What you see is not what you get: The costs of trading market anomalies

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Education

Ph.D., University of California - San Diego 2002
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Specializations

Financial econometrics, and the analysis of hedge funds and mutual funds

Bollerslev, T., A. J. Patton, and R. Quaedvlieg. “Multivariate leverage effects and realized semicovariance GARCH models.” Journal of Econometrics 217, no. 2 (August 1, 2020): 411–30.

The Journal of Finance, Journal of Econometrics, Journal of Financial Economics, Journal of the American Statistical Association, Review of Financial Studies, and the Journal of Business and Economic Statistics.

Brian M. Weller

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Professor Weller studies financial markets with an emphasis on liquidity and asset prices.

He specializes in developing tools to analyze the informational and risk content of market intermediary behavior.

He also investigates how technological and market structure innovations affect risk sharing and price discovery.

Background

Empirical asset pricing overflows with explanations for differences in average returns across securities.

Recent calls to action by Harvey et al. (2016) , Harvey (2017) , and Hou et al. (2017) have focused on high false discovery rates and scurrilous academic practices.

Fundamentally, they question whether candidate factors in the cross section of expected returns are real and actionable.

The main work

We investigate whether on-paper trading strategies are implementable in practice, thereby representing true expected return factors or market anomalies.

(We measuring real-world implementation costs for academic factors)

Existing approaches generally fall into two categories:
The first category entails using proprietary trading data to analyze costs for a single firm.

The second approach uses market-wide trading data such as NYSE Trade and Quote (TAQ) to estimate trading costs for individual securities with parametric transactions cost models.

Abstract

Is there a gap between the profitability of a trading strategy on paper and that which is achieved in practice?

We answer this question by developing a general technique to measure the real-world implementation costs of financial market anomalies.

Our method extends Fama-MacBeth regressions to compare the on-paper returns to factor exposures with those achieved by mutual funds.

Unlike existing approaches, ours delivers estimates of all-in implementation costs without relying on parametric microstructure models or explicitly specified factor trading strategies. (参数化微观结构模型或特定因子交易策略)

After accounting for implementation costs, typical mutual funds earn low returns to value and no returns to momentum.

Data

1 Our mutual fund sample consists of 4267 United States domestic equity mutual fund groups with at least 24 non-missing monthly gross returns from January 1970 to December 2016.

2 Our first Stock portfolio set consists of the Fama-French 25 size-value double-sorted portfolios, 25 size-beta portfolios, 25 size-prior return portfolios, and 25 size-Amihud illiquidity portfolios. (100 portfolios)

In our larger Stockportfolio set, we add 49 industry portfolios, 25 size–operating profitability portfolios, 25 size–investment portfolios, 10 market beta–sorted portfolios, 10 market capitalization–sorted portfolios, 10 book-to-market ratio–sorted portfolios, 10 prior-return–sorted portfolios, 10 Amihud illiquidity–sorted portfolios, 10 operating profitability–sorted portfolios, and 10 investment–sorted portfolios for a total of 269 portfolios.

Fig. 1. Count of active domestic equity mutual funds by month.

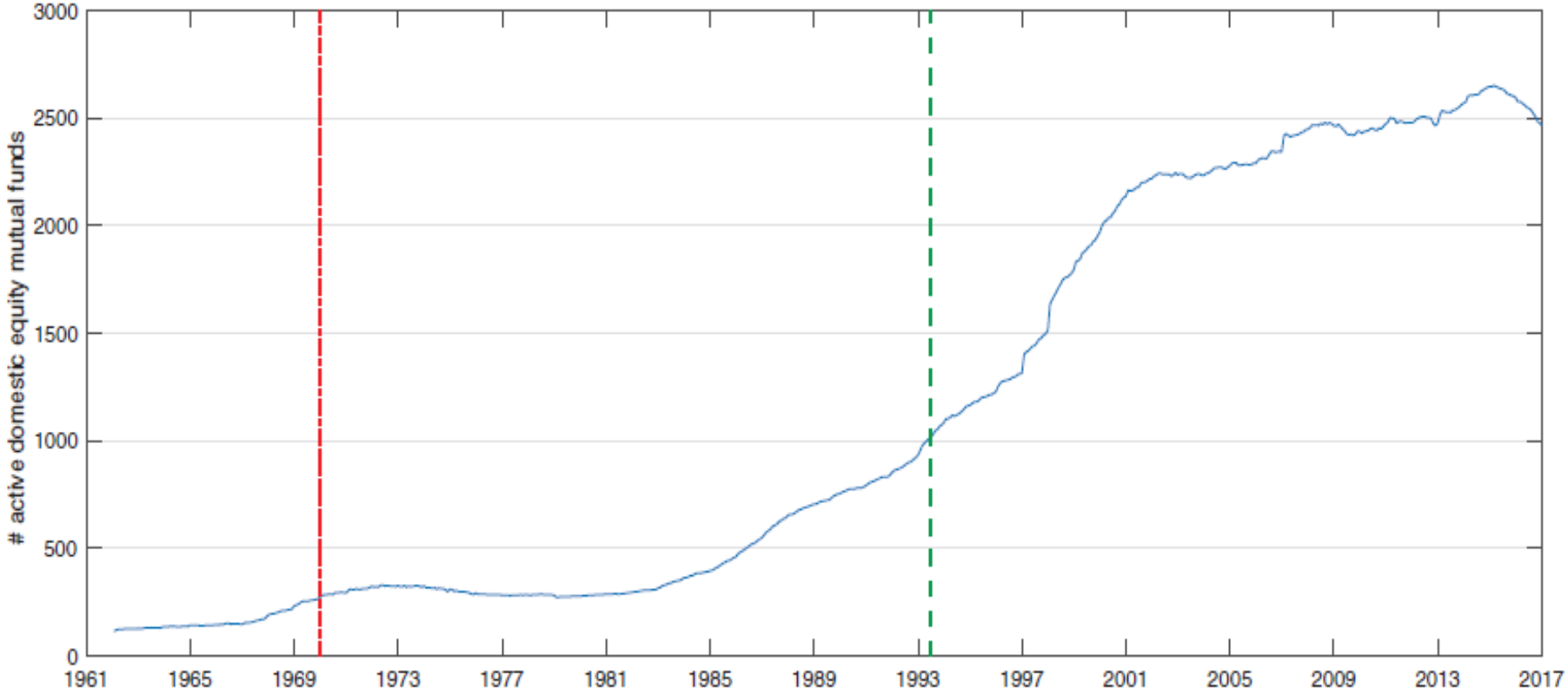

Fig. 1. Count of active domestic equity mutual funds by month.

Process

Fama-MacBeth estimates of implementation costs

In this section, we consider the compensation per unit of risk exposure and investigate whether mutual funds obtain the same risk premium that academics achieve on paper.

The $N_S + N_{MF}$ first-stage time series regressions are

$$r_{it} = \alpha_i + \sum_k f_{kt}\beta_{ik} + \epsilon_{it}, \quad i = 1, \ldots, N_S, N_{S+1}, \ldots, N_S + N_{MF}, \tag{1}$$

$$r_{it} = \sum_k \lambda_{kt}^S \hat{\beta}_{ik} 1_{i \in S} + \sum_k \lambda_{kt}^{MF} \hat{\beta}_{ik} 1_{i \in MF} + \epsilon_{it}, \quad t = 1, \ldots, T. \tag{2}$$

Process

In the first stage, time series regressions estimate factor loadings β_i for each asset i

In the second stage, cross-sectional regressions estimate the compensation per unit of factor exposure λt at each date t

λ_{Sk}, represent the on-paper profitability of a given factor strategy (stock portfolios)
"what you see"

λ_{MFk}, represent the actual returns achieved by an asset manager (mutual funds)
"what you get"

λ_{Sk}-λ_{MFk} delivers an estimate of implementation costs for factor k.

Results

We estimate the "implementation gap" using augmented Fama and MacBeth two-stage regressions for the Carhart four-factor model (Carhart, 1997).

the market (MKT), value (HML), size (SMB), and momentum (UMD)

	N_S	1970 – 2016				1993 – 2016			
		MKT	*HML*	*SMB*	*UMD*	*MKT*	*HML*	*SMB*	*UMD*
Panel A: Value-weighted stock portfolios									
λ^{Δ}	100	−0.38	3.81***	0.26	7.18***	−0.11	3.12***	−0.24	4.27***
		(−1.28)	(5.08)	(0.42)	(5.53)	(−0.32)	(3.83)	(−0.29)	(2.64)
λ^{Δ}	269	−0.21	2.59***	−0.07	7.30***	0.28	2.09***	−0.97	5.04***
		(−0.88)	(3.81)	(−0.14)	(5.54)	(1.25)	(3.31)	(−1.39)	(2.89)
λ^{S}	100	6.60***	6.43***	1.27	8.72***	7.67**	5.43*	1.96	6.01
		(2.75)	(3.51)	(0.75)	(3.74)	(2.35)	(1.93)	(0.81)	(1.60)
λ^{S}	269	6.77***	5.20***	0.94	8.85***	8.06**	4.40	1.23	6.78*
		(2.82)	(2.84)	(0.56)	(3.80)	(2.49)	(1.54)	(0.51)	(1.83)
λ^{MF}	–	6.98***	2.62	1.01	1.54	7.78**	2.31	2.20	1.73
		(2.86)	(1.51)	(0.59)	(0.63)	(2.38)	(0.83)	(0.92)	(0.45)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123
Panel B: Equal-weighted stock portfolios									
λ^{Δ}	100	−0.36	4.47***	2.34**	6.83***	0.07	3.16***	2.14	3.71**
		(−0.76)	(5.57)	(2.41)	(5.21)	(0.12)	(3.29)	(1.55)	(2.21)
λ^{Δ}	269	0.25	3.31***	2.22**	8.51***	0.95	2.01*	2.05	6.04***
		(0.5)	(3.58)	(2.05)	(6.19)	(1.45)	(1.96)	(1.34)	(3.13)
λ^{S}	100	6.62***	7.09***	3.35***	8.37***	7.85**	5.48**	4.34	5.45
		(2.75)	(3.91)	(1.70)	(3.59)	(2.39)	(1.99)	(1.53)	(1.44)
λ^{S}	269	7.23***	5.93***	3.23	10.06***	8.73***	4.33	4.25	7.78**
		(3.02)	(3.03)	(1.56)	(4.17)	(2.69)	(1.47)	(1.43)	(1.98)
λ^{MF}	–	6.98***	2.62	1.01	1.54	7.78**	2.31	2.20	1.73
		(2.86)	(1.51)	(0.59)	(0.63)	(2.38)	(0.83)	(0.92)	(0.45)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123

Estimates when costs vary across funds and time

		1970 – 2016				1993 – 2016			
	N_S	*MKT*	*HML*	*SMB*	*UMD*	*MKT*	*HML*	*SMB*	*UMD*
Panel A: Value-weighted stock portfolios									
λ^{Δ}	100	−0.44	4.07***	0.35	7.49***	−0.12	3.30***	−0.24	5.23***
		(−1.45)	(5.17)	(0.57)	(5.71)	(−0.36)	(3.92)	(−0.29)	(3.09)
λ^{Δ}	269	−0.22	2.83***	−0.02	7.55***	0.27	2.30***	−0.93	5.84***
		(−0.92)	(3.87)	(−0.03)	(5.70)	(1.22)	(3.54)	(−1.32)	(3.29)
λ^{S}	100	6.55***	6.71***	1.26	8.77***	7.68**	5.38*	1.98	5.99
		(2.74)	(3.63)	(0.74)	(3.76)	(2.37)	(1.90)	(0.82)	(1.59)
λ^{S}	269	6.77***	5.47***	0.89	8.84***	8.08**	4.39	1.30	6.60*
		(2.83)	(2.94)	(0.53)	(3.78)	(2.51)	(1.51)	(0.54)	(1.78)
λ^{MF}	–	6.99***	2.64	0.90	1.28	7.80**	2.09	2.22	0.76
		(2.87)	(1.51)	(0.53)	(0.52)	(2.41)	(0.74)	(0.92)	(0.20)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123
Panel B: Equal-weighted stock portfolios									
λ^{Δ}	100	−0.53	4.48***	2.69***	6.92***	0.00	2.67***	2.32*	4.00**
		(−1.12)	(5.35)	(2.75)	(5.14)	(0.00)	(2.59)	(1.71)	(2.27)
λ^{Δ}	269	0.05	3.64***	2.64**	8.54***	0.74	1.92*	2.29	5.73***
		(0.09)	(3.79)	(2.44)	(5.95)	(1.09)	(1.81)	(1.56)	(2.82)
λ^{S}	100	6.46***	7.12***	3.60*	8.20***	7.81**	4.76*	4.54	4.76
		(2.70)	(3.88)	(1.84)	(3.51)	(2.40)	(1.73)	(1.63)	(1.26)
λ^{S}	269	7.04***	6.28***	3.55*	9.82***	8.55***	4.01	4.51	6.49
		(2.97)	(3.14)	(1.73)	(4.05)	(2.66)	(1.35)	(1.57)	(1.64)
λ^{MF}	–	6.99***	2.64	0.90	1.28	7.80**	2.09	2.22	0.76
		(2.87)	(1.51)	(0.53)	(0.52)	(2.41)	(0.74)	(0.92)	(0.20)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123

Cross-sectional characteristic regressions

		1970 – 2016				1993 – 2016			
	N_S	*MKT*	*HML*	*SMB*	*UMD*	*MKT*	*HML*	*SMB*	*UMD*
Panel A: Value-weighted stock portfolios									
λ^{Δ}	100	−0.44	4.07***	0.35	7.49***	−0.12	3.30***	−0.24	5.23***
		(−1.45)	(5.17)	(0.57)	(5.71)	(−0.36)	(3.92)	(−0.29)	(3.09)
λ^{Δ}	269	−0.22	2.83***	−0.02	7.55***	0.27	2.30***	−0.93	5.84***
		(−0.92)	(3.87)	(−0.03)	(5.70)	(1.22)	(3.54)	(−1.32)	(3.29)
λ^{S}	100	6.55***	6.71***	1.26	8.77***	7.68**	5.38*	1.98	5.99
		(2.74)	(3.63)	(0.74)	(3.76)	(2.37)	(1.90)	(0.82)	(1.59)
λ^{S}	269	6.77***	5.47***	0.89	8.84***	8.08**	4.39	1.30	6.60*
		(2.83)	(2.94)	(0.53)	(3.78)	(2.51)	(1.51)	(0.54)	(1.78)
λ^{MF}	–	6.99***	2.64	0.90	1.28	7.80**	2.09	2.22	0.76
		(2.87)	(1.51)	(0.53)	(0.52)	(2.41)	(0.74)	(0.92)	(0.20)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123
Panel B: Equal-weighted stock portfolios									
λ^{Δ}	100	−0.53	4.48***	2.69***	6.92***	0.00	2.67***	2.32*	4.00**
		(−1.12)	(5.35)	(2.75)	(5.14)	(0.00)	(2.59)	(1.71)	(2.27)
λ^{Δ}	269	0.05	3.64***	2.64**	8.54***	0.74	1.92*	2.29	5.73***
		(0.09)	(3.79)	(2.44)	(5.95)	(1.09)	(1.81)	(1.56)	(2.82)
λ^{S}	100	6.46***	7.12***	3.60*	8.20***	7.81**	4.76*	4.54	4.76
		(2.70)	(3.88)	(1.84)	(3.51)	(2.40)	(1.73)	(1.63)	(1.26)
λ^{S}	269	7.04***	6.28***	3.55*	9.82***	8.55***	4.01	4.51	6.49
		(2.97)	(3.14)	(1.73)	(4.05)	(2.66)	(1.35)	(1.57)	(1.64)
λ^{MF}	–	6.99***	2.64	0.90	1.28	7.80**	2.09	2.22	0.76
		(2.87)	(1.51)	(0.53)	(0.52)	(2.41)	(0.74)	(0.92)	(0.20)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123

Comparison with cost estimates from other work

Study (sample period)	Parameter	*HML*	*SMB*	*UMD*
This paper (1970–2016)	λ^{MF}	2.64	0.90	1.28
		(1.51)	(0.53)	(0.52)
	λ^{MF}_{small}	2.55	1.37	2.62
		(1.37)	(0.82)	(0.97)
Korajczyk and Sadka (2004) (1967–1999)	α_{gross}			6.84***
				(4.54)
	$\alpha^{espr.}_{net}$			5.40***
				(3.59)
	$\alpha^{qspr.}_{net}$			4.80***
				(3.17)
Lesmond et al. (2004) (1980–1998)	r_{gross}			7.83***
				(6.22)
	r^{LDV}_{net}			0.13
				(0.07)
	r^{direct}_{net}			2.24
				(1.22)
Frazzini et al. (2015) (1986–2013)	r_{gross}	4.86	7.98***	2.26
		(1.12)	(3.01)	(0.40)
	r_{net}	3.51	6.52**	-0.77
		(0.80)	(2.48)	(-0.14)
Novy-Marx and Velikov (2016) (1963–2013)	r_{gross}	5.64***	3.96*	15.96***
		(2.68)	(1.66)	(4.80)
	r_{net}	5.04**	3.36	8.16**
		(2.39)	(1.44)	(2.45)

Decomposing implementation costs

The role of mutual fund shorting constraints

		1970 – 2016				1993 – 2016			
	N_S	MKT	HML^+	SMB^+	UMD^+	MKT	HML^+	SMB^+	UMD^+
Panel A: Value-weighted stock portfolios									
λ^{Δ}	100	−0.61*	2.56***	0.52	3.09***	−0.32	2.10***	0.32	2.41***
		(−1.94)	(4.05)	(1.00)	(4.52)	(−0.92)	(3.85)	(0.56)	(2.98)
λ^{Δ}	269	−0.29	1.60***	0.02	2.85***	0.18	1.30***	−0.34	2.46***
		(−1.21)	(2.72)	(0.04)	(4.25)	(0.81)	(3.00)	(−0.61)	(2.85)
λ^{S}	100	6.22***	12.25***	9.19***	11.69***	7.32**	12.89***	10.84**	12.12***
		(2.59)	(4.33)	(2.85)	(4.11)	(2.24)	(3.19)	(2.54)	(3.22)
λ^{S}	269	6.54***	11.29***	8.68***	11.46***	7.82**	12.09***	10.17**	12.17***
		(2.73)	(3.95)	(2.68)	(4.02)	(2.41)	(2.95)	(2.38)	(3.24)
λ^{MF}	–	6.83***	9.69***	8.66***	8.60***	7.63**	10.80***	10.51**	9.71**
		(2.81)	(3.25)	(2.60)	(2.85)	(2.34)	(2.59)	(2.44)	(2.48)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123
Panel B: Equal-weighted stock portfolios									
λ^{Δ}	100	−0.83	3.82***	2.21***	3.64***	−0.25	3.11***	2.31***	3.27***
		(−1.66)	(6.06)	(3.37)	(5.46)	(−0.43)	(5.57)	(2.64)	(4.01)
λ^{Δ}	269	−0.26	3.40***	2.17***	4.25***	0.41	2.84***	2.38**	4.26***
		(−0.50)	(4.92)	(2.96)	(6.29)	(0.66)	(4.21)	(2.25)	(4.86)
λ^{S}	100	6.00**	13.50***	10.88***	12.24***	7.38**	13.91***	12.82***	12.98***
		(2.49)	(4.71)	(3.27)	(4.27)	(2.23)	(3.41)	(2.87)	(3.39)
λ^{S}	269	6.57***	13.09***	10.83***	12.86***	8.04**	13.64***	12.90***	13.98***
		(2.75)	(4.44)	(3.19)	(4.44)	(2.46)	(3.23)	(2.80)	(3.64)
λ^{MF}	–	6.83***	9.69***	8.66***	8.60***	7.63**	10.80***	10.51**	9.71**
		(2.81)	(3.25)	(2.60)	(2.85)	(2.34)	(2.59)	(2.44)	(2.48)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123

The role of investability frictions

		1970 – 2016				1993 – 2016			
	N_S	*MKT*	*HML*	*SMB*	*UMD*	*MKT*	*HML*	*SMB*	*UMD*
Panel A: Baseline specification									
λ^{Δ}	80	−0.37	2.85***	0.70	6.14***	0.10	2.06**	−0.42	3.49**
		(−1.39)	(3.84)	(1.24)	(4.66)	(0.32)	(2.44)	(−0.61)	(2.12)
λ^{S}	80	6.61***	5.47***	1.71	7.68***	7.88***	4.37	1.78	5.23
		(2.74)	(3.03)	(1.07)	(3.31)	(2.40)	(1.57)	(0.80)	(1.41)
λ^{S}	100	6.60***	6.43***	1.27	8.72***	7.67**	5.43*	1.96	6.01
		(2.75)	(3.51)	(0.75)	(3.74)	(2.35)	(1.93)	(0.81)	(1.60)
λ^{MF}	–	6.98***	2.62	1.01	1.54	7.78**	2.31	2.20	1.73
		(2.86)	(1.51)	(0.59)	(0.63)	(2.38)	(0.83)	(0.92)	(0.45)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123
Panel B: Including liquidity principal components									
λ^{Δ}	80	−0.37	2.97***	0.55	6.42***	0.13	2.25***	−0.69	4.55***
		(−1.34)	(3.81)	(0.97)	(4.82)	(0.4)	(2.64)	(−0.96)	(2.65)
λ^{S}	80	6.63***	5.60***	1.45	7.70***	7.93**	4.34	1.53	5.31
		(2.76)	(3.10)	(0.91)	(3.31)	(2.43)	(1.56)	(0.68)	(1.43)
λ^{S}	100	6.55***	6.71***	1.26	8.77***	7.68**	5.38*	1.98	5.99
		(2.74)	(3.63)	(0.74)	(3.76)	(2.37)	(1.90)	(0.82)	(1.59)
λ^{MF}	–	6.99***	2.64	0.90	1.28	7.80**	2.09	2.22	0.76
		(2.87)	(1.51)	(0.53)	(0.52)	(2.41)	(0.74)	(0.92)	(0.20)
T		564	564	564	564	282	282	282	282
$\bar{N}_{MF}$		1286	1286	1286	1286	2123	2123	2123	2123

Tracking error and the performance of factor strategies

		Baseline specification				Including liquidity PCs			
	$\bar{R}^2$	*MKT*	*HML*	*SMB*	*UMD*	*MKT*	*HML*	*SMB*	*UMD*
λ_5^{MF}	94.2%	6.50***	3.60**	1.78	4.59*	6.52***	3.97**	1.74	5.36**
		(2.69)	(1.99)	(1.04)	(1.68)	(2.71)	(2.15)	(1.02)	(1.99)
λ_4^{MF}	89.9%	6.91***	2.93*	2.67	0.73	6.89***	3.04*	2.72	0.34
		(2.82)	(1.70)	(1.57)	(0.26)	(2.83)	(1.74)	(1.59)	(0.12)
λ_3^{MF}	86.0%	7.31***	3.00*	0.09	3.23	7.28***	2.89	0.11	2.30
		(2.96)	(1.68)	(0.05)	(1.20)	(2.95)	(1.59)	(0.06)	(0.86)
λ_2^{MF}	79.9%	7.29***	2.66	1.15	−0.81	7.27***	2.42	1.14	−1.45
		(2.98)	(1.48)	(0.64)	(−0.31)	(2.98)	(1.32)	(0.64)	(−0.55)
λ_1^{MF}	55.4%	7.00***	2.93	−0.98	2.08	7.14***	3.44*	−1.51	2.38
		(2.80)	(1.52)	(−0.49)	(0.72)	(2.85)	(1.75)	(−0.75)	(0.81)
λ^{MF}	81.1%	6.98***	2.62	1.01	1.54	6.99***	2.64	0.90	1.28
		(2.86)	(1.51)	(0.59)	(0.63)	(2.87)	(1.51)	(0.53)	(0.52)
λ^{S}	–	6.77***	5.20***	0.94	8.85***	6.77***	5.47***	0.89	8.84***
		(2.82)	(2.84)	(0.56)	(3.80)	(2.83)	(2.94)	(0.53)	(3.78)
λ_5^{Δ}	–	0.27	1.60**	−0.84	4.26***	0.25	1.49*	−0.85	3.48**
		(1.17)	(2.02)	(−1.45)	(2.80)	(1.08)	(1.85)	(−1.46)	(2.21)
$\lambda_i = 0$		0.00***	0.41	0.00***	0.02**	0.00***	0.22	0.00***	0.00***
$\lambda_i = \lambda^*$		0.00***	0.83	0.00***	0.01***	0.01**	0.47	0.00***	0.00***
$\Delta\lambda \neq 0$		0.27	0.08*	0.79	0.68	0.13	0.37	0.85	0.78

Cost estimates across funds and time

Implementation costs across funds

	Baseline specification				Including liquidity PCs			
	MKT	*HML*	*SMB*	*UMD*	*MKT*	*HML*	*SMB*	*UMD*
λ^{MF}_{mega}	6.66***	3.11*	1.89	−2.53	6.67***	3.15*	1.94	−2.77
	(2.74)	(1.67)	(1.05)	(−0.75)	(2.75)	(1.66)	(1.08)	(−0.84)
λ^{MF}_{large}	6.85***	2.78	0.90	0.86	6.86***	2.83	0.91	0.04
	(2.78)	(1.54)	(0.52)	(0.31)	(2.79)	(1.54)	(0.53)	(0.02)
λ^{MF}_{medium}	7.02***	2.45	0.90	2.36	7.00***	2.45	0.96	1.76
	(2.87)	(1.41)	(0.52)	(0.92)	(2.86)	(1.37)	(0.55)	(0.68)
λ^{MF}_{small}	7.36***	2.94	1.20	3.40	7.30***	2.55	1.37	2.62
	(2.98)	(1.64)	(0.72)	(1.25)	(2.96)	(1.37)	(0.82)	(0.97)
λ^{MF}_{micro}	7.18***	2.60	−2.68	−0.24	7.18***	2.54	−3.29	−0.04
	(2.94)	(1.11)	(−1.32)	(−0.06)	(2.92)	(1.11)	(−1.59)	(−0.01)
λ^{Δ}_{small}	−0.59	2.26**	−0.26	5.45***	−0.53	2.92**	−0.48	6.22***
	(−1.59)	(2.22)	(−0.34)	(3.32)	(−1.4)	(2.58)	(−0.62)	(3.76)
λ^{MF}	6.98***	2.62	1.01	1.54	6.99***	2.64	0.90	1.28
	(2.86)	(1.51)	(0.59)	(0.63)	(2.87)	(1.51)	(0.53)	(0.52)
$\lambda_i = 0$	0.01***	0.46	0.56	0.11	0.01**	0.52	0.52	0.14
$\lambda_i = \lambda^*$	0.13	0.81	0.46	0.13	0.20	0.83	0.44	0.13
$\Delta\lambda \neq 0$	0.01***	0.28	0.20	0.01***	0.01***	0.06*	0.28	0.01***

Implementation costs over time

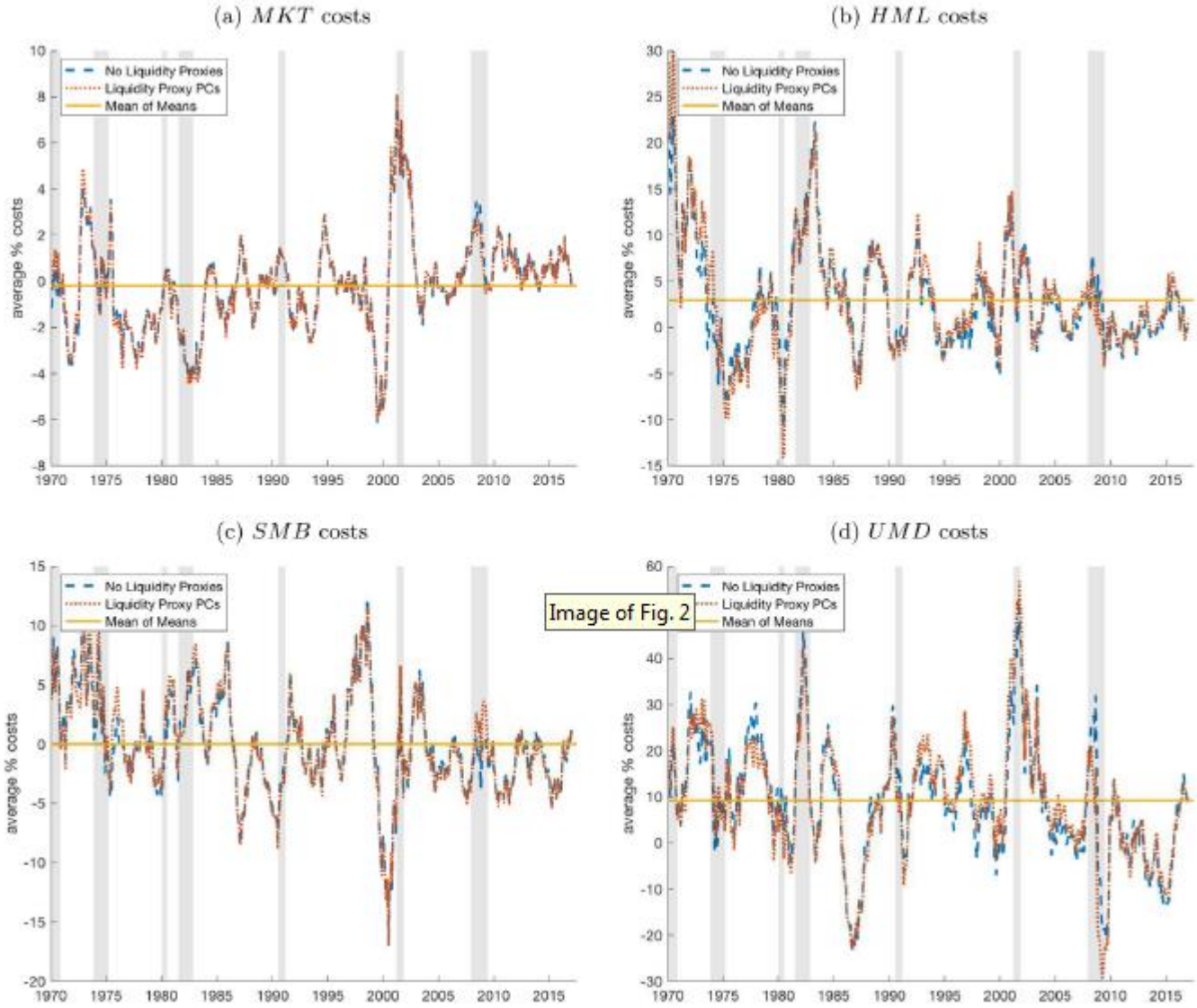

Image of Fig. 2

	Baseline specification		Including liquidity PCs	
	$N_S = 100$	$N_S = 269$	$N_S = 100$	$N_S = 269$
Panel A: Value-weighted stock portfolios				
$\bar{\lambda}^{\Delta}_{1970-1974}$	6.24	6.09	7.13	6.93
$\bar{\lambda}^{\Delta}_{1975-1996}$	2.91	2.38	2.72	2.22
$\bar{\lambda}^{\Delta}_{1997-2000}$	2.37	1.91	3.65	3.05
$\bar{\lambda}^{\Delta}_{2001-2016}$	1.34	1.29	1.44	1.37
$\bar{\lambda}^{\Delta}_{1975-1996}-\bar{\lambda}^{\Delta}_{1970-1974}$	−3.34**	−3.71***	−4.41***	−4.71***
	(−2.31)	(−2.74)	(−2.93)	(−3.32)
$\bar{\lambda}^{\Delta}_{1997-2000}-\bar{\lambda}^{\Delta}_{1975-1996}$	−0.54	−0.47	0.93	0.83
	(−0.32)	(−0.3)	(0.54)	(0.52)
$\bar{\lambda}^{\Delta}_{2001-2016}-\bar{\lambda}^{\Delta}_{1997-2000}$	−1.03	−0.62	−2.21	−1.68
	(−0.63)	(−0.41)	(−1.39)	(−1.12)
$F(\bar{\lambda}^{\Delta}_{1970-1974} = \ldots = \bar{\lambda}^{\Delta}_{2001-2016})$	3.73*	4.08**	4.92**	5.37**
p-value	0.05	0.04	0.03	0.02
Panel B: Equal-weighted stock portfolios				
$\bar{\lambda}^{\Delta}_{1970-1974}$	6.73	6.89	7.61	7.90
$\bar{\lambda}^{\Delta}_{1975-1996}$	3.50	3.55	3.19	3.31
$\bar{\lambda}^{\Delta}_{1997-2000}$	3.22	3.23	4.39	4.36
$\bar{\lambda}^{\Delta}_{2001-2016}$	1.94	2.57	2.00	2.71
$\bar{\lambda}^{\Delta}_{1975-1996}-\bar{\lambda}^{\Delta}_{1970-1974}$	−3.23**	−3.33**	−4.42***	−4.59***
	(−2.15)	(−2.30)	(−2.85)	(−3.08)
$\bar{\lambda}^{\Delta}_{1997-2000}-\bar{\lambda}^{\Delta}_{1975-1996}$	−0.27	−0.33	1.20	1.05
	(−0.16)	(−0.19)	(0.68)	(0.60)
$\bar{\lambda}^{\Delta}_{2001-2016}-\bar{\lambda}^{\Delta}_{1997-2000}$	−1.28	−0.66	−2.39	−1.65
	(−0.79)	(−0.39)	(−1.51)	(−0.95)
$F(\bar{\lambda}^{\Delta}_{1970-1974} = \ldots = \bar{\lambda}^{\Delta}_{2001-2016})$	3.41*	2.78*	4.68**	4.03**
p-value	0.07	0.10	0.03	0.05

	MKT			HML			SMB			UMD		
Panel A: Baseline specification												
β_{MFLOW}	0.07		−0.02	1.91**		1.30	−0.02		−0.19	0.65		−0.03
	(0.27)		(−0.06)	(2.21)		(1.47)	(−0.04)		(−0.34)	(0.50)		(−0.03)
β_{DFLOW}	−0.05		−0.10	−2.16*		−2.45**	0.13		0.09	−1.81		−2.09
	(−0.13)		(−0.27)	(−1.87)		(−2.15)	(0.23)		(0.17)	(−0.92)		(−1.08)
β_{ML}		0.53*	0.55*		2.80***	3.03***		0.44	0.44		2.75	3.03
		(1.65)	(1.68)		(2.81)	(3.31)		(0.59)	(0.59)		(1.53)	(1.64)
β_{FL}		−0.46	−0.49		−3.08***	−3.08***		−0.68	−0.73		−2.92	−0.73
		(−1.34)	(−1.35)		(−3.28)	(−3.12)		(−0.88)	(−0.88)		(−1.57)	(−0.88)
α	−0.21	−0.21	−0.21	2.59***	2.59***	2.59***	−0.07	−0.07	−0.07	7.30***	7.30***	7.30***
	(−0.88)	(−0.88)	(−0.88)	(3.85)	(3.87)	(3.92)	(−0.14)	(−0.14)	(−0.14)	(5.59)	(5.57)	(5.65)
Panel B: Including liquidity principal components												
β_{MFLOW}	0.10		−0.02	2.38**		1.55	−0.14		−0.25	1.87		0.00
	(0.39)		(−0.09)	(2.50)		(1.64)	(−0.29)		(−0.46)	(1.42)		(0.00)
β_{DFLOW}	−0.02		−0.07	−1.95		−2.28*	0.01		−0.07	−1.50		−1.70
	(−0.05)		(−0.19)	(−1.57)		(−1.90)	(0.02)		(−0.12)	(−0.76)		(−0.91)
β_{ML}		0.57*	0.58*		3.42***	3.61***		0.76	0.79		2.38	2.61
		(1.82)	(1.83)		(3.38)	(3.88)		(0.90)	(0.93)		(1.41)	(1.51)
β_{FL}		−0.61*	−0.63*		−4.12***	−4.01***		−0.54	−0.64		−6.69***	−0.64
		(−1.79)	(−1.77)		(−4.28)	(−4.05)		(−0.69)	(−0.76)		(−3.77)	(−0.76)
α	−0.22	−0.22	−0.22	2.83***	2.83***	2.83***	−0.02	−0.02	−0.02	7.55***	7.55***	7.55***
	(−0.91)	(−0.92)	(−0.92)	(3.92)	(4.03)	(4.08)	(−0.03)	(−0.03)	(−0.03)	(5.73)	(5.92)	(5.98)