

Online Appendix:

The International Commonality of Idiosyncratic Variances

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OA-I. Alternative Methods to Estimate Idiosyncratic ROE Variances (IVROE)

We consider seven alternative methods to estimate IVROE.

Methods I-III are based on panel regressions. Specifically, for each country, we estimate the following panel regression:

$$\begin{aligned} ROE_{iq} = & (\alpha_{0,i} + a_1 size_{i,q-1} + a_2 BM_{i,q-1}) + (b_0 + b_1 size_{i,q-1} + b_2 BM_{i,q-1}) WMKT_q^{ROE} \\ & + (c_0 + c_1 size_{i,q-1} + c_2 BM_{i,q-1}) WSBM_q^{ROE} + (d_0 + d_1 size_{i,q-1} + d_2 BM_{i,q-1}) WHML_q^{ROE} \\ & + (e_0 + e_1 size_{i,q-1} + e_2 BM_{i,q-1}) MKT_{C,q}^{ROE} + (f_0 + f_1 size_{i,q-1} + f_2 BM_{i,q-1}) SMB_{C,q}^{ROE} \\ & + (g_0 + g_1 size_{i,q-1} + g_2 BM_{i,q-1}) HML_{C,q}^{ROE} + u_{iq}^{ROE} \end{aligned}$$

where $\alpha_{0,i}$ represents firm fixed effects, and $size_{i,q-1}$ ($BM_{i,q-1}$) is the log size (book-to-market ratio) for firm i from the previous quarter $q-1$.

We estimate the panel regression using different windows. Our baseline results in the main text are based on regressions using the full sample period. The alternative Method I estimates the panel regression using 20-quarter rolling window and uses the last quarter's residual, $(u_{iq}^{ROE})^2$, in each rolling window (q-19, q) as IVROE for firm i in quarter q . Method II uses the variance of u_{iq}^{ROE} in each rolling window (q-19, q) as IVROE for firm i in quarter q . Method III estimates the panel regression for each 20-quarter nonoverlapping window (1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2000-2014, 2015-2019), and uses $(u_{iq}^{ROE})^2$ as IVROE for firm i in quarter q .

Methods IV-VII are based on firm-level regressions. Specifically, for each firm, we estimate the following time-series regression:

$$ROE_{iq} = \alpha_i + b_i WMKT_q^{ROE} + c_i MKT_{C,q}^{ROE} + u_{iq}^{ROE}.$$

Similar to the panel regression approach, we estimate the firm-level regressions using different windows. Method IV use the full sample period and IVROE for firm i in quarter q is the squared residual $(u_{iq}^{ROE})^2$. Methods V uses 20-quarter rolling window and uses the last quarter's $(u_{iq}^{ROE})^2$ in each rolling window (q-19, q) as IVROE for firm i in quarter q . Method VI uses the variance of u_{iq}^{ROE} in each rolling window (q-19, q) as IVROE for firm i in quarter q . Method VII estimates the firm-level regression for each 20-quarter nonoverlapping window and uses $(u_{iq}^{ROE})^2$ as IVROE for firm i in quarter q .

Table OA1. Commonality in Change in Idiosyncratic Return Variances (Δ IVRET)

This table presents evidence of commonality in the change in country idiosyncratic return variances (Δ IVRET), calculated as the change in value-weighted firm-level IVRET in each country. Panel A presents the average pairwise correlation and the regression results. Column I (II) presents the average pairwise correlation of country Δ IVRET (market return). For each country, we calculate the pairwise correlations of its Δ IVRET (market return) with the Δ IVRET (market return) of each of the other countries, and present the average pairwise correlation. Market return is the market return in US\$ over each quarter. Columns III-V show the regression results of country Δ IVRET on global Δ IVRET, where global Δ IVRET is the change in value-weighted country IVRET of all countries. The t-statistics are adjusted for serial correlation using Newey and West (1987) standard errors with four lags. Column VI presents the average pairwise correlation of the residuals from this regression. Panel B presents the principal component analysis results. The first (second) row the time-series average of the % of variation in country Δ IVRETs explained by each principal component (the correlation between each principal component and the global Δ IVRET) over 1982-1993, 1994-2006, and 2007-2019.

Panel A. Average Pairwise Correlation and Regression of Country Δ IVRET on Global Δ IVRET

Country/ Region	I	II	III	IV	V	VI
	Pairwise Correlation		Regression of Country Δ IVRET on Global Δ IVRET			
	Δ IVRET	Market Return	Coef.	t-stat	Adj. R ²	Residual Pairwise Correlation
<i>Across Countries</i>						
Average	0.559	0.591	0.786	6.05	0.500	0.148
P25	0.514	0.566	0.557	3.83	0.402	0.099
P75	0.627	0.631	1.039	7.58	0.579	0.224
<i>By Country</i>						
Australia	0.625	0.612	0.884	3.51	0.534	0.247
Austria	0.622	0.488	1.068	2.52	0.504	0.249
Belgium	0.619	0.619	1.043	2.36	0.526	0.239
Canada	0.662	0.624	1.102	10.47	0.821	0.142
Denmark	0.572	0.605	0.630	6.15	0.438	0.200
Finland	0.384	0.591	0.509	6.20	0.179	0.099
France	0.619	0.651	0.780	9.90	0.591	0.181
Germany	0.596	0.609	0.916	4.02	0.537	0.187
Hong Kong	0.546	0.483	1.039	4.48	0.469	0.139
Ireland	0.627	0.566	1.347	4.18	0.564	0.226
Israel	0.644	0.599	0.557	3.11	0.510	0.224
Italy	0.530	0.578	0.690	5.88	0.402	0.143
Japan	0.505	0.422	0.933	10.39	0.579	-0.072
Netherlands	0.602	0.674	0.758	5.84	0.525	0.198
New Zealand	0.380	0.546	0.205	5.68	0.212	0.071
Norway	0.634	0.585	1.020	4.66	0.528	0.259
Portugal	0.220	0.631	0.227	3.10	0.044	0.084
Singapore	0.514	0.485	0.501	3.83	0.398	0.136
Spain	0.439	0.650	0.368	3.83	0.328	0.040
Sweden	0.595	0.683	0.780	7.58	0.540	0.171
Switzerland	0.630	0.619	0.685	5.74	0.590	0.221
UK	0.682	0.662	0.893	11.28	0.782	0.224
US	0.606	0.613	1.139	14.53	0.900	-0.194

Panel B. Principal Component Analysis of Country Δ IVRETs

	PC 1	PC 2	PC 3	PC 4	PC 5
% Variation Explained	64.4%	8.7%	5.6%	4.5%	3.5%
Correlation with Global Δ IVRET	0.908	0.158	0.249	0.093	0.106

Table OA2. Commonality in Idiosyncratic Return Variances (Alternative Factor Models)

This table presents evidence of commonality in country idiosyncratic return variances (IVRET) calculated based on the global-local version of five alternative factor models, including the Fama-French (2015) 5-factor model (FF5), Fama-French (2015) 5-factor augmented with a momentum factor (FF5+MOM), Hou, Xue, and Zhang (HXZ, 2015) 4-factor model, Stambaugh and Yuan (SY, 2017) model, and Barillas and Shanken (BS, 2018) 6-factor model. For the FF5 and FF5+MOM models, we construct the global and local factors in a similar approach to the world-local Fama-French (1996) factor model in the text. To obtain RMW, we sort all firms in each country into three groups at the end of each June based on operating profitability and RMW is computed as the value-weighted return difference between firms in the highest and lowest operating profitability groups. To obtain CMA, we sort all firms in each country into three groups at the end of each June based on investment and CMA is computed as the value-weighted return difference between firms in the lowest and highest investment groups. To obtain MOM, we sort all firms in each country into three groups at the end of each month based on prior (2-12) return and MOM is computed as the value-weighted return difference between firms in the highest and lowest prior return groups. The global factors are computed as the value-weighted averages of the country level factors. For the other models, at the end of June, firms in each country are classified into small and big size groups, with big stocks defined as those that account for the top 90% of the market capitalization in the country, and small stocks as those that account for the bottom 10%. We sort portfolios and construct the country-level factors in a similar approach to the original papers. For the SY (2017) model, we follow Lu, Stambaugh, and Yuan (2018) to construct anomaly variables in each country and drop financial distress and O-score from the second cluster. The global factors are computed as the value-weighted averages of the country level factors. For each model, we present two parts of results. In the first part, Column I (II) presents the average pairwise correlation of country IVRET (market return). For each country, we calculate the pairwise correlations of its IVRET (market return) with the IVRET (market return) of each of the other countries, and present the average pairwise correlation. Market return is the market return in US\$ over each quarter. Columns III-V show the regression results of country IVRET on global IVRET, where global IVRET is the value-weighted country IVRET of all countries. The t-statistics are adjusted for serial correlation using Newey and West (1987) standard errors with four lags. Column VI presents the average pairwise correlation of the residuals from this regression. The first three rows summarize the average, 25th percentile, and 75th percentile of the respective statistics across countries. The second part presents the principal component analysis results. The first (second) row the time-series average of the % of variation in country IVRETs explained by each principal component (the correlation between each principal component and the global IVRET) over 1982-1993, 1994-2006, and 2007-2019.

Panel A. Fama-French (2015) 5-Factor Model

A1. Average Pairwise Correlation and Regression of Country IVRET on Global IVRET

Country/ Region	I	II	III	IV	V	VI
	Pairwise Correlation		Regression of Country IVRET on Global IVRET			
	IVRET	Market Return	Coef.	t-stat	Adj. R ²	Residual Pairwise Correlation
<i>Across Countries</i>						
Average	0.621	0.591	0.603	6.24	0.525	0.237
P25	0.600	0.566	0.425	2.10	0.339	0.194
P75	0.690	0.631	0.791	7.49	0.734	0.359
<i>By Country</i>						
Australia	0.634	0.612	0.549	2.10	0.339	0.370
Austria	0.635	0.488	0.597	1.94	0.344	0.362
Belgium	0.702	0.619	0.584	2.43	0.499	0.398
Canada	0.715	0.624	0.800	7.49	0.784	0.292
Denmark	0.672	0.605	0.619	6.30	0.654	0.251
Finland	0.300	0.591	0.425	4.25	0.114	0.049
France	0.653	0.651	0.791	13.21	0.784	0.101
Germany	0.643	0.609	0.722	5.78	0.596	0.226
Hong Kong	0.563	0.483	0.717	3.46	0.340	0.256
Ireland	0.644	0.566	0.792	2.00	0.331	0.395
Israel	0.616	0.599	0.215	1.52	0.216	0.413
Italy	0.615	0.578	0.515	7.41	0.554	0.195
Japan	0.592	0.422	0.966	12.06	0.787	-0.121
Netherlands	0.708	0.674	0.608	9.06	0.734	0.307
New Zealand	0.510	0.546	0.143	1.90	0.161	0.331
Norway	0.701	0.585	0.791	6.23	0.683	0.299
Portugal	0.371	0.631	0.168	1.70	0.093	0.194
Singapore	0.600	0.485	0.486	5.13	0.514	0.185
Spain	0.666	0.650	0.346	6.58	0.609	0.238
Sweden	0.690	0.683	0.603	5.66	0.603	0.318
Switzerland	0.682	0.619	0.402	3.46	0.510	0.359
UK	0.718	0.662	0.765	11.63	0.861	0.271
US	0.645	0.613	1.257	22.21	0.957	-0.233

A2. Principal Component Analysis of Country IVRETs

	PC 1	PC 2	PC 3	PC 4	PC 5
% Variation Explained	72.0%	8.5%	5.6%	4.2%	2.5%
Correlation with Global IVRET	0.934	0.043	0.230	0.100	0.052

Panel B. Fama-French 5-Factor+Momentum Model**B1. Average Pairwise Correlation and Regression of Country IVRET on Global IVRET**

	I	II	III	IV	V	VI
Country/ Region	Pairwise Correlation		Regression of Country IVRET on Global IVRET			
	IVRET	Market Return	Coef.	t-stat	Adj. R ²	Residual Pairwise Correlation
<i>Across Countries</i>						
Average	0.624	0.591	0.587	6.18	0.523	0.246
P25	0.609	0.566	0.428	2.08	0.328	0.211
P75	0.692	0.631	0.743	6.92	0.733	0.345
<i>By Country</i>						
Australia	0.635	0.612	0.546	2.06	0.336	0.374
Austria	0.641	0.488	0.589	1.95	0.349	0.370
Belgium	0.711	0.619	0.534	2.58	0.517	0.410
Canada	0.718	0.624	0.781	6.38	0.766	0.310
Denmark	0.682	0.605	0.603	6.52	0.662	0.271
Finland	0.316	0.591	0.428	4.13	0.130	0.051
France	0.651	0.651	0.768	11.70	0.772	0.109
Germany	0.652	0.609	0.730	5.96	0.615	0.237
Hong Kong	0.563	0.483	0.707	3.32	0.328	0.266
Ireland	0.634	0.566	0.694	2.08	0.317	0.391
Israel	0.616	0.599	0.212	1.50	0.211	0.418
Italy	0.611	0.578	0.471	6.92	0.514	0.216
Japan	0.590	0.422	0.952	11.99	0.784	-0.123
Netherlands	0.718	0.674	0.591	8.58	0.733	0.340
New Zealand	0.496	0.546	0.136	1.84	0.145	0.329
Norway	0.697	0.585	0.788	6.55	0.677	0.295
Portugal	0.395	0.631	0.171	1.86	0.113	0.202
Singapore	0.609	0.485	0.479	4.59	0.502	0.211
Spain	0.676	0.650	0.349	6.63	0.623	0.252
Sweden	0.692	0.683	0.586	6.11	0.609	0.321
Switzerland	0.676	0.619	0.359	4.02	0.515	0.345
UK	0.717	0.662	0.743	11.54	0.861	0.270
US	0.648	0.613	1.275	23.24	0.958	-0.213

B2. Principal Component Analysis of Country IVRETs

	PC 1	PC 2	PC 3	PC 4	PC 5
% Variation Explained	71.8%	8.9%	5.9%	4.2%	2.5%
Correlation with Global IVRET	0.934	0.048	0.236	0.093	0.049

Panel C. Hou, Xue, Zhang (2015) 4-Factor Model

C1. Average Pairwise Correlation and Regression of Country IVRET on Global IVRET

	I	II	III	IV	V	VI
Country/ Region	Pairwise Correlation		Regression of Country IVRET on Global IVRET			
	IVRET	Market Return	Coef.	t-stat	Adj. R ²	Residual Pairwise Correlation
<i>Across Countries</i>						
Average	0.641	0.591	0.669	6.41	0.552	0.226
P25	0.618	0.566	0.503	2.31	0.379	0.171
P75	0.699	0.631	0.823	8.64	0.756	0.351
<i>By Country</i>						
Australia	0.656	0.612	0.622	2.31	0.395	0.357
Austria	0.642	0.488	0.649	1.91	0.350	0.361
Belgium	0.691	0.619	0.779	2.10	0.454	0.384
Canada	0.724	0.624	0.823	9.26	0.815	0.250
Denmark	0.699	0.605	0.703	6.20	0.679	0.264
Finland	0.376	0.591	0.503	3.14	0.142	0.114
France	0.663	0.651	0.779	12.22	0.764	0.089
Germany	0.688	0.609	0.881	5.81	0.648	0.258
Hong Kong	0.578	0.483	0.726	3.92	0.379	0.237
Ireland	0.665	0.566	0.999	2.30	0.398	0.375
Israel	0.651	0.599	0.251	1.79	0.293	0.393
Italy	0.618	0.578	0.530	7.76	0.537	0.181
Japan	0.598	0.422	0.946	11.86	0.770	-0.149
Netherlands	0.730	0.674	0.786	8.64	0.756	0.307
New Zealand	0.623	0.546	0.236	3.70	0.369	0.309
Norway	0.727	0.585	0.888	5.39	0.682	0.326
Portugal	0.349	0.631	0.200	1.98	0.083	0.171
Singapore	0.577	0.485	0.559	6.36	0.496	0.118
Spain	0.696	0.650	0.399	7.75	0.653	0.234
Sweden	0.688	0.683	0.671	8.15	0.664	0.240
Switzerland	0.701	0.619	0.458	3.60	0.549	0.351
UK	0.737	0.662	0.787	11.14	0.864	0.272
US	0.665	0.613	1.220	20.17	0.952	-0.237

C2. Principal Component Analysis of Country IVRETs

	PC 1	PC 2	PC 3	PC 4	PC 5
% Variation Explained	71.2%	7.8%	5.0%	4.5%	2.8%
Correlation with Global IVRET	0.921	0.038	0.227	0.112	0.089

Panel D. Stambaugh-Yuan (2017) Model

D1. Average Pairwise Correlation and Regression of Country IVRET on Global IVRET

	I	II	III	IV	V	VI
Country/ Region	Pairwise Correlation		Regression of Country IVRET on Global IVRET			
	IVRET	Market Return	Coef.	t-stat	Adj. R ²	Residual Pairwise Correlation
<i>Across Countries</i>						
Average	0.629	0.591	0.662	6.48	0.544	0.216
P25	0.591	0.566	0.483	2.33	0.370	0.154
P75	0.688	0.631	0.820	8.38	0.747	0.343
<i>By Country</i>						
Australia	0.656	0.612	0.639	2.33	0.411	0.349
Austria	0.639	0.488	0.625	1.98	0.354	0.358
Belgium	0.681	0.619	0.755	2.15	0.458	0.369
Canada	0.712	0.624	0.834	8.56	0.787	0.241
Denmark	0.688	0.605	0.698	6.72	0.665	0.253
Finland	0.352	0.591	0.483	3.54	0.138	0.085
France	0.663	0.651	0.799	13.09	0.775	0.092
Germany	0.674	0.609	0.820	6.63	0.647	0.238
Hong Kong	0.572	0.483	0.723	3.77	0.370	0.239
Ireland	0.656	0.566	1.024	2.29	0.395	0.364
Israel	0.581	0.599	0.259	1.72	0.232	0.338
Italy	0.605	0.578	0.510	7.53	0.521	0.173
Japan	0.601	0.422	0.948	12.57	0.768	-0.123
Netherlands	0.736	0.674	0.740	6.80	0.747	0.347
New Zealand	0.591	0.546	0.222	3.24	0.326	0.288
Norway	0.709	0.585	0.888	5.88	0.672	0.295
Portugal	0.330	0.631	0.185	2.00	0.077	0.154
Singapore	0.583	0.485	0.548	7.33	0.524	0.110
Spain	0.684	0.650	0.408	8.11	0.647	0.220
Sweden	0.659	0.683	0.676	8.38	0.634	0.202
Switzerland	0.701	0.619	0.440	3.82	0.571	0.343
UK	0.728	0.662	0.763	11.07	0.851	0.264
US	0.657	0.613	1.230	19.43	0.949	-0.233

D2. Principal Component Analysis of Country IVRETs

	PC 1	PC 2	PC 3	PC 4	PC 5
% Variation Explained	69.3%	9.8%	6.1%	4.5%	3.1%
Correlation with Global IVRET	0.925	0.022	0.215	0.087	0.067

Panel E. Barillas-Shanken (2018) 6-Factor Model

E1. Average Pairwise Correlation and Regression of Country IVRET on Global IVRET

	I	II	III	IV	V	VI
Country/	Pairwise Correlation		Regression of Country IVRET on Global IVRET			
Region	IVRET	Market Return	Coef.	t-stat	Adj. R ²	Residual Pairwise Correlation
<i>Across Countries</i>						
Average	0.663	0.591	0.633	6.07	0.575	0.245
P25	0.635	0.566	0.491	2.45	0.379	0.186
P75	0.730	0.631	0.780	7.41	0.766	0.393
<i>By Country</i>						
Australia	0.678	0.612	0.530	1.99	0.379	0.396
Austria	0.687	0.488	0.649	1.95	0.398	0.404
Belgium	0.741	0.619	0.650	2.45	0.537	0.427
Canada	0.755	0.624	0.787	7.51	0.833	0.301
Denmark	0.730	0.605	0.696	6.58	0.734	0.291
Finland	0.371	0.591	0.494	3.96	0.152	0.093
France	0.710	0.651	0.760	13.76	0.879	0.107
Germany	0.684	0.609	0.780	6.34	0.682	0.208
Hong Kong	0.597	0.483	0.678	3.27	0.361	0.269
Ireland	0.690	0.566	0.877	2.27	0.407	0.404
Israel	0.668	0.599	0.259	1.83	0.306	0.414
Italy	0.656	0.578	0.496	7.41	0.616	0.186
Japan	0.635	0.422	0.959	10.78	0.814	-0.126
Netherlands	0.770	0.674	0.750	5.60	0.766	0.393
New Zealand	0.571	0.546	0.192	2.59	0.251	0.327
Norway	0.753	0.585	0.869	5.94	0.760	0.333
Portugal	0.384	0.631	0.192	2.04	0.108	0.188
Singapore	0.618	0.485	0.491	4.26	0.508	0.177
Spain	0.700	0.650	0.380	6.26	0.627	0.269
Sweden	0.705	0.683	0.641	6.81	0.671	0.258
Switzerland	0.721	0.619	0.408	3.79	0.601	0.354
UK	0.758	0.662	0.774	9.51	0.866	0.295
US	0.678	0.613	1.245	22.66	0.965	-0.332

E2. Principal Component Analysis of Country IVRETs

	PC 1	PC 2	PC 3	PC 4	PC 5
% Variation Explained	76.5%	7.1%	4.4%	3.7%	2.6%
Correlation with Global IVRET	0.828	0.224	0.186	0.143	0.114

Table OA3. Estimation of Idiosyncratic ROE Variances (IVROE)

This table presents the summary statistics of ROE factors and the results from the regressions to estimate idiosyncratic ROE variances (IVROE). Panel A presents the summary statistics of ROE factors. For each country/region at the end of each June, we sort stocks into 3 portfolios based on size or B/M ratio, i.e. Size1, Size2, Size3, B/M1, B/M2, B/M3. MKT_ROE is the value-weighted average of firm ROEs within the country. SMB_ROE is the difference between value-weighted average of ROE of firms in Size1 (smallest) and value-weighted average of ROE of firms in Size3 (largest). HML_ROE is the difference between value-weighted average of ROE of firms in B/M3 (highest) and value-weighted average of ROE of firms in B/M1 (lowest). Global ROE factors are value-weighted country-level ROE factors (including countries when they have data available). All statistics are in percent. Panel B presents the coefficients and t-statistics from the following firm-quarter panel regression estimated country by country: $ROE_{i,q} = (a_{0,i} + a_1 \times size_{i,q-1} + a_2 \times BM_{i,q-1}) + [b_0 + b_1 \times size_{i,q-1} + b_2 \times BM_{i,q-1}] \times WMKT_ROE_q + [c_0 + c_1 \times size_{i,q-1} + c_2 \times BM_{i,q-1}] \times WSMB_ROE_q + [d_0 + d_1 \times size_{i,q-1} + d_2 \times BM_{i,q-1}] \times WHML_ROE_q + [e_0 + e_1 \times size_{i,q-1} + e_2 \times BM_{i,q-1}] \times MKT_ROE_q + [f_0 + f_1 \times size_{i,q-1} + f_2 \times BM_{i,q-1}] \times SMB_ROE_q + [g_0 + g_1 \times size_{i,q-1} + g_2 \times BM_{i,q-1}] \times HML_ROE_q + u_{i,q}$ where MKT_ROE, SMB_ROE and HML_ROE are orthogonalized to the global factors. Standard errors are clustered by both firm and quarter. The columns P25, Median and P75 shows the 25th percentile, median and 75th percentile of the statistics across all countries.

Panel A. Summary Statistics of ROE Factors

Country/ Region	MKT_ROE		SMB_ROE		HML_ROE	
	Mean (%)	Std Dev (%)	Mean (%)	Std Dev (%)	Mean (%)	Std Dev (%)
Australia	13.57	4.29	-16.66	15.34	-10.27	7.60
Austria	10.22	4.49	-4.72	5.36	-7.34	8.07
Belgium	14.18	4.77	-7.34	7.05	-9.15	7.22
Canada	11.36	4.44	-15.17	11.78	-9.67	7.29
Denmark	19.87	10.35	-14.73	13.82	-17.94	17.24
Finland	16.83	9.79	-10.37	9.44	-17.99	11.81
France	13.16	3.46	-7.39	3.98	-10.60	5.12
Germany	13.34	3.83	-8.26	6.00	-3.87	7.88
Hong Kong	17.37	5.35	-13.14	8.06	-15.17	6.13
Ireland	14.56	6.73	-9.18	8.95	-12.52	10.52
Israel	14.16	5.85	-8.70	7.89	-11.96	8.89
Italy	10.96	4.52	-9.90	5.71	-11.89	6.50
Japan	7.79	3.55	-4.61	2.52	-6.42	3.75
Netherlands	16.34	5.40	-8.29	6.42	-15.52	8.20
New Zealand	15.25	7.24	-12.22	7.72	-18.68	12.07
Norway	15.05	7.66	-12.62	10.70	-15.43	15.19
Portugal	15.03	4.24	-11.00	5.60	-14.19	8.53
Singapore	13.78	3.39	-12.21	4.45	-9.99	4.35
Spain	16.27	5.37	-12.62	8.91	-15.31	7.76
Sweden	18.34	5.26	-15.01	9.20	-11.67	9.68
Switzerland	14.37	5.14	-9.52	6.20	-9.12	7.30
UK	18.22	3.60	-13.09	8.28	-21.15	7.91
US	19.21	3.23	-20.57	5.87	-19.45	5.46
Global	15.71	2.83	-14.84	5.44	-14.83	4.05

Panel B. Regression Results

Variable	P25		Median		P75		U.S.	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Size	-0.007	-0.48	0.007	0.72	0.017	2.48	0.017	4.87
BM	-0.055	-3.48	-0.010	-1.15	0.002	0.04	-0.135	-8.45
WMKT	0.079	0.13	0.371	1.19	1.108	2.94	0.417	2.48
Size×WMKT_ROE	-0.014	-0.42	0.048	0.61	0.122	2.26	0.048	2.26
BM×WMKT_ROE	-0.259	-2.19	-0.150	-1.08	0.008	0.13	-0.212	-2.19
WSMB_ROE	0.155	0.14	0.728	1.47	1.397	3.74	1.149	5.85
Size×WSMB_ROE	-0.123	-1.79	-0.016	-0.50	0.039	1.21	-0.073	-3.00
BM×WSMB_ROE	-0.270	-2.41	-0.112	-1.79	0.034	0.51	-0.436	-4.35
WHML_ROE	-0.440	-1.85	-0.193	-0.61	0.198	0.44	-0.397	-2.27
Size×WHML_ROE	-0.059	-0.98	0.010	0.28	0.061	1.63	0.093	4.56
BM×WHML_ROE	0.012	0.42	0.110	1.27	0.200	1.96	0.188	1.83
MKT_ROE	-0.061	-0.12	0.509	1.69	0.936	2.72	-0.282	-1.06
Size×MKT_ROE	-0.013	-0.26	0.013	0.32	0.100	1.50	0.011	0.32
BM×MKT_ROE	-0.194	-2.80	-0.032	-0.39	0.008	0.11	0.201	1.26
SMB_ROE	0.538	2.47	0.860	3.65	1.154	5.40	-0.019	-0.11
Size×SMB_ROE	-0.133	-4.79	-0.077	-2.77	-0.055	-1.76	-0.008	-0.38
BM×SMB_ROE	-0.115	-2.34	-0.056	-1.11	-0.012	-0.79	0.186	1.90
HML_ROE	-0.185	-1.25	-0.105	-0.64	-0.043	-0.17	-0.185	-1.11
Size×HML_ROE	0.010	0.59	0.019	0.99	0.033	1.49	0.012	0.59
BM×HML_ROE	0.013	0.40	0.035	0.83	0.066	1.54	-0.343	-3.40
Overall R ²	0.447		0.462		0.526		0.514	

Table OA4. Cross-Country Correlations of ROE and ROE Residuals

This table presents the average cross-country correlations of ROE and ROE residuals. Column I represents the average cross-country correlations of country ROEs, calculated as the value-weighted average of firm ROEs. Columns II-IV present the results using the panel model. Specifically, for each country, we estimate $ROE_{iq} = (a_{0,i} + a_1 \times size_{i,q-1} + a_2 \times BM_{i,q-1}) + [b_0 + b_1 \times size_{i,q-1} + b_2 \times BM_{i,q-1}] \times WMKT_{ROE_q} + [c_0 + c_1 \times size_{i,q-1} + c_2 \times BM_{i,q-1}] \times WSMB_{ROE_q} + [d_0 + d_1 \times size_{i,q-1} + d_2 \times BM_{i,q-1}] \times WHML_{ROE_q} + [e_0 + e_1 \times size_{i,q-1} + e_2 \times BM_{i,q-1}] \times MKT_{ROE_q} + [f_0 + f_1 \times size_{i,q-1} + f_2 \times BM_{i,q-1}] \times SMB_{ROE_q} + [g_0 + g_1 \times size_{i,q-1} + g_2 \times BM_{i,q-1}] \times HML_{ROE_q} + u_{i,q}$. Columns V-VII present the results using the firm regression model. Specifically, for each firm, we estimate $ROE_{iq} = a + b \times WMKT_{ROE_q} + c \times MKT_{ROE_q} + u_{i,q}$. We estimate the models using different windows and obtain the residuals $u_{i,q}$, and calculate the country-level value-weighted ROE residual as the value-weighted $u_{i,q}$ within each country. For each country, we report the average pairwise correlation of ROE residuals with the other countries. Column II (V) reports the results using full sample. Column III (VI) reports the results using 20-quarter rolling windows. Column IV (VII) reports the results using seven non-overlapping samples of 20 quarters (1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2000-2014, 2015-2019).

	I	II	III	IV	V	VI	VII
		ROE Residual Corr. (Panel)			ROE Residual Corr. (Firm)		
Country/ Region	ROE Corr.	Full Sample	Rolling Window	Non-Overlap Window	Full Sample	Rolling Window	Non-Overlap Window
<i>Across Countries</i>							
Average	0.334	0.172	0.029	0.056	0.186	0.083	0.202
P25	0.277	0.103	-0.016	0.022	0.087	0.025	0.146
P75	0.401	0.241	0.069	0.094	0.275	0.125	0.264
<i>By Country</i>							
Australia	0.462	0.232	0.087	0.117	0.281	0.166	0.322
Austria	0.475	0.004	0.062	0.022	0.035	0.025	0.186
Belgium	0.277	0.253	0.004	0.102	0.229	0.018	0.141
Canada	0.401	0.237	0.028	0.107	0.275	0.061	0.198
Denmark	0.053	-0.063	-0.027	0.052	0.060	0.095	0.218
Finland	0.365	0.013	0.069	0.049	-0.024	0.099	0.157
France	0.357	0.340	0.060	0.102	0.254	0.083	0.262
Germany	0.385	0.147	0.010	-0.004	0.307	0.111	0.214
Hong Kong	0.013	0.190	0.035	0.015	0.087	-0.051	0.112
Ireland	0.245	0.167	0.092	0.080	0.191	0.068	0.203
Israel	0.311	0.012	-0.030	0.010	0.303	0.105	0.129
Italy	0.423	0.305	0.029	0.075	0.233	0.185	0.286
Japan	0.231	0.209	0.007	0.044	0.180	0.105	0.202
Netherlands	0.390	0.162	-0.034	0.060	0.254	0.048	0.146
New Zealand	0.265	0.103	-0.016	0.053	0.005	-0.030	-0.046
Norway	0.386	0.274	-0.025	-0.017	0.225	0.047	0.235
Portugal	0.357	0.161	0.108	0.094	0.242	0.130	0.216
Singapore	0.358	0.270	0.003	0.030	0.135	0.025	0.061
Spain	0.472	0.157	0.085	0.094	0.275	0.125	0.264
Sweden	0.436	0.230	0.115	0.143	0.307	0.148	0.301
Switzerland	0.314	0.093	-0.058	-0.025	0.175	0.023	0.191
UK	0.386	0.241	0.030	0.041	0.084	0.125	0.299
US	0.316	0.211	0.032	0.049	0.157	0.194	0.338

Table OA5. Validity of Growth Opportunity Variable (AGO)

This table presents evidence for the validity of growth opportunity variable (AGO) and the regression results using alternative AGO extracted from the market to book ratio (M/B) of Datastream Total Market Index. Panel A presents the regression results of future EBIT growth on AGO. In each quarter, we calculate EBIT of the Datastream Total Market Index as the trailing 4-quarter EBIT. EBIT growth is the growth rate of EBIT over the same quarter of the previous year. AGO is the growth opportunity variable extracted from aggregate earnings yield. The t-statistics are adjusted for serial correlation using Newey and West (1987) standard errors with 10 lags and are shown in parentheses. Panel B presents the regression results of future EBIT growth on the alternative AGO measure extracted from M/B. M/B is calculated as (market value of equity+book value of total assets–book value of total equity)/book value of total assets. AGO is the residual from a regression of M/B on ACV, ADR, AROE, and AEV. The t-statistics are adjusted for serial correlation using Newey and West (1987) standard errors with 10 lags and are shown in parentheses. Panel C presents the results from regressions of global IVRET on the alternative AGO measure and other state variables.

Panel A. Predictability of Future EBIT Growth using AGO

	EBIT Growth _{t+4}	EBIT Growth _{t+5}	EBIT Growth _{t+6}	EBIT Growth _{t+7}	EBIT Growth _{t+8}
Coefficient	7.185	6.913	5.086	2.701	0.004
t-stat	2.55	2.43	2.17	1.41	0.00
Adj.R ²	0.162	0.146	0.075	0.015	-0.009

Panel B. Predictability of Future EBIT Growth using Alternative AGO

	EBIT Growth _{t+4}	EBIT Growth _{t+5}	EBIT Growth _{t+6}	EBIT Growth _{t+7}	EBIT Growth _{t+8}
Coefficient	0.232	0.131	0.011	-0.117	-0.211
t-stat	1.25	0.73	0.07	-0.76	-1.30
Adj.R ²	0.038	0.006	-0.008	0.003	0.029

Panel C. Regression of IVRET^G on Alternative AGO and Other State Variables

	I	II	III
IVROE ^G	6.099 (6.84)		6.342 (11.11)
ACV			0.594 (6.82)
ADR			-0.235 (-7.79)
AROE			-0.358 (-4.32)
AEV			24.136 (1.65)
AGO		0.060 (2.98)	0.095 (8.64)
Adj. R ²	0.267	0.059	0.739

Table OA6. Explaining the Global Idiosyncratic Returns Variance (IVRET^G) using State Variables

This table presents the results of using the levels, squares and cross-products of state variables to explain global idiosyncratic return variance (IVRET^G). State variables are estimated using data on the Datastream World Market Index. ACV is the conditional variance of global returns. ADR represents the global discount rate. We calculate ROE as the net income divided by lagged book value and AROE is the natural logarithm of 1+ROE. AEV is the conditional aggregate variance of the cash flows. AGO is the growth opportunity measure.

	Coefficient	t-stat
IVROE ^G	9.367	2.11
ACV	3.040	2.44
ADR	0.565	2.94
AROE	-0.140	-0.24
AEV	-36.124	-0.39
AGO	-1.803	-1.91
ACV ²	4.929	4.14
ADR ²	0.575	2.68
AROE ²	-0.012	-0.01
AEV ²	42458.092	0.61
AGO ²	68.303	5.87
IVROE ^G ×ACV	-203.574	-2.44
IVROE ^G ×ADR	-64.881	-5.85
IVROE ^G ×AROE	-13.263	-0.35
IVROE ^G ×AEV	2593.107	0.42
IVROE ^G ×AGO	167.883	2.84
Adj. R ²	0.824	

Table OA7. Cyclicity of Country Idiosyncratic Variances

This table presents the correlation between country idiosyncratic variances and country GDP growth rates. GDP growth is the growth rate of trailing 4-quarter real GDP compared to the same quarter of previous year. We obtain nominal GDP and GDP deflator data for each country/region from Datastream and OECD. The GDP growth rates are measured with a lag of j quarters relative to the idiosyncratic variance measures; thus the correlations with positive j measure the extent to which the idiosyncratic variance measure leads the business cycle, whereas the correlations with negative j measure the extent to which the idiosyncratic measure lags the cycle. Negative correlations that are statistically significant at 10% level or lower are indicated in bold. Panel A presents the results for country idiosyncratic return variance (IVRET). Panel B presents the results for country idiosyncratic ROE variance (IVROE). Both IVROE and GDP growth rates are transformed using the kernel method.

Panel A. Country IVRET

Country/ Region	I +4	II +3	III +2	IV +1	V 0	VI -1	VII -2	VIII -3	IX -4
Australia	0.156	0.119	0.086	0.053	0.016	-0.018	-0.057	-0.090	-0.106
Austria	0.214	0.196	0.156	0.087	-0.027	-0.169	-0.291	-0.343	-0.308
Belgium	0.280	0.224	0.154	0.057	-0.066	-0.190	-0.274	-0.273	-0.181
Canada	0.180	0.164	0.124	0.079	0.038	-0.013	-0.048	-0.071	-0.049
Denmark	0.086	0.064	0.023	-0.046	-0.171	-0.276	-0.369	-0.431	-0.410
Finland	-0.131	-0.160	-0.203	-0.265	-0.336	-0.412	-0.469	-0.484	-0.452
France	0.364	0.345	0.316	0.278	0.235	0.183	0.143	0.127	0.138
Germany	0.101	0.082	0.046	-0.013	-0.090	-0.187	-0.250	-0.265	-0.235
Hong Kong	-0.150	-0.112	-0.095	-0.110	-0.165	-0.238	-0.284	-0.313	-0.305
Ireland	-0.093	-0.140	-0.195	-0.258	-0.337	-0.400	-0.439	-0.451	-0.427
Israel	0.258	0.267	0.232	0.153	0.024	-0.114	-0.206	-0.260	-0.245
Italy	0.155	0.122	0.088	0.050	-0.008	-0.077	-0.107	-0.093	-0.030
Japan	0.007	-0.005	-0.024	-0.058	-0.095	-0.130	-0.134	-0.109	-0.068
Netherlands	0.349	0.291	0.226	0.148	0.051	-0.058	-0.154	-0.220	-0.235
New Zealand	-0.248	-0.294	-0.374	-0.439	-0.492	-0.515	-0.486	-0.413	-0.304
Norway	0.140	0.087	0.013	-0.071	-0.140	-0.205	-0.261	-0.277	-0.260
Portugal	0.342	0.316	0.262	0.183	0.090	0.005	-0.027	-0.017	0.026
Singapore	-0.002	-0.018	-0.038	-0.072	-0.105	-0.159	-0.188	-0.179	-0.137
Spain	0.333	0.301	0.257	0.205	0.131	0.050	-0.014	-0.046	-0.028
Sweden	0.096	0.043	-0.021	-0.096	-0.193	-0.282	-0.338	-0.349	-0.298
Switzerland	0.291	0.261	0.220	0.150	0.037	-0.113	-0.252	-0.349	-0.340
UK	0.107	0.094	0.074	0.040	-0.020	-0.090	-0.145	-0.171	-0.143
US	0.255	0.225	0.191	0.137	0.069	-0.002	-0.070	-0.109	-0.099

Panel B. Country IVROE

Country/ Region	I +4	II +3	III +2	IV +1	V 0	VI -1	VII -2	VIII -3	IX -4
Australia	0.122	0.085	0.048	0.013	-0.021	-0.054	-0.085	-0.114	-0.140
Austria	-0.024	-0.030	-0.032	-0.029	-0.018	-0.001	0.021	0.045	0.069
Belgium	0.154	0.117	0.076	0.031	-0.015	-0.058	-0.092	-0.114	-0.121
Canada	0.251	0.224	0.192	0.154	0.112	0.068	0.024	-0.016	-0.050
Denmark	0.019	0.026	0.024	0.016	0.001	-0.017	-0.040	-0.065	-0.091
Finland	-0.320	-0.309	-0.296	-0.283	-0.271	-0.260	-0.250	-0.240	-0.228
France	0.439	0.412	0.387	0.363	0.342	0.325	0.313	0.306	0.305
Germany	-0.265	-0.262	-0.260	-0.261	-0.267	-0.278	-0.294	-0.311	-0.326
Hong Kong	-0.046	-0.031	-0.015	-0.002	0.007	0.013	0.015	0.015	0.015
Ireland	0.002	0.007	0.015	0.028	0.047	0.071	0.100	0.131	0.162
Israel	0.054	-0.016	-0.080	-0.133	-0.175	-0.192	-0.201	-0.201	-0.191
Italy	-0.084	-0.074	-0.058	-0.035	-0.008	0.025	0.061	0.100	0.141
Japan	-0.655	-0.640	-0.623	-0.602	-0.578	-0.551	-0.522	-0.492	-0.461
Netherlands	0.205	0.143	0.077	0.010	-0.058	-0.123	-0.185	-0.239	-0.283
New Zealand	0.359	0.340	0.323	0.309	0.297	0.284	0.269	0.252	0.229
Norway	0.085	0.041	0.005	-0.023	-0.041	-0.051	-0.051	-0.044	-0.030
Portugal	-0.236	-0.292	-0.347	-0.401	-0.453	-0.500	-0.540	-0.571	-0.591
Singapore	0.169	0.156	0.131	0.096	0.056	0.015	-0.023	-0.054	-0.073
Spain	-0.044	-0.084	-0.122	-0.155	-0.184	-0.206	-0.222	-0.229	-0.228
Sweden	-0.104	-0.217	-0.331	-0.442	-0.545	-0.636	-0.710	-0.766	-0.802
Switzerland	0.348	0.329	0.299	0.262	0.219	0.173	0.126	0.082	0.044
UK	0.168	0.124	0.074	0.023	-0.030	-0.079	-0.125	-0.163	-0.195
US	-0.018	-0.053	-0.092	-0.135	-0.181	-0.228	-0.275	-0.319	-0.356