Online Appendix
International Portfolio Choice with Frictions: Evidence from Mutual Funds

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This Online Appendix has four sections. Section A presents the return differential regressions when applied to our EPFR portfolio sample. Section B presents results with alternative specifications of portfolio regressions and further robustness analysis. Section C provides detailed information on the heterogeneity of the country shares. Section D provides information on the representativeness of our EPFR data sample.

A Predicting Cross-Country Equity Return Differentials

The return differential regressions in Section 3 of the paper are done for 73 countries at different horizons. In the portfolio regressions using EPFR data, the number of non-US countries is reduced to 35. Moreover, the expected return differentials are discounted by the factor δ, so that we need to predict

$$er^{\delta}_{n,t,t+k} = (1-\delta)\sum_{s=1}^{k}\delta^{s-1}er_{n,t+s}$$

Table A1 shows the results of the pooled regressions for the discounted return differential when using the 35 countries of the EPFR sample and setting $\delta = 0.9$. This table illustrates the predictability for the whole sample, but we use true forecasts to construct discounted expected return differentials.

Table A2 shows the Clark and McCracken (2001) test of out-of-sample predictability for $er^{0.9}_{n,t,t+k}$ for $k = 1, 12, 24$ and 36. When the reported value is higher than 1.079 (Clark and McCracken, 2001 Table 1, $\pi = 0.4$, $k_2 = 1$), predicting the expected excess return with the momentum, dividend-price and the earning-price is statistically superior to using the mean of the expected excess return at the p-value of 5%.

Table A1: Regressions Return Differential - Different Horizons - Discounted - EPFR Sample

	(1) $er_{n,t+1}$	(2) $er^{0.9}_{n,t,t+12}$	(3) $er^{0.9}_{n,t,t+24}$	(4) $er^{0.9}_{n,t,t+36}$
Momentum	0.0378*	0.01717***	0.01778***	0.01916***
	(0.0194)	(0.00443)	(0.00447)	(0.00456)
Dividend-Price	0.0045	0.00511***	0.00691***	0.00760***
	(0.0028)	(0.00070)	(0.00077)	(0.00080)
Earning-Price	0.0044**	0.00222***	0.00312***	0.00321***
	(0.0022)	(0.00054)	(0.00057)	(0.00058)
Observations	14672	14287	13867	12612
R^2	0.004	0.039	0.060	0.080

Standard errors clustered by month in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: Regressions with 35 countries over the interval 1970:01-2019:02. All regressions include a country fixed effects.

Table A2: Predictability, Out-of-Sample, Different Horizons

	(1) $er_{n,t+1}$	(2) $er^{0.9}_{n,t,t+12}$	(3) $er^{0.9}_{n,t,t+24}$	(4) $er^{0.9}_{n,t,t+36}$
73 countries, 2002:01-2016:07	0.587	10.138***	11.347***	12.076***
73 countries, 2002:01-2019:02	0.658	11.329***	13.200***	14.284***
35 countries, 2002:01-2016:07	1.169***	12.810***	16.181***	16.973***
35 countries, 2002:01-2019:02	1.312***	14.911***	19.195***	20.077***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Predicting the expected excess return with the momentum, dividend-price and the earning-price is statistically superior to using the mean of the expected excess return at the p-value of 5% when the value reported in Table A2 is higher than the critical value of 1.079 reported in Clark and McCracken (2001, Table 1, $\pi = 0.4$, $k_2 = 1$).

B Portfolio Regressions

Table B1 tests the benchmark portfolio equation over different specifications. In column (1), we do the portfolio regression with OLS including a country-month fixed effect. The country-month fixed effect captures a country shock in a given month which affects all funds similarly and lead to a common portfolio reallocation. Compared to our benchmark 2SLS portfolio regression, OLS underestimates the persistence and overestimates the effect of the expected excess return. Only the 2SLS portfolio regression correctly resolves the endogeneity problem. In columns (2) and (3), we change the horizon from k = 24 to k = 12 and k = 36, respectively. In columns (4) and (5), we change the value of β from 0.97 to 0.96 and 0.98, respectively. Changing β gives a value of δ of 0.917 and 0.936, respectively. In column (6), we use the past shares $z_{i,m,-n,t-1}$ instead of average shares $\bar{z}_{i,m,-n}$ to compute the return on the reference portfolio and therefore the excess return. We do the same to compute the instruments at the fund level, where we subtract the weighted average for the reference countries. Finally, in column (7), we use differentials in momentum, dividend-price and earning-price ratio nonrecursively, i.e., using the whole sample to estimate return differentials so that these are not true forecasts.

Table B1: Portfolio Regressions, Alternative Specifications

	(1) OLS Country-Time FE	(2) k = 12	(3) k = 36	(4) $\beta = 0.96$	(5) $\beta = 0.98$	(6) Weight $z_{i,m,-n,t-1}$	(7) Non-Recursive
$z_{i,n,t-1}$	0.917***	0.929***	0.960***	0.948***	0.951***	0.970***	0.966***
	(0.005)	(0.012)	(0.013)	(0.013)	(0.013)	(0.009)	(0.010)
$val_{i,n,t}$	0.293***	0.228***	0.296***	0.293***	0.302***	0.340***	0.326***
	(0.029)	(0.069)	(0.066)	(0.066)	(0.065)	(0.062)	(0.063)
$ER_{i,n,t}$	18.792***	8.217***	10.309**	9.403***	9.811***	6.431***	8.825***
	(2.787)	(1.730)	(4.039)	(2.742)	(3.054)	(2.168)	(3.210)
Observations	154,186	142,758	134,142	142,758	142,758	142,758	142,758
R^2	0.99	0.88	0.87	0.87	0.87	0.87	0.87

Clustered standard errors by months in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: Regressions for 36 countries over the interval 2002:01-2016:07. The regressions include a fund-country fixed effect. In columns (2)-(7) the instruments are $val_{i,n,t-1}$, $e_{i,n,t}$, $\Delta e_{i,n,t}$, $\Delta d_{i,n,t}$, $y_{i,n,t}$, $b_{i,n,t}$, $h_{i,n,t}$, $\Delta h_{i,n,t}$.

Table B2 tests the benchmark portfolio equation over different data samples. Column (1) is the benchmark portfolio regression when we start the sample in January 2012. Column (2) restricts the sample to funds investing at least for 24 consecutive months. In column (3), we consider (i,n) pairs for which $\bar{k}_{i,n}$ is at least 1 percent.

Table B2: Portfolio Regressions, Alternative Samples, $\delta = 0.97 \times b_1$

	(1) From Jan, 2012	(2) Report more than 24 months	(3) $\bar{k}_{in} \geq 1\%$
$z_{i,n,t-1}$	0.880***	0.950***	0.946***
	(0.021)	(0.013)	(0.011)
$val_{i,n,t}$	0.178*	0.298***	0.238***
	(0.097)	(0.065)	(0.070)
$ER_{i,n,t}$	22.736***	9.508***	7.244***
	(4.814)	(2.871)	(1.900)
Observations	88,436	142,729	189,551
R^2	0.81	0.87	0.87

Clustered standard errors by months in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: Regressions for 36 countries over the interval 2002:01-2016:07. The regressions include a fund-country fixed effect. In columns (1)-(3) the instruments are $val_{i,n,t-1}$, $e_{i,n,t}$, $\Delta e_{i,n,t}$, $\Delta d_{i,n,t}$, $y_{i,n,t}$, $b_{i,n,t}$, $h_{i,n,t}$, $\Delta h_{i,n,t}$.

Table B3 shows the benchmark portfolio regression using confidence indices as additional instruments. The indices correspond to the consumer confidence index, the business confidence index and the leading indicators compiled by the OECD.[1] The indices are available for a subset of countries. Column (1) shows the benchmark portfolio regression for the sample in which OECD has data for the consumer confidence index. Columns (2), (3) and (4) show the 2sls portfolio regressions when we add the consumer confidence index, the business confidence

[1]Consumer confidence index: OECD (2022), Consumer confidence index (CCI) (indicator). doi: 10.1787/46434d78-en (Accessed on 23 September 2022). Business confidence index: OECD (2022), Business confidence index (BCI) (indicator). doi: 10.1787/3092dc4f-en (Accessed on 23 September 2022). Leading indicator: OECD (2022), Composite leading indicator (CLI) (indicator). doi: 10.1787/4a174487-en (Accessed on 23 September 2022).

index and the leading indicator to the benchmark set of instruments, respectively. Those instruments satisfy our first stage and risk criteria.

Table B3: Portfolio Regressions, Confidence Index

	(1) Sample Reduced	(2) Consumer Conf. Index	(3) Business Conf. Index	(4) Leading Indicators
$z_{i,n,t-1}$	0.933***	0.934***	0.939***	0.946***
	(0.021)	(0.018)	(0.020)	(0.017)
$val_{i,n,t}$	0.301***	0.302***	0.303***	0.305***
	(0.078)	(0.074)	(0.081)	(0.076)
$ER_{i,n,t}$	14.551**	13.750***	14.281***	11.868***
	(5.691)	(4.848)	(5.273)	(4.417)
Observations	111,322	111,322	113,254	120,905
R^2	0.88	0.88	0.88	0.88

Clustered standard errors by months in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: Regressions for 36 countries over the interval 2002:01-2016:07. The regressions include a fund-country fixed effect. The dependent variables in columns (2)-(4) were multiplied by 10,000 before the regressions. In columns (1)-(4) the benchmark instruments are $val_{i,n,t-1}$, $e_{i,n,t}$, $\Delta e_{i,n,t}$, $\Delta d_{i,n,t}$, $y_{i,n,t}$, $b_{i,n,t}$, $h_{i,n,t}$, $\Delta h_{i,n,t}$. Columns (2), (3) and (4) add the consumer confidence index, the business confidence index and the leading indicator to the set of benchmark instruments, respectively.

Table B4 shows the portfolio regression when we take the logarithm of the portfolio shares. In the data, the distribution of the portfolio shares is closer to a log-normal distribution than to a normal distribution. In the paper, we use the shares in level following the theory.

C Heterogeneous Country Shares

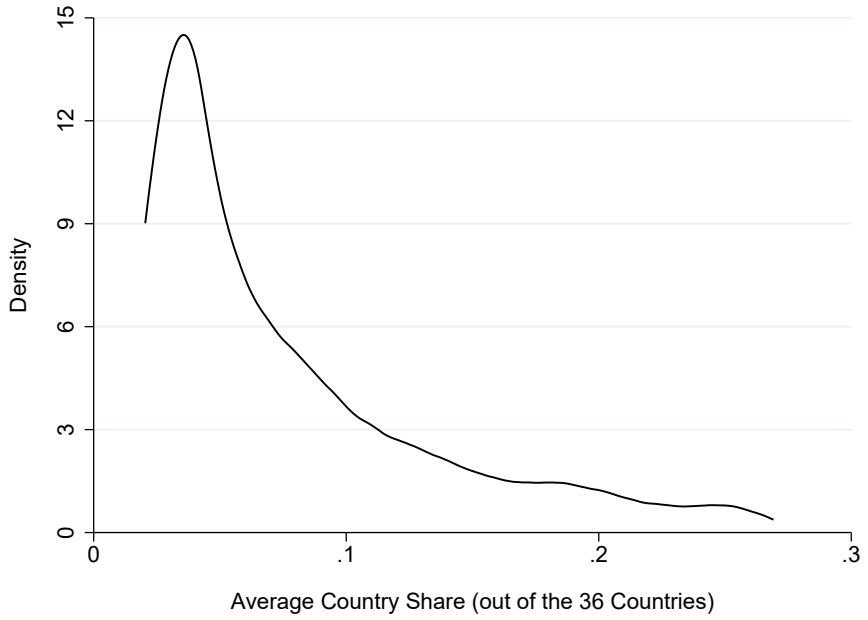
Figure C.1 shows the distribution of the mean portfolio shares $\bar{z}_{i,n}$ across (i,n). We truncate the sample to the bottom 95 percent of the observations because of large outliers in the top 5 percent. The average portfolio share $\bar{z}_{i,n}$ in the top 5 percent of the distribution ranges from 27 percent to 89 percent. The 10th, 50th and 90th percentiles of $\bar{z}_{i,n}$ are 2.7%, 6% and 20.4%, respectively.

Table B4: Log Portfolio Regressions

	(1) $\ln z_{i,n,t}$
$\ln z_{i,n,t-1}$	0.938***
	(0.019)
$val_{i,n,t}$	3.736***
	(0.540)
$ER_{i,n,t}$	114.847***
	(41.315)
Observations	142,758
R^2	0.81

Clustered standard errors by months in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Notes: Regressions for 36 countries over the interval 2002:01-2016:07. The regressions include a fund-country fixed effect. In column (1) the instruments are $val_{i,n,t-1}$, $e_{i,n,t}$, $\Delta e_{i,n,t}$, $\Delta d_{i,n,t}$, $y_{i,n,t}$, $b_{i,n,t}$, $h_{i,n,t}$, $\Delta h_{i,n,t}$.

Figure C.1: Distribution of $\bar{z}_{i,n}$



Notes: This Figure shows the distribution of $\bar{z}_{i,n}$ across (i,n). We truncate the sample to the bottom 95 percent of the observations.

D Representativeness

How representative is our data? To answer this question, we report some evidence of how representative this sample is in terms of the allocation across foreign countries. Let $W_{n,t}^{EPFR}$ be the total equity holdings in country n by our EPFR mutual funds. Further, let $W_t^{EPFR} = \sum_{n \in 35} W_{n,t}^{EPFR}$ be the total foreign equity holdings of our US EPFR funds. We denote that aggregate share invested in country n by $z_{n,t}^{EPFR} = \frac{W_{n,t}^{EPFR}}{W_t^{EPFR}}$. Similarly, we denote the aggregate share of all US equity investors by $z_{n,t}^{all}$. The aggregate equity holdings correspond to the monthly US foreign equity holdings reported by Bertaut and Tryon (2007), later extended by Bertaut and Judson (2014), who have since further updated it through December 2018 (see section 4.1 in the paper).

Table D1 reports the share (expressed in percent) invested in each of the 35 foreign countries in July 2016 by all US equity investors and by the aggregate of the EPFR funds in out sample. The correlation between the two series is 88%.

Figure D.1 report time series of portfolio shares (expressed in percent) allocated to 3 regions (Europe, Asia and Latin America) from January 2002 to July 2016.

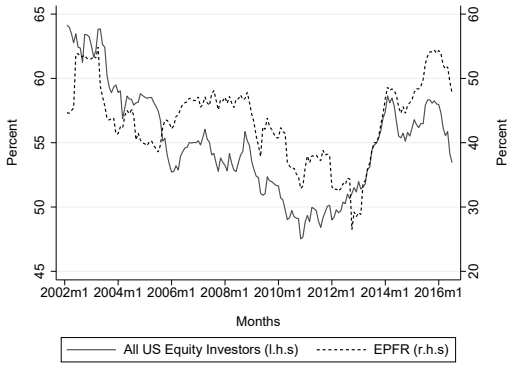
Table D1: All US Equity Investors vs EPFR US Funds: Country Share in July 2016 (Out of 35 countries)

	All US equity investors (%)	EPFR (%)
Australia	3.1	4.2
Belgium	1.1	0.4
Brazil	2.0	2.8
Canada	7.7	2.2
Chile	0.1	0.1
China	1.9	8.0
Colombia	0.1	0.01
Denmark	0.7	0.5
Finland	0.6	0.4
France	6.4	8.8
Germany	5.4	8.2
Hong-Kong	2.4	2.2
India	2.6	3.4
Indonesia	0.6	0.9
Ireland	3.7	0.1
Israel	1.1	0.1
Italy	1.2	1.1
Japan	13.3	14.6
Korea, Rep. of	3.0	3.5
Malaysia	0.2	0.8
Mexico	1.1	1.4
Netherlands	5.1	2.9
Norway	0.2	0.1
Peru	0.04	0.02
Philippines	0.4	0.2
Poland	0.2	0.03
Singapore	1.9	0.3
South Africa	1.4	2.2
Spain	1.7	2.4
Sweden	1.6	1.7
Switzerland	8.1	7.0
Taiwan	2.5	4.3
Thailand	0.7	0.9
Turkey	0.4	0.2
United Kingdom	17.4	14.3

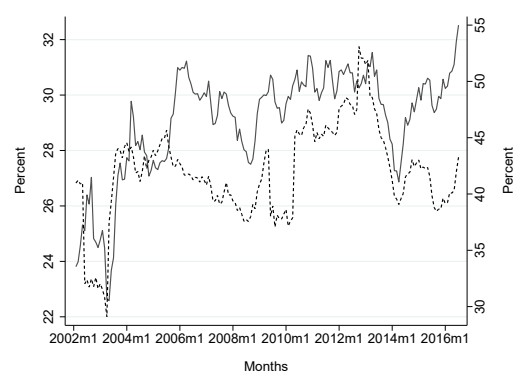
The Table reports the aggregate shares in July 2016. The data of the first column come from Bertaut and Tryon (2007) and Bertaut and Judson (2014).

Figure D.1: All US Equity Investors vs EPFR US Funds: Regional Shares

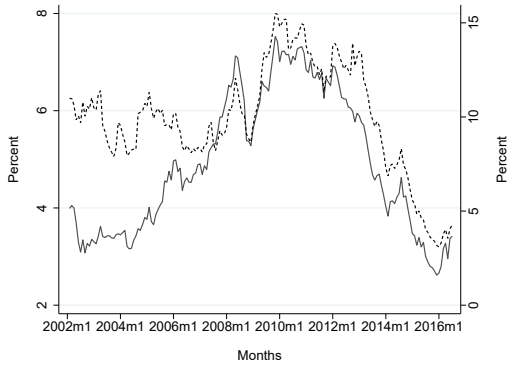
A. Europe



B. Asia



C. Latin America



Notes: Europe: Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom. Asia: Australia, China, Hong-Kong, India, Indonesia, Japan, Korea Rep. of, Malaysia, Philippines, Singapore, Taiwan, Thailand. Latin America: Brazil, Chile, Colombia, Mexico, Peru.