Online Appendix for

"Asset Fire Sales and Purchases and the International Transmission of Funding Shocks"

This internet appendix provides supplemental analyses to the main tables and figures in "Asset Fire Sales and Purchases and the International Transmission of Funding Shocks"

The first section describes the process used to clean and investigate the reliability of the EPFR data, the main international funds holding and flow data employed in this paper. There is also an illustration of the composition of FIFA quintiles. Prior to Table IA.XIII, we detail the values of some parameters estimated from the data. Many model derivations are at the end of this document.

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Cleaning the EPFR Data

Before proceeding to the empirical analysis, we screen the EPFR fund data in a few standard ways. First, given our focus on fund flows and stock returns in emerging markets, we keep only the funds that invest in at least one emerging country (under the current MSCI classification) during the sample period. (We exclude Zimbabwe from the list due to its extremely high inflation.) Second, to avoid data errors, we only include funds once their *TNA*s hit the USD 5 million threshold. Third, in the early part of the sample, we find that several funds have a series of zero returns that persist for a few months. During these months, changes in *TNA* are all lumped into fund flows, by construction. As this clearly generates data errors, we exclude those months. Fourth, since our analysis requires a significant cross-section of funds, we restrict our sample to those countries in which EPFR has data on at least 30 invested funds. Collectively, these exclusions have almost no impact on our analysis as the excluded funds have negligible dollar holdings and flows compared to the rest of the sample, but they reduce the number of unique funds in our sample to a total of 1,175. Finally, we winsorize fund flows and returns at the -50% and +200% points in order to minimize the influence of potential outliers. This procedure affects less than 1% of the sample. We also investigate the reliability of the EPFR data. Figure IA.2 below shows the *TNA*s and monthly returns from EPFR and CRSP are virtually identical for funds (around 10% of the overall sample) that we match across databases using a name-matching algorithm.

Composition of FIFA Quintiles

To illustrate the composition of the FIFA quintiles, take for example May 2008. Countries that are in the highest FIFA quintile in this month are: Malaysia, Hungary, South Korea, Hong Kong, and Indonesia. The average return (CAPM beta) for this quintile portfolio is 0.59% (1.51). These countries are held by a total of 398 funds, with combined holdings ranging from 2.08% to 5.00% of the countries' market capitalizations. These funds (e.g. Managers Emerging Markets Equity Fund) experience an aggregate inflow equal to 0.53% of combined beginning-of-month TNA. In the same month, countries in the lowest FIFA quintile are: Taiwan, Brazil, Mexico, India, and Thailand. The average return (CAPM beta) for this quintile portfolio is -0.10% (0.74). These countries are held by a total of 446 funds, with combined holdings ranging from 2.56% to 5.60% of the countries' market capitalizations. These funds (e.g. Templeton Developing Markets Fund) experience an aggregate inflow of 0% of combined beginning-of-month TNA.

Table IA.I
Comparison between EPFR and TIC data

This table compares the mean and standard deviation of monthly change in dollar holding, summed across all funds, in the EPFR data with the net transactions in foreign stocks (by U.S. investors) from the TIC data for emerging countries. The sample period is from July 2001 to June 2009. The change in dollar holding is calculated as the end-of-month holding in the country minus the beginning-of-month holding multiplied by the country index return. The last column reports the time-series correlation between the change in the dollar holding and the net transactions in stocks for each country, both normalized by the country's market capitalization at the end of the previous month. The last row reports the cross-country average for each column.

	Average Flow ($ Million)		Standard Deviation of Flow ($ Million)		Flow/MCAP
Country	EPFR	TIC	EPFR	TIC	Correlation
Argentina	-5.0	3.6	48.1	99.6	0.10
Brazil	-32.9	392.0	573.1	694.9	0.33
Chile	2.4	1.7	66.6	119.1	0.25
China	132.2	104.6	1635.5	440.2	0.14
Colombia	-0.5	0.6	21.7	58.7	0.29
Czech Republic	-22.9	-1.3	65.5	35.5	0.13
Hong Kong	-9.8	136.4	585.3	1898.8	0.49
Hungary	-36.9	1.3	95.1	46.6	0.12
India	-31.8	12.1	414.2	400.1	0.18
Indonesia	-23.5	5.4	108.1	94.1	0.12
Israel	11.4	17.1	79.9	202.7	0.09
Jordan	-0.3		5.1		
Malaysia	-7.9	50.9	222.6	169.0	0.55
Mexico	-87.5	-76.7	249.8	424.0	0.38
Morocco	-2.7	1.3	12.6	5.3	0.33
Pakistan	7.2	6.7	28.9	31.7	0.39
Philippines	0.5	6.4	58.1	35.9	0.04
Poland	-24.5	3.2	89.7	26.4	0.15
Russia	49.9	-7.6	582.1	146.9	0.17
South Africa	-29.6	64.1	272.9	178.0	0.19
South Korea	-175.3	32.6	531.8	551.3	0.38
Taiwan	81.3	399.3	494.9	1340.9	0.28
Thailand	2.4	10.6	141.9	83.8	0.24
Turkey	-9.4	23.9	156.4	166.9	0.10
Venezuela	-1.9	11.9	7.7	99.5	-0.20
Average	-8.6	50.0	261.9	306.3	0.22

Table IA.II

Predictive Regressions for Fund Flows

This table reports results from regressions of fund flows on log of beginning-of-period *TNA*, lagged fund flows and lagged fund returns, at monthly and weekly frequencies. The monthly (weekly) sample period is from February 1996 to June 2009 (first week of July 2001 to last week of June 2009). Both fund flows and fund returns are measured as a percentage of the beginning-of-period *TNA*. All variables in the regressions are divided by their own standard deviations. Fama-MacBeth regression coefficients are the time-series average of monthly (weekly) cross-sectional regression coefficients, with *t*-statistics calculated as the time-series standard error of the mean. The reported R-squared is the average across all cross-sectional regressions. *N* denotes the number of observations, and *t*-statistics are in parentheses.

	Monthly		Weekly	
Variable	Estimate	Standard Error	Estimate	Standard Error
Intercept	-0.063**	(0.029)	0.013	(0.012)
ln(*TNA*)	-0.006***	(0.001)	-0.001***	(0.000)
Flow_lag1	0.124***	(0.013)	0.086***	(0.005)
Flow_lag2	0.090***	(0.010)	0.071***	(0.004)
Flow_lag3	0.073***	(0.009)	0.058***	(0.004)
Flow_lag4	0.036***	(0.009)	0.046***	(0.004)
Flow_lag5	0.049***	(0.009)	0.031***	(0.003)
Flow_lag6	0.029***	(0.011)	0.020***	(0.004)
Flow_lag7	0.035***	(0.009)	0.020***	(0.004)
Flow_lag8	0.031***	(0.007)	0.026***	(0.003)
Flow_lag9	0.019*	(0.010)	0.032***	(0.003)
Flow_lag10	0.021*	(0.011)	0.020***	(0.003)
Flow_lag11	0.030***	(0.009)	0.018***	(0.003)
Flow_lag12	0.030***	(0.008)	0.016***	(0.003)
Flow_lag13			0.026***	(0.003)
Return_lag1	0.171***	(0.021)	0.093***	(0.008)
Return_lag2	0.058***	(0.018)	0.075***	(0.007)
Return_lag3	0.029	(0.049)	0.053***	(0.007)
Return_lag4	0.104	(0.091)	0.052***	(0.007)
Return_lag5	-0.163	(0.124)	0.031***	(0.007)
Return_lag6	0.161	(0.231)	0.027***	(0.007)
Return_lag7	0.019	(0.154)	0.024***	(0.007)
Return_lag8	-0.059	(0.057)	0.003	(0.007)
Return_lag9	0.051*	(0.028)	0.022***	(0.007)
Return_lag10	-0.083	(0.055)	0.007	(0.007)
Return_lag11	0.072	(0.078)	0.010	(0.007)
Return_lag12	-0.004	(0.041)	0.008	(0.007)
Return_lag13			-0.004	(0.007)
R-squared	0.286		0.181	
N	147		404	

Table IA.III

Fund Trading Associated with Fund Flows

This table reports how fund holdings change conditional on actual and expected monthly flows, measured as a percentage of the beginning-of-month *TNA*. Fund-month observations with available flow data are sorted into deciles according to fund flow (Panel A) and expected fund flow (Panel B), estimated as in Table IA.II. For each fund-month, countries are considered expanded (reduced) if the end-of-month holdings are greater (smaller) than the beginning-of-month holdings multiplied by the country index returns. These are then reported as fractions of the total number of countries invested in at the beginning of the month. Average change in positions is computed as the cross-country average of the change in dollars invested as a percentage of beginning-of-month *TNA*. Change in cash holding is also measured as a percentage of the beginning-of-month *TNA*. Test statistics are for the difference in mean between all fund-months in deciles 1 and 10, based on standard errors clustered by calendar year-month. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

Panel A: Actual flow sort

Flow Decile	Flow (%)	% Countries Expanded	% Countries Reduced	% Countries Eliminated	Avg. Change in Positions	Change in Cash Holding
1 (Inflows)	12.752	75.784	22.683	1.533	4.374	1.737
2	3.733	63.934	34.460	1.606	1.089	0.544
3	1.375	55.561	43.138	1.301	0.315	0.269
4	0.237	49.370	49.410	1.220	-0.030	0.106
5	-0.066	47.341	51.535	1.124	-0.110	0.144
6	-0.670	44.372	53.995	1.633	-0.207	-0.156
7	-1.577	40.909	57.404	1.687	-0.456	-0.224
8	-2.815	36.749	61.295	1.956	-0.805	-0.389
9	-4.709	32.990	65.163	1.847	-1.351	-0.452
10 (Outflows)	-10.852	27.382	69.370	3.247	-3.113	-1.034
1-10	23.605	48.402***	-46.687***	-1.715***	7.487***	2.771***

Panel B: Expected flow sort

E[Flow] Decile	E[Flow] (%)	% Countries Expanded	% Countries Reduced	% Countries Eliminated	Avg. Change in Positions	Change in Cash Holding
1 (Inflows)	5.542	58.142	40.371	1.486	1.492	-0.042
2	2.158	52.625	45.785	1.590	0.325	-0.124
3	0.937	50.021	48.591	1.389	0.122	0.098
4	0.179	48.324	50.436	1.240	-0.118	0.027
5	-0.364	46.887	51.649	1.463	-0.075	0.013
6	-0.895	45.314	53.026	1.660	-0.104	0.018
7	-1.499	45.126	53.024	1.851	-0.098	0.045
8	-2.275	43.826	54.384	1.789	-0.393	0.135
9	-3.429	43.354	54.393	2.254	-0.459	0.130
10 (Outflows)	-6.742	40.786	56.780	2.434	-0.985	0.245
1-10	12.284	17.357***	-16.409***	-0.948***	2.477***	-0.286

Table IA.IV
Fund Trading Associated with Fund Flows – Index vs. Non-Index Funds

This table reports how fund holdings change conditional on actual and expected monthly flows, measured as a percentage of the beginning-of-month *TNA*. Fund-month observations in the samples of index funds (Panel A) and non-index funds (Panel B) are sorted into deciles according to fund flow. Index (non-index) funds are defined as funds with mean absolute month-to-month change in country allocation lower (higher) than the sample median. For each fund-month, countries are considered expanded (reduced) if the end-of-month holdings are greater (smaller) than the beginning-of-month holdings multiplied by the country index returns. These are then reported as fractions of the total number of countries invested in at the beginning of the month. Average change in positions is computed as the cross-country average of the change in dollars invested as a percentage of beginning-of-month *TNA*. Change in cash holding is also measured as a percentage of the beginning-of-month *TNA*. Test statistics are for the difference in mean between all fund-months in deciles 1 and 10, based on standard errors clustered by calendar year-month. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

Panel A: Index funds

Decile	Flow (%)	% Countries Expanded	% Countries Reduced	% Countries Eliminated	Avg. Change in Positions	Change in Cash Holding
1 (Inflows)	11.546	73.316	24.980	1.704	2.475	1.266
2	3.663	63.315	34.795	1.890	0.659	0.465
3	1.448	55.240	43.393	1.368	0.186	0.349
4	0.331	50.510	47.999	1.491	0.045	0.060
5	-0.107	46.480	52.096	1.424	-0.080	0.117
6	-0.745	45.116	53.178	1.705	-0.104	-0.118
7	-1.595	40.873	57.177	1.950	-0.258	-0.197
8	-2.701	37.878	59.977	2.145	-0.428	-0.329
9	-4.389	35.301	62.893	1.807	-0.661	-0.447
10 (Outflows)	-9.785	29.584	67.549	2.867	-1.363	-0.865
1-10	21.331	43.731***	-42.568***	-1.163***	3.838***	2.131***

Panel B: Non-index funds

Decile	Flow (%)	% Countries Expanded	% Countries Reduced	% Countries Eliminated	Avg. Change in Positions	Change in Cash Holding
1 (Inflows)	14.117	78.330	20.260	1.410	6.518	2.265
2	3.803	65.098	33.712	1.189	1.475	0.650
3	1.242	55.309	43.496	1.195	0.532	0.121
4	0.155	48.449	50.585	0.965	-0.171	0.222
5	-0.038	48.375	50.628	0.997	-0.169	0.145
6	-0.562	44.367	54.257	1.377	-0.195	-0.205
7	-1.492	40.814	57.720	1.466	-0.527	-0.291
8	-2.806	35.472	62.639	1.889	-1.226	-0.255
9	-5.006	31.515	66.780	1.705	-1.943	-0.649
10 (Outflows)	-12.289	23.107	73.249	3.644	-5.436	-1.191
1-10	26.407	55.223***	-52.989***	-2.234***	11.954***	3.455***

Table IA.V
Examining Alternative Benchmark Returns

This table reports results from panel regressions of realized betas with the U.S. and Europe markets, as alternative benchmarks, on dummy variables for the countries that are in the extreme quintiles of *FIFA*. The sample period is from February 1996 to June 2009. Countries are sorted into quintiles on the basis of *FIFA* (calculated as described in Table III of the paper). For each country-month, realized U.S. (Europe) beta (dependent variable) is calculated at daily frequency as the average of country return and MSCI U.S. (Advanced Europe) index return divided by the variance of MSCI U.S. (Advanced Europe) index return. *FIFA* Q1 (Q5) dummy variable equals one if the country is in the highest (lowest) holding quintile, and zero otherwise. Positive (negative) benchmark dummy variable equals 1 if the benchmark excess return, MSCI U.S. in the first column and MSCI Advanced Europe in the second column, for the month is greater (lower) than zero, and zero otherwise. The U.S. 1-month T-bill return is used as the risk-free rate. The Wald tests are for the null hypothesis that the coefficients of *FIFA* Q1 and Q5 dummies are equal in both U.S. (Advanced Europe) excess return regimes. The number of country-month observations is denoted by *N*. Rogers (1993) standard errors clustered by calendar-month using three leads/lags are in parentheses. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

	U.S. (1)	Advanced Europe (2)
Positive Benchmark Dummy	0.688***	0.634***
	(0.099)	(0.054)
Positive Benchmark Dummy * *FIFA* Q1 Dummy	0.069	0.160**
	(0.070)	(0.071)
Positive Benchmark Dummy * *FIFA* Q5 Dummy	-0.099*	0.007
	(0.060)	(0.068)
Negative Benchmark Dummy	0.668***	0.604***
	(0.100)	(0.065)
Negative Benchmark Dummy * *FIFA* Q1 Dummy	0.061	0.026
	(0.099)	(0.084)
Negative Benchmark Dummy * *FIFA* Q5 Dummy	0.159**	0.071*
	(0.065)	(0.041)
Wald Test Statistic	3.991	4.177
N	3828	3828
R-Squared	0.002	0.003

Table IA.VI

FIFA Sorted Calendar-Time Portfolio Regressions

This table reports results from time-series regressions of calendar-time long Q1 short Q5 portfolio returns on the G-7 excess return, over the sample period from February 1996 to June 2009. Countries are sorted into quintiles on the basis of actual *FIFA* (first two columns) and predicted *FIFA* (last two columns). Predicted *FIFA* is calculated by replacing the current month flow by the expected flows, estimated via the Fama-MacBeth regressions in Table IA.II. The excess return on the MSCI G-7 index is on the RHS. Positive (negative) G-7 dummy equals one if the G-7 excess return is positive (negative) and zero otherwise. The U.S. 1-month T-bill return is used as the risk-free rate. The number of monthly observations is denoted by *N*, and Newey-West standard errors using three lags are in parentheses.

	FIFA Sort (1)	*FIFA* Sort (2)	Predicted *FIFA* Sort (3)	Predicted *FIFA* Sort (4)
Intercept	0.013***	0.001	-0.004	-0.018**
	(0.005)	(0.007)	(0.005)	(0.008)
G-7 Excess Return	-0.066		-0.089	
	(0.094)		(0.148)	
Positive G-7 Dummy * G-7 Excess Return		0.345*		0.356
		(0.208)		(0.298)
Negative G-7 Dummy * G-7 Excess Return		-0.354***		-0.398**
		(0.133)		(0.198)
N	158	158	147	147
R-squared	0.003	0.035	0.005	0.042

Table IA.VII

Explaining Realized G-7 Betas Using Holding

This table reports results from panel regressions of G-7 betas on dummy variables for the countries that are in the extreme quintiles of holding. The sample period is from February 1996 to June 2009. Countries are sorted into quintiles on the basis of beginning-of-month holding in the country of all sample funds, measured as a percentage of the country market capitalization. For each country-month, G-7 beta (dependent variable) is calculated at daily frequency as the average of country return and MSCI G-7 index return divided by the variance of MSCI G-7 index return. Holding Q1 (Q5) dummy variable equals one if the country is in the highest (lowest) holding quintile, and zero otherwise. Positive (negative) G-7 dummy variable equals 1 if the MSCI G-7 return for the month is greater (lower) than zero, and zero otherwise. The U.S. 1-month T-bill return is used as the risk-free rate. The number of country-month observations is denoted by *N*. Rogers (1993) standard errors clustered by calendar-month using three leads/lags are in parentheses. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

Positive G-7 Dummy	0.755***
	(0.095)
Positive G-7 Dummy * Holding Q1 Dummy	0.347***
	(0.080)
Positive G-7 Dummy * Holding Q5 Dummy	-0.438***
	(0.075)
Negative G-7 Dummy	0.820***
	(0.097)
Negative G-7 Dummy * Holding Q1 Dummy	0.158**
	(0.062)
Negative G-7 Dummy * Holding Q5 Dummy	-0.386***
	(0.077)
N	3828
R-Squared	0.024

Table IA.VIII

Equally-Weighted Average Trading Costs and Fund Flows

This table reports the average trading costs of countries expanded and countries reduced or eliminated conditional on actual fund flows. Fund flows are measured as a percentage of the beginning-of-month *TNA*. Fund-month observations with available flow data are sorted into deciles according to fund flow. For each fund-month, countries are divided into two groups—those that are expanded and those that are reduced or eliminated. Countries are considered expanded (reduced) if the end-of-month holdings are greater (smaller) than the beginning-of-month holdings multiplied by the country index returns. Trading costs in basis points are first averaged for each group of countries for each fund in each month. All countries bought and sold carry equal weight. The average trading costs are then averaged across fund-months in each flow decile. Test statistics are for the difference in mean between deciles 1 and 10 and between the groups of countries expanded and reduced or eliminated, and are calculated using standard errors clustered by calendar year-month.

		Countries Expanded			Countries Reduced or Eliminated			Difference		
Decile	Flow (%)	Total Trading Costs	Explicit Costs	Price Impact Costs	Total Trading Costs	Explicit Costs	Price Impact Costs	Total Trading Costs	Explicit Costs	Price Impact Costs
1 (Inflows)	12.752	56.597	39.884	16.712	60.043	42.514	17.529	-3.446***	-2.629***	-0.817**
2	3.733	55.818	39.467	16.351	57.602	40.756	16.846	-1.784***	-1.289***	-0.495**
3	1.375	55.674	39.599	16.074	56.922	40.368	16.554	-1.248***	-0.768***	-0.480**
4	0.237	56.992	39.757	17.235	58.040	40.703	17.337	-1.048**	-0.946***	-0.102
5	-0.066	56.965	39.869	17.095	57.594	40.147	17.447	-0.629	-0.277	-0.352
6	-0.670	56.970	40.066	16.905	56.437	40.010	16.427	0.533	0.055	0.478**
7	-1.577	56.396	39.423	16.973	55.070	38.998	16.072	1.327***	0.425**	0.901***
8	-2.815	57.424	40.282	17.142	56.142	39.520	16.621	1.282***	0.762***	0.520**
9	-4.709	56.914	40.001	16.914	55.296	38.931	16.365	1.618***	1.069***	0.549**
10 (Outflows)	-10.852	58.311	41.074	17.237	55.807	39.226	16.581	2.504***	1.848***	0.656**
1-10	23.605	-1.715*	-1.189*	-0.525	4.236***	3.288***	0.948**	--	--	--

Table IA.IX

Explaining Cross-Country Correlations and G-7 Betas Using Liquidity Adjusted *FIFA*

This table reports results from panel regressions of (i) cross-country correlations and (ii) G-7 betas on dummy variables for the country(s) being in the extreme quintiles of liquidity-adjusted *FIFA*. The sample period is from February 1996 to June 2009. The dependent variables, realized cross-country correlations and realized G-7 betas, are calculated as described in Tables IV and V, respectively. Countries are sorted into quintiles on the basis of liquidity-adjusted *FIFA* (first and third columns) and predicted liquidity-adjusted *FIFA* (second and fourth columns). Liquidity-adjusted *FIFA* is calculated by multiplying each term in the summation in equation (3.2) by $(1/\kappa_{c,t})/\overline{(1/\kappa)_{\iota,t}}$ where $\kappa_{c,t}$ denotes the price impact costs of country *c* in month *t* and $\overline{(1/\kappa)_{\iota,t}}$ is the allocation-weighted average of $1/\kappa_{c,t}$ for fund *i* in month *t*. For country-months with missing price impact costs, the time-series average for the country is used. Predicted liquidity-adjusted *FIFA* is calculated by replacing the current month flow by the expected flow, estimated via the Fama-MacBeth regressions in Table IA.II. *FIFA* Q1 (Q5) dummy variable equals one if the country pair or country is in the highest (lowest) *FIFA* quintile, and zero otherwise. Positive (negative) G-7 dummy variable equals 1 if the MSCI G-7 excess return for the month is greater (lower) than zero, and zero otherwise. The U.S. 1-month T-bill return is used as the risk-free rate. The Wald tests are for the null hypothesis that the coefficients of *FIFA* Q1 and Q5 dummies are equal in both G-7 excess return regimes. The number of observations is denoted by *N*. Rogers (1993) standard errors clustered by calendar-month using three leads/lags are in parentheses. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

	Cross-Country Correlation		G-7 Beta	
	Liq-Adj *FIFA*	Predicted Liq-Adj *FIFA*	Liq-Adj *FIFA*	Predicted Liq-Adj *FIFA*
Intercept	0.217***	0.225***		
	(0.024)	(0.025)		
FIFA Q1 Dummy	0.044**	0.062***		
	(0.018)	(0.021)		
FIFA Q5 Dummy	0.044**	0.038*		
	(0.022)	(0.021)		
Positive G-7 Dummy			0.718***	0.756***
			(0.078)	(0.074)
Positive G-7 Dummy * *FIFA* Q1 Dummy			0.155*	0.166*
			(0.094)	(0.099)
Positive G-7 Dummy * *FIFA* Q5 Dummy			-0.012	-0.043
			(0.094)	(0.100)
Negative G-7 Dummy			0.737***	0.736***
			(0.089)	(0.095)
Negative G-7 Dummy * *FIFA* Q1 Dummy			0.057	0.092
			(0.074)	(0.067)
Negative G-7 Dummy * *FIFA* Q5 Dummy			0.148**	0.155**
			(0.071)	(0.076)
Wald Test Statistic			5.184*	7.117**
N	44508	41407	3828	3561
R-Squared	0.002	0.002	0.002	0.003

Table IA.X

Controlling for Momentum

This table reports results from panel regressions of cross-country correlations and G-7 betas, as in Table IV and V, controlling for the possible confounding effects of return momentum. For each country in month *t*, momentum is calculated as the index return from *t*-13 to *t*-1. Momentum Q1 (Q5) dummy equals one if the country pair or country is in the highest (lowest) momentum quintile, and zero otherwise. The Wald tests are for the null hypothesis that the coefficients of *FIFA* Q1 and Q5 dummies are equal in both G-7 excess return regimes. The U.S. 1-month T-bill return is used as the risk-free rate. The number of observations is denoted by *N*. Rogers (1993) standard errors clustered by calendar-month using three leads/lags are in parentheses. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

	Cross-Country Correlation		G-7 Beta	
	FIFA	Predicted *FIFA*	*FIFA*	Predicted *FIFA*
Intercept	0.217***	0.223***		
	(0.024)	(0.025)		
FIFA Q1 Dummy	0.055***	0.073***		
	(0.017)	(0.022)		
FIFA Q5 Dummy	0.039*	0.065***		
	(0.020)	(0.020)		
Positive G-7 Dummy			0.730***	0.752***
			(0.081)	(0.078)
Positive G-7 Dummy * *FIFA* Q1 Dummy			0.121*	0.160*
			(0.065)	(0.094)
Positive G-7 Dummy * *FIFA* Q5 Dummy			-0.113	-0.053
			(0.083)	(0.086)
Negative G-7 Dummy			0.729***	0.726***
			(0.095)	(0.108)
Negative G-7 Dummy * *FIFA* Q1 Dummy			0.102	0.151**
			(0.094)	(0.074)
Negative G-7 Dummy * *FIFA* Q5 Dummy			0.166**	0.227***
			(0.065)	(0.075)
Momentum Control Variables				
Momentum Q1 Dummy	-0.009	-0.007		
	(0.021)	(0.021)		
Momentum Q5 Dummy	0.035	0.041		
	(0.031)	(0.033)		
Positive G-7 Dummy * Momentum Q1 Dummy			-0.008	-0.019
			(0.095)	(0.104)
Positive G-7 Dummy * Momentum Q5 Dummy			0.080	0.060
			(0.141)	(0.153)
Negative G-7 Dummy * Momentum Q1 Dummy			0.079	0.059
			(0.092)	(0.089)
Negative G-7 Dummy * Momentum Q5 Dummy			-0.064	-0.048
			(0.105)	(0.107)
Wald Test Statistic			5.933*	13.100***
N	44508	41407	3828	3561
R-Squared	0.001	0.002	0.003	0.004

Table IA.XI

Percentage Position Changes by Fund Flows

This table reports how fund holdings change conditional on actual monthly flows, measured as a percentage of fund's beginning-of-month *TNA*. Fund-month observations are sorted into deciles according to fund flow. For each fund-country-month, position change is calculated as the end-of-month holding minus the product of beginning-of-month holding and the country index return. Countries are considered expanded (reduced) if the position changes are greater (smaller) than zero. The position changes are then divided by the fund's beginning-of-month *TNA* and averaged for each fund-month within each category of countries- expanded, reduced, and eliminated. These percentage position changes are then averaged across all fund-months in each flow decile and reported. Test statistics are for the difference in mean between all fund-months in deciles 1 and 10, based on standard errors clustered by calendar year-month. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

Decile	Flow (%)	Countries Expanded	Countries Reduced	Countries Eliminated
1 (Inflows)	12.752	5.332	-0.918	-1.654
2	3.733	2.045	-0.971	-1.248
3	1.375	1.439	-1.121	-1.589
4	0.237	1.438	-1.389	-1.346
5	-0.066	1.456	-1.477	-1.690
6	-0.670	1.184	-1.272	-1.311
7	-1.577	1.186	-1.511	-1.565
8	-2.815	1.097	-1.705	-1.446
9	-4.709	0.898	-2.152	-1.378
10 (Outflows)	-10.852	0.805	-3.462	-3.466
1-10	23.605	4.527***	2.545***	1.812**

Table IA.XII

Realized Cross-Country Correlations Conditional on G-7 Returns

This table reports results from panel regressions of realized correlations on dummy variables for the country pair being in the extreme quintiles of *FIFA*, conditional on G-7 index returns. Realized correlation (the dependent variable) is estimated using daily data for each country pair-month. Countries are sorted into quintiles on the basis of actual *FIFA* and predicted *FIFA*. Predicted *FIFA* is calculated by replacing the current month flow by the expected flows, estimated via the Fama-MacBeth regressions in Panel A of Table IA.II. Dummy variables equal one if both countries in the pair are in the top or bottom quintiles, either Q1 or Q5 as specified, and zero otherwise. Positive (negative) G-7 dummy variable equals 1 if the MSCI G-7 excess return for the month is greater (lower) than zero, and zero otherwise. The U.S. 1-month T-bill return is used as the risk-free rate. Same region dummy variable equals one if both countries in the pair are in the same geographical region, and zero otherwise. The number of country pair-month observations is denoted by *N*. Rogers (1993) standard errors clustered by calendar-month using three leads/lags are in parentheses. *, **, and *** refer to statistical significance at 10%, 5%, and 1% levels.

	FIFA		Predicted *FIFA*	
	(1)	(2)	(3)	(4)
(1) *FIFA* Q1 Dummy	0.040*	0.036*	0.059*	0.054*
	(0.022)	(0.022)	(0.030)	(0.029)
(2) *FIFA* Q5 Dummy	0.028	0.024	0.048**	0.043**
	(0.020)	(0.021)	(0.019)	(0.018)
Positive G-7 Dummy	0.199***	0.183***	0.208***	0.192***
	(0.020)	(0.020)	(0.020)	(0.020)
(3) Positive G-7 Dummy * *FIFA* Q1 Dummy	0.026	0.026	0.025	0.025
	(0.020)	(0.020)	(0.022)	(0.022)
Negative G-7 Dummy	0.242***	0.226***	0.246***	0.230***
	(0.033)	(0.034)	(0.035)	(0.036)
(4) Negative G-7 Dummy * *FIFA* Q5 Dummy	0.024	0.025	0.039*	0.041*
	(0.026)	(0.027)	(0.023)	(0.023)
Same Region Dummy		0.058***		0.057***
		(0.009)		(0.008)
Wald Test for H0: (1) = 0 and (2) = 0	4.634*	3.620	9.559***	8.657
Wald Test for H0: (3) = 0 and (4) = 0	2.172	2.009	3.078	3.341
N	44508	44508	41407	41407
R-Squared	0.003	0.005	0.003	0.006

Parameters Used in the Calibration

A number of parameters are estimated from the data, such as country betas on the G-7 (cross-sectional mean of 0.806, cross-sectional standard deviation of 0.315); $N_C = 25$, the number of countries in our sample; $N_F = 498$ to match the number of funds that exist in our data (this is the number of funds in the year 2008, the last full year in our sample, and thus, the year in which we observe the largest number of funds in our data -- we also employ the average dollar holdings of these funds in 2008 as the starting values of holdings). We need at least a year to calculate reliable averages of fund allocations, as they are treated as targets in our simulation. σ(G-7) the daily standard deviation of G-7 returns is estimated at 0.011; the cross-sectional mean daily time-series standard deviation of idiosyncratic country returns is 0.019; and the price impact of flows κ in our baseline calibration that best matches the empirical results is 60, which we maintain through the remainder of the comparative statics. This translates to a 60 basis point increase in returns for a 1 basis point of country market capitalization increase in *FIFA*. This is higher than, but comparable to the estimate of price impact from a cross-border flow shock in Froot and Ramadorai (2008) of 35.

Table IA.XIII

Parameters Used in the Simulation

This table lists the model parameters that are used in the simulation at *daily* frequency. The parameters are estimated/ inferred from the data, except those that are underlined. The underlined parameters are calibrated to match the empirical results in the baseline case or set at certain values to examine the role of information trading and various components of non-information trading. ϕ_p and ϕ_r are the loadings of daily fund flow on date d-1 fund flow and fund return. The loadings on further lags are linearly declining, up to 60 lags. Other symbols are as described in the Model and Calibration section.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parameter/ Mechanism	Baseline	Without Developed Market Push	Without Developed Market Push or Flow-Performance	Without Non-Information Trading	Without Information-Induced Rebalancing	No Information	High Information	Only Information Trading and Flow-Performance
ρ	0.080	0.000	0.000	0.000	0.080	0.080	0.080	0.000
ϕ_r	0.010	0.010	0.000	0.000	0.010	0.010	0.010	0.010
ϕ_p	0.010	0.010	0.000	0.000	0.010	0.010	0.010	0.010
μ_{σ_δ}	0.011	0.011	0.011	0.000	0.011	0.011	0.011	0.000
$\frac{\sigma^2(\kappa Q_c)}{\sigma^2(u_c + \kappa Q_c)}$	0.030	0.030	0.030	0.030	0.030	0.000	0.150	0.075
Information-Induced Rebalancing	YES	YES	YES	NO	NO	NO	YES	NO

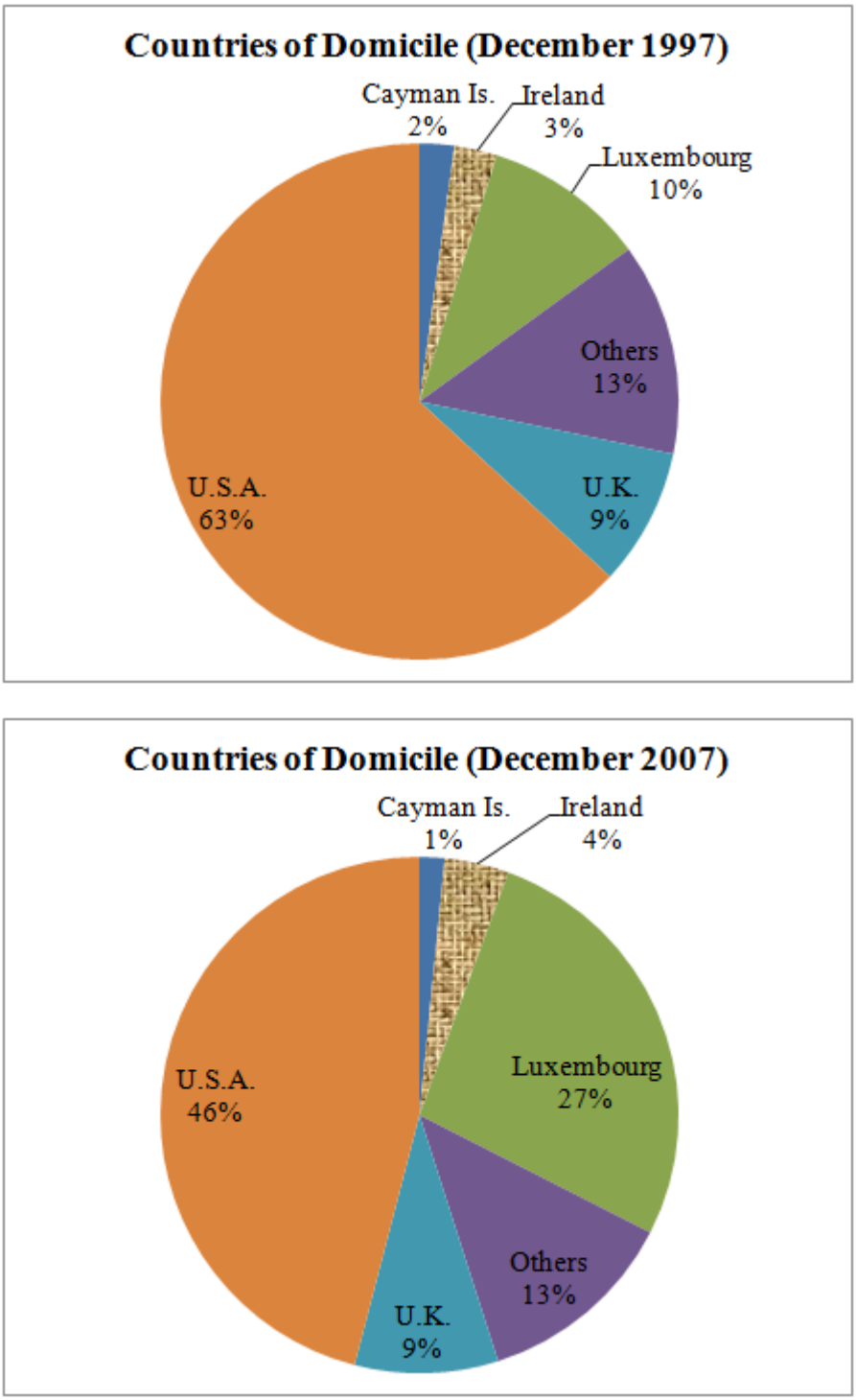

Figure IA.1. Distribution of Countries of Domicile. This figure plots the total net assets (*TNA*) shares for different countries of domicile of the funds in the EPFR sample at the ends of 1997 and 2007. The *TNA* share is calculated as the sum of *TNA*s of all funds that are domiciled in each country divided by the total *TNA* of all funds in the EPFR sample on each date. Countries other than Cayman Island, Ireland, Luxembourg, the U.K., and the U.S. have very small shares, and as a result, are grouped together as "others."

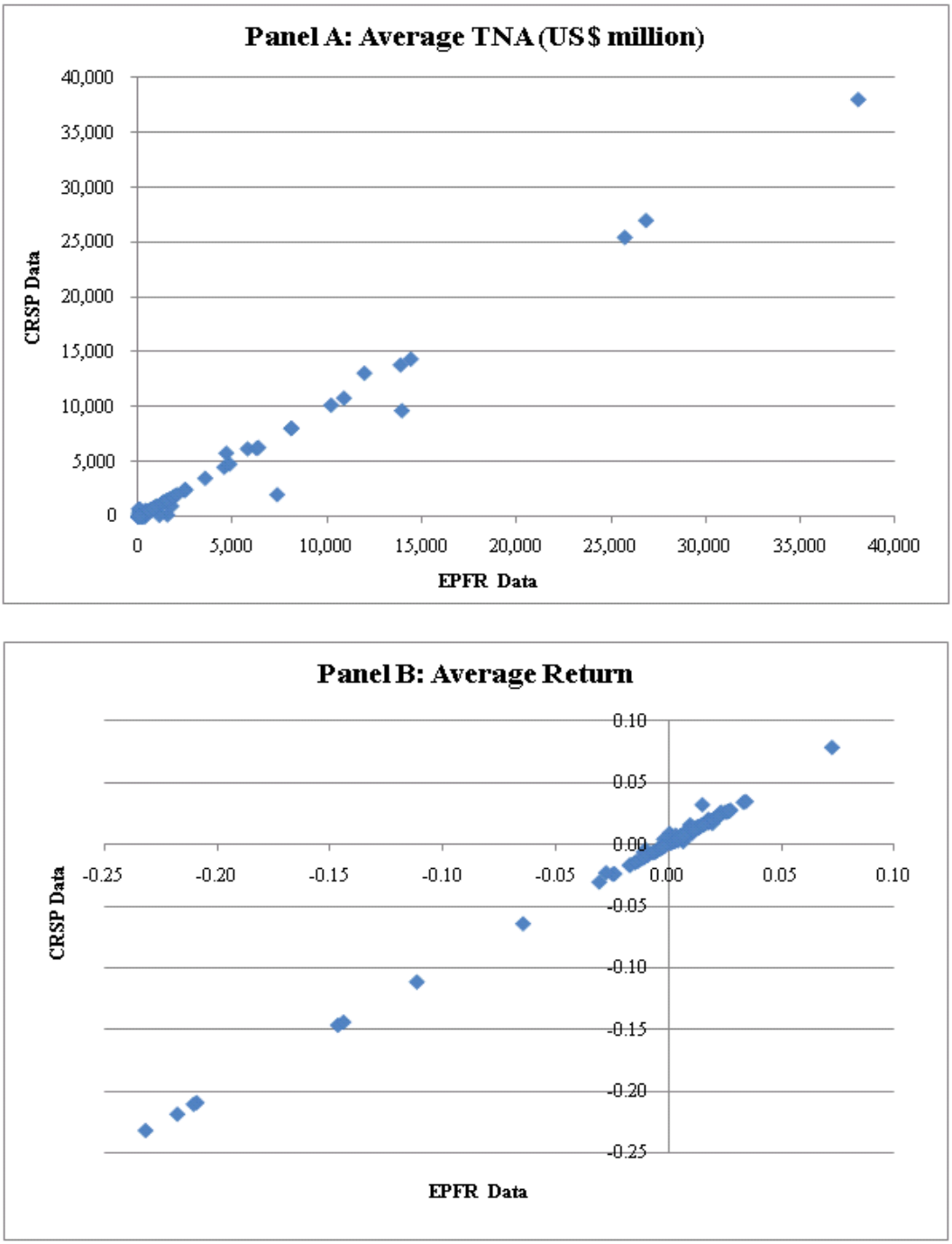

Figure IA.2. Comparison between EPFR and CRSP Mutual Fund Data. For a subset of funds, this figure compares the average *TNA*s and the average monthly returns from the EPFR and CRSP mutual fund data, matched by fund name, for the period from February 1996 to September 2008. Panel A plots the (time-series) average *TNA*s. The *TNA* for each fund-month is measured as the sum of reported *TNA*s of all share classes from the same portfolio. Panel B plots the (time-series) average monthly returns. The return for each fund-month is measured as the sum of USD return of all share classes from the same portfolio divided by the portfolio *TNA*.

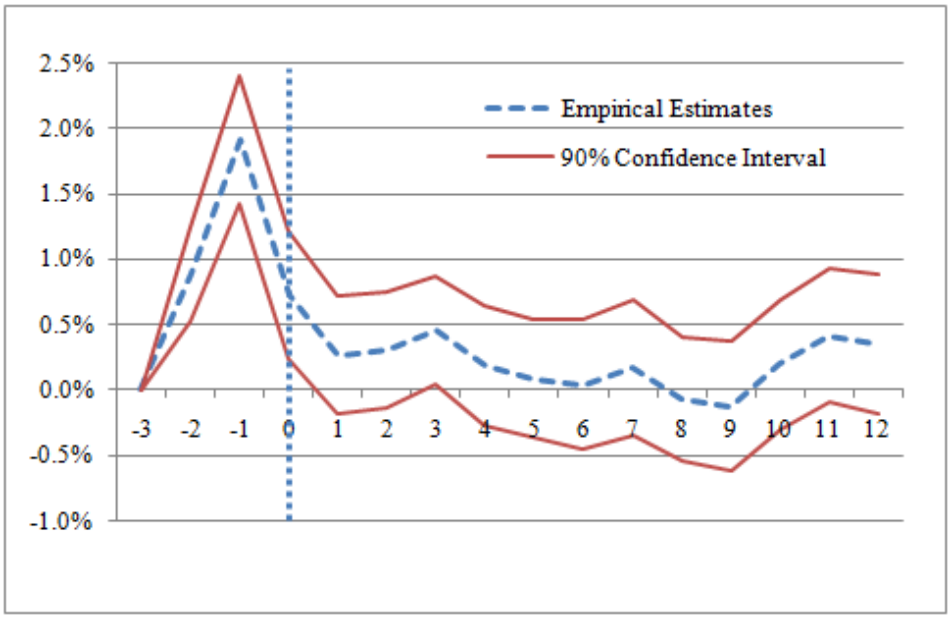

Figure IA.3. Cumulative Abnormal Returns Associated with Predicted *FIFA*. This figure plots the cumulative abnormal returns (*CAR*s) over the period from event weeks -3 to 12 for the equally-weighted long Q1-short Q5 portfolio. In each calendar week, countries are sorted into quintiles on the basis of predicted *FIFA*, calculated using the expected flow, estimated via the Fama-MacBeth regressions in Panel B of Table IA.II. Week 0 is the week in which the countries are placed in Q1 and Q5. The methodology for calculating *CAR*s is as described in Figure 2 of the paper. The 90% confidence bands are calculated from the covariance matrix of the regression coefficients, taking into account the correlations in *AR*s across event weeks.

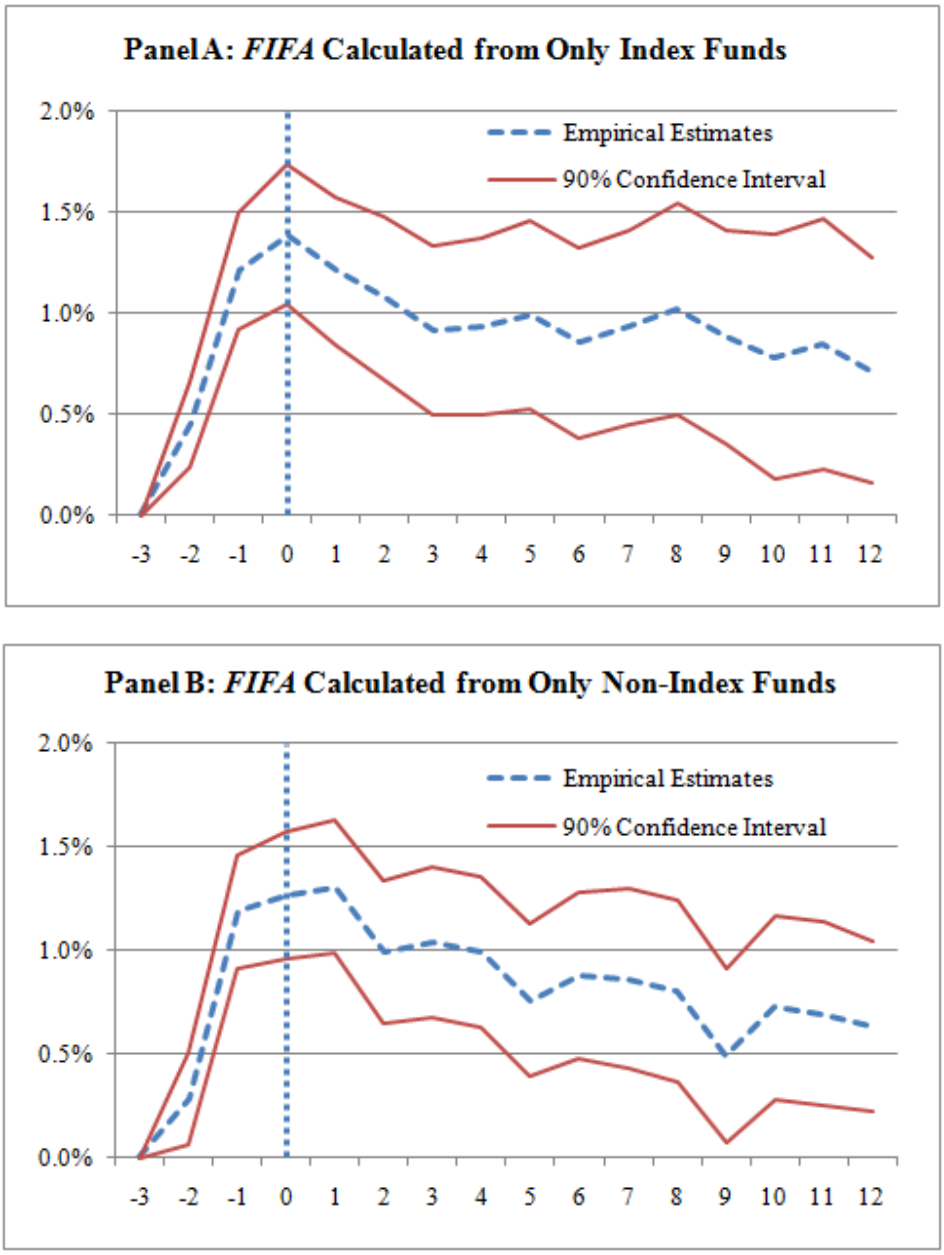

Figure IA.4. Cumulative Abnormal Returns Associated with *FIFA* from Index vs. Non-Index Funds. This figure plots the cumulative abnormal returns (*CAR*s) over the period from event weeks -3 to 12 for the equally-weighted long Q1-short Q5 portfolio. In each calendar week, countries are sorted into quintiles on the basis of *weekly FIFA* calculated using only index funds (Panel A) and *FIFA* calculated using only non-index funds (Panel B). Index (non-index) funds are defined as funds with mean absolute month-to-month change in country allocation lower (higher) than the sample median. Week 0 is the week in which the countries are placed in Q1 and Q5. The methodology for calculating *CAR*s is as described in Figure 2 of the paper. The 90% confidence bands are calculated from the covariance matrix of the regression coefficients, essentially taking into account the correlations in *AR*s across event weeks.

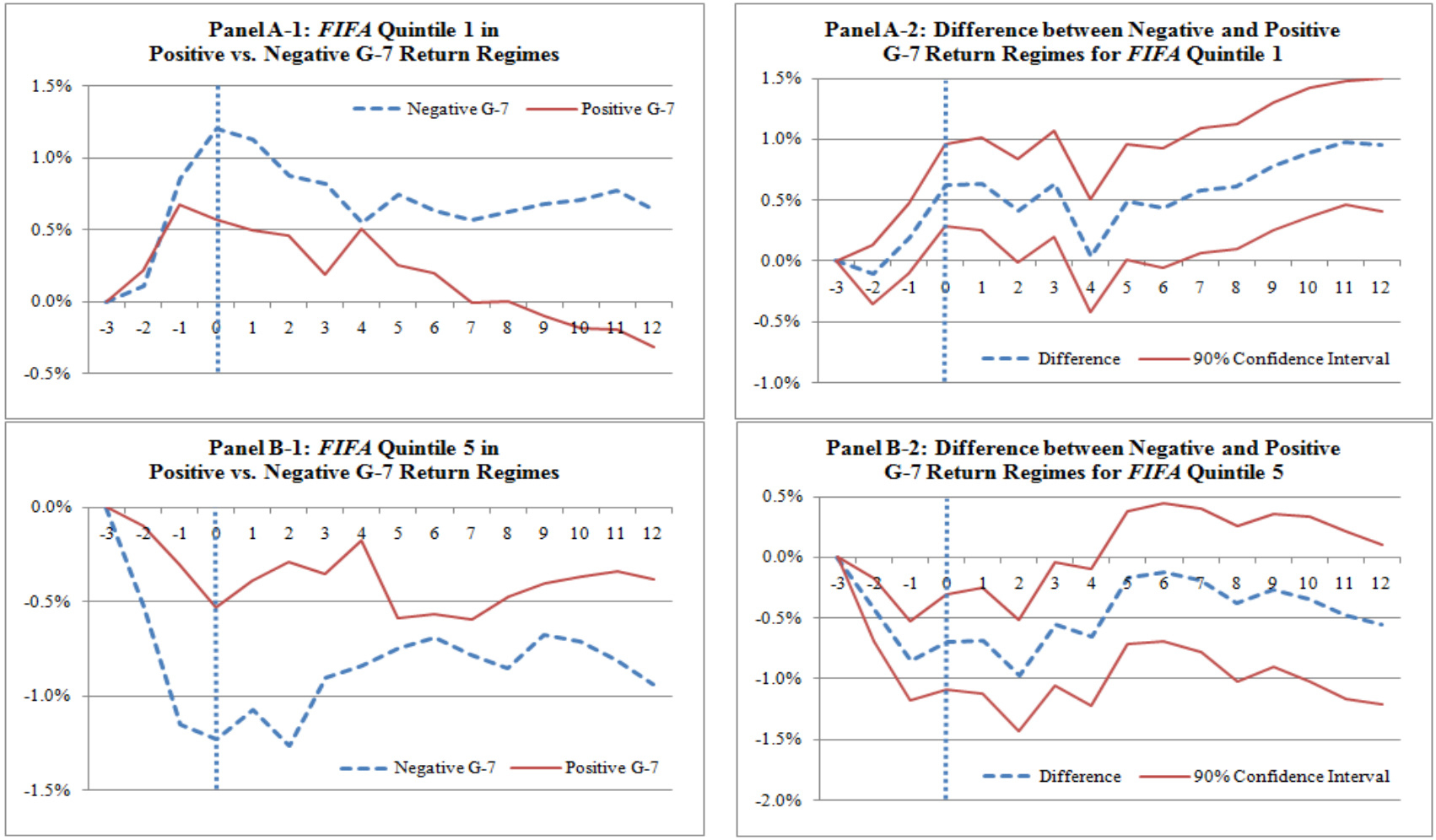

Figure IA.5. Cumulative Abnormal Returns Conditional on G-7 Market Return. This figure compares the cumulative abnormal returns (*CAR*s) over the period from event weeks -3 to 12 for the equally-weighted portfolios of countries in *FIFA* Q1 (Panels A-1 and A-2) and *FIFA* Q5 (Panels B-1 and B-2), conditional on the MSCI G-7 index return. In each calendar week, countries are sorted into quintiles on the basis of *weekly FIFA*. Week 0 is the week in which the countries are placed in Q1 and Q5. Positive (negative) G-7 return regime includes all weeks in which the MSCI G-7 index return in greater than or equal to (less than) zero. *CAR*s are estimated as described in Figure 2 of the paper. Panel A-1 (B-1) plots *CAR*s estimated for countries in Q1 (Q5) when the event weeks fall in the positive (negative) G-7 return regime. Panel A-2 (B-2) plots the corresponding differences in *CAR*s, along with the 90% confidence ban.

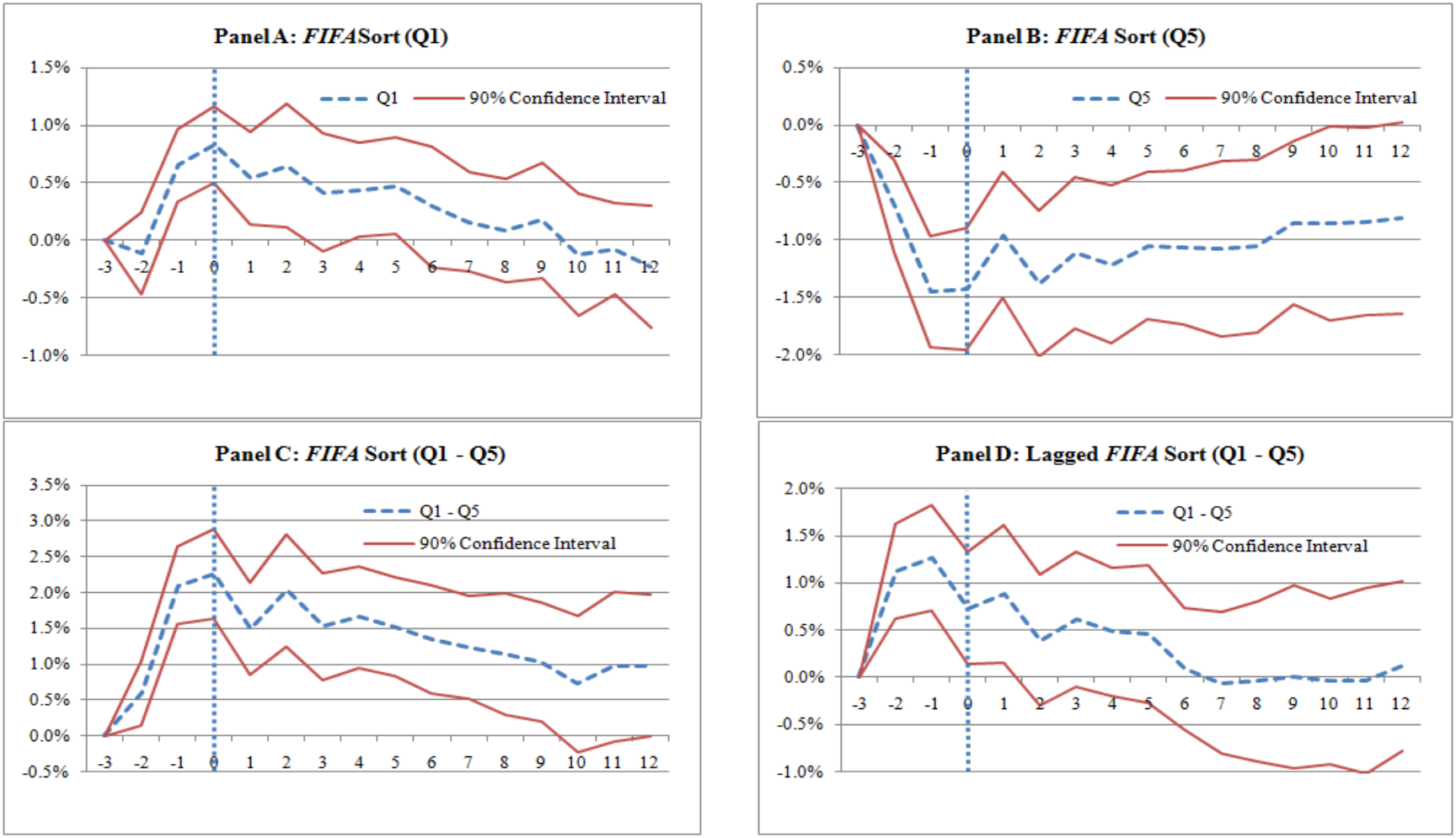

Figure IA.6. Cumulative Abnormal Returns for the Period 2007-2009. This figure plots the cumulative abnormal returns (*CAR*s) over the period from event weeks -3 to 12 for the equally-weighted long Q1 (Panel A), long Q5 (Panel B), or long Q1-short Q5 (Panels C and D) portfolio. The sample period is from January 2007 to June 2009. In each calendar week, countries are sorted into quintiles on the basis of *weekly FIFA* (Panels A, B, and C) and lagged *FIFA* (Panel D). Lagged *FIFA* is calculated by replacing the current week flow by the lagged flow. Week 0 is the week in which the countries are placed in Q1 and Q5. Abnormal returns (*AR*s) are estimated by regressing weekly country returns on dummy variables for being in Q1and Q5 in each event week from weeks -26 to 26 and the calendar-week fixed effects. *CAR* at event week *t* is calculated as the sum of *AR*s for being in Q1 from event weeks -2 to *t* minus the sum of *AR*s for being in Q5 over the same event period (i.e. normalizing *CAR*s at week -3 to zero). The 90% confidence bands are calculated from the covariance matrix of the regression coefficients, taking into account the correlations in *AR*s across event weeks.

Model Derivations and Details

Here we present several specific model details, beginning with the evolution of fund holdings, going from fund-level investor flows to country-level allocation changes, and finally, deriving the model's implications for world-market betas and cross-country correlations.

Evolution of fund holdings

It is instructive to see how dollar holdings of fund i in country c evolve:

$$A_{i,c,d} = A_{i,c,d-1}(1 + r_{c,d})(1 + p_{i,d} + q_{i,c,d} + \sum_{k \neq c} p^*_{i,k,d}), \tag{A1}$$

where $A_{i,c,d}$ is the i, c^{th} element of A_d (aggregate dollar assets of all funds), $r_{c,d}$ is the day d return of country c, $p_{i,d}$ is the i^{th} element of p_d, and $q_{i,c,d} + \sum_{k \neq c} p^*_{i,k,d} = \omega_{i,d-1}\nu_d$ where $\omega_{i,d-1}$ is the i^{th} row of allocation weight matrix ω_{d-1}. Equation (A1) shows explicitly that the dollar holdings $A_{i,c,d}$ grow at the rate of country returns $r_{c,d}$, as well as according to three types of flows from their investors – (i) push flows $p_{i,d}$, (ii) pull flows due to investor information about country c, $q_{i,c,d}$ and (iii) co-ownership spillover due to investors' information about other countries $\sum_{k \neq c} p^*_{i,k,d}$. We also allow funds to rebalance back to target asset allocation levels, to model the influence of tracking error constraints on funds' country allocation strategies. In particular, if $\bar{\omega}_{i,c}$ is the benchmark percentage holding of country c by mutual fund i, and if

$$\left| \left(A_{i,c,d} \; / \; \sum_{j=1}^{N_C} A_{i,j,d} \right) / \bar{\omega}_{i,c} - 1 \right| > \tau, then A_{i,c,d} = \bar{\omega}_{i,c} \sum_{j=1}^{N_C} A_{i,j,d} \forall c,$$

i.e., the fund's country allocations are all re-set. The rebalancing threshold τ could be fund-specific (though we currently set this the same for all funds, at a level of 10%). Note also that *all* country holdings are rebalanced if *any* country goes above the threshold.

From investor flows to country-level allocation changes

Excluding, for the moment, the non-informational allocation changes P_d, the aggregate percentage allocation changes by funds directed to each country can be written as:

$$Q_d + P^*_d = (M_{d-1})^{-1} A'_{d-1} q_d, \tag{A2}$$

where Q_d is an $(N_C \times 1)$ vector of aggregate country-level allocation changes driven by information flows, P_d^* is an $(N_C \times 1)$ vector of aggregate country-level co-ownership spillover, A_{d-1} is an $(N_F \times N_C)$ matrix representing the dollar allocations of each fund to each country on day $d-1$, and M_{d-1} is a diagonal $(N_C \times N_C)$ matrix with the dollar market capitalization of each country on day $d-1$ as diagonal elements. The accounting identity in (A2) must hold since at the fund level q_d is allocated proportionally to the countries about which investors have information as well as to the other countries that are owned by the same fund, i.e. $q_{i,c,d} = p^*_{i,c,d}$. Thus, for each country c, the aggregate new money it receives is the result of both information about itself and information about other countries $k \neq c$, as illustrated by (A1). Mathematically, the c^{th} elements of vectors Q_d and P_d^* are given by $\sum_{i=1}^{N_F} A_{i,c,d-1} q_{i,c,d}$ and $\sum_{i=1}^{N_F} \sum_{k \neq c} A_{i,c,d-1} p^*_{i,k,d}$, both normalized by country c's market capitalization. Note that since information flows q_d are the result of information about country returns, we set aggregate information-induced country flows Q_d in our calibration to various different normalized values first, and then solve for ν_d for each value of Q_d. This is internally consistent, since aggregate dollar flows driven by country information are *exactly* equal to Q_d.

Non-informational 'push' flows to funds are also straightforwardly translated into country-level flows. In aggregate, the country-level impact of trading induced by this component is the $(N_C \times 1)$ vector $P_d = (M_{d-1})^{-1} \left(A'_{d-1} p_d\right)$.

Model implied betas and cross-market correlations

We define a modified flow vector, $\tilde{P}_d$, from which the G-7 flow exposures for each country are extracted, i.e., $\tilde{P}_d = P_d - \kappa (M_{d-1})^{-1} \left(\rho A'_{d-1}\right) \left(r_{G-7,d} \iota_{N_F}\right)$. Substituting into equation (5.1) in the text using the expressions derived above, and since $r_{w,d} \approx r_{G-7,d}$ (the correlation over our sample is 0.997), equation (5.1) in the text can then be written as:

$$r_d \approx \beta^* r_{G-7,d} + \kappa \left[\tilde{P}_d + P_d^* + Q_d\right] + \gamma (P_{d-1} + P^*_{d-1}) + u_d, \tag{A3}$$

where β^* is an $(N_C \times 1)$ vector of modified G-7 betas that incorporates both the fundamental G-7 betas, β, plus the push effects associated with G-7 flow induced pressure. These modified G-7 betas are:

$$\beta^* = \beta + \kappa (M_{d-1})^{-1} \left(\rho A'_{d-1}\right) \iota_{N_F}, \tag{A4}$$

i.e., measured country betas with the G-7 are the 'fundamental' betas plus a component that depends on the size of the world-market push effects and aggregate holdings of funds.

The conditional covariance of country returns can be written as:

$$\Sigma_{r|d-1} = \beta\beta'\sigma^2_{G-7|d-1} + \Sigma_{u|d-1} + \kappa^2 G'\Sigma_{F|d-1}G + \kappa(G'\Phi_{FG-7|d-1}\beta' + \beta\Phi'_{FG-7|d-1}G) \qquad \text{(A5)}$$

Where $G = \begin{bmatrix} I_{N_C} & I_{N_C} & I_{N_C} \end{bmatrix}'$, $F_d = \begin{bmatrix} P'_d & Q'_d & P^{*\prime}_d \end{bmatrix}'$, $\Sigma_{x|d-1}$ denotes the conditioning of covariance matrix of x on the information set on day $d-1$ and $\Phi_{FG-7|d-1}$ is a $N_C \times 1$ vector of covariances between flows and G-7 returns. The first two terms of (A5) make up the 'fundamental' covariance of country returns: the first reflects the common dependence of country returns on the G-7 market and the second the covariance of country-specific returns. Flows affect return covariances through the last two terms of (A5): the third term is directly driven by the covariance of country-specific flows, and the last term arises from the covariance between country flows and G-7 returns (i.e., direct push effects). We first express these terms as functions of underlying parameters, then simplify and interpret the expressions.

By the definition of F_d and the assumption that P_d and Q_d as well as P_d and P^*_d are conditionally orthogonal (P^*_d is just a linear function of Q_d), we can write the covariance of flows $\Sigma_{F|d-1}$ as consisting of non-zero blocks:

$$\Sigma_{F|d-1} = \begin{bmatrix} \Sigma_{P|d-1} & 0 & 0 \\ 0 & \Sigma_{Q|d-1} & \Sigma_{QP^*|d-1} \\ 0 & \Sigma'_{QP^*|d-1} & \Sigma_{P^*|d-1} \end{bmatrix} \qquad \text{(A6)}$$

where $\Sigma_{QP^*|d-1}$ is the conditional covariance of Q_d and P^*_d. By definition, Q_d represents country-specific information flows, hence $\Sigma_{Q|d-1}$ is diagonal. Moreover, since P^*_d is just a linear function of Q_d, the matrix $\Sigma_{F|d-1}$ is of rank $2N_F$ rather than $3N_F$.

Covariances of P

The conditional covariance matrix of country-level push flows P_d is:

$$\begin{aligned} \Sigma_{P|d-1} &= (M_{d-1})^{-1} A'_{d-1}\Lambda_{p|d-1}A_{d-1}(M_{d-1})^{-1} \qquad \text{(A7)} \\ &= (M_{d-1})^{-1} A'_{d-1}\left(\rho^2\sigma^2_{G-7|d-1}\imath_{N_F}\imath'_{N_F} + \Omega_{\delta|d-1}\right) A_{d-1}(M_{d-1})^{-1} \end{aligned}$$

where $\Lambda_{p|d-1} = \rho^2\sigma^2_{G-7|d-1}\imath_{N_F}\imath'_{N_F} + \Omega_{\delta|d-1}$ and $\Omega_{\delta|d-1}$ is the conditional covariance of fund-specific shocks. Furthermore, the covariance between P_d and the G-7 return can be written

as

$$(M_{d-1})^{-1}A'_{d-1}(\rho\sigma^2_{G-7|d-1}\imath_{N_F}).$$

Covariances of Q and P^*

The conditional covariance of Q_d, $\Sigma_{Q|d-1}$, comes directly from underlying parameters. The conditional covariance of P^*_d and covariance between Q_d and P^*_d can then be written as linear functions of $\Sigma_{Q|d-1}$, i.e.,

$$\Sigma_{P^*|d-1} = (\Pi_{d-1} - I_{N_C})\Sigma_{Q|d-1}(\Pi_{d-1} - I_{N_C})' \quad \text{(A8)}$$

$$\Sigma_{QP^*|d-1} = \Sigma_{Q|d-1}(\Pi_{d-1} - I_{N_C})' \quad \text{(A9)}$$

where $\Pi_{d-1} = (M_{d-1})^{-1}A'_{d-1}\omega_{d-1}diagzero(A'_{d-1}\omega_{d-1})^{-1}M_{d-1}$ and $diagzero(\cdot)$ denotes replacement of all off-diagonal elements by zero.

Putting it all together

Having derived the specific terms in equation (A5), we can group terms and re-express it as:

$$\Sigma_{r|d-1} = \Sigma_{\text{fundamental}} + \Sigma_{\text{info. trading}} + \Sigma_{\text{non-info. trading}} + \Sigma_{\text{interaction}} \quad \text{(A10)}$$

The first two pieces are simply $\Sigma_{\text{fundamental}} = \beta\beta'\sigma^2_{G-7|d-1} + \Sigma_{u|d-1}$ and $\Sigma_{\text{info. trading}} = \kappa^2\Sigma_{Q|d-1}$. Since $\Sigma_{Q|d-1}$ is diagonal by construction, information flows on their own do not affect cross-country covariances. Writing out the other two terms:

$$\Sigma_{\text{non-info. trading}} = \kappa^2(\Sigma_{P|d-1} + \Sigma_{P^*|d-1} + \Sigma_{QP^*|d-1} + \Sigma'_{QP^*|d-1}) \quad \text{(A11)}$$

$$\Sigma_{\text{interaction}} = \kappa\rho\sigma^2_{G-7|d-1}((M_{d-1})^{-1}A'_{d-1}\imath_{N_F}\beta' + \beta\imath'_{N_F}A_{d-1}(M_{d-1})^{-1}) \quad \text{(A12)}$$

A few points are worth noting. First, ρ affects the covariances of country returns: both $\Sigma_{\text{non-info. trading}}$ (see expression (A7)) and $\Sigma_{\text{interaction}}$ are increasing in ρ; this effect depends on the extent to which countries are held by funds. Second, countries held the most by funds (corresponding to large elements of $(M_{d-1})^{-1}A'_{d-1}\imath_{N_F}$) are generally more highly correlated with one another. Third, information flows drive cross-country covariances through the term $\Sigma_{P^*|d-1} + \Sigma_{QP^*|d-1} + \Sigma'_{QP^*|d-1} = \kappa^2(\Pi_{d-1}\Sigma_{Q|d-1}\Pi'_{d-1} - \Sigma_{Q|d-1})$ in equation (A11). This effect again depends on how much these countries are simultaneously held by the same funds – according with intuition, if all funds were single-country funds, then $A'_{d-1}\omega_{d-1} = diag(A'_{d-1}\omega_{d-1})$

and $\Pi_{d-1}\Sigma_{Q|d-1}\Pi'_{d-1} - \Sigma_{Q|d-1} = 0$, i.e. co-ownership spillover would have no effects on cross-country covariances. By the same logic, countries jointly held by the same funds will have high covariance (even if they are fundamentally unrelated), driven by individual countries' information flows. Fourth, this logic also applies to $\Sigma_{\text{non-info. trading}}$, as it also depends on $\Omega_{\delta|d-1}$ through funds' holdings A_{d-1}. $\Omega_{\delta|d-1}$ can only affect the off-diagonal elements of $A'_{d-1}\Omega_{\delta|d-1}A_{d-1}$ if some rows of A_{d-1} have more than one non-zero element, i.e. some countries are held by the same funds, and the greater the co-ownership of these countries, the more they are mutually affected by fund-specific flow shocks. This mechanism whereby assets are linked though common holdings by the same investors is also present in models such as Greenwood and Thesmar (2010), and helps to explain the empirical work of Bartram, Griffin and Ng (2010). However these papers do not explore the fund flows dimension which is crucial for explaining the full set of our results. Finally, it is worth noting here that flow-performance relationships (non-zero $\phi_{p,l}$ and $\phi_{p,l}$) do not affect the *conditional* covariance of country returns. However, as we move from conditional covariance to unconditional covariance (our realized measures lie somewhere in-between), positive $\phi_{p,l}$ and $\phi_{p,l}$ will amplify the effects discussed above.

Conditional correlations

We can write $\Psi_{r|d-1}$, the conditional correlation matrix of country returns, as a simple transformation of conditional covariance:

$$\Psi_{r|d-1} = diag(\Sigma_{r|d-1})^{-1}\Sigma_{r|d-1}diag(\Sigma_{r|d-1})^{-1} \tag{A13}$$

and all of the arguments put forth in the above go through with one caveat, which is that the impact of parameter changes on the off-diagonal elements of $\Sigma_{r|d-1}$ should be bigger than that on the diagonal elements.