Internet Appendix For

Dynamic Liquidity Management by

Corporate Bond Mutual Funds

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TABLE A1 Changes in Fund Asset Allocation in Response to Redemptions: An Alternative Sample

This table reports the results of panel regressions of changes in holdings of various asset classes, in percent, on NETOUTFLOW (NETINFLOW), in decimal, at the quarterly frequency, specified as follows:

$$\Delta \text{ASSET\_SHARE}(\%)_{i,t} = \beta_0 + \beta_1 \text{NETINFLOW}_{i,t} + \beta_2 \text{NETOUTFLOW}_{i,t} + \gamma \text{CONTROLS}_{i,t-1} + e_{i,t}.$$

The sample includes corporate bond funds holding at least 20% of their fixed-income assets in corporate bonds at all times. We winsorize fund flows at the top and bottom 1% level, and standardize the natural log of TNA and family size of the funds relative to their means. Other control variables include EX-PENSE_RATIO, TURNOVER, FRONT_LOAD, REAR_LOAD, SHARE_OF_RETAIL, Log of FUND_AGE, and QTR_FUND_RETURN. We include fund- and quarter-fixed effects in the regressions, and cluster standard errors at the fund level, as reported in parentheses. *** 1% statistical significance; ** 5% significance; * 10% significance.

	ΔCASH	ΔGOV BONDS	ΔCORPORATE BONDS
NETINFLOW	0.522	0.652**	-0.064
	(0.49)	(0.32)	(0.49)
NETOUTFLOW	4.781***	1.955**	-3.102***
	(1.14)	(0.97)	(1.17)
Log(TNA)$_{t-1}$	-0.322**	-0.173	0.264**
	(0.15)	(0.12)	(0.13)
Log(FAMILY_SIZE)$_{t-1}$	0.043	-0.239*	-0.167
	(0.16)	(0.14)	(0.18)
EXPENSE_RATIO$_{t-1}$	113.851***	-15.925	-10.582
	(40.26)	(29.46)	(39.68)
TURNOVER_RATIO$_{t-1}$	-0.023	-0.088	0.117*
	(0.07)	(0.05)	(0.06)
FRONT_LOAD$_{t-1}$	-0.001	-0.121	0.111
	(0.08)	(0.10)	(0.12)
REAR_LOAD$_{t-1}$	-0.142*	-0.080	0.183***
	(0.08)	(0.06)	(0.07)
SHARE_OF_RETAIL$_{t-1}$	-0.336	0.257	-0.228
	(0.30)	(0.25)	(0.34)
Log(FUND_AGE)$_{t-1}$	0.386*	0.181	-0.356*
	(0.22)	(0.15)	(0.20)
QTR_FUND_RETURN$_{t-1}$	-0.022	-0.016	0.026
	(0.02)	(0.01)	(0.02)
Constant	6.181	4.713	-5.775
	(4.35)	(7.43)	(10.47)
Fund- and time-fixed effects	Y	Y	Y
Adjusted R-squared	0.072	0.029	0.046
Fund-Quarter Observations	10,087	10,853	10,853

TABLE A2 Changes in Fund Asset Allocation in Response to Redemptions: Seemingly Unrelated Regressions (SUR) Estimation

This table reports the results of SUR estimation of panel regressions of changes in holdings of various asset classes, in percent, on NETOUTFLOW (NETINFLOW), in decimal, at the quarterly frequency, specified as follows:

$$\Delta\text{ASSET\_SHARE}(\%)_{i,t} = \beta_0 + \beta_1\text{NETINFLOW}_{i,t} + \beta_2\text{NETOUTFLOW}_{i,t} + \gamma\text{CONTROLS}_{i,t-1} + e_{i,t}.$$

We winsorize fund flows at the top and bottom 1% level, and standardize the natural log of TNA and family size of the funds relative to their means. Other control variables include EXPENSE_RATIO, TURNOVER, FRONT_LOAD, REAR_LOAD, SHARE_OF_RETAIL, Log of FUND_AGE, and QTR_FUND_RETURN. We include fund-and quarter-fixed effects in the regressions, and cluster standard errors at the fund level, as reported in parentheses. *** 1% significance; ** 5% significance; * 10% significance.

	ΔCASH	ΔGOV BONDS	ΔCORPORATE BONDS
NETINFLOW	0.798*	1.020***	0.447
	(0.46)	(0.36)	(0.50)
NETOUTFLOW	4.226***	2.952***	-3.218***
	(1.02)	(1.05)	(1.17)

TABLE A3 Changes in Fund Asset Allocation in Response to Redemptions: Effects of Aggregate Uncertainty using Alternative Measures

This table reports the results of quarterly panel regressions of changes in asset allocations across various asset classes, in percent, on NETOUTFLOW (NETINFLOW), in decimal, and their interaction terms with aggregate uncertainty as follows:

$$\Delta \text{ASSET\_SHARE}(\%)_{i,t} = \beta_0 + \beta_{1,1}\text{NETINFLOW}_{i,t} \times \text{LOWVOL}_t + \beta_{1,2}\text{NETINFLOW}_{i,t} \times \text{HIGHVOL}_t$$
$$+\beta_{2,1}\text{NETOUTFLOW}_{i,t} \times \text{LOWVOL}_t + \beta_{2,2}\text{NETOUTFLOW}_{i,t} \times \text{HIGHVOL}_t + \gamma\text{CONTROLS}_{i,t-1} + e_{i,t}.$$

The LOWVOL (HIGHVOL) indicator variable takes a value of 1 if market volatility is below (above) historical sample median, and 0 otherwise. Panel A reports results when LOWVOL (HIGHVOL) is based on the 1-month CBOE implied volatility, Panel B based on 12-month CBOE implied volatility, and Panel C based on the implied volatility of 10-year Treasury swaptions. We winsorize fund flows at the top and bottom 1% level, and standardize the natural log of TNA and family size of the funds relative to their means. Other control variables include EXPENSE_RATIO, TURNOVER, FRONT_LOAD, REAR_LOAD, SHARE_OF_RETAIL, Log of FUND_AGE, and QTR_FUND_RETURN, TERM_SPREADS, CREDIT_SPREADS, and HIGHVOL. We include fund-fixed effects in the regressions, and cluster standard errors at the fund level, as reported in parentheses. *** 1% significance; ** 5% significance; * 10% significance.

Interaction of VOLATILITY with NETOUTFLOW	ΔCASH	ΔGOV BONDS	ΔCORPORATE BONDS
Panel A: 1-Month Volatility			
LOWVOL × NETOUTFLOW	4.389***	4.469***	-5.307***
	(1.15)	(1.25)	(1.39)
HIGHVOL × NETOUTFLOW	1.416	1.396	-1.979
	(1.97)	(1.73)	(2.07)
Panel B: 12-Month Volatility			
LOWVOL × NETOUTFLOW	4.479***	3.643**	-5.335***
	(1.20)	(1.42)	(1.56)
HIGHVOL × NETOUTFLOW	1.489	2.793*	-2.793
	(1.69)	(1.48)	(1.75)
Panel C: Implied Volatility of Swaptions on 10-Year Treasuries			
LOWVOL × NETOUTFLOW	3.187***	3.864***	-4.429***
	(1.17)	(1.21)	(1.33)
HIGHVOL × NETOUTFLOW	3.767**	2.156	-3.385
	(1.89)	(1.86)	(2.15)

TABLE A4 Changes in Fund Asset Allocation in Response to Redemptions: Controlling for Bonds to Retire

This table reports the results of panel regressions of changes in holdings of various asset classes, in percent, on NETOUTFLOW (NETINFLOW), in decimal, at the quarterly frequency, specified as follows:

$$\Delta \text{ASSET\_SHARE}(\%)_{i,t} = \beta_0 + \beta_1 \text{NETINFLOW}_{i,t} + \beta_2 \text{NETOUTFLOW}_{i,t} + \gamma \text{CONTROLS}_{i,t-1} + e_{i,t}.$$

In Regressions 1–3 (4–6), we include the percentage of bonds to retire in a quarter (year) as a control variable. We winsorize fund flows at the top and bottom 1% level, and standardize the natural log of TNA and family size of the funds relative to their means. Other control variables include EXPENSE_RATIO, TURNOVER, FRONT_LOAD, REAR_LOAD, SHARE_OF_RETAIL, Log of FUND_AGE, and QTR_FUND_RETURN. We include fund- and quarter-fixed effects in the regressions, and cluster standard errors at the fund level, as reported in parentheses. *** 1% statistical significance; ** 5% significance; * 10% significance.

	(1)	(2)	(3)	(4)	(5)	(6)
	ΔCASH	ΔGOV BONDS	ΔCORPORATE BONDS	ΔCASH	ΔGOV BONDS	ΔCORPORATE BONDS
NETINFLOW	0.806	1.037***	0.464	0.803	0.972***	0.469
	(0.49)	(0.36)	(0.51)	(0.49)	(0.36)	(0.51)
NETOUTFLOW	4.347***	2.925***	-3.217***	4.363***	3.006***	-3.223***
	(1.07)	(1.07)	(1.19)	(1.07)	(1.07)	(1.19)
Log(TNA)$_{t-1}$	-0.336**	-0.177	0.257**	-0.340**	-0.197	0.249*
	(0.16)	(0.12)	(0.13)	(0.16)	(0.12)	(0.13)
Log(FAMILY_SIZE)$_{t-1}$	0.104	-0.247*	-0.480**	0.107	-0.215	-0.469**
	(0.18)	(0.15)	(0.19)	(0.18)	(0.15)	(0.19)
EXPENSE_RATIO$_{t-1}$	48.258	-43.121	-24.02	49.449	-46.878	-20.258
	(37.97)	(37.27)	(46.04)	(37.98)	(38.06)	(46.21)
TURNOVER_RATIO$_{t-1}$	0.034	-0.217***	0.125**	0.03	-0.223***	0.119**
	(0.07)	(0.06)	(0.06)	(0.07)	(0.06)	(0.06)
FRONT_LOAD$_{t-1}$	-0.062	-0.158*	0.05	-0.061	-0.166**	0.056
	(0.06)	(0.08)	(0.10)	(0.06)	(0.08)	(0.10)
REAR_LOAD$_{t-1}$	-0.114	-0.017	0.133	-0.115	-0.02	0.134*
	(0.08)	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)
SHARE_OF_RETAIL$_{t-1}$	-0.269	0.314	-0.048	-0.27	0.329	-0.056
	(0.27)	(0.28)	(0.33)	(0.27)	(0.28)	(0.33)
Log(FUND_AGE)$_{t-1}$	0.502**	0.412**	-0.495**	0.505**	0.423**	-0.503**
	(0.22)	(0.16)	(0.24)	(0.22)	(0.16)	(0.24)
QTR_FUND_RETURN$_{t-1}$	-0.013	-0.033**	0.045**	-0.013	-0.033**	0.044**
	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)
%BONDSRETIRE1	3.289	-16.378*	18.052*			
	(6.57)	(9.69)	(9.44)			
%BONDSRETIRE4				-1.316	-5.045***	-0.414
				(0.92)	(1.55)	(1.64)
CONSTANT	-1.178**	-0.457	1.729**	-1.154**	-0.346	1.720**
	(0.50)	(0.59)	(0.76)	(0.50)	(0.59)	(0.76)
Adjusted R-squared	0.066	0.025	0.042	0.066	0.028	0.041
Fund-Quarter Observation	13408	15624	15624	13408	15624	15624

TABLE A5 Determinants of the Level of Cash Holdings

This table reports the results of panel regressions of cash holdings, in percent, on fund characteristics at the quarterly frequency. Columns (1) to (4) use the level of cash holdings defined as the ratio of cash to a fund's total net assets. Column (5) uses the residual cash holdings defined as the difference between actual cash level and expected cash level estimated using the specification as in Column (2). We winsorize fund flows at the top and bottom 1% level, and standardize the natural log of TNA and family size of the funds relative to their means. Other control variables include EXPENSE_RATIO, TURNOVER, FRONT_LOAD, REAR_LOAD, SHARE_OF_RETAIL, Log of FUND_AGE, and QTR_FUND_RETURN. We include fund- and quarter-fixed effects in the regressions, and cluster standard errors at the fund level, as reported in parentheses. *** 1% statistical significance; ** 5% significance; * 10% significance.

	CASH	CASH	CASH	CASH	ABNORMAL_CASH
	(1)	(2)	(3)	(4)	(5)
FLOWVOL	0.053**				
	(0.02)				
VIX					0.051***
					(0.01)
CORP_SHARE$_{t-1}$	0.004	0.001	0.007	0.004	
	(0.01)	(0.01)	(0.01)	(0.01)	
Log(TNA) (std)	-0.26	-0.261	-0.81	-0.264	
	(0.19)	(0.21)	(0.54)	(0.21)	
Log(FAMILY_SIZE)	0.002	0.087	0.634	0.02	
	(0.20)	(0.22)	(0.77)	(0.22)	
TURNOVER$_{t-1}$	0.036	-0.069	0.401	-0.063	
	(0.15)	(0.17)	(0.27)	(0.16)	
SHARE_OF_RETAIL$_{t-1}$	0.391	0.672	1.081	0.393	
	(0.32)	(0.41)	(0.87)	(0.43)	
EXP_NETFLOW		1.062	0.554	1.814	
		(1.40)	(1.24)	(1.37)	
FLOWVOL$_{t-1}$		0.003	-0.015	0.023	
		(0.03)	(0.03)	(0.03)	
EXPENSE_RATIO$_{t-1}$		-24.511	-272.548*	-17.828	
		(54.79)	(164.07)	(53.27)	
FRONT_LOAD$_{t-1}$		-0.15	0.415	-0.194*	
		(0.11)	(0.28)	(0.11)	
REAR_LOAD$_{t-1}$		0.407**	-0.209	0.319	
		(0.19)	(0.36)	(0.20)	
Log(FUND_AGE)$_{t-1}$		-0.577*	-2.988***	-0.151	
		(0.31)	(0.76)	(0.32)	
QTR_FUND_RETURN$_{t-1}$		-0.080***	-0.062***	-0.036	
		(0.01)	(0.01)	(0.02)	
CONSTANT	3.472***	5.777***	13.544***	4.444***	-1.011***
	(0.44)	(1.08)	(2.80)	(1.09)	(0.14)
Fixed Effect	quarter	fund	quarter	none	fund
R^2	0.034	0.015	0.226	0.04	
N	8,323	6,935	6,935	6,935	6,935

TABLE A6 Effects of Aggregate Uncertainty on Changes in Fund Asset Allocation in Response to Redemptions: Funds with Sufficient Cash

This table reports the results of quarterly panel regressions of changes in asset allocations across various asset classes, in percent, on NETOUTFLOW (NETINFLOW), in decimal, and their interaction terms with aggregate uncertainty as follows:

$$\Delta\text{ASSET\_SHARE}(\%)_{i,t} = \beta_0 + \beta_{1,1}\text{NETINFLOW}_{i,t} \times \text{LOWVOL}_t + \beta_{1,2}\text{NETINFLOW}_{i,t} \times \text{HIGHVOL}_t$$
$$+\beta_{2,1}\text{NETOUTFLOW}_{i,t} \times \text{LOWVOL}_t + \beta_{2,2}\text{NETOUTFLOW}_{i,t} \times \text{HIGHVOL}_t + \gamma\text{CONTROLS}_{i,t-1} + e_{i,t}.$$

We use a smaller sample of funds with sufficient cash reserves, defined as those whose last-quarter cash holdings plus expected within-quarter flows are greater than 0. The LOWVOL(HIGHVOL) indicator variable takes a value of 1 if 3-month CBOE implied volatility is below (above) historical sample median, and 0 otherwise. We winsorize fund flows at the top and bottom 1% level, and standardize the natural log of TNA and family size of the funds relative to their means. Other control variables include EXPENSE_RATIO, TURNOVER, FRONT_LOAD, REAR_LOAD, SHARE_OF_RETAIL, Log of FUND_AGE, and QTR_FUND_RETURN, TERM_SPREADS, CREDIT_SPREADS, and HIGHVOL. We include fund-fixed effects in the regressions, and cluster standard errors at the fund level, as reported in parentheses. *** 1% significance; ** 5% significance; * 10% significance.

Interaction of VOLATILITY with NETOUTFLOW	ΔCASH	ΔGOVERNMENT BONDS	ΔCORPORATE BONDS
LOWVOL × NETOUTFLOW	5.499***	4.439***	-5.114***
	(1.35)	(1.43)	(1.63)
HIGHVOL × NETOUTFLOW	3.901*	1.595	0.871
	(2.27)	(2.06)	(2.48)
$Adj.R^2$	0.025	-0.013	0.003
N	11,488	12,570	12,570

TABLE A7 Flow-Implied Trade and Future Bond Returns: Portfolio Sorts

This table reports the results from quarterly regressions of the difference in cumulative abnormal returns between high and low flow-implied trade quintiles on the lagged VIX variable:

$$\text{CUM\_ABNORMAL\_RETURN}_{t,t+k}^{Hi-Low} = \beta_0 + \beta_1 VIX_t + e_t, k = 1, 2.$$

Each quarter, we construct quintile portfolios by sorting corporate bonds based on the level of flow-implied trades. We compute equal-weighted (par value-weighted) cumulative abnormal returns as the simple (par-weighted weighted) average of the cumulative abnormal bond returns over the next 1 to 3 quarters within each quintile. Abnormal bond return, in percent, is the raw bond return subtracted by the size-weighted average return of the portfolio of bonds matched on credit rating, financial/nonfinancial classification, and time to maturity in that quarter. The CUM_ABNORMAL_RETURN^{Hi-Low} is the difference in cumulative abnormal returns between the high- and low-pressure quintiles. The Newey-West standard errors are reported in parentheses. *** 1% significance; ** 5% significance; * 10% significance.

		$Qtr_{t,t+1}$	$Qtr_{t,t+2}$
EW	Intercept	0.709**	0.862*
		(0.33)	(0.45)
	VIX_t	-0.044**	-0.057**
		(0.02)	(0.02)
PVW	Intercept	0.338	0.224
		(0.21)	(0.41)
	VIX_t	-0.027**	-0.024
		(0.01)	(0.02)