	4.12	0.10	26.99	20.35	6.30	8.59
GSS target	20.13	-68.83	-48.11	15.18	-30.56	66.25	-81.22	-130.99	12.22
t	[0.17]	[-0.78]	[-0.46]	[0.16]	[-0.19]	[0.63]	[-0.64]	[-1.06]	[0.10]
R^2	0.11	2.28	0.79	0.10	0.13	1.48	1.55	4.15	0.04
GSS path	84.74***	35.67*	33.76	36.32*	18.83	62.66***	72.29***	64.83***	52.32**
t	[4.16]	[1.91]	[1.49]	[1.80]	[0.52]	[3.07]	[2.92]	[2.58]	[2.05]
R^2	39.95	12.29	7.85	11.10	1.02	26.65	24.69	20.41	13.93
GSS LSAP	22.89	-80.24	23.65	25.07	152.05	28.14	-35.80	1.91	55.32
t	[0.27]	[-1.27]	[0.31]	[0.36]	[1.32]	[0.36]	[-0.39]	[0.02]	[0.62]
R^2	0.27	5.86	0.36	0.50	6.27	0.51	0.57	0.00	1.47
Day 5	**AUD**	**CAD**	**CHF**	**EUR**	**JPY**	**NOK**	**NZD**	**SEK**	**GBP**
Short-term	21.53***	8.82	10.47	14.62**	6.57	22.52***	20.53**	20.87**	18.38**
t	[2.77]	[1.31]	[1.54]	[2.28]	[0.67]	[2.95]	[2.25]	[2.47]	[2.26]
R^2	19.79	5.23	7.11	14.34	1.42	21.90	14.02	16.45	14.10
Long-term	8.61*	2.41	5.67	7.31*	5.73	8.99*	8.71	9.99*	10.84**
t	[1.72]	[0.58]	[1.37]	[1.84]	[0.97]	[1.81]	[1.52]	[1.89]	[2.19]
R^2	8.67	1.07	5.70	9.80	2.94	9.55	6.90	10.31	13.42
NS	28.21***	13.08*	6.22	10.60	2.95	23.16***	24.79**	14.06	17.02*
t	[3.26]	[1.71]	[0.76]	[1.35]	[0.26]	[2.64]	[2.36]	[1.35]	[1.75]
R^2	27.49	9.45	2.04	6.12	0.24	19.94	16.55	6.14	9.81
GSS target	37.81	-48.33	22.36	50.70	49.76	136.55	-65.49	-52.18	23.10
t	[0.25]	[-0.41]	[0.20]	[0.44]	[0.30]	[0.96]	[-0.39]	[-0.33]	[0.15]
R^2	0.25	0.64	0.15	0.73	0.36	3.43	0.58	0.41	0.09
GSS path	84.65***	45.69*	43.59*	42.42*	30.65	64.58**	74.84**	59.71*	60.54*
t	[2.92]	[1.83]	[1.84]	[1.73]	[0.85]	[2.18]	[2.17]	[1.78]	[1.91]
R^2	24.75	11.45	11.52	10.32	2.72	15.41	15.31	10.90	12.26
GSS LSAP	42.49	-46.65	1.71	34.37	143.35	72.72	-55.20	19.16	48.08
t	[0.39]	[-0.54]	[0.02]	[0.41]	[1.24]	[0.70]	[-0.45]	[0.17]	[0.44]
R^2	0.59	1.12	0.00	0.64	5.60	1.84	0.78	0.11	0.73

Notes: We run the regression: $\Delta fx_{t,t+h} = \alpha + \beta x_t + \epsilon_t$. where $\Delta fx_{t,t+h}$ is the h days after FOMC days' cumulative individual currency exchange rate change. x_t is the FOMC days' yields factor change or monetary policy shocks. The Post ZLB sample period is from 12/16/2015-01/19/2020 which includes 33 FOMC meetings. t-statistics are reported in the bracket. *** $p < 1\%$, ** $p < 5\%$ and * $p < 10\%$. All R^2s are expressed in %.

8.3 VAR Estimation

Following Stavrakeva and Tang (2019)'s notations, let $\tilde{s}_t = s_t + p_t - p_t^*$ denote the real exchange rate, $\tilde{\pi}_t = \pi_t^* - \pi_t$ denote the inflation difference and $\tilde{i}_t = i_t^* - i_t$ denote the interest rate differential. Hence, the risk premium of holding US dollar is given by $rx_t = E_t \Delta s_{t+1} - \tilde{i}_t$, and then it is equivalent to obtain

$$\Delta s_{t+1} = \tilde{i}_t + rx_t + \Delta s_{t+1} - E_t \Delta s_{t+1}. \tag{16}$$

Iterating (5) forward, we get

$$s_t = -E_t \sum_{k=0}^{\infty} \left[\tilde{i}_{t+k} + \sigma_{t+k}\right] + \lim_{k\to\infty} E_t s_{t+k}. \tag{17}$$

Hence, we can decompose the unexpected news of change of exchange rate into interest rate differential news ($\tilde{i}_{t+1}^{\Delta E}$), risk premium news ($rx_{t+1}^{\Delta E}$) and long-run nominal exchange rate news ($\tilde{\pi}_{t+1}^{\Delta E}$) as follows

$$\begin{aligned}\Delta s_{t+1} - E_t \Delta s_{t+1} = &- \underbrace{\sum_{k=0}^{\infty} \left(E_{t+1}\tilde{i}_{t+k+1} - E_t \tilde{i}_{t+k+1}\right)}_{\tilde{i}_{t+1}^{\Delta E}} - \underbrace{\sum_{k=0}^{\infty} \left(E_{t+1}\sigma_{t+k+1} - E_t \sigma_{t+k+1}\right)}_{rx_{t+1}^{\Delta E}} \\ &+ \underbrace{E_{t+1} \lim_{K\to\infty} s_{t+K} - E_t \lim_{K\to\infty} s_{t+K}}_{\tilde{\pi}_{t+1}^{\Delta E}}.\end{aligned}$$

In the long run, we assume that $\lim_{K\to\infty} \left(E_{t+1} - E_t\right) \tilde{s}_{t+k+1} = 0$, and then

$$\begin{aligned}\tilde{\pi}_{t+1}^{\Delta E} &= \lim_{K\to\infty} E_{t+1}\left(s_{t+K} - s_t\right) - \lim_{K\to\infty} E_t\left(s_{t+K} - s_t\right) \\ &= \lim_{K\to\infty} \sum_{k=0}^{K-1} \left(E_{t+1}\left[\Delta\tilde{s}_{t+k+1} + \tilde{\pi}_{t+k+1}\right] - E_t\left[\Delta\tilde{s}_{t+k+1} + \tilde{\pi}_{t+k+1}\right]\right) \\ &= \sum_{k=0}^{\infty} \left(E_{t+1}\tilde{\pi}_{t+k+1} - E_t\tilde{\pi}_{t+k+1}\right),\end{aligned}$$

which indicates that $\tilde{\pi}_{t+1}^{\Delta E}$ reflects the inflation differential news.

Based on the calculation before, we can decompose the actual exchange rate change (Δs_{t+1}) into the following three parts:

$$\Delta s_{t+1} = \tilde{i}_t - \tilde{i}_{t+1}^{\Delta E} + rx_t - rx_{t+1}^{\Delta E} + \tilde{\pi}_{t+1}^{\Delta E}. \tag{18}$$

Now, we consider the following VAR estimation.

$$\mathbf{z}_t = \bar{\mathbf{z}} + \mathbf{\Gamma}\mathbf{z}_{t-1} + \boldsymbol{\epsilon}_t,$$

with

$$\mathbf{z}_t = \begin{bmatrix} \tilde{s}_t \\ \tilde{\pi}_t \\ \tilde{i}_t \end{bmatrix}.$$

Based on the above VAR estimation, we can get the news decomposition in (7):

$$\Delta s_{t+1} = \Delta \tilde{s}_{t+1} + \tilde{\pi}_{t+1} = (e_{\tilde{s}} + e_{\tilde{\pi}})\, \mathbf{z}_{t+1} - e_{\tilde{s}} \mathbf{z}_t, \tag{19}$$

and

$$rx_t = \hat{E}_t \left[\Delta s_{t+1}\right] - \tilde{i}_t = (e_{\tilde{s}} + e_{\tilde{\pi}})\, (\overline{\mathbf{z}} + \mathbf{\Gamma} \mathbf{z}_t) - (e_{\tilde{s}} + e_{\tilde{i}})\, \mathbf{z}_t, \tag{20}$$

and for all the news estimation, we have

$$\tilde{i}_{t+1}^{\Delta E} = e_{\tilde{i}} (\mathbf{I} - \mathbf{\Gamma})^{-1} \boldsymbol{\epsilon}_t, \tag{21}$$

$$rx_{t+1}^{\Delta E} = \left[(e_{\tilde{s}} + e_{\tilde{\pi}})\, \mathbf{\Gamma} - (e_{\tilde{s}} + e_{\tilde{i}})\right] (\mathbf{I} - \mathbf{\Gamma})^{-1} \boldsymbol{\epsilon}_t, \tag{22}$$

$$\tilde{\pi}_{t+1}^{\Delta E} = e_{\tilde{\pi}} (\mathbf{I} - \mathbf{\Gamma})^{-1} \boldsymbol{\epsilon}_t. \tag{23}$$

Finally, we decompose the regression coefficients of nominal exchange rate change onto monetary policy shocks $\hat{\beta}^{\Delta s_{t+1}, mp}$ into

$$\hat{\beta}^{\Delta s_{t+1}, mp} = \hat{\beta}^{\tilde{i}_t - \tilde{i}_{t+1}^{\Delta E} mp} + \hat{\beta}^{rx_t - rx_{t+1}^{\Delta E}, mp} + \hat{\beta}^{\tilde{\pi}_{t+1}^{\Delta E}, mp}. \tag{24}$$

Similarly, we can also define $\hat{\beta}^{\tilde{i}_{t+1}^{\Delta E} mp}$ and $\hat{\beta}^{rx_{t+1}^{\Delta E}, mp}$.

How much does the currency move with a 1% shock to intrinsic value? We interpret this coefficient as a measure of overreaction. That is, if the currency appreciates by more (less) than 1

$$\beta_{\text{over}} = 1 - \frac{e1' \Phi(k) \Sigma \Psi' e1}{e1' \Psi \Sigma \Psi' e1} - \frac{e1' (\Phi - \Phi(k)) \Sigma \Psi' e1}{e1' \Psi \Sigma \Psi' e1} \tag{25}$$

Given that intrinsic-value shocks are the residual from our VAR, any measurement error in that model biases over toward 1, making it difficult to find evidence of over/underreaction.