Internet Appendix for

"Fund Tradeoffs"

ĽUBOŠ PÁSTOR, ROBERT F. STAMBAUGH, and LUCIAN A. TAYLOR

January 8, 2020

This Internet Appendix presents additional empirical results, mostly robustness results, complementing the results presented in the paper. Most of the results presented here are summarized in the paper.

Contents

Section 5. Robustness of Table 4 (Explaining the Components of Portfolio Liquidity)

Section 6. Robustness of Table 5 (Explaining Fund Activeness)

Section 7. Robustness of Table 6 (Correlations Among Fund Characteristics)

Section 8. Robustness of Table 7 (Activeness and the Turnover-Performance Relation)

1 Robustness of Table 1 (Explaining Mutual Funds' Portfolio Liquidity)

Table IA1

Version of Table 1 Comparing Early and Late Subperiods

Details are the same as in Table 1 in the paper, except Panel A shows results using years 1979–2004, and Panels B shows results using years 2005-2014. These year breakpoints create subsamples of roughly equal size.

Panel A: 1979–2004				
	(1)	(2)	(3)	(4)
Fund Size	0.186			0.162
	(16.91)			(14.61)
Expense Ratio		-0.651		-0.428
		(-10.98)		(-7.99)
Turnover			0.0135	0.0631
			(0.59)	(2.87)
Observations	41558	41823	39213	35069
R^2	0.644	0.616	0.592	0.662
R^2 (FEs only)	0.601	0.589	0.592	0.608

Panel B: 2005–2014				
	(1)	(2)	(3)	(4)
Fund Size	0.133			0.0925
	(12.28)			(8.60)
Expense Ratio		-0.892		-0.780
		(-12.12)		(-10.92)
Turnover			0.0676	0.130
			(2.47)	(5.06)
Observations	47367	47194	42679	41859
R^2	0.609	0.628	0.588	0.646
R^2 (FEs only)	0.584	0.583	0.586	0.586

Table IA2

Version of Table 1 in Subsamples by Fund Type and Number of Stocks

This table contains results from estimating our main specification (paper's Table 1, column 4) in various subsamples. Column titles denote the subsamples. Following Sun (2014)[1], we say that a share class is broker-sold if it has a non-zero front load, a non-zero back load, or a 12b–1 fee exceeding 25 bps; otherwise, the share class is direct sold. Fraction Broker-Sold is the fraction of the fund's AUM in share classes that are classified as broker-sold. We choose the 100% breakpoint for Fraction Broker-Sold because it creates subsamples of roughly equal size. 12b-1 Fee is Low if it is less than 2.23 bp per year, our sample median. Has Inst. Share Class is Yes if at least one of the fund's share classes is an institutional class, as reported by Morningstar. Number of Stocks is Low if the fund's number of stocks is below the median across funds within the given sector and quarter. Remaining details are the same as in the paper's Table 1.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Fraction Broker-Sold | | 12b-1 Fee | | Has Inst. Share Class? | | Number of Stocks | |
	<100%	100%	Low	High	Yes	No	Low	High
Fund Size	0.118	0.0987	0.107	0.0999	0.0904	0.142	0.0903	0.0410
	(7.77)	(7.90)	(6.84)	(9.16)	(7.57)	(10.73)	(7.91)	(4.13)
Expense Ratio	-0.884	-0.576	-0.884	-0.660	-0.728	-0.539	-0.349	-0.498
	(-9.02)	(-7.84)	(-8.76)	(-9.98)	(-9.60)	(-7.65)	(-6.02)	(-9.93)
Turnover	0.0801	0.0748	0.104	0.0874	0.0904	0.0877	0.0596	-0.0235
	(2.53)	(2.48)	(3.47)	(3.52)	(3.39)	(3.23)	(2.57)	(-0.96)
Observations	23647	27965	36292	40636	35831	39856	38505	38423
R^2	0.684	0.683	0.639	0.685	0.700	0.632	0.695	0.717
R^2 (FEs only)	0.624	0.647	0.562	0.643	0.662	0.567	0.677	0.690

[1]Sun, Yang, 2014, The effect of index fund competition on money management fees, Working paper, University of Hong Kong.

Table IA3
Version of Table 1 Controlling for Fraction of Portfolio Held in Cash

Details are the same as in the paper's Table 1, except we now control for the fraction of the portfolio held in cash (Cash Fraction). This variable comes from Morningstar. Cash Fraction is often missing, so we present results with and without controlling for Cash Fraction, both in the subsample with non-missing Cash Fraction.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fund Size	0.154	0.153					0.118	0.119
	(12.00)	(12.32)					(9.20)	(9.43)
Expense Ratio			-0.908	-0.857			-0.800	-0.746
			(-14.20)	(-13.81)			(-12.34)	(-11.86)
Turnover					0.0124	-0.00383	0.0631	0.0471
					(0.41)	(-0.13)	(2.21)	(1.73)
Cash Fraction		-4.029		-3.499		-3.973		-3.340
		(-7.42)		(-7.05)		(-8.14)		(-6.73)
Observations	43199	43199	42377	42377	38754	38754	37004	37004
R^2	0.626	0.644	0.645	0.659	0.603	0.622	0.661	0.673
R^2 (FEs only)	0.602	0.602	0.602	0.602	0.603	0.603	0.605	0.605

6

Table IA4
Version of Table 1 Controlling for Flow Volatility

This table is the same as Table 1 in the paper, except we control for flow volatility. Flow volatility is the standard deviation of the fund's 12 monthly fraction flows during the previous calendar year. We winsorize the variable at the 1st and 99th percentiles. Panel A controls for log flow volatility, Panel B controls for raw (not logged) flow volatility.

Panel A: Control for Log Flow Volatility

	(1)	(2)	(3)	(4)
Fund Size	0.147			0.115
	(15.34)			(11.90)
Expense Ratio		-0.730		-0.603
		(-11.12)		(-10.02)
Turnover			0.0736	0.124
			(3.36)	(5.86)
Log(Flow Volatility)	-0.00667	-0.0440	-0.0641	-0.0178
	(-0.71)	(-4.58)	(-6.01)	(-1.94)
Observations	68891	68758	62620	61946
R^2	0.639	0.642	0.618	0.664
R^2 (FEs only)	0.610	0.610	0.614	0.614

Panel B: Control for Raw (Not Logged) Flow Volatility

	(1)	(2)	(3)	(4)
Fund Size	0.149			0.118
	(15.62)			(12.40)
Expense Ratio		-0.739		-0.602
		(-11.32)		(-10.09)
Turnover			0.0644	0.121
			(2.93)	(5.72)
Flow Volatility	0.256	0.189	0.0790	0.244
	(3.60)	(2.60)	(1.00)	(3.47)
Observations	68891	68758	62620	61946
R^2	0.639	0.641	0.615	0.664
R^2 (FEs only)	0.610	0.610	0.614	0.614

Table IA5

Version of Table 1 at Annual Frequency

This table is the same as Table 1 in the paper, except we only include data from the quarter ending in December.

	(1)	(2)	(3)	(4)
Fund Size	0.164			0.135
	(17.46)			(13.85)
Expense Ratio		-0.743		-0.548
		(-13.62)		(-10.27)
Turnover			0.0378	0.0965
			(1.66)	(4.49)
Observations	18391	18226	16301	15403
R^2	0.641	0.631	0.602	0.660
R^2 (FEs only)	0.606	0.600	0.601	0.608

Table IA6
Version of Table 1 with Double-Clustered Standard Errors

This table is the same as Table 1 in the main paper, except we cluster by fund and quarter instead of by fund alone.

	(1)	(2)	(3)	(4)
Fund Size	0.157			0.124
	(16.94)			(12.92)
Expense Ratio		-0.766		-0.608
		(-12.77)		(-10.49)
Turnover			0.0408	0.101
			(1.93)	(4.90)
Observations	88905	89014	81887	76906
R^2	0.627	0.623	0.591	0.652
R^2 (FEs only)	0.594	0.588	0.591	0.598

Table IA7
Version of Table 1 Using Quarter Fixed Effects

Details are the same as in Table 1 in the paper, except we use quarter fixed effects (FEs) instead of sector × quarter FEs.

	(1)	(2)	(3)	(4)
Fund Size	0.245			0.164
	(17.09)			(11.05)
Expense Ratio		-1.418		-1.186
		(-17.85)		(-14.58)
Turnover			-0.0953	0.0239
			(-3.12)	(0.81)
Observations	88925	89017	81892	76928
R^2	0.097	0.145	0.017	0.174
R^2 (FEs only)	0.014	0.014	0.014	0.013

Table IA8
Version of Table 1 Restricting $\gamma = \lambda$

This table matches column 4 of Table 1 in the paper, except we replace the regressors with the log product of Fund Size and Turnover, and the log product of Fund Size and Expense Ratio.

Fund Size $\times$ Turnover	0.166
	(8.63)
Fund Size $\times$ Expense Ratio	-0.0243
	(-1.18)
Observations	76928
R^2	0.631
R^2 (FEs only)	0.598

This table tests our model's main prediction under the restriction that $\gamma = \lambda$. To see this, note that we can rearrange equation (16) in the paper as

$$\ln L = \frac{1}{\phi} \ln[(\gamma - 1)\theta] + \left(\frac{\gamma}{\phi}\right) \ln A + \left(\frac{\lambda}{\phi}\right) \ln T - \left(\frac{1}{\phi}\right) \ln(Af) \ . \tag{1}$$

Applying the restriction $\gamma = \lambda$ yields

$$\ln L = \frac{1}{\phi} \ln[(\gamma - 1)\theta] + \left(\frac{\gamma}{\phi}\right) \ln(AT) - \left(\frac{1}{\phi}\right) \ln(Af) \ . \tag{2}$$

With this restriction, the model predicts that portfolio liquidity is positively related to AT (Fund Size $\times$ Turnover) and negatively related to Af (Fund Size $\times$ Expense Ratio), in logs. The regression evidence above supports both predictions, although the coefficient on Fund Size $\times$ Expense Ratio is not statistically significant. The R^2 above, 0.631, is slightly lower than the R^2 of 0.651 in column 4 of Table 1 in the paper. In other words, imposing the restriction $\gamma = \lambda$ reduces the model's explanatory power.

2 Robustness of Table 2 (Explaining Volume-Based Portfolio Liquidity)

Table IA9

Version of Table 2 with Double-Clustered Standard Errors

This table is the same as Table 2 in the main paper, except we cluster by fund and quarter instead of by fund alone.

	(1)	(2)	(3)	(4)
Fund Size	0.159			0.133
	(15.10)			(12.58)
Expense Ratio		-0.743		-0.617
		(-11.00)		(-9.92)
Turnover			0.180	0.242
			(7.72)	(10.51)
Observations	88902	89011	81884	76903
R^2	0.596	0.589	0.574	0.631
R^2 (FEs only)	0.568	0.562	0.564	0.572

3 Robustness of Table 3 (Explaining Portfolio Liquidity Under Nonlinear Trading Costs)

Table IA10
Version of Table 3 with Double-Clustered Standard Errors

This table is the same as Table 3 in the main paper, except we cluster by fund and quarter instead of by fund alone.

	$\eta = 0.1$	$\eta = 0.3$	$\eta = 0.5$	$\eta = 0.7$	$\eta = 0.9$
Fund Size	0.00922	0.0298	0.0534	0.0798	0.109
	(11.06)	(11.57)	(12.02)	(12.43)	(12.77)
Expense Ratio	-0.0519	-0.163	-0.283	-0.409	-0.541
	(-10.81)	(-10.85)	(-10.80)	(-10.69)	(-10.56)
Turnover	0.00870	0.0273	0.0473	0.0683	0.0901
	(4.72)	(4.82)	(4.87)	(4.90)	(4.90)
Observations	76906	76906	76906	76906	76906
R^2	0.724	0.710	0.694	0.677	0.660

4 Additional Descriptive Evidence on Portfolio Liquidity and Its Components

Table IA11

Are There Time Trends in Portfolio Liquidity and Its Components?

The dependent variable in each regression is listed in the column header. TimeTrend is the number of months since January 1979. Panel A includes no FEs, Panel B includes Sector FEs, and Panel C includes fund FEs. All regressions cluster by fund.

Panel A: No Fixed Effects					
	(1)	(2)	(3)	(4)	(5)
	Portfolio Liquidity	Stock Liquidity	Diversification	Coverage	Balance
TimeTrend	0.0000645	-0.0156	0.0000327	0.0000566	0.000499
	(7.80)	(-11.49)	(10.62)	(10.64)	(19.44)
Observations	93366	93366	93366	93366	93366
R^2	0.009	0.020	0.025	0.025	0.063

Panel B: Sector Fixed Effects					
	(1)	(2)	(3)	(4)	(5)
	Portfolio Liquidity	Stock Liquidity	Diversification	Coverage	Balance
TimeTrend	0.0000793	-0.0148	0.0000328	0.0000577	0.000465
	(8.85)	(-11.58)	(9.52)	(9.66)	(17.36)
Observations	93366	93366	93366	93366	93366
R^2	0.271	0.534	0.060	0.053	0.206

Panel C: Fund Fixed Effects					
	(1)	(2)	(3)	(4)	(5)
	Portfolio Liquidity	Stock Liquidity	Diversification	Coverage	Balance
TimeTrend	0.0000932	-0.00183	0.0000195	0.0000349	0.000385
	(13.08)	(-1.45)	(13.64)	(10.85)	(15.18)
Observations	93366	93366	93366	93366	93366
R^2	0.774	0.770	0.887	0.878	0.679

14

Figure IA1
Effects of Fund Entry and Exit on Figure 1: Funds Alive from 2005–2014

This figure explores whether the patterns in Figure 1 are driven by within-fund variation or entry and exit of funds. Each panel below corresponds to a time series in Figure 1 in the main paper. We only show results from 2005–2014. The solid line is the same as in Figure 1. To remove the effects of fund entry and exit, the dashed line shows the average across the 889 funds that were present in the sample from 2005–2014.
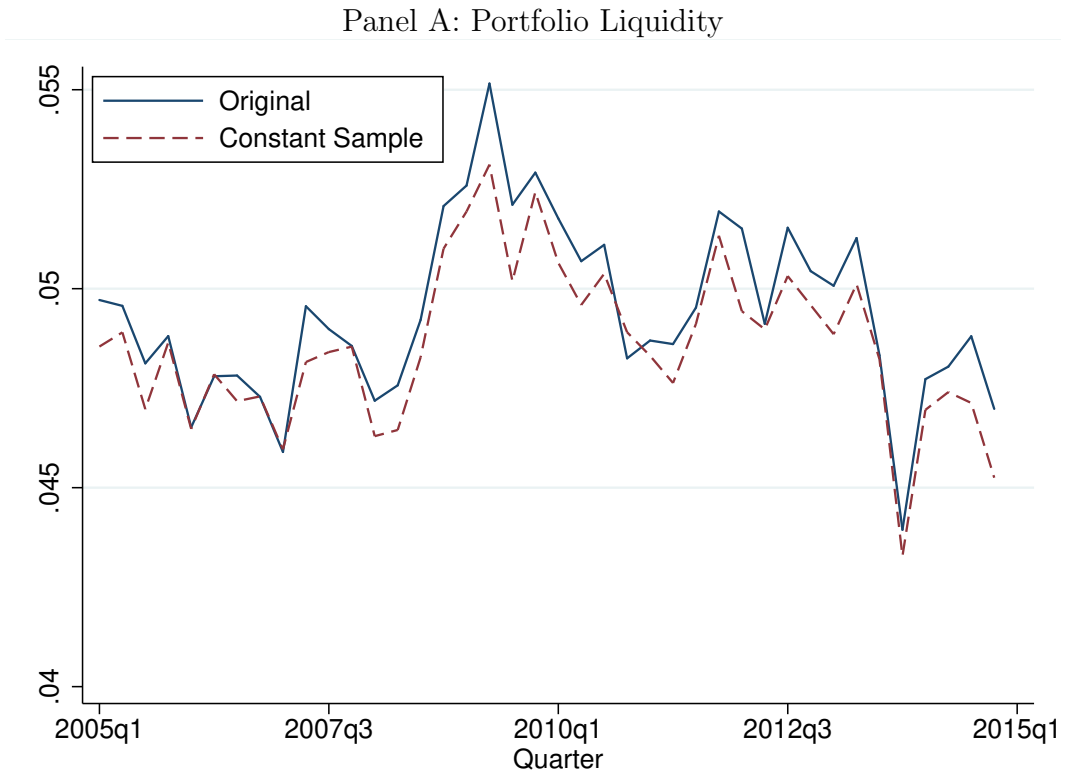
Panel A: Portfolio Liquidity

Panel B: Stock Liquidity

Panel C: Diversification

Panel D: Balance
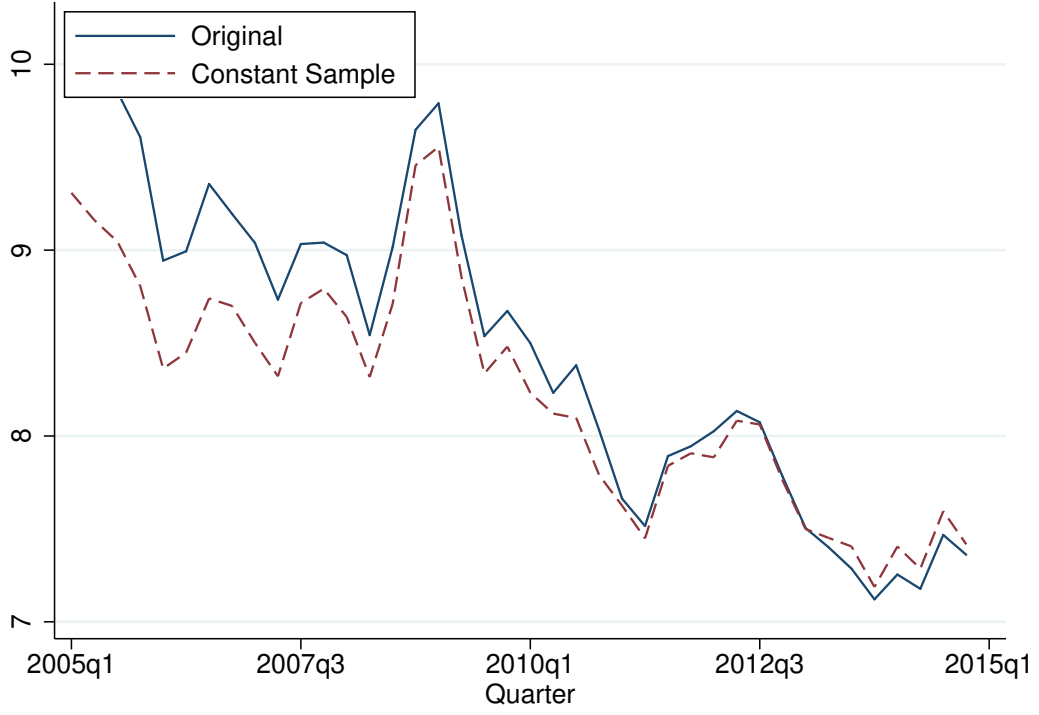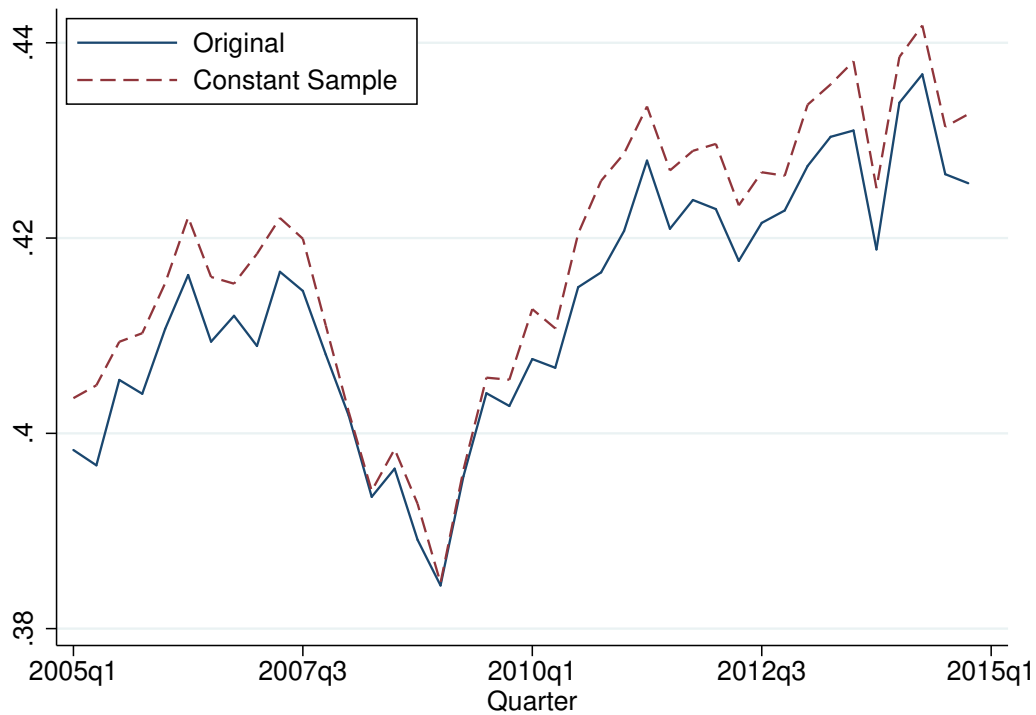

Panel E: Coverage
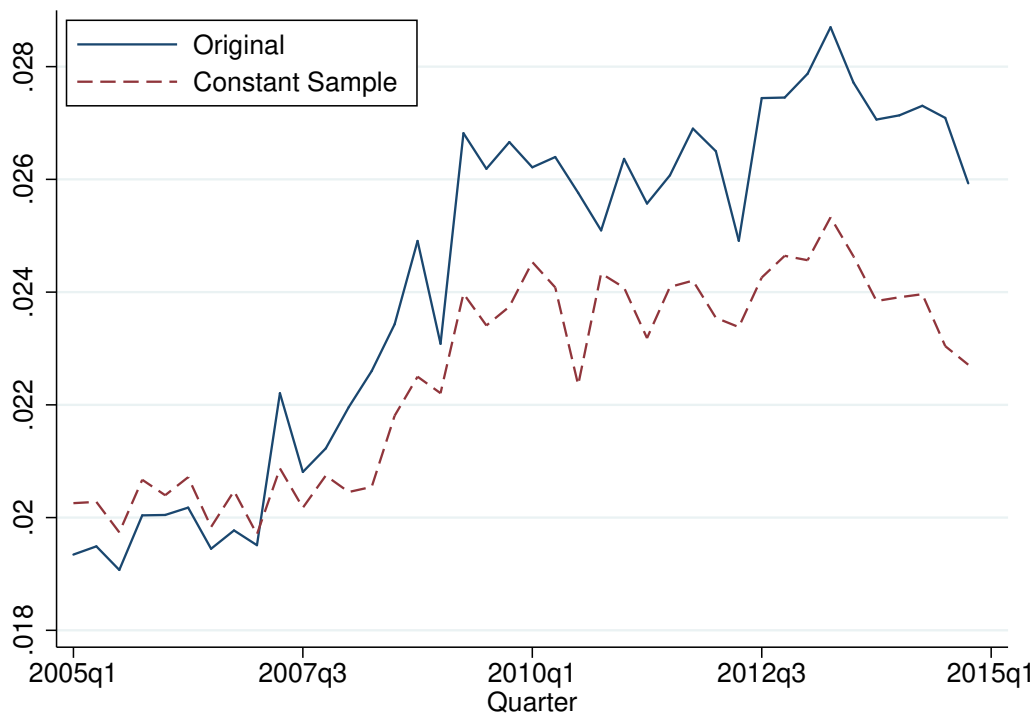
Panel F: Num. Stocks per Fund

Figure IA2
Effects of Fund Entry and Exit on Figure 1: First Differences
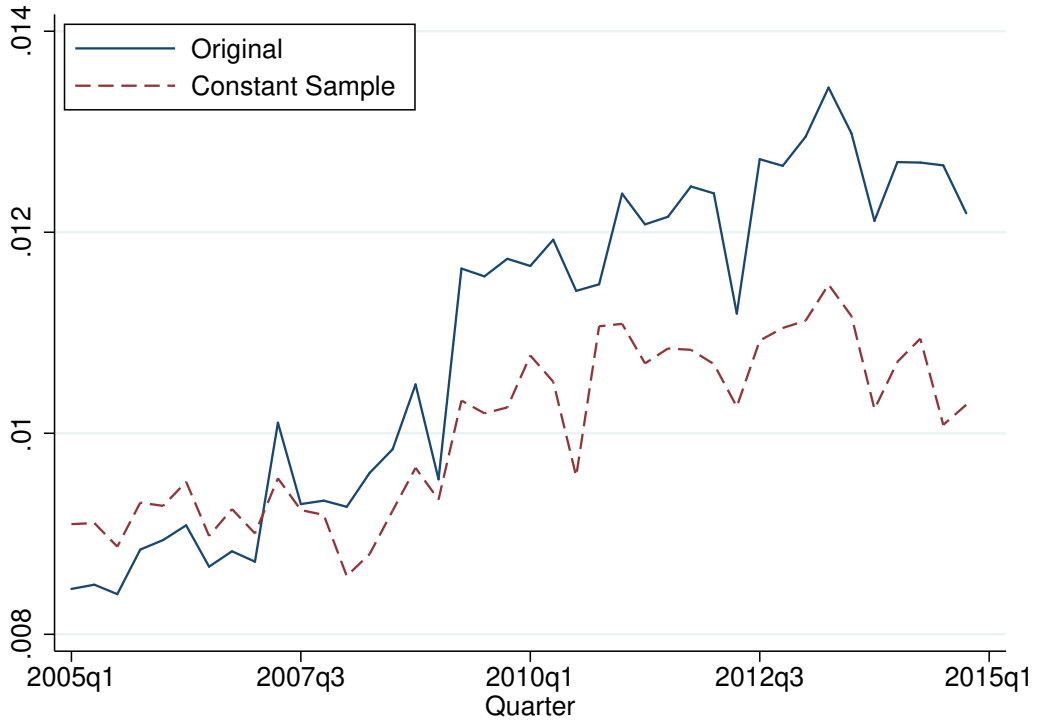
This figure explores whether the patterns in Figure 1 are driven by within-fund variation or entry and exit of funds. Each panel below corresponds to a time series in Figure 1 in the main paper. The line marked "Orig. Shifted" is the line from Figure 1 in our paper, except we have shifted it vertically so it begins at zero. The line marked "Cum. Avg. 1st Diff." is an alternative version that depends only on time-series changes within funds, as opposed to changes in the composition of funds. To remove the effects of fund entry and exit, we compute the alternative version by computing quarterly first difference in the variable at the fund level, averaging these first differences across funds each quarter, then plotting the cumulative sum of the average changes.

Panel A: Portfolio Liquidity

Panel B: Stock Liquidity

Panel C: Diversification

Panel D: Balance

Panel E: Coverage

Panel F: Num. Stocks per Fund

Legend:
- Num. Stocks per Fund (Orig. Shifted)
- Num. Stocks per Fund (Cum Avg. 1st Diff.)

Quarter
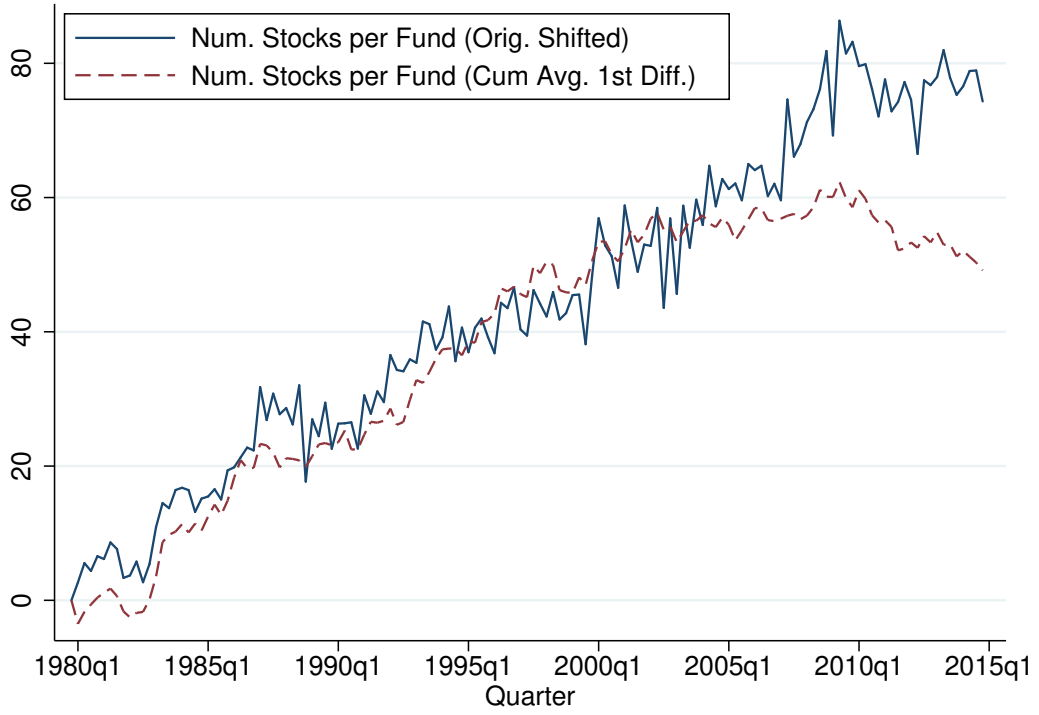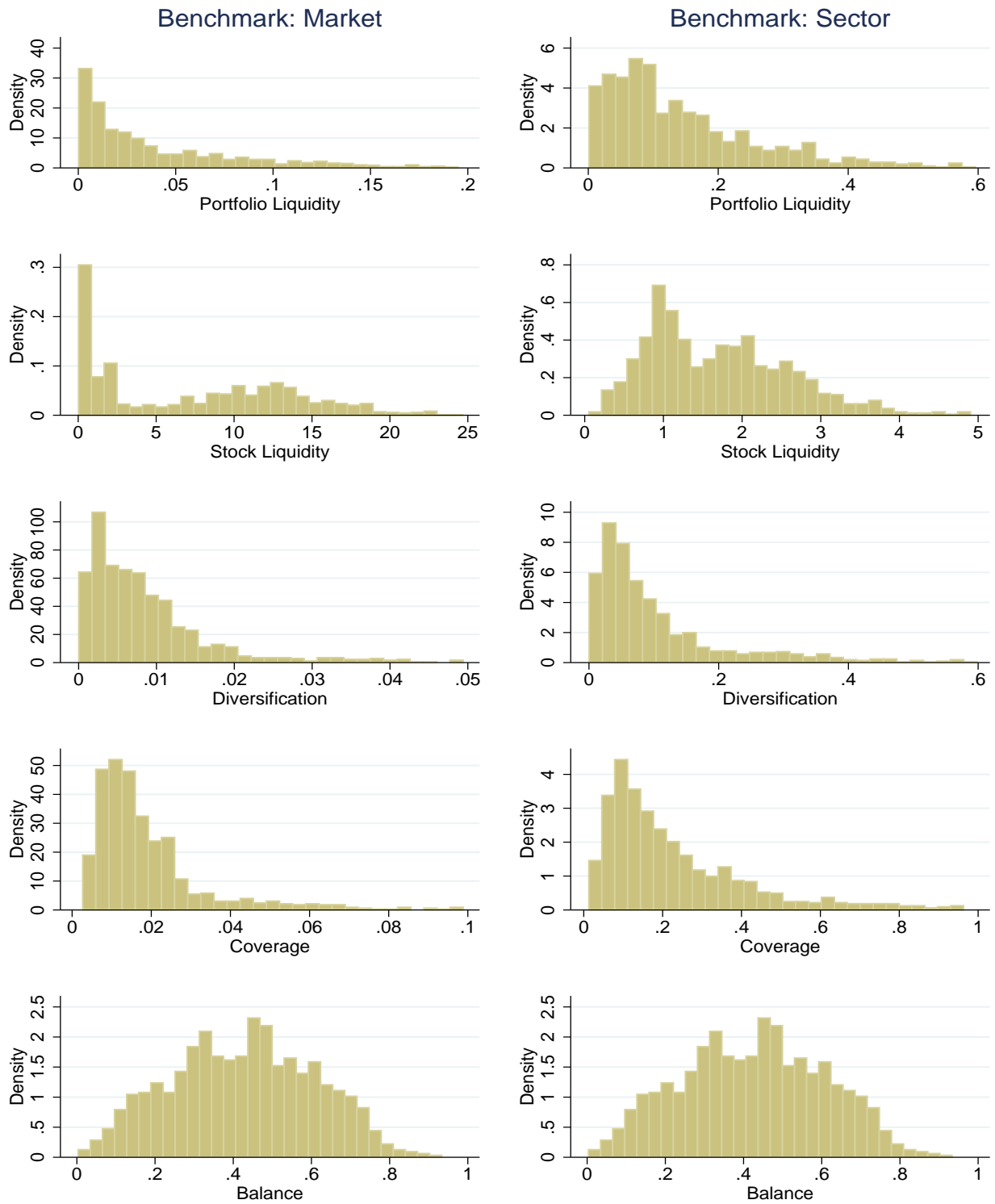
Figure IA3. Cross Section of Portfolio Liquidity and Its Components. This figure plots histograms of portfolio liquidity, stock liquidity, diversification, coverage, and balance across all funds at the end of our sample (2014Q4).

Figure IA3 plots the cross-sectional distribution of L and its components at the end of our sample. The left-hand set of panels uses the market portfolio as a benchmark (as in Figure 1 in the main paper); the right-hand set uses the appropriate sector benchmark. As explained in the paper, we consider nine sectors corresponding to the traditional 3×3 style box used by Morningstar. To calculate L with respect to a fund's sector, we divide the fund's market-benchmarked L by the fraction of the total market capitalization accounted for by that sector. We calculate those sector-specific fractions from the holdings of the Vanguard index fund tracking the sector-specific benchmark.[2]

To calculate a fund's sector-benchmarked stock liquidity, we multiply the fund's market-benchmarked stock liquidity by the ratio of the average market cap of all stocks in the market to the average market cap of all stocks held by the Vanguard sector index fund. To calculate sector-benchmarked diversification and coverage, we multiply their market-benchmarked values by the ratio of the number of stocks in the market to the number of stocks held by the Vanguard sector index fund. Balance is unaffected by benchmark choice.

Figure IA3 shows that active mutual funds hold relatively illiquid portfolios. Market-benchmarked L, plotted in the top left panel, is mostly below 0.15, far below its potential maximum of 1. Sector-benchmarked L, plotted in the top right panel, is larger than market-benchmarked L, by construction. But even sector-benchmarked L is far below 1, mostly below 0.5.

Are the low portfolio liquidities caused by funds' preference for illiquid stocks? The answer is no. For the vast majority of funds, stock liquidity, plotted in the second row of Figure IA3, exceeds 1. In fact, market-benchmarked stock liquidity often exceeds 10, suggesting that the average stock held by the fund is more than ten times bigger than the average stock in the market. Sector-benchmarked stock liquidity also exceeds 1 for most funds, though it rarely exceeds 4. In short, mutual funds tend to hold more-liquid stocks than their benchmarks. The high stock liquidity makes fund portfolios more liquid, not less. Instead, the story behind funds' low portfolio liquidity is diversification. Market-benchmarked diversification is mostly below 0.02, and sector-benchmarked diversification is largely below 0.4. To gain more insight, we examine the distributions of the components of diversification. While balance occupies most of the range between 0 and 1, coverage tends to be lower. Even sector-benchmarked coverage takes values mostly below 0.5. This result is not surprising, since the average fund holds only 126 stocks (recall Panel D of Figure 1 in the main paper. We thus conclude that the relatively low liquidity of active mutual funds is largely due to their low diversification, and that the low diversification is driven mostly by the low coverage of the funds' portfolios.

---

[2]These sector-specific fractions are 0.403, 0.748, and 0.362 for large-cap value, blend, and growth funds (Vanguard tickers VIVAX, VLACX, VIGRX), 0.069, 0.134, and 0.070 for mid-cap value, blend, and growth funds (tickers VMVIX, VIMSX, VMGIX), and 0.067, 0.123, 0.061 for small-cap value, blend, and growth funds (tickers VISVX, NAESX, VISGX).

Table IA12
Correlations Between Portfolio Liquidity and Its Components

This table reports correlations between our measure of portfolio liquidity, L, and its various components: stock liquidity (column 1), diversification (column 2), coverage (column 3), and balance (column 4). The first row reports raw correlations, which are computed from panel data without any de-meaning. Row 2 reports cross-sectional correlations computed by first de-meaning each variable using the mean across all observations from the same quarter, then computing the full-sample correlation between the two de-meaned variables. Rows 3 and 4 are the same as Row 2 except that they replace quarter with quarter×sector (Row 3) or with fund (Row 4). All variables are measured in logs.

Correlation Type	Components of Portfolio Liquidity			
	Stock Liquidity	Diversi- fication	Coverage	Balance
Raw	0.712	0.300	0.288	0.177
Cross-Sectional	0.744	0.282	0.270	0.157
Cross-Sectional, Within Sectors	0.228	0.798	0.650	0.544
Time-Series	0.400	0.724	0.524	0.547

How much of the variance in portfolio liquidity is contributed by each of its components? Table IA12 reports the correlations between market-benchmarked L and stock liquidity, diversification, coverage, and balance. We compute these correlations in four ways: across all panel observations (row 1), across funds (row 2), across funds within the same sector (row 3), and over time within funds (row 4). In all four rows, L is positively correlated with both stock liquidity and diversification, which is not surprising. The correlation with stock liquidity is higher in rows 1 and 2, whereas the correlation with diversification is higher in rows 3 and 4. This difference is driven by dispersion in stock liquidity across sectors (e.g., large-cap stocks are more liquid than small-cap stocks). Therefore, when we do not control for sector differences, the primary driver of L is stock liquidity (rows 1 and 2), but when we do, the primary driver is diversification (rows 3 and 4).

Table IA13

Summary Statistics

This table presents summary statistics of the fund-level variables used in the paper's empirical analysis. Portfolio liquidity and its components (the first five variables) are defined in the main paper's text. They are measured quarterly as they require holdings data. The remaining variables, which are measured monthly, are defined in Appendix B of the paper. Fund size is measured as a fraction of the total stock market capitalization. Expense ratio and turnover are in units of fraction per year.

	N	Mean	Stdev.	P1	P25	P50	P75	P99
Portfolio Liquidity	93,366	0.0461	0.0636	0.0006	0.0075	0.0227	0.0619	0.2949
Stock Liquidity	93,366	10.68	10.12	0.15	1.63	9.18	16.67	42.31
Diversification	93,366	0.0080	0.0190	0.0002	0.0020	0.0042	0.0084	0.0585
Coverage	93,366	0.0191	0.0332	0.0029	0.0077	0.0121	0.0194	0.1312
Balance	93,366	0.3711	0.1835	0.0389	0.2271	0.3584	0.5052	0.7838
Fund Size$\times 10^4$	351,243	0.955	3.472	0.011	0.052	0.170	0.594	14.319
Expense Ratio	365,301	0.0123	0.0044	0.0034	0.0095	0.0117	0.0146	0.0250
Turnover	336,006	0.83	0.70	0.03	0.34	0.64	1.10	3.89

5 Robustness of Table 4 (Explaining the Components of Portfolio Liquidity)

Table IA14
Results with Alternative Measures of Diversification

Panel A, Column 1 below matches our paper's Table 4, Column 1. The remaining columns replace the dependent variable with an alternative diversification measure. All variables are in logs and measured contemporaneously. Panel A includes sector × quarter fixed effects, as in the paper's Table 4, while Panel B includes quarter fixed effects. Portfolio HHI is the market-adjusted Herfindahl index of fund portfolio weights at the end of the quarter. This measure is the same as the Industry Concentration Index (ICI) in Kacperczyk, Sialm, and Zheng (2005), except industries are replaced by individual stocks. Number of Stocks is the number of stocks in the fund's portfolio at the end of the quarter. R-Squared comes from the regression of the fund's monthly returns on its Morningstar benchmark returns, using the previous 24 months of data for the fund. We require at least 20 monthly observations and winsorize this measure at the 1st and 99th percentiles to remove extreme outliers. We multiply the log of Portfolio HHI by −1 so the dependent variable in every column reflects diversification and not its opposite.

Panel A: Results with Sector × Quarter Fixed Effects

	(1) Diversification	(2) Portfolio HHI*-1	(3) Number of Stocks	(4) R-Squared
Fund Size	0.134	0.0448	0.0922	0.00389
	(15.00)	(6.94)	(12.03)	(3.35)
Expense Ratio	-0.622	-0.346	-0.398	-0.0542
	(-11.00)	(-9.42)	(-9.19)	(-10.45)
Turnover	0.122	0.104	0.101	0.00562
	(5.96)	(7.13)	(6.32)	(2.08)
Stock Liquidity	-0.621	-0.0990	-0.324	0.00406
	(-21.61)	(-5.34)	(-13.64)	(0.89)
Observations	76928	76928	76928	69853
R^2	0.465	0.204	0.281	0.333
R^2 (FEs only)	0.240	0.110	0.095	0.313

Panel B: Results with Quarter Fixed Effects

	(1) Diversification	(2) Portfolio HHI*-1	(3) Number of Stocks	(4) R-Squared
Fund Size	0.148	0.0467	0.0966	0.00499
	(15.81)	(7.05)	(12.54)	(4.11)
Expense Ratio	-0.690	-0.389	-0.445	-0.0537
	(-11.56)	(-9.85)	(-9.78)	(-10.56)
Turnover	0.129	0.0895	0.0934	0.00748
	(6.27)	(6.10)	(5.90)	(2.71)
Stock Liquidity	-0.340	0.00402	-0.172	0.00291
	(-32.04)	(0.58)	(-18.05)	(2.20)
Observations	76928	76928	76928	69853
R^2	0.413	0.123	0.236	0.255
R^2 (FEs only)	0.117	0.029	0.019	0.230

<div align="center">

Table IA15

Version of Table 4 Using Quarter Fixed Effects

</div>

Details are the same as in Table 4 in the paper, except we use quarter fixed effects (FEs) instead of sector × quarter FEs.

	(1)	(2)	(3)	(4)
	Diversification	Coverage	Balance	Stock Liquidity
Fund Size	0.148	0.0974	0.0522	0.131
	(15.81)	(12.31)	(8.35)	(8.61)
Expense Ratio	-0.690	-0.448	-0.251	-1.083
	(-11.56)	(-9.82)	(-6.98)	(-13.66)
Turnover	0.129	0.0939	0.0368	-0.0195
	(6.27)	(5.93)	(2.74)	(-0.66)
Stock Liquidity	-0.340	-0.175	-0.169	
	(-32.04)	(-16.72)	(-28.20)	
Balance		-0.0145		
		(-0.67)		
Coverage			-0.0112	
			(-0.67)	
Diversification				-0.763
				(-28.88)
Observations	76928	76928	76928	76928
R^2	0.413	0.294	0.230	0.316
R^2 (FEs only)	0.117	0.093	0.055	0.027

Table IA16
Simple Correlations with Diversification

This table reports cross-sectional correlations within sectors between diversification and other fund characteristics, all measured in logs. This analysis is comparable to Table 4, Column 1 in the paper; the table in the paper reports partial correlations, whereas this table computes simple pairwise correlations. Starting with our full panel dataset, we first de-mean each variable using the mean across all observations in the same sector and quarter, then we compute the full-sample correlation between the two de-meaned variables. t-statistics are computed clustering by fund and adjusting for de-meaning.

	Fund Size	Expense Ratio	Turnover	Stock Liquidity
Correlation	0.313	-0.292	0.080	-0.406
	(16.58)	(-14.10)	(3.70)	(-26.12)
Observations	88925	89017	81892	93336

Table IA17

Version of Table 4 Comparing Early and Late Subperiods

Details are the same as in Table 4 in the paper, except Panel A shows results using years 1979–2004, and Panels B shows results using years 2005-2014. These year breakpoints create subsamples of roughly equal size.

	Panel A: 1979–2004			
	(1)	(2)	(3)	(4)
	Diversification	Coverage	Balance	Stock Liquidity
Fund Size	0.181	0.127	0.0589	0.0196
	(16.91)	(14.68)	(7.59)	(2.72)
Expense Ratio	-0.411	-0.216	-0.206	-0.154
	(-7.79)	(-6.00)	(-5.50)	(-4.85)
Turnover	0.0970	0.0872	0.0125	-0.0329
	(4.59)	(5.75)	(0.89)	(-2.33)
Stock Liquidity	-0.542	-0.248	-0.309	
	(-19.96)	(-11.64)	(-14.15)	
Balance		-0.0264		
		(-1.27)		
Coverage			-0.0272	
			(-1.28)	
Diversification				-0.300
				(-18.96)
Observations	35069	35069	35069	35069
R^2	0.440	0.327	0.269	0.847
R^2 (FEs only)	0.190	0.136	0.137	0.814

	(1) Diversification	(2) Coverage	(3) Balance	(4) Stock Liquidity
Panel B: 2005–2014				
Fund Size	0.0969	0.0676	0.0342	0.0100
	(9.04)	(7.27)	(4.90)	(1.68)
Expense Ratio	-0.813	-0.583	-0.271	-0.0948
	(-10.74)	(-9.02)	(-6.58)	(-3.00)
Turnover	0.141	0.113	0.0344	0.00104
	(5.43)	(5.37)	(2.15)	(0.08)
Stock Liquidity	-0.713	-0.445	-0.306	
	(-15.62)	(-11.77)	(-10.28)	
Balance		-0.0689		
		(-2.32)		
Coverage			-0.0429	
			(-2.34)	
Diversification				-0.235
				(-19.34)
Observations	41859	41859	41859	41859
R^2	0.415	0.291	0.250	0.907
R^2 (FEs only)	0.160	0.090	0.144	0.887

Table IA18
Version of Table 4 at Annual Frequency

This table is the same as Table 4 in the paper, except we only include data from the fourth quarter of each year.

	(1) Diversification	(2) Coverage	(3) Balance	(4) Stock Liquidity
Fund Size	0.150	0.105	0.0514	0.00881
	(15.78)	(12.43)	(7.62)	(1.44)
Expense Ratio	-0.545	-0.314	-0.253	-0.155
	(-10.00)	(-8.01)	(-6.58)	(-5.45)
Turnover	0.118	0.0973	0.0254	-0.0117
	(5.53)	(5.59)	(1.84)	(-0.94)
Stock Liquidity	-0.588	-0.299	-0.315	
	(-19.41)	(-12.18)	(-13.18)	
Balance		-0.0456		
		(-1.94)		
Coverage			-0.0388	
			(-1.95)	
Diversification				-0.272
				(-21.22)
Observations	15403	15403	15403	15403
R^2	0.476	0.340	0.300	0.877
R^2 (FEs only)	0.256	0.179	0.179	0.852

Table IA19

Version of Table 4 Controlling for Flow Volatility

This table is the same as Table 4 in the paper, except we control for flow volatility. Flow volatility is the standard deviation of the fund's 12 monthly fraction flows during the previous calendar year. We winsorize the variable at the 1st and 99th percentiles. Panel A controls for log flow volatility, Panel B controls for raw (not logged) flow volatility.

	(1) Diversification	(2) Coverage	(3) Balance	(4) Stock Liquidity
Fund Size	0.126	0.0856	0.0467	0.00712
	(12.97)	(10.39)	(7.16)	(1.32)
Expense Ratio	-0.630	-0.437	-0.227	-0.0965
	(-9.90)	(-8.55)	(-6.13)	(-3.64)
Turnover	0.144	0.122	0.0289	-0.00845
	(6.87)	(7.34)	(2.07)	(-0.73)
Stock Liquidity	-0.635	-0.367	-0.303	
	(-20.11)	(-13.36)	(-12.95)	
Balance		-0.0658		
		(-2.64)		
Coverage			-0.0476	
			(-2.68)	
Diversification				-0.252
				(-22.91)
Log(Flow Volatility)	-0.0110	-0.0379	0.0268	-0.0183
	(-1.22)	(-5.45)	(4.81)	(-3.51)
Observations	61946	61946	61946	61946
R^2	0.462	0.332	0.284	0.897
R^2 (FEs only)	0.238	0.151	0.179	0.875

<div align="center">Panel A: Control for Log Flow Volatility</div>

	(1) Diversification	(2) Coverage	(3) Balance	(4) Stock Liquidity
	Panel B: Control for Raw (Not Logged) Flow Volatility			
Fund Size	0.128	0.0916	0.0436	0.0101
	(13.42)	(11.19)	(6.71)	(1.88)
Expense Ratio	-0.630	-0.435	-0.230	-0.0953
	(-9.95)	(-8.56)	(-6.18)	(-3.61)
Turnover	0.141	0.118	0.0307	-0.0106
	(6.76)	(7.10)	(2.20)	(-0.92)
Stock Liquidity	-0.634	-0.366	-0.306	
	(-20.08)	(-13.29)	(-13.07)	
Balance		-0.0699		
		(-2.80)		
Coverage			-0.0504	
			(-2.84)	
Diversification				-0.252
				(-22.86)
Flow Volatility	0.250	-0.0106	0.279	0.0486
	(3.61)	(-0.20)	(6.36)	(1.24)
Observations	61946	61946	61946	61946
R^2	0.462	0.329	0.284	0.897
R^2 (FEs only)	0.238	0.151	0.179	0.875

Table IA20
Results with Alternative Measures of Stock Liquidity

Panel A, Column 1 below matches our paper's Table 4, Column 4. The remaining columns replace the dependent variable with an alternative stock liquidity measure. All variables are in logs and measured contemporaneously. Panel A includes sector $\times$ quarter fixed effects, as in the paper's Table 4, while Panel B includes quarter fixed effects. Dollar Volume is the average dollar trading volume across stocks in the fund's portfolio. For each stock in the fund's portfolio, we use CRSP data to compute total dollar trading volume for that stock during the given quarter. Note this trading volume is by all investors, not just this specific fund. Amihud Illiq. is the average of Amihud's (2002) stock illiquidity measure across stocks in the mutual fund's portfolio. For each stock and quarter, we compute Illiq as in Amihud (2002), using CRSP daily data and averaging across all days within the quarter. We winsorize this measure at the 1st and 99th percentiles to remove extreme outliers. Bid-Ask Spread is the average fraction bid-ask spread across stocks in the mutual fund's portfolio. Using CRSP daily data, we compute each stock's spread as ask minus bid divided by the midpoint. We compute each stock's spread every day and compute its average during the quarter. We winsorize this measure at the 1st and 99th percentiles to remove extreme outliers. Like our main Stock Liquidity measure, the alternative measures are all equal-weighted averages across the portfolio's stocks. We multiply the logs of Amihud Illiq. and Bid-Ask Spread by -1 so the dependent variable in every column reflects stock liquidity and not its opposite.

Panel A: Results with Sector × Quarter Fixed Effects

	(1) Stock Liquidity	(2) Dollar Volume	(3) Amihud Illiq.*-1	(4) Bid-Ask Spread*-1
Fund Size	0.0122	0.0163	-0.0734	-0.0138
	(2.35)	(3.19)	(-3.91)	(-3.36)
Expense Ratio	-0.132	-0.0950	-0.134	-0.0252
	(-5.26)	(-4.00)	(-1.58)	(-1.17)
Turnover	-0.0146	0.0524	0.215	0.0416
	(-1.32)	(4.56)	(6.10)	(4.72)
Diversification	-0.264	-0.216	0.145	0.0144
	(-24.49)	(-20.72)	(3.54)	(1.40)
Observations	76928	76904	76904	71242
R^2	0.882	0.887	0.663	0.935
R^2 (FEs only)	0.857	0.871	0.651	0.934

Panel B: Results with Quarter Fixed Effects

	(1) Stock Liquidity	(2) Dollar Volume	(3) Amihud Illiq.*-1	(4) Bid-Ask Spread*-1
Fund Size	0.131	0.124	0.0808	0.0204
	(8.61)	(9.20)	(3.19)	(3.60)
Expense Ratio	-1.083	-0.867	-1.254	-0.281
	(-13.66)	(-13.00)	(-10.01)	(-9.42)
Turnover	-0.0195	0.0942	0.258	0.0685
	(-0.66)	(3.55)	(5.21)	(5.49)
Diversification	-0.763	-0.643	-0.465	-0.130
	(-28.88)	(-26.48)	(-9.13)	(-10.31)
Observations	76928	76904	76904	71242
R^2	0.316	0.476	0.310	0.861
R^2 (FEs only)	0.027	0.286	0.248	0.847

Table IA21

Version of Table 4 with Double-Clustered Standard Errors

This table is the same as Table 4 in the main paper, except we cluster by fund and quarter instead of by fund alone.

	(1) Diversification	(2) Coverage	(3) Balance	(4) Stock Liquidity
Fund Size	0.134	0.0940	0.0452	0.0122
	(13.67)	(11.39)	(7.44)	(2.36)
Expense Ratio	-0.622	-0.408	-0.238	-0.132
	(-10.17)	(-8.37)	(-6.92)	(-5.24)
Turnover	0.122	0.102	0.0247	-0.0146
	(5.98)	(6.39)	(1.94)	(-1.30)
Stock Liquidity	-0.621	-0.337	-0.308	
	(-20.70)	(-12.81)	(-14.98)	
Balance		-0.0447		
		(-2.08)		
Coverage			-0.0343	
			(-2.12)	
Diversification				-0.264
				(-23.81)
Observations	76906	76906	76906	76906
R^2	0.465	0.336	0.286	0.882
R^2 (FEs only)	0.24	0.163	0.172	0.857

6 Robustness of Table 5 (Explaining Fund Activeness)

Table IA22

Version of Table 5 Using Quarter Fixed Effects

This table is the same as Table 5 in the paper, except we use quarter fixed effects (FEs) instead of sector × quarter FEs.

	(1)	(2)	(3)
Fund Size	-0.189		-0.119
	(-14.77)		(-9.44)
Expense Ratio		1.148	0.958
		(19.06)	(15.73)
Observations	76928	76928	76928
R^2	0.089	0.137	0.161
R^2 (FEs only)	0.019	0.019	0.019

Table IA23
Version of Table 5 Comparing Early and Late Subperiods

Details are the same as in Table 5 in the main paper, except Panel A shows results using years 1979–2004, and Panels B shows results using years 2005–2014. These year breakpoints create subsamples of roughly equal size.

Panel A: 1979–2004	(1)	(2)	(3)
Fund Size	-0.138		-0.101
	(-11.00)		(-7.85)
Expense Ratio		0.669	0.525
		(11.67)	(9.19)
Observations	35069	35069	35069
R^2	0.400	0.405	0.421
R^2 (FEs only)	0.367	0.367	0.367

Panel B: 2005–2014	(1)	(2)	(3)
Fund Size	-0.137		-0.0992
	(-11.20)		(-8.04)
Expense Ratio		0.754	0.591
		(10.24)	(7.77)
Observations	41859	41859	41859
R^2	0.380	0.387	0.405
R^2 (FEs only)	0.341	0.341	0.341

Table IA24

Results with Alternative Measures of Fund Activeness

Column 1 below matches Column 3 in the paper's Table 5. The remaining columns replace Activeness with an alternative proxy for fund activeness. All variables are measured in logs. Active Share, from Cremers and Petajisto (2009), is the sum of absolute deviations between portfolio weights and benchmark weights, computed for each fund at the end of each quarter. R-Squared comes from the regression of the fund's monthly returns on its Morningstar benchmark returns, using the previous 24 months of data for the fund. We require at least 20 monthly observations and winsorize this measure at the 1st and 99th percentiles to remove extreme outliers. We multiply the log of R-Squared by −1 so the dependent variable in every column reflects activeness, not its opposite. All other details are the same as in Table 5 in the paper, except in Column 3 we include sector × month fixed effects (FEs) rather than sector × quarter FEs, because R-Squared is observed at the monthly frequency.

	(1) Activeness	(2) Active Share	(3) R-Squared*-1
Fund Size	-0.100	-0.00588	-0.00534
	(-9.53)	(-4.55)	(-4.54)
Expense Ratio	0.558	0.0670	0.0539
	(10.12)	(7.09)	(9.76)
Observations	76928	86045	296047
R^2	0.415	0.521	0.319
R^2 (FEs only)	0.356	0.490	0.304

Table IA25
Version of Table 5 with Double-Clustered Standard Errors

This table is the same as Table 5 in the main paper, except we cluster by fund and quarter instead of by fund alone.

	(1)	(2)	(3)
Fund Size	-0.138		-0.100
	(-13.26)		(-9.51)
Expense Ratio		0.712	0.558
		(13.00)	(10.07)
Observations	76906	76906	76906
R^2	0.392	0.398	0.415
R^2 (FEs only)	0.356	0.356	0.356

7   Robustness of Table 6 (Correlations Among Fund Characteristics)

Table IA26
Version of Table 6 with Quarter Fixed Effects

Details are the same as in the paper's Table 6, Panel A, except instead of reporting cross-sectional correlations within sectors, we instead report cross-sectional correlations (not necessarily within sectors). We do so by de-meaning variables using the mean across all observations (including those from other sectors) in the same quarter.

	Fund Size	Expense Ratio	Portfolio Liquidity	Turnover
Fund Size	1			
Expense Ratio	-0.335 (-15.83)	1		
Portfolio Liquidity	0.289 (17.09)	-0.364 (-17.85)	1	
Turnover	-0.116 (-6.48)	0.170 (8.44)	-0.061 (-3.09)	1

Version of Table 6 Comparing Early and Late Subperiods

Detail are the same as in Table 6 in the paper, except Panels A and C show results using data from 1979–2004 and Panels B and D show results using data from 2005–2014. These year breakpoints create subsamples of roughly equal size.

	Fund Size	Expense Ratio	Portfolio Liquidity	Turnover
Panel A: Cross-Sectional Correlations Within Sectors, 1979–2004				
Fund Size	1			
Expense Ratio	-0.300	1		
	(-12.84)			
Portfolio Liquidity	0.329	-0.256	1	
	(16.91)	(-10.98)		
Turnover	-0.066	0.142	0.013	1
	(-3.36)	(6.54)	(0.59)	
Panel B: Cross-Sectional Correlations Within Sectors, 2005–2014				
Fund Size	1			
Expense Ratio	-0.331	1		
	(-14.37)			
Portfolio Liquidity	0.246	-0.328	1	
	(12.28)	(-12.12)		
Turnover	-0.144	0.116	0.064	1
	(-6.86)	(4.49)	(2.43)	
Panel C: Time-Series Correlations, 1979–2004				
Fund Size	1			
Expense Ratio	-0.166	1		
	(-8.85)			
Portfolio Liquidity	0.339	-0.051	1	
	(16.04)	(-2.47)		
Turnover	-0.129	0.090	-0.082	1
	(-8.75)	(4.95)	(-4.01)	
Panel D: Time-Series Correlations, 2005–2014				
Fund Size	1			
Expense Ratio	-0.214	1		
	(-12.22)			
Portfolio Liquidity	0.211	-0.090	1	
	(11.67)	(-5.70)		
Turnover	-0.078	0.081	-0.086	1
	(-5.43)	(5.72)	(-4.38)	

Table IA28
Relation Between T and A (or f), Controlling for L

This table supports the claim in Section 6 that, controlling for L, T is negatively related to fund size and positively related to expense ratio. The dependent variable is the log of turnover. Fixed effects are noted in the bottom row. All other details are the same as in Table 1 in the paper.

	(1)	(2)	(3)	(4)
Fund Size	-0.0672	-0.0942		
	(-6.49)	(-9.10)		
Expense Ratio			0.377	0.322
			(6.71)	(6.22)
Portfolio Liquidity	0.0706	-0.0688	0.0817	-0.0953
	(3.51)	(-4.38)	(3.99)	(-6.16)
Observations	78841	78841	79517	79517
R^2	0.154	0.679	0.159	0.676
Fixed Effects	Sector*Month	Fund	Sector*Month	Fund

8 Robustness of Table 7 (Activeness and the Turnover-Performance Relation)

Table IA29

Version of Table 7 Controlling for Portfolio Liquidity

This table is the same as Table 7 in the main paper, except we also control for the inverse square root of Portfolio Liquidity in columns 4 and 5.

	(1)	(2)	(3)	(4)	(5)
Turnover (T)	0.00123		-0.000625		-0.000183
	(6.53)		(-2.26)		(-0.62)
Activeness ($TL^{-1/2}$)		0.000162	0.000190	0.000127	0.000138
		(8.67)	(7.33)	(5.89)	(4.24)
Portfolio Illiquidity ($L^{-1/2}$)				0.000135	0.000125
				(2.71)	(2.29)
Observations	320712	235337	235337	235337	235337
R^2	0.015	0.016	0.016	0.016	0.016