Reserves Were Not So Ample After All
Evidence from the U.S. Treasury Repo Market

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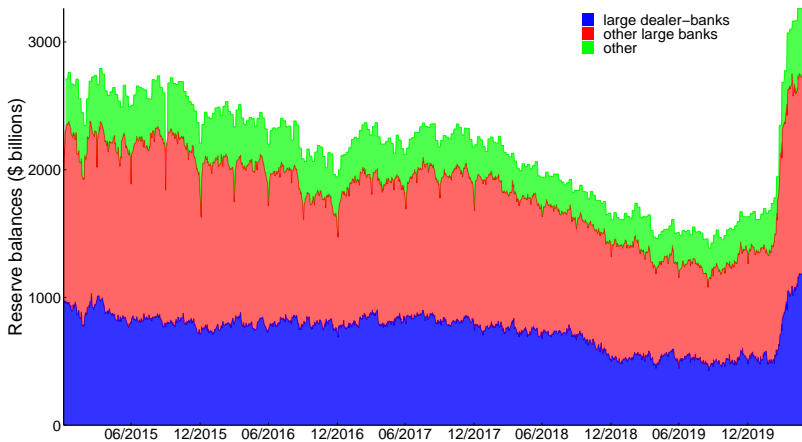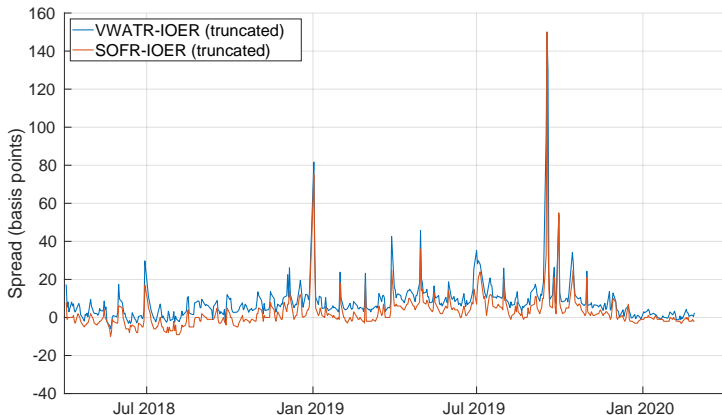
The Fed's "Balance sheet normalization"

Figure: Data: Fedwire Funds Service, FRED.

Repo rates sometimes went far above their arbitrage level: IOER

Figure: Truncated at 150 basis points. Data: FRBNY and Tradition.

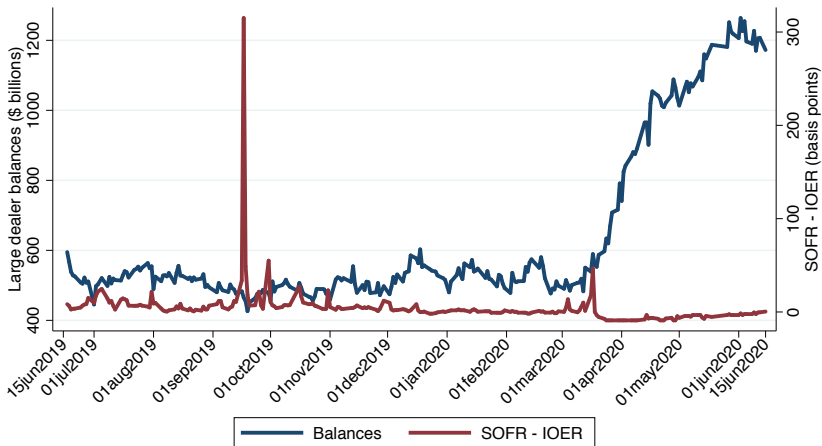# Dealer balances remained low until the Fed's Covid rescue

Figure: Data: Fedwire Funds Service, FRBNY.

Some findings

1. **Ample reserves:** Crucial for the intermediation of US dollar funding markets. This point was already made by Correa, Du, and Liao (2020).

2. The opening reserve balances of the nine large repo-active dealer banks matter a lot for repo rate distortions. The reserve balances of other banks have played no significant role.

3. Even greater explanation of repo rate spreads is provided by intra-day payment timing stress on the major dealers.

4. Significant additional explanation of repo rate spreads with: end of quarter, Treasuries issuance, and net dealer treasury position.

What did Jamie Dimon say?

When asked on JP Morgan's Q3 2019 earnings call why the bank did not use its reserve balances to arbitrage repo rate spikes in September 2019, Jamie Dimon replied:

". . . we have a checking account at the Fed with a certain amount of cash in it. Last year [2018] we had more cash than we needed for regulatory requirements. So when repo rates went up, we went from the checking account, which was paying IOER into repo. Obviously makes sense, you make more money. But now the cash in the account, which is still huge – it's $120 billion in the morning and goes down to $60 billion during the course of the day and back to $120 billion at the end of the day – that cash, we believe, is required under resolution and recovery and liquidity stress testing."

Peak daylight overdrafts
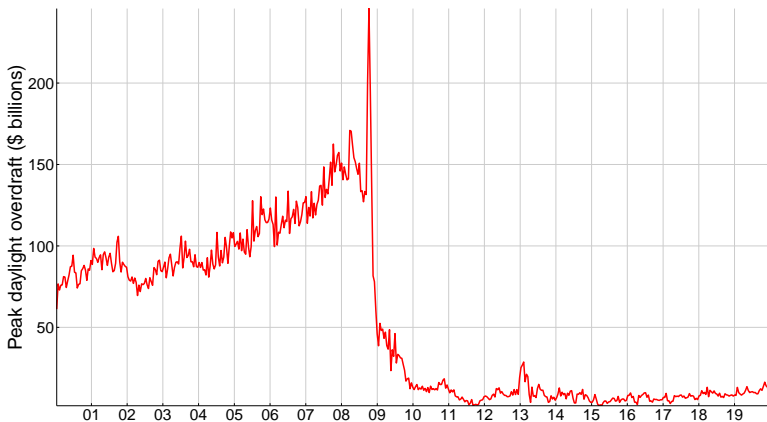
Data: Federal Reserve Board
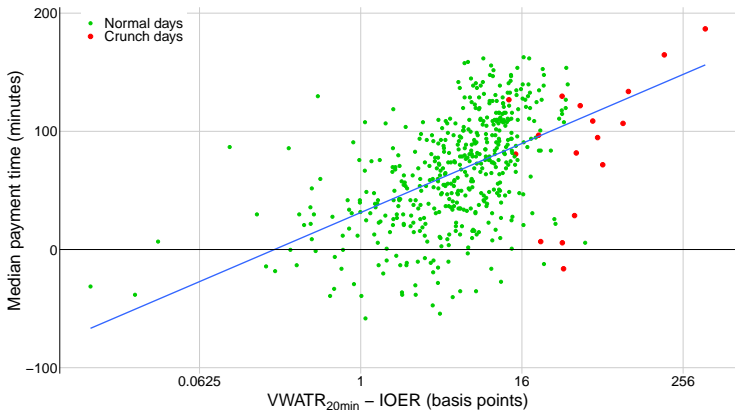
Intraday interdealer volumes on Tradition
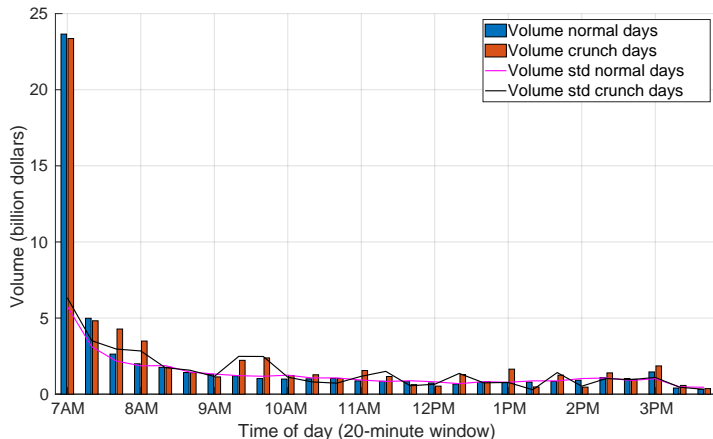
Figure: Average and standard deviation, across normal days and across crunch days, of Tradition O/N Treasury repo trading volume in each 20-minute time window. Data: Tradition.

Opening repo spreads are elevated on days when intraday payment timing shows stress

Figure: Horizontal axis: VWATR-IOER in the beginning 20 minutes, in basis points (log scale). VWATR is the volume-weighted average estimated mid-point repo rate executed on Tradition. Vertical axis: the time, net of sample mean, at which 50% of the day's total incoming value has been received over Fedwire by dealer banks. The regression line fits median payment time to log(VWATR-IOER). Data sources: Fedwire and Tradition.

When large dealer opening reserve balances were lower, peak daylight overdrafts were higher
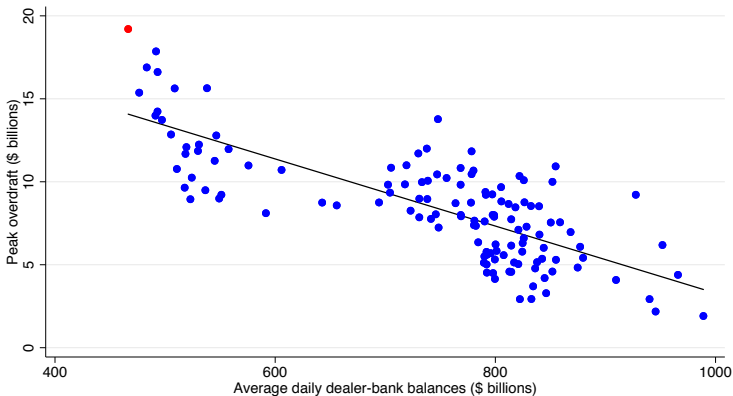
Figure: A scatter plot of peak intraday overdrafts over two-week periods, as reported by the Federal Reserve, and the average of the total opening reserve balances of our study's nine dealer banks during the same two-week periods. The R^2 for the linear relationship, plotted, is 0.60. The red dot is the maintenance period containing September 17, 2019. Data sources: Federal Reserve and Fedwire.

Dealer-bank balances: Opening minus intra-day drop
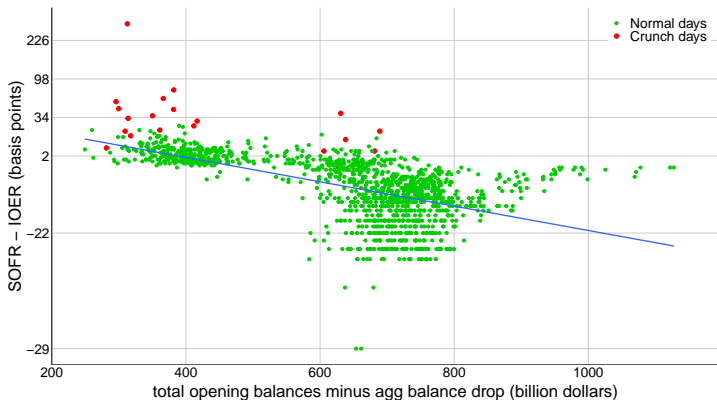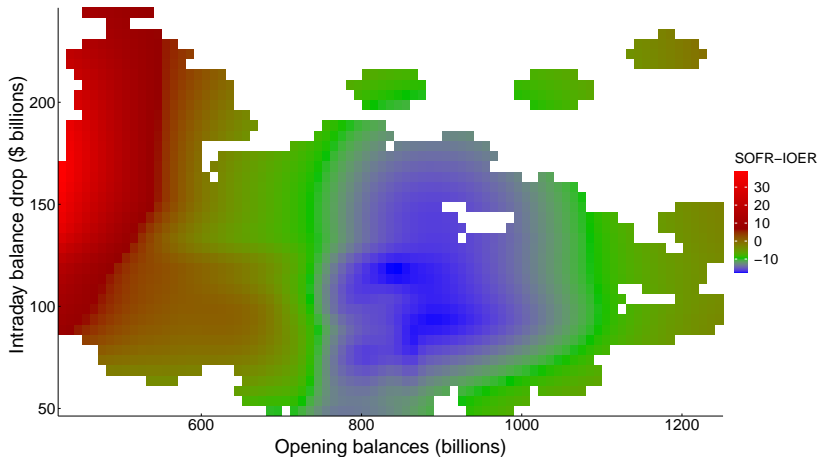
Figure: Data: Fedwire Funds Service, FRBNY. Vertical axis in log scale.

Separate regression:

SOFR − IOER = c − 0.025*** opening balances + 0.027*** intra-day balance drop + 0.085*** median receive time + 9.07*** quarter-end fixed effect + residual. ($R^2 = 0.38$).

SOFR-IOER against opening balances and intraday balance drop

Data: Fedwire Funds Service, FRBNY.

Further explanation of repo rate spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Dependent variable: SOFR − IOER				
dealer opening balances	−0.055***		−0.027***	−0.028***	−0.018***	−0.030***	−0.020***
	(0.004)		(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
median time of receives		0.152***	0.098***	0.096***	0.065***	0.090***	0.064***
		(0.013)	(0.016)	(0.016)	(0.019)	(0.016)	(0.019)
quarter-end fixed effect				13.013***	13.527***	8.895**	10.121**
				(4.201)	(4.179)	(4.107)	(4.044)
net Treasuries inventory					0.047***		0.043***
					(0.006)		(0.007)
Treasury redemption						−0.060***	−0.015
						(0.015)	(0.013)
Bill issuance						0.071***	0.024**
						(0.012)	(0.012)
Coupon issuance						0.091***	0.053***
						(0.017)	(0.015)
Constant	32.49***	−9.92***	10.72***	10.83***	−5.56***	11.71***	−4.23*
	(3.04)	(0.23)	(2.39)	(2.36)	(2.11)	(2.29)	(2.35)
Observations	1,347	1,346	1,346	1,346	1,343	1,346	1,343
R^2	0.306	0.334	0.366	0.378	0.404	0.393	0.412
Adjusted R^2	0.306	0.334	0.365	0.377	0.402	0.391	0.409
Residual Std. Error	11.79	11.56	11.28	11.18	10.96	11.05	10.89

Note: Standard errors are adjusted for heteroskedasticity. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Views on Fed policy by Gagnon and Sack (2019)

- *"First, the Fed should implement a standing fixed-rate repo facility from which a set of counterparties (including banks) can borrow at a rate modestly above the rate of interest the Fed pays on excess reserves (IOER)."*

- *"The minimum level of reserves is conceptually murky, impossible to estimate, and likely to vary over time. The best approach is to steer well clear of it, especially since maintaining a higher level of reserves as a buffer has no meaningful cost."*

- *"It is important for the Fed to control the repo rate, and the FOMC directive should explicitly state that. In fact, the Fed should consider even going as far as adopting the repo rate, as measured by the secured overnight financing rate (SOFR), as the targeted policy instrument."*

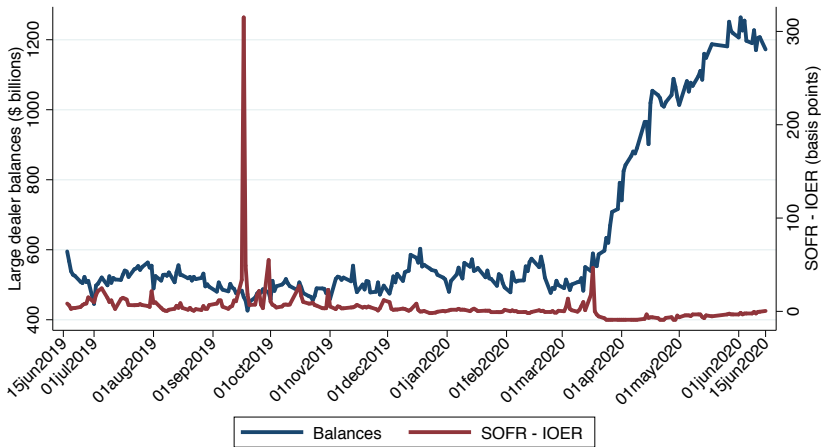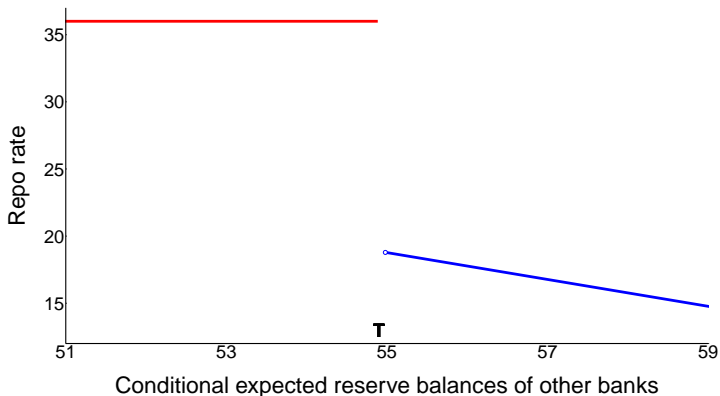# Without cash-hoarding feedback, we will not explain this spike!

Figure: Data: Fedwire Funds Service, FRBNY.

When reserves get low enough, dealers hoard reserves in their equilibrium timing of payments, and repo rates spike

Figure: Source: Yang (2020). Empirical evidence on reserves hoarding: Hamilton (1996), McAndrews and Potter (2002), Ashcraft, McAndrews, and Skeie (2011).

Appendix exhibits

As reserves went down, their distribution across dealers flattened
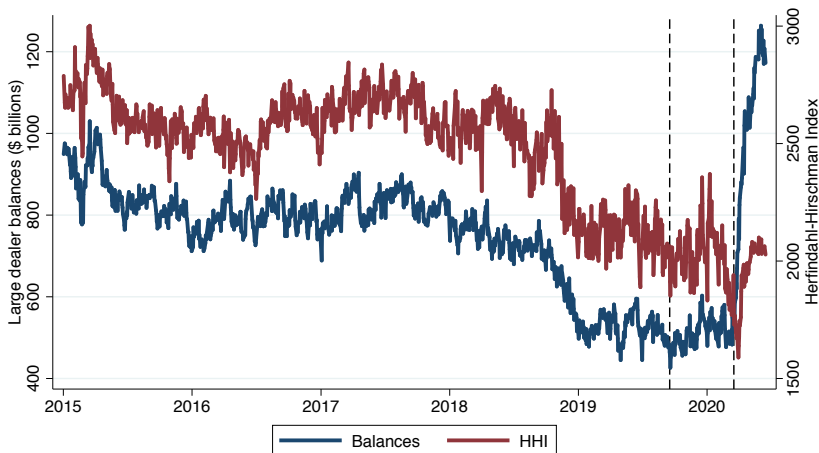
Figure: Repo rate spreads are significantly negatively correlated with HHI (concentration of reserves across the nine large dealers) after controlling for other covariates. Data: Fedwire Funds Service.

When reserves went up, intra-day payments were made earlier
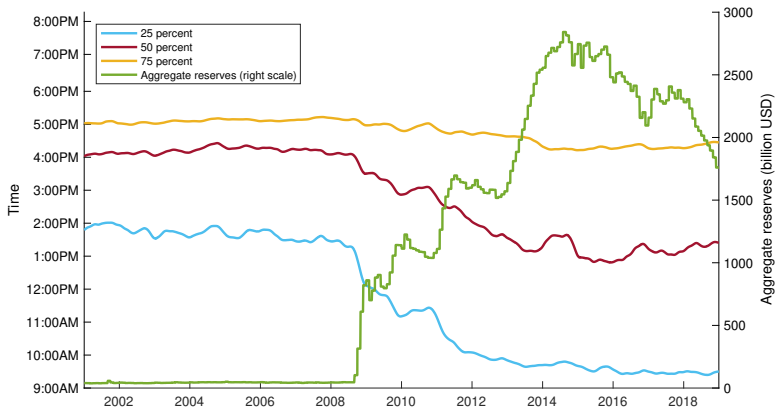
Figure: A variant of a figure from Copeland, Molloy, and Tarascina, Federal Reserve Bank of New York, February 25, 2019, based on data provided by the authors.

Intraday interdealer repo rate spreads and volatility

Figure: Data: Tradition.

SOFR was far from the fed funds target during the COVID19 crisis

Figure: Federal Reserve Bank of New York, Lorie Logan speech, April 14, 2020.
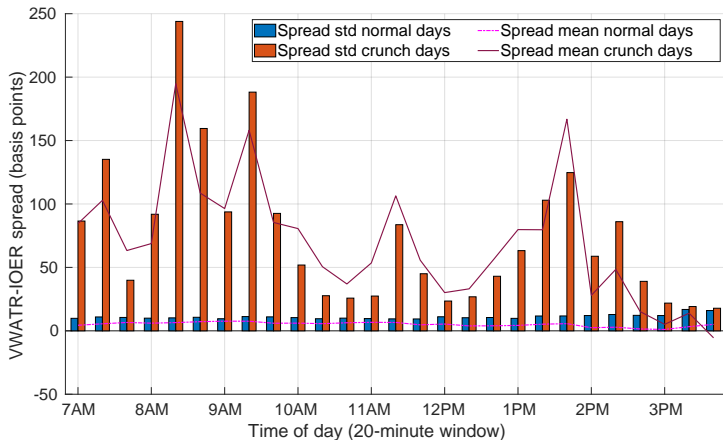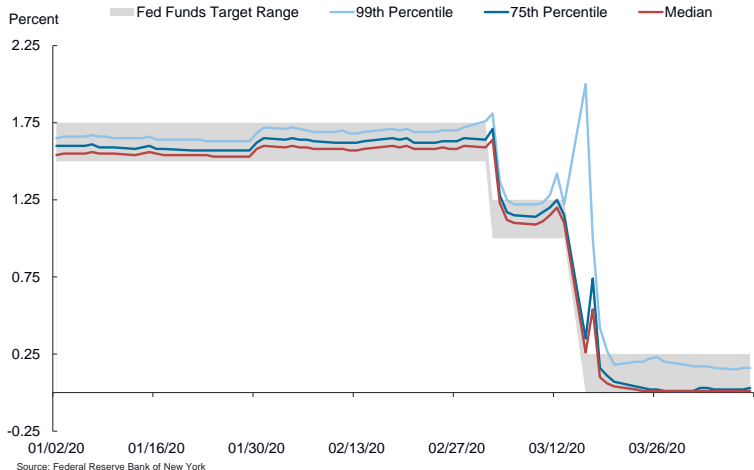
What explains interdealer (GCF) repo spreads over IOER?

Table: Regression models of interdealer (GCF) Treasury repo spreads over IOER.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: GCF − IOER						
dealer opening balances	−0.049***		−0.018***	−0.019***	−0.014***	−0.022***	−0.017***
	(0.005)		(0.004)	(0.004)	(0.003)	(0.004)	(0.003)
median time of receives		0.155***	0.119***	0.115***	0.083***	0.105***	0.081***
		(0.016)	(0.019)	(0.019)	(0.025)	(0.019)	(0.025)
quarter-end fixed effect				30.720**	31.254**	24.503**	25.609**
				(13.107)	(13.103)	(12.435)	(12.499)
net Treasuries inventory					0.039***		0.033***
					(0.008)		(0.009)
Treasury redemption						−0.063***	−0.026
						(0.021)	(0.020)
Bill issuance						0.076***	0.038**
						(0.017)	(0.018)
Coupon issuance						0.120***	0.089***
						(0.025)	(0.022)
Constant	35.83***	−2.45***	11.66***	11.68***	−0.10	13.08***	2.29
	(3.89)	(0.32)	(3.05)	(2.87)	(2.23)	(2.85)	(2.36)
Observations	1,359	1,358	1,358	1,358	1,355	1,358	1,355
R^2	0.168	0.219	0.230	0.274	0.286	0.293	0.300
Adjusted R^2	0.167	0.218	0.229	0.272	0.284	0.289	0.296
Residual Std. Error	16.211	15.713	15.603	15.163	15.050	14.980	14.918

Note: Standard errors are adjusted for heteroskedasticity. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

What explains tri-party (TGCR) repo spreads over IOER?

	Dependent variable: TGCR − IOER						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dealer opening balances	−0.052***		−0.020***	−0.020***	−0.013***	−0.024***	−0.015***
	(0.004)		(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
median time of receives		0.162***	0.123***	0.122***	0.076***	0.114***	0.075***
		(0.013)	(0.016)	(0.016)	(0.019)	(0.015)	(0.019)
quarter-end fixed effect				7.767*	8.554**	4.203	5.919
				(4.062)	(3.871)	(3.948)	(3.789)
net Treasuries inventory					0.057***		0.052***
					(0.006)		(0.006)
Treasury redemption						−0.086***	−0.030**
						(0.015)	(0.012)
Bill issuance						0.096***	0.038***
						(0.012)	(0.011)
Coupon issuance						0.101***	0.052***
						(0.016)	(0.014)
Constant	27.01***	−13.29***	1.90	1.90	−15.00***	3.87*	−12.74***
	(3.11)	(0.21)	(2.26)	(2.26)	(1.78)	(2.14)	(2.06)
Observations	1,359	1,358	1,358	1,358	1,355	1,358	1,355
R^2	0.293	0.378	0.399	0.404	0.446	0.421	0.451
Adjusted R^2	0.293	0.378	0.398	0.402	0.444	0.419	0.448
Residual Std. Error	11.896	11.161	10.975	10.939	10.560	10.788	10.518

Note: Standard errors are adjusted for heteroskedasticity. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.