The International CAPM Redux

- Supplementary Online Appendix -

This Appendix is divided into two sections. Section A extends Section 4 in the main text providing details about the data sets. Section B reports additional robustness checks for our asset pricing tests.

A Data Appendix

We build two international data sets spanning from February 1976 to April 2013. In the choice of the country coverage, we follow the 2011 MSCI classification for the MSCI Global Investable Market Indices. Accordingly, we consider 25 'developed' markets and 21 'emerging' markets. Countries, data coverage and sources are listed in Table A.1.

Details about the construction of the equity data set are provided in the main text. In this data set, we do not do data cleaning.

Our second data set is for foreign exchange. We extend previous work by Lustig and Verdelhan (2005, 2007) and Lustig et al. (2011) along the time-series dimension, while we depart from them in cross-section to ensure consistency with our equity variables. Israel, China, Morocco and Russia enter our data set by replacing Hungary, Kuwait, Saudi Arabia and United Arab Emirates from previous research. National foreign exchange rate series for Euro Area countries end in December 1998 except for Greece due to the later adoption of the Euro (in January 2001). The Euro series start in January 1999.

We assume covered interest parity also for countries that have adopted a fixed or partial peg to the U.S. dollar over the sample. Since forward contracts were easily accessible to investors, their forward prices are not inconsistent with our assumption. We account for large deviations of forward discounts from the predictions of economic theory by deleting the following observations: Indonesia from January 2001 onwards, South Africa in July and August 1985 and Turkey from February 2001 to November 2002.

The dollar and carry factors are constructed using all currencies in the sample subject to data availability. Figure A.3 shows their times-series along with the third factor (equity market factor in local currencies) we adopt in our empirical specification. Figure A.2 reports details about the cross-sectional size of our two data sets over time.

Table A.1
Equity and currency data sets

This table reports, for each country, the starting date of equity return, spot rate and forward rate series along with their sources. All series end in April 2013. For each country, monthly equity returns are computed on five types of MSCI country total return indices: aggregate market, value-stocks, growth-stocks, small-stocks and big-stocks indices. Forward rate series are from three sources (Reuters, Barclays and Other sources), all accessible via Datastream. Series quoted in GBP and converted into USD are denoted by *. Other Datastream sources for one-month forward rates are: WMR: WM/Reuters; TR: Thompson Reuters; TEJ: The Taiwan Economic Journal; O: Other. Countries are allocated to two groups (Developed or Emerging) according to the 2011 MSCI classification for the MSCI Global Investable Market Indices.

	Equity data set				Currency data set			
Country	Agg. Mkt	Value-Growth	Small	Big	Spot Rates	1m Fwd rates		
	(MSCI)	(MSCI)	(MSCI)	(MSCI)	(Reuters)	(Reuters)	(Barclays)	(Other)
Developed Markets								
Australia	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	–
Austria	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	–	Jan-76 *(O)
Belgium	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jan-76 *(O)
Canada	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	Jan-76 *(O)
Denmark	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	Jan-76 *(O)
Finland	Jan-88	Jan-88	Jan-01	Jun-94	Jan-76*	Dec-96*	–	–
France	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jan-76 *(O)
Germany	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jan-76 *(O)
Greece	Jan-88	Jan-97	Oct-01	Jun-96	Jan-76*	Dec-96*	–	–
China Hong Kong	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	–
Ireland	Jan-88	Jan-91	Jan-01	Jun-94	Jan-76*	Dec-96*	–	Jan-76 *(O)
Israel	Jan-93	Jan-97	Jun-94	Jun-94	Jan-76*	Dec-96*	–	–
Italy	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Mar-84	Jan-76 *(O)
Japan	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jun-78*(O)
Netherlands	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jan-76 *(WMR)
New Zealand	Jan-88	Jan-88	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	–
Norway	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	Jan-76 *(O)
Portugal	Jan-88	Jan-97	Jan-01	Jul-95	Jan-76*	Dec-96*	–	Jan-76 *(O)
Singapore	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	–
Spain	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	–	Jan-76 *(O)
Sweden	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Dec-84	Jan-76 *(O)
Switzerland	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jan-76 *(O)
United Kingdom	Feb-76	Feb-76	Jan-01	Jun-94	Jan-76*	Dec-96*	Oct-83	Jan-76 *(O)
United States	Feb-76	Feb-76	Jan-01	Jun-94	–	–	–	–
Emerging Markets								
Brazil	Jan-88	Jan-97	Jun-94	Jun-94	Jan-76*	–	–	–
Chile	Jan-88	Jan-97	Jun-94	Jun-94	Jan-76*	–	–	–
China	Jan-93	Jan-97	Jun-94	Jun-94	Jan-85*	Feb-02*	–	–
Colombia	Jan-93	Jan-97	Jun-94	Jun-94	Jan-76*	–	–	–
Czech Republic	Jan-95	Jan-97	Jun-95	Jun-95	Nov-89*	Dec-96*	–	–
Egypt	Jan-95	Oct-97	Jun-96	Dec-96	Dec-88*	–	–	–
Hungary	Jan-95	Jan-97	Jun-94	Dec-95	Jul-89*	Oct-97*	–	–
India	Jan-93	Jan-97	Jun-94	Jun-94	Jan-76*	Oct-97*	–	–
Indonesia	Jan-88	Jun-97	Jun-94	Jun-94	Jan-76*	Dec-96*	–	–
Malaysia	Jan-88	Jun-97	Jun-94	Jun-94	Jan-76*	Dec-96*	Dec-84	–
Mexico	Jan-88	Jan-97	Jun-96	Jun-96	Jan-76*	Dec-96*	–	–
Morocco	Jan-95	Oct-97	Jun-97	Jun-97	Jan-85*	–	–	Mar-04 (WMR)
Peru	Jan-93	Jan-97	Jun-95	Jun-95	Aug-79*	–	–	–
Philippines	Jan-88	Jan-97	Jun-94	Jun-94	Jan-76*	Dec-96*	–	–
Poland	Jan-93	Jan-97	Jun-94	Jun-94	Nov-89*	Feb-02*	–	Aug-96 (TR)
Russia	Jan-95	Jan-97	Jun-96	Jun-96	Jan-93*	Mar-04*	–	–
South Africa	Jan-93	Jan-97	Jun-94	Jun-94	Jan-76*	Dec-96*	Oct-83	–
South Korea	Jan-88	Jan-97	Jun-94	Jun-94	Jan-76*	Feb-02*	–	–
Taiwan	Jan-88	Jan-97	Oct-96	Oct-96	Dec-84*	Dec-96*	–	Jan-92 (TEJ)
Thailand	Jan-88	Jun-97	Jun-94	Jun-94	Jan-76*	Dec-96*	–	Mar-95 (TR)
Turkey	Jan-88	Jan-97	Jun-94	Jun-94	Dec-82*	Dec-96*	–	–

Table A.2
Currency Portfolios sorted by Forward Discount

This table reports summary statistics (mean μ and standard deviation σ) on portfolios of currencies sorted on their forward discount. See Section 4.1 in the main text and Lustig et al. (2011) for details about the construction of these portfolios. For each portfolio, summary statistics are reported for the average change in log spot exchange rates (Δs), the average log forward discount ($f - s$) and the average log excess return ($rx = (f - s) - \Delta s$). All moments are annualized and in percentage points. The sample period is February 1976 to April 2013.

	Portfolios					
Moments	1	2	3	4	5	6
	Spot change: Δs					
μ	-0.40	-0.97	-1.27	-0.48	0.63	4.81
σ	8.63	8.47	8.66	8.43	8.75	9.69
	Forward Discount: $f - s$					
μ	-3.57	-1.43	-0.01	1.31	2.92	9.29
σ	0.76	0.64	0.59	0.59	0.65	1.75
	Excess Return: $rx = (f - s) - \Delta s$					
μ	-3.17	-0.46	1.26	1.80	2.29	4.48
σ	8.74	8.51	8.73	8.50	8.78	9.65

Table A.3
Correlations among factors

This table reports pairwise correlations among all factors tested in the main text. The sample period is February 1976 to April 2013 for factors from the World CAPM and the International CAPM (Panel I) and November 1990 to April 2013 for factors from the three-global-factor model and the four-global-factor model (Panel II) due to their limited data coverage. Series are monthly and in percentage terms.

Panel I: February 1976-April 2013

Factors	R^{eWMKT}	rx^{GBP}	rx^{JPY}	rx^{EUR}	R^{eLWMKT}	$R^{eDollar}$	R^{eCarry}
R^{eWMKT}	1.00						
rx^{GBP}	0.30	1.00					
rx^{JPY}	0.20	0.36	1.00				
rx^{EUR}	0.30	0.66	0.47	1.00			
R^{eLWMKT}	0.95	0.08	-0.03	0.04	1.00		
$R^{eDollar}$	0.43	0.73	0.51	0.93	0.18	1.00	
R^{eCarry}	0.21	0.18	-0.28	0.01	0.25	0.18	1.00

Panel II: November 1990-April 2013

Factors	R^{eWMKT}	rx^{GBP}	rx^{JPY}	rx^{EUR}	R^{eFFMKT}	SMB	HML	MOM	R^{eLWMKT}	$R^{eDollar}$	R^{eCarry}
R^{eWMKT}	1.00										
rx^{GBP}	0.30	1.00									
rx^{JPY}	0.08	0.18	1.00								
rx^{EUR}	0.32	0.67	0.32	1.00							
R^{eFFMKT}	0.99	0.31	0.10	0.34	1.00						
SMB	-0.11	-0.01	-0.01	0.04	-0.01	1.00					
HML	-0.12	0.05	-0.07	0.09	-0.14	-0.18	1.00				
MOM	-0.25	-0.05	-0.03	-0.07	-0.23	0.17	-0.25	1.00			
R^{eLWMKT}	0.96	0.13	-0.09	0.10	0.95	-0.08	-0.14	-0.25	1.00		
$R^{eDollar}$	0.52	0.70	0.33	0.90	0.54	0.08	0.04	-0.13	0.32	1.00	
R^{eCarry}	0.39	0.28	-0.28	0.18	0.39	0.01	-0.01	-0.09	0.40	0.43	1.00

Figure A.1
Monthly cross-sectional size of international data sets

This figure shows the monthly cross-sectional size of two international data sets for the January 1976 to April 2013 period. The graph on the left refers to equity markets: test assets are returns on five types of MSCI country equity indices (aggregate market, growth stock, value stock, big cap and small cap indices) in excess of the U.S. 30-day Treasury bill rate. The graph on the right refers to currency market and reports the number of currencies over time. Countries enter the sample according to their data coverage (see Table A.1).

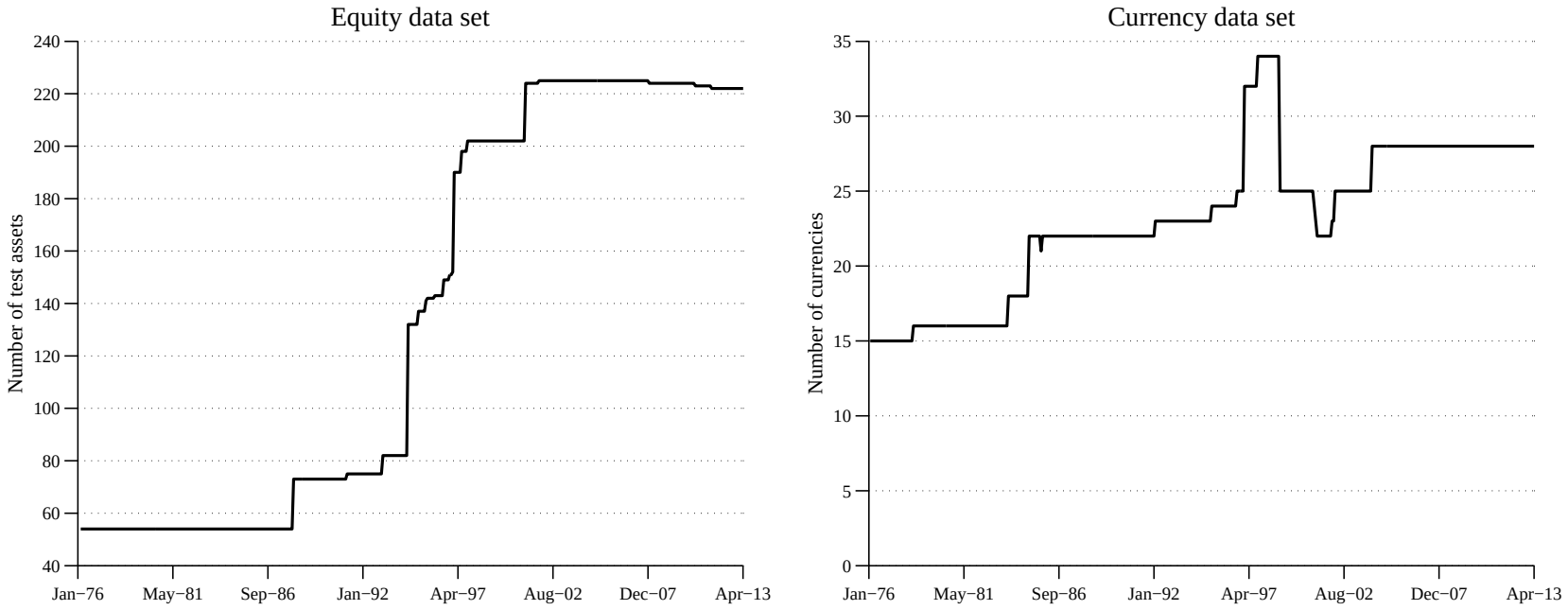
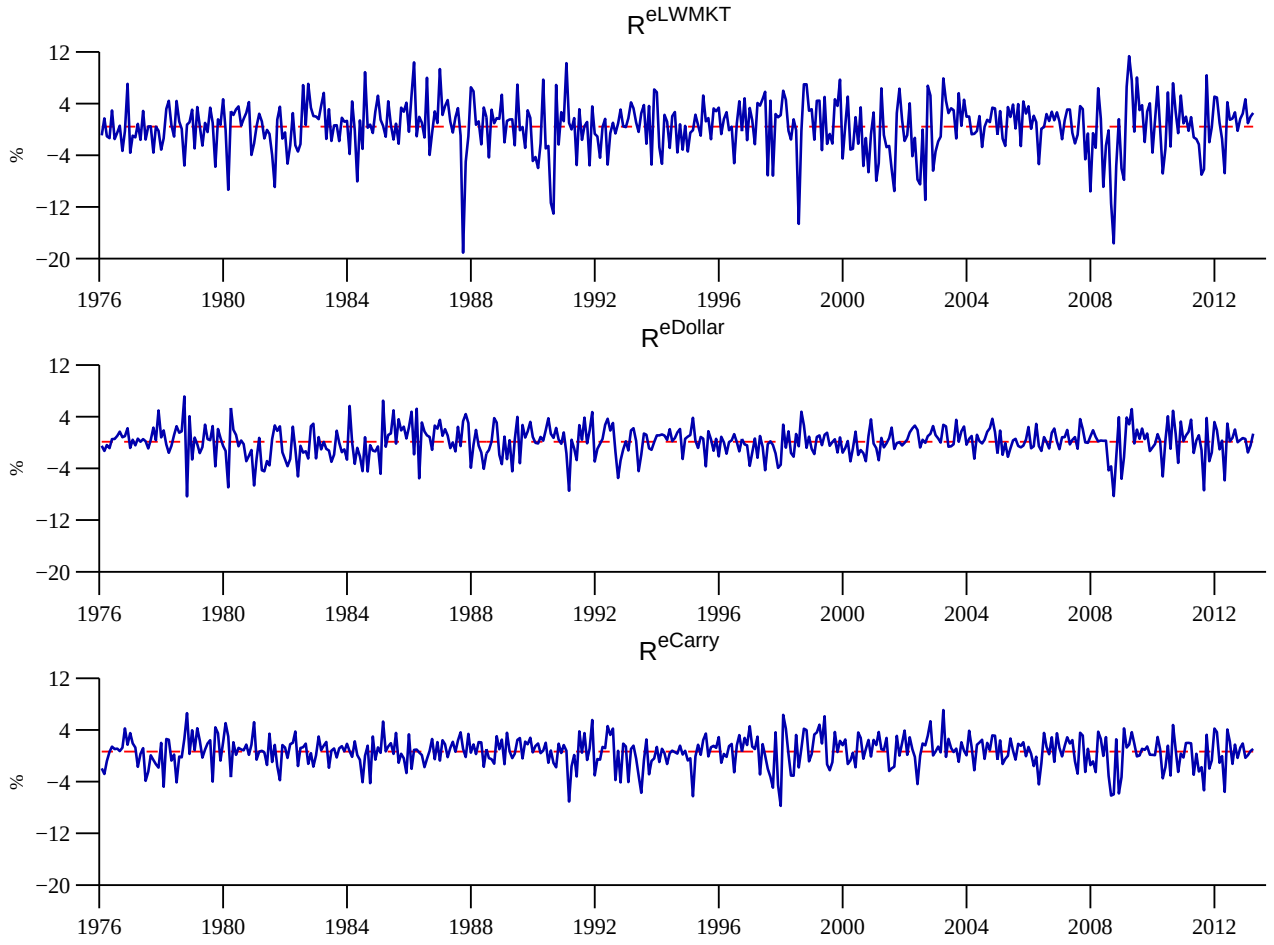


Figure A.2
Factors

This figure shows the time-series of the three global factors embedded in our empirical specification, namely a pure global equity factor (LWMKT) and two global currency factors (the dollar factor and the carry factor). LWMKT is the weighted average return on a portfolio of MSCI aggregate market returns denominated in local currencies and computed in excess from the U.S. 30-day Treasury bill rate. Portfolio weights are computed using lagged market capitalization in U.S. dollars. Countries enter this world portfolio according to their data coverage (see Table A.1). The dollar factor is the average excess return earned by borrowing in the U.S and investing in all other currencies (see Table A.1 for data coverage). The carry factor is the average excess return earned by going long in a basket of high interest rate currencies and short in a basket of low interest rate currencies. An increase in these currency factors corresponds to a depreciation of the U.S. dollar. The sample mean of each factor is reported in red dashed line. The sample period is February 1976 to April 2013. Values are in percentage term.



B Robustness checks

Table B.1
Time-varying factor betas: Standard deviations

This table reports, for each country, the standard deviation of the time-varying local equity (LWMKT), dollar and carry betas. Loadings are obtained by regressing monthly country aggregate market returns for developed (DM) or emerging (EM) markets on a constant, the local equity factor and the dollar and carry factors over rolling windows of 60-months. For each factor, the cross-country average is reported at the bottom of the table. The sample period is February 1976 to April 2013.

	Developed Markets				Emerging Markets		
Country	$\hat{\beta}_{LWMKT}$	$\hat{\beta}_{Dollar}$	$\hat{\beta}_{Carry}$	Country	$\hat{\beta}_{LWMKT}$	$\hat{\beta}_{Dollar}$	$\hat{\beta}_{Carry}$
Australia	0.207	0.476	0.581	Brazil	0.318	0.829	0.434
Austria	0.453	0.444	0.303	Chile	0.276	0.650	0.306
Belgium	0.292	0.383	0.248	China	0.271	0.742	0.826
Canada	0.292	0.399	0.253	Colombia	0.288	0.767	0.415
Denmark	0.207	0.296	0.236	Czech Republic	0.212	0.258	0.273
Finland	0.279	0.605	0.230	Egypt	0.243	0.639	0.437
France	0.164	0.364	0.308	Hungary	0.295	0.918	0.362
Germany	0.376	0.330	0.208	India	0.494	0.370	0.316
Greece	0.344	0.486	0.291	Indonesia	0.469	1.744	1.473
China Hong Kong	0.270	0.622	0.516	Malaysia	0.339	0.603	0.777
Ireland	0.218	0.274	0.263	Mexico	0.272	0.892	0.494
Israel	0.270	0.354	0.219	Morocco	0.253	0.341	0.323
Italy	0.126	0.651	0.478	Peru	0.283	0.889	0.464
Japan	0.360	0.454	0.243	Philippines	0.324	1.088	0.487
Netherlands	0.203	0.157	0.199	Poland	0.274	0.533	0.437
New Zealand	0.275	0.507	0.536	Russia	0.649	1.053	0.967
Norway	0.209	0.387	0.328	South Africa	0.203	0.503	0.238
Portugal	0.127	0.364	0.166	South Korea	0.410	0.860	0.657
Singapore	0.174	0.734	0.494	Taiwan	0.162	0.490	0.825
Spain	0.364	0.366	0.220	Thailand	0.485	1.443	0.575
Sweden	0.345	0.310	0.296	Turkey	0.996	1.029	1.201
Switzerland	0.127	0.212	0.233				
United Kingdom	0.146	0.247	0.449				
United States	0.187	0.168	0.190				
Means							
DM/EM	0.251	0.400	0.312		0.358	0.792	0.585
ALL	0.301	0.583	0.439				

Table B.2
Time-varying factor betas: Correlations

This table reports, for each country, the pairwise correlation between the time-varying local equity (LW), dollar (D) and carry (C) betas. Loadings are obtained by regressing monthly country aggregate market returns for developed (DM) or emerging (EM) markets on a constant, the local equity factor and the dollar and carry factors over rolling windows of 60-months. For each factor, the cross-country average is reported at the bottom of the table. The sample period is February 1976 to April 2013.

	Developed Markets				Emerging Markets		
Country	$(\hat{\beta}_{LW}, \hat{\beta}_D)$	$(\hat{\beta}_{LW}, \hat{\beta}_C)$	$(\hat{\beta}_D, \hat{\beta}_C)$	Country	$(\hat{\beta}_{LW}, \hat{\beta}_D)$	$(\hat{\beta}_{LW}, \hat{\beta}_C)$	$(\hat{\beta}_D, \hat{\beta}_C)$
Australia	-0.026	-0.043	-0.181	Brazil	0.421	0.113	-0.309
Austria	-0.074	-0.307	0.363	Chile	0.727	-0.058	-0.207
Belgium	0.026	-0.385	0.002	China	-0.271	-0.656	0.562
Canada	0.522	-0.017	-0.487	Colombia	0.606	0.561	0.297
Denmark	-0.009	-0.206	-0.231	Czech Republic	0.389	-0.667	-0.490
Finland	-0.131	0.075	-0.104	Egypt	0.639	-0.539	-0.437
France	-0.168	-0.561	0.608	Hungary	-0.769	-0.437	0.459
Germany	-0.198	-0.239	0.111	India	-0.315	-0.082	-0.201
Greece	0.441	-0.213	-0.548	Indonesia	0.406	0.148	0.130
China Hong Kong	0.118	-0.082	0.155	Malaysia	0.614	0.210	0.565
Ireland	-0.414	0.021	0.162	Mexico	-0.246	0.007	0.472
Israel	-0.099	-0.680	-0.243	Morocco	0.077	-0.327	0.415
Italy	-0.032	-0.068	-0.569	Peru	0.014	-0.622	-0.466
Japan	0.854	-0.641	-0.803	Philippines	0.470	0.281	0.754
Netherlands	-0.025	-0.423	-0.221	Poland	-0.718	-0.556	0.089
New Zealand	-0.440	-0.787	0.473	Russia	-0.923	0.851	-0.930
Norway	0.341	-0.277	-0.392	South Africa	-0.252	-0.440	0.757
Portugal	-0.168	-0.402	0.114	South Korea	0.665	-0.513	-0.704
Singapore	0.269	0.219	0.637	Taiwan	-0.008	-0.636	-0.027
Spain	-0.027	-0.208	-0.523	Thailand	0.370	0.324	0.168
Sweden	0.535	-0.247	-0.309	Turkey	-0.630	0.511	-0.071
Switzerland	-0.671	0.387	-0.170				
United Kingdom	0.378	0.661	0.558				
United States	0.344	-0.534	-0.865				
Means							
DM/EM	0.056	-0.207	-0.103		0.060	-0.120	0.039
ALL	0.058	-0.166	-0.036				

Table B.3
Bootstrap tests for testing the statistical significance of cross-sectional FMB-TV RMSE differences

This table reports bootstrap critical values for testing the statistical significance of real sample RMSE differences ($\Delta RMSE$) obtained via the FMB-TV procedure. Results and details for the real sample exercise are reported in Table 3 and Table 4 in the main text. $\Delta RMSE$ is defined as the difference in the RMSE values between a competitor model and our model. A positive difference indicates that our model outperforms. The bootstrap exercise is carried out on rolling windows, meaning that for each bootstrap sample and all models, test assets and factors are drawn with replacements across 61 periods. In each bootstrapped sample and for each model, the FMB-TV test is run as described in Table 3. The table below reports the 5^{th}, 10^{th}, 90^{th} and 95^{th} percentile of the distribution of 1000 bootstrap $\Delta RMSE$. The real sample $\Delta RMSE$ is statistically different from zero at the 10% confidence level (assuming a two-sided test) if its value is lower/greater that the $5^{th}/95^{th}$ bootstrap percentile. The bootstrap standard error, se^b, is computed as follows: $\text{se}^b(\hat{\theta}) = \sqrt{\frac{1}{B-1}\sum_{j=1}^{B}(\hat{\theta}_j^b - \bar{\theta}^b)^2}$, where $\hat{\theta}$ denotes the real sample $\Delta RMSE$, $\hat{\theta}_j^b$ is the estimate of $\Delta RMSE$ for the jth bootstrap replication, $\bar{\theta}^b$ is the mean of the $\hat{\theta}_j^b$, and $B = 1000$ is the number of bootstrap replications. *, **, *** denote statistical significance at the 10%, 5% and 1% level, respectively, for a two-sided t-test based on the bootstrap standard error. The sample period is February 1976 (November 1990) to April 2013 in the top (bottom) table. DM (EM) denotes Developed (Emerging) Markets, respectively.

February 1976 - April 2013

Test assets	Markets	Against World CAPM						Against the International CAPM					
			Bootstrap						Bootstrap				
		$\Delta RMSE$	5^{th} perc	10th perc	90th perc	95th perc	se^b	$\Delta RMSE$	5th perc	5th perc	90th perc	95th perc	se^b
Aggr. Mkt	DM	−0.036	−0.034	−0.024	0.035	0.043	0.023	−0.017	−0.063	−0.050	0.012	0.020	0.025
Aggr. Mkt	DM+EM	0.056	0.045	0.058	0.154	0.168	0.037	0.079***	−0.031	−0.021	0.056	0.066	0.030
All	DM	−0.021	−0.004	0.003	0.044	0.052	0.016	−0.012	−0.041	−0.035	0.006	0.012	0.016
All	DM+EM	0.097***	0.040	0.047	0.119	0.127	0.027	0.046*	−0.023	−0.015	0.051	0.061	0.025

November 1990 - April 2013

Test assets	Markets	Against the Three Global factor model						Against the Four Global factor model					
			Bootstrap						Bootstrap				
		$\Delta RMSE$	5^{th} perc	10th perc	90th perc	95th perc	se^b	$\Delta RMSE$	5th perc	5th perc	90th perc	95th perc	se^b
Aggr. Mkt	DM	0.001	−0.052	−0.043	0.034	0.041	0.029	−0.055	−0.102	−0.091	0.013	0.029	0.040
Aggr. Mkt	DM+EM	0.077**	−0.028	−0.014	0.084	0.099	0.039	0.059	−0.067	−0.053	0.045	0.061	0.039
All	DM	−0.016	−0.046	−0.037	0.036	0.044	0.028	−0.056	−0.079	−0.069	0.028	0.037	0.036
All	DM+EM	0.016	−0.025	−0.017	0.067	0.081	0.032	−0.011	−0.058	−0.048	0.048	0.065	0.037

Figure B.1
Time-varying GRS test statistics by asset type: against the World CAPM

This figure compares, in each 60-month rolling window, the values of the GRS test statistic based on our empirical specification (in blue circle line) and the World CAPM (in green solid line). For each 60-month rolling window, the value of the GRS statistic that corresponds to a p-value of 10% (i.e. the cutoff) is reported in dash-dot black line. The GRS statistic tests whether all intercepts in a set of Np regressions are zero, where Np denotes the number of test assets. A value of the GRS statistic above the 10% cutoff means that the null hypothesis can be rejected at the 10% confidence level. Test assets are excess returns on value-stocks, growth-stocks, small-stocks or big-stocks indices as reported at the top of each graph. Dates reported on the x-axis refer to the end date of each rolling window; the estimation sample is February 1976 to March 2013.

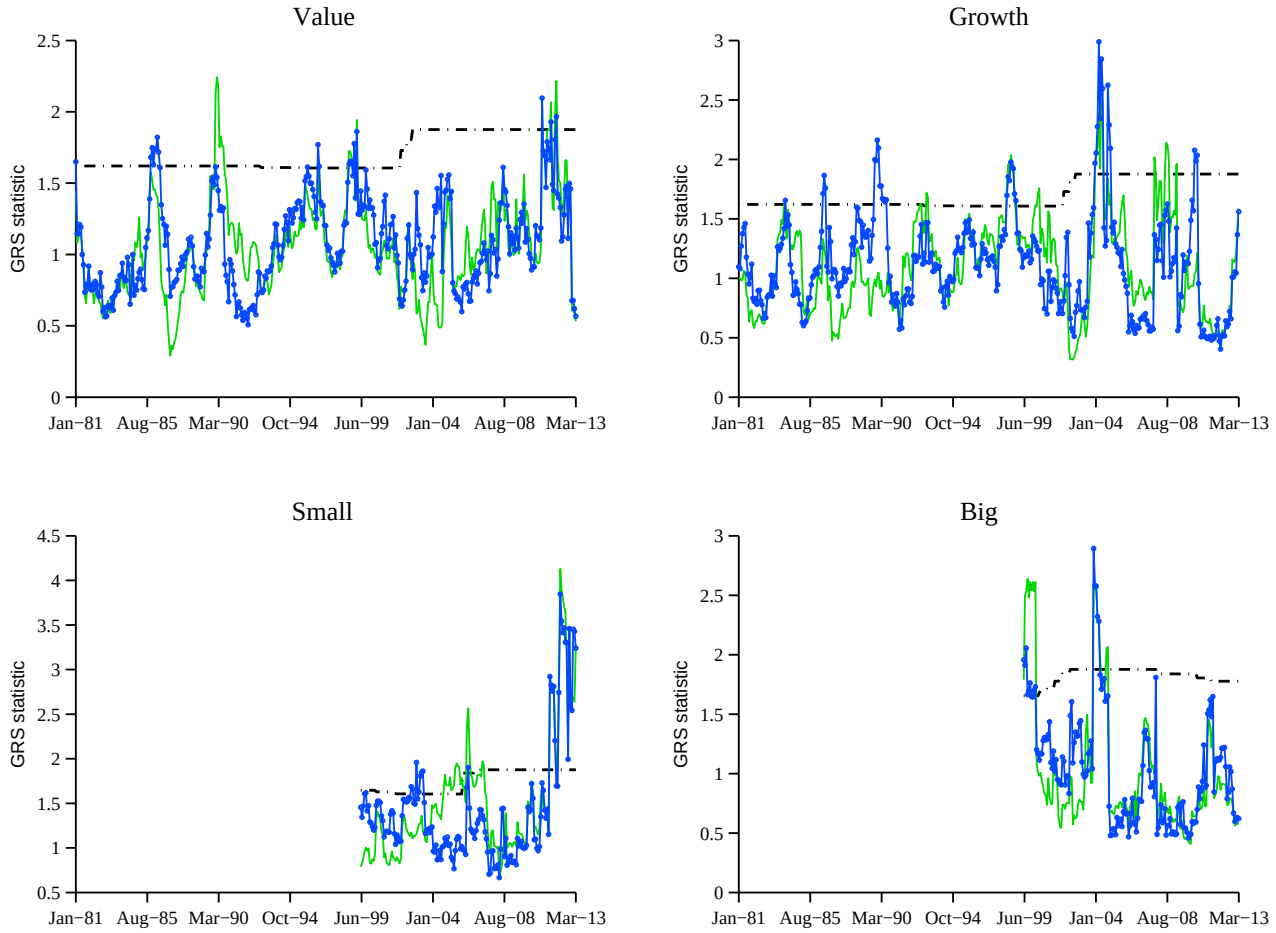


Figure B.2
Time-varying GRS test statistics by asset type: against the International CAPM

This figure compares, in each 60-month rolling window, the values of the GRS test statistic based on our empirical specification (in blue circle line) and the International CAPM (in light blue triangle line). For each 60-month rolling window, the value of the GRS statistic that corresponds to a p-value of 10% (i.e. the cutoff) is reported in dash-dot black line. The GRS statistic tests whether all intercepts in a set of *Np* regressions are zero, where *Np* denotes the number of test assets. A value of the GRS statistic above the 10% cutoff means that the null hypothesis can be rejected at the 10% confidence level. Test assets are excess returns on value-stocks, growth-stocks, small-stocks or big-stocks indices as reported at the top of each graph. Dates reported on the x-axis refer to the end date of each rolling window; the estimation sample is February 1976 to March 2013.

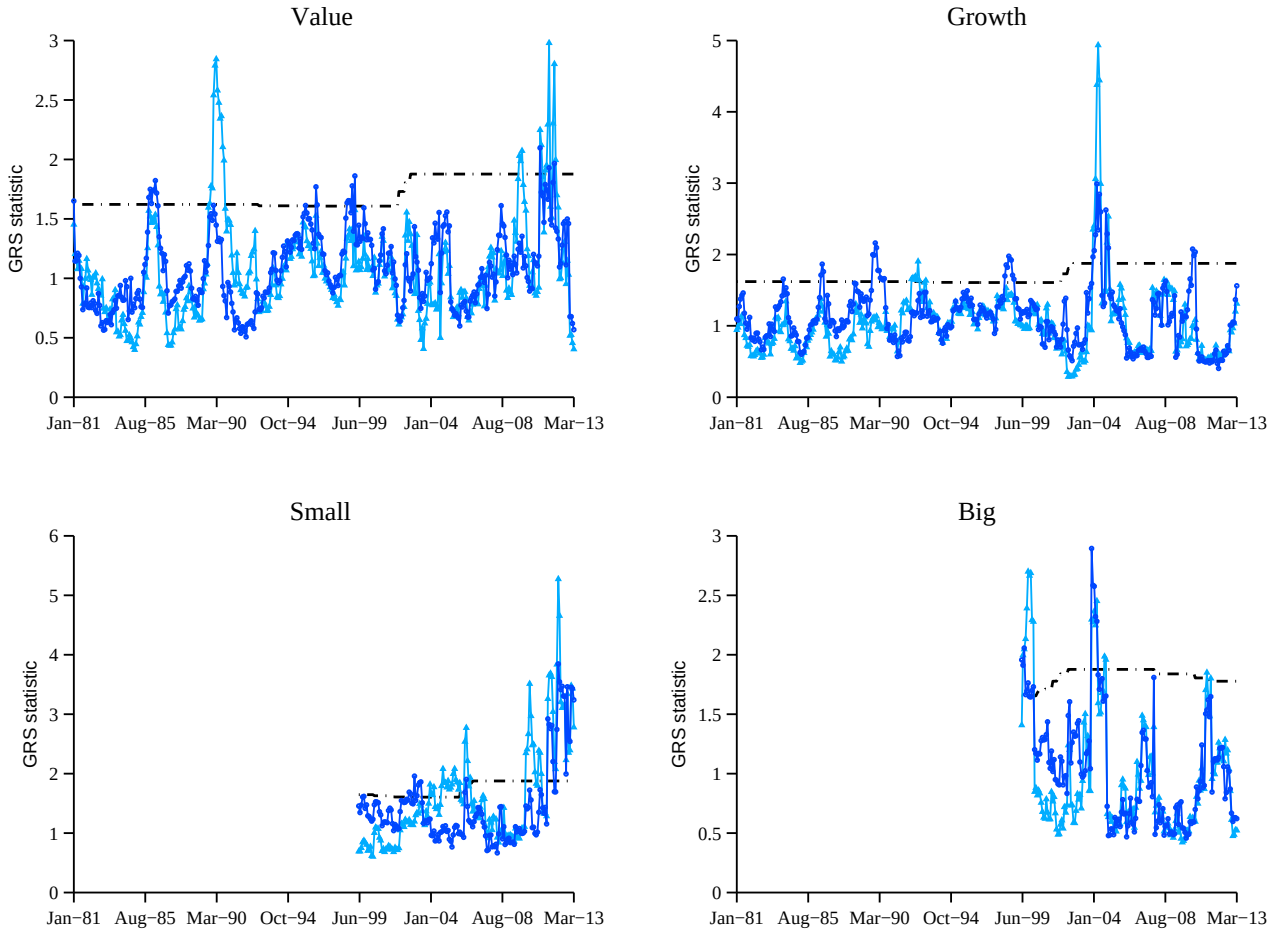
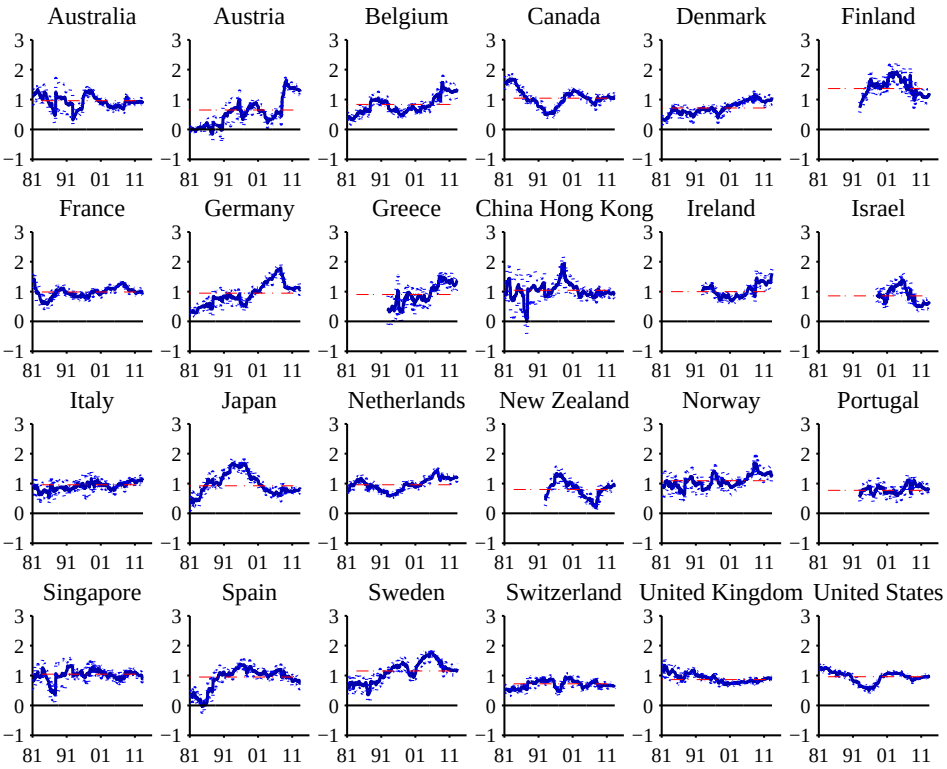


Figure B.3
Time-varying factor betas for aggregate market excess returns

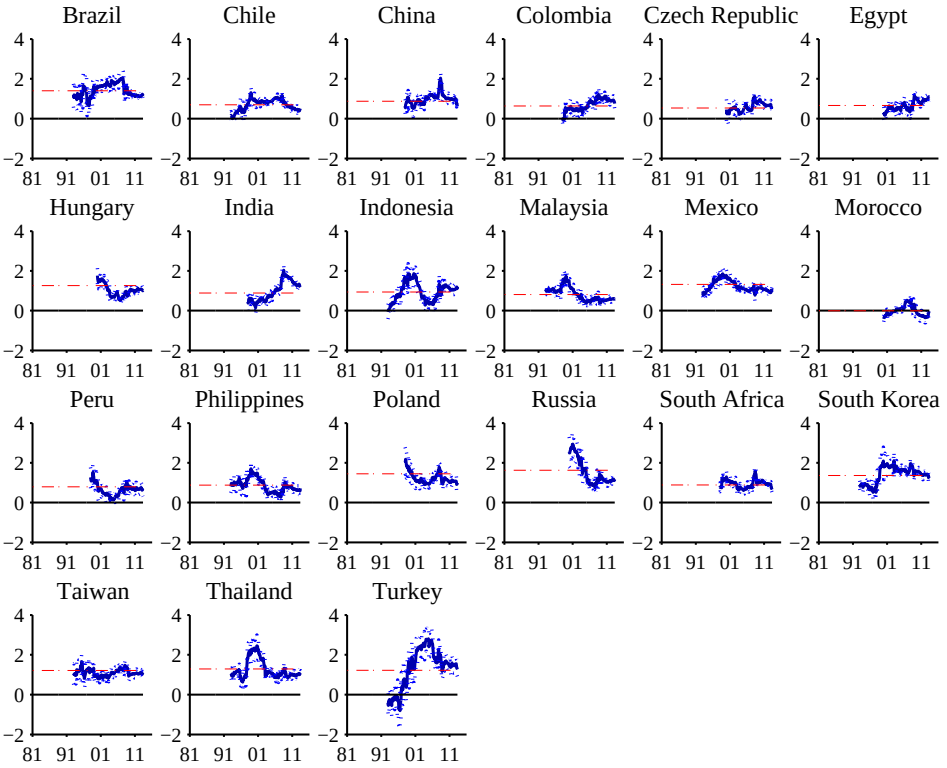
This figure shows the time-series of 60-month rolling factor betas from regressing country aggregate market excess returns (in U.S. dollars) on a world market equity factor denominated in local currencies (LWMKT), the dollar factor and the carry factor. Standard errors (in blue dotted line) are Newey-West (1987) and computed with the optimal number of lags according to Andrews (1991). The unconditional estimates of the factor betas are in red dash-dot line. The sample is February 1976 to April 2013.

β_t^{LWMKT}

Developed Markets

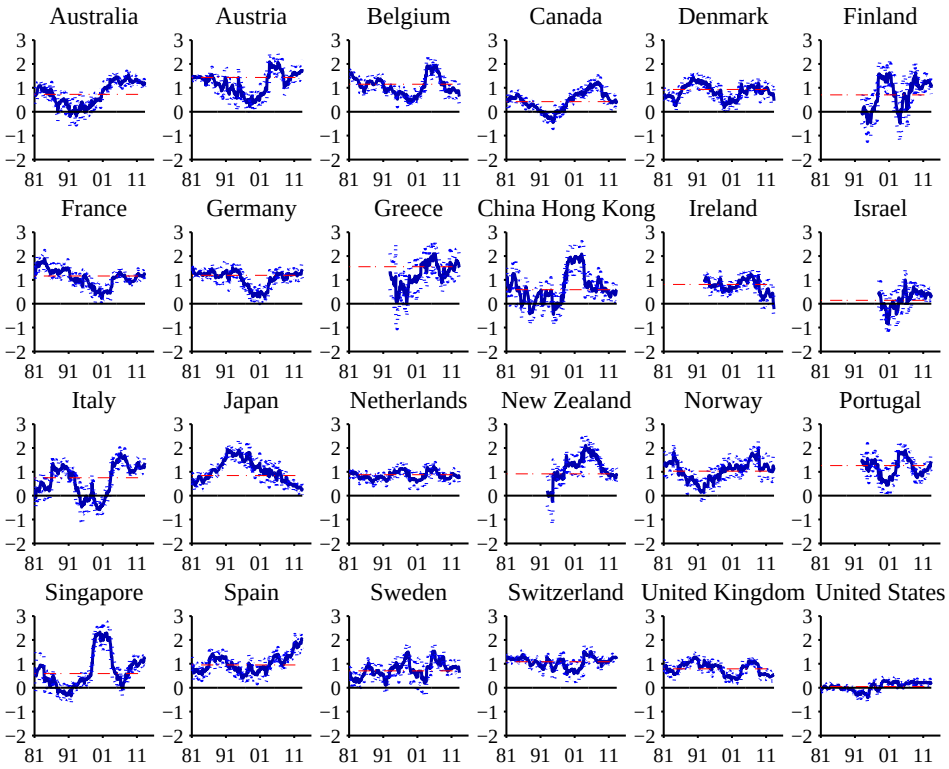


Emerging Markets

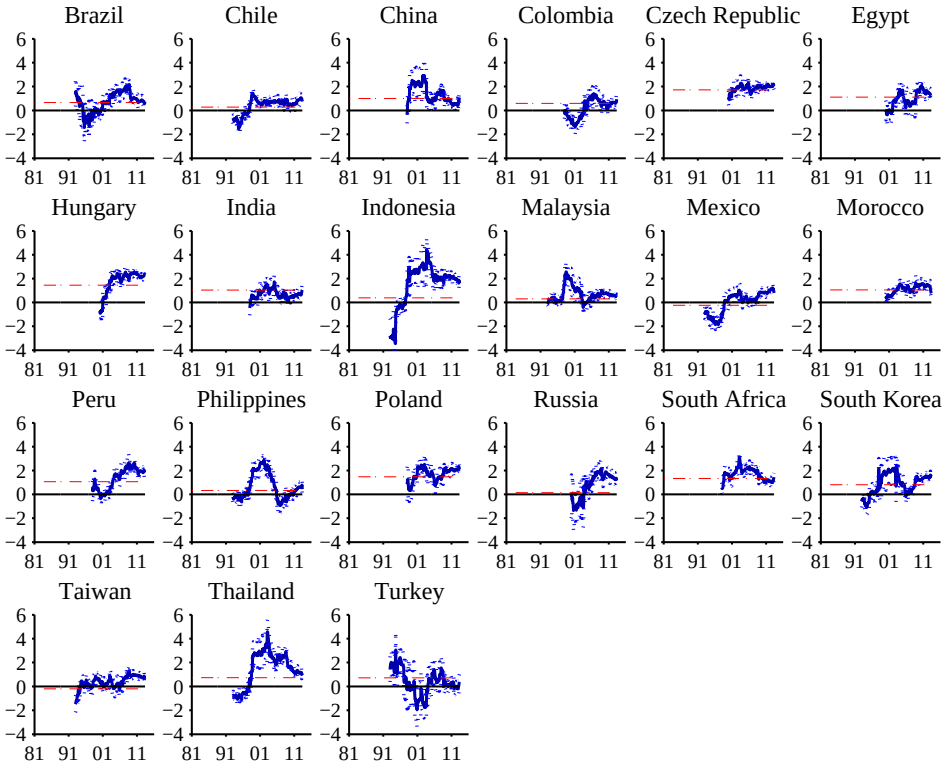


β_t^{Dollar}

Developed Markets

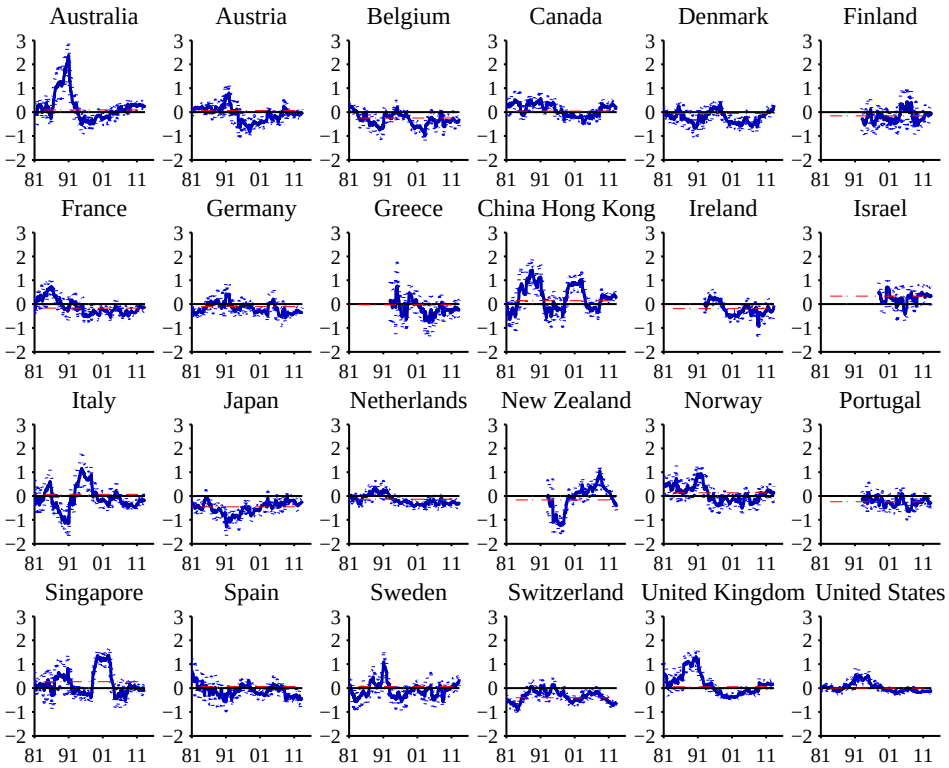


Emerging Markets



β_t^{Carry}

Developed Markets



Emerging Markets

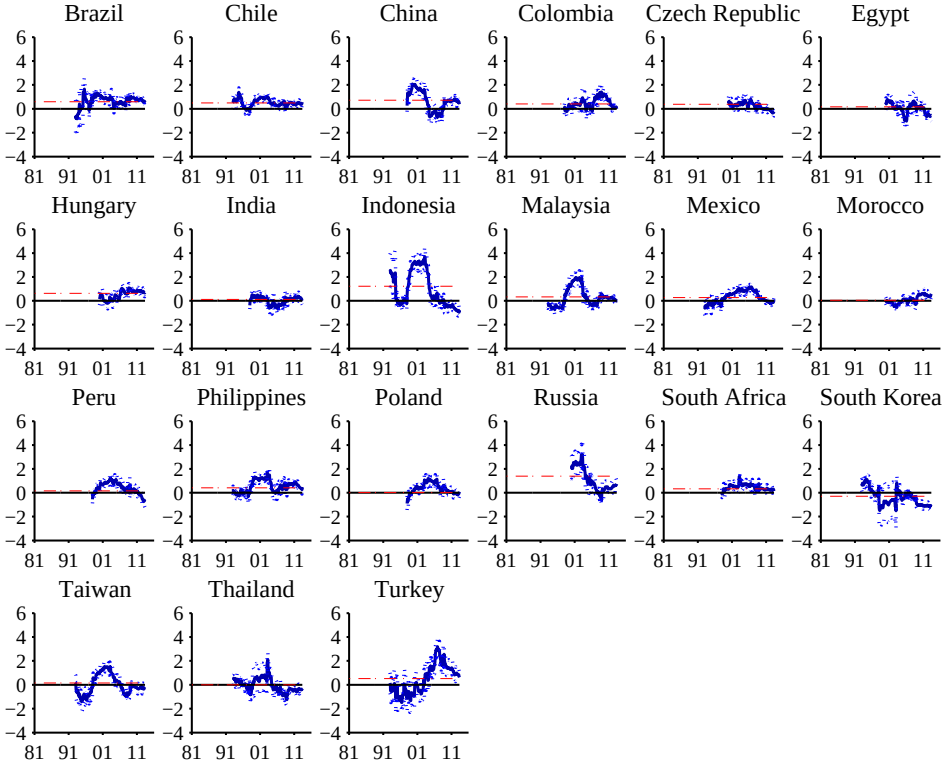
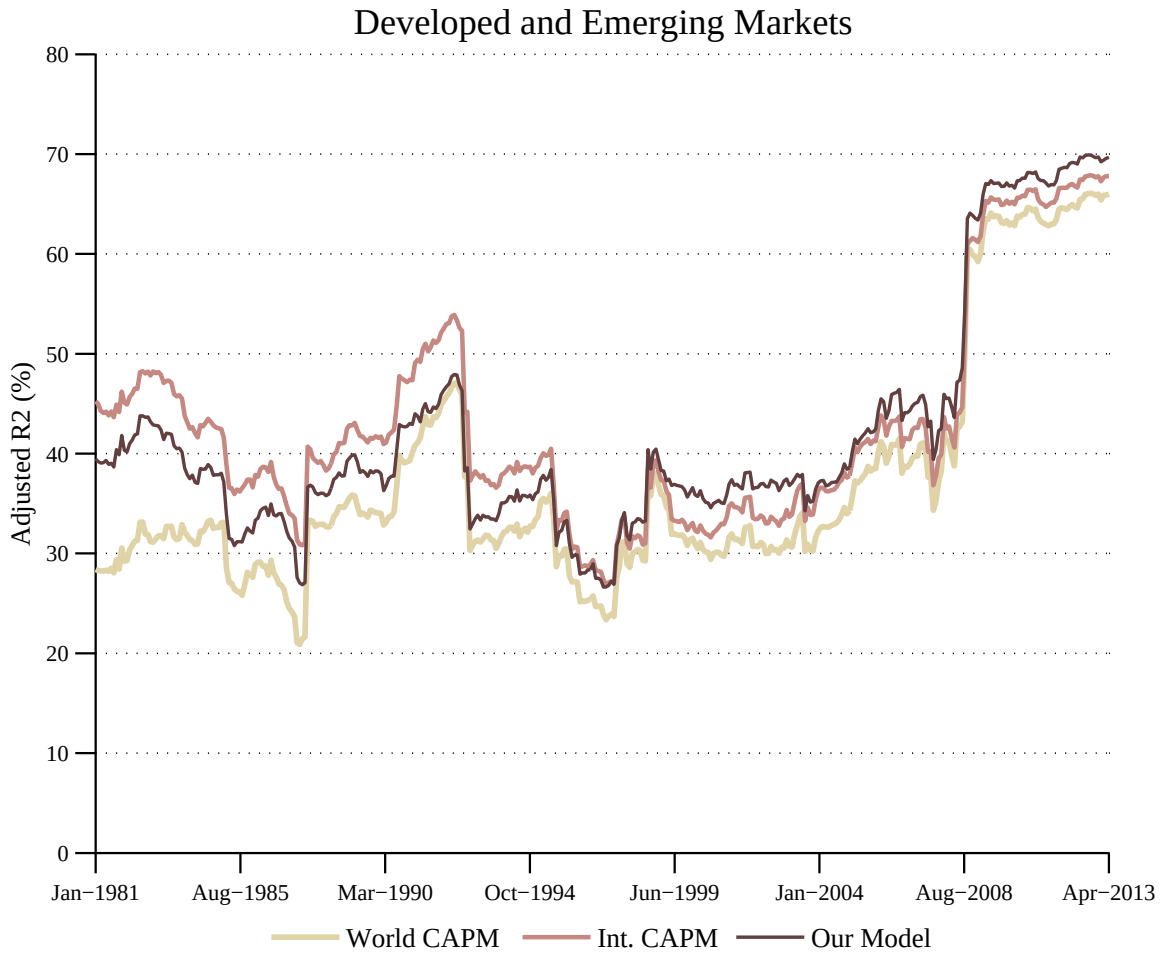
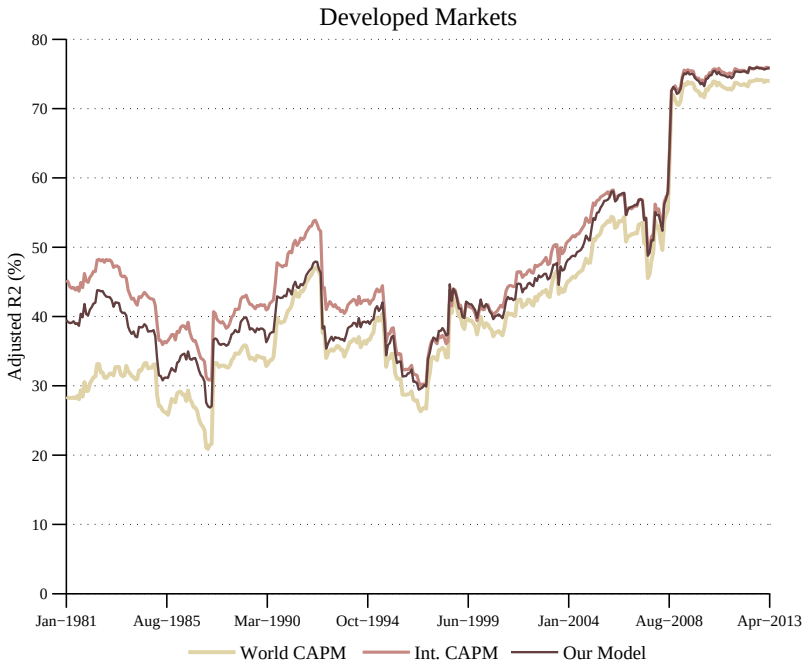


Figure B.4
Average cross-sectional adjusted R2

This figure shows, for each 60-month rolling window, the average cross-sectional adjusted R-squared (in percentage) for the widest cross-section of country equity excess returns (below) and for developed and emerging markets, separately (next page). Values are from the World CAPM, the International CAPM and our empirical specification. Countries enter the sample according to data coverage. Dates reported on the x-axis refer to the end date of each rolling window. The full estimation sample is February 1976 to April 2013.




Developed Markets
Adjusted R2 (%)
0
10
20
30
40
50
60
70
80
Jan−1981
Aug−1985
Mar−1990
Oct−1994
Jun−1999
Jan−2004
Aug−2008
Apr−2013
World CAPM
Int. CAPM
Our Model

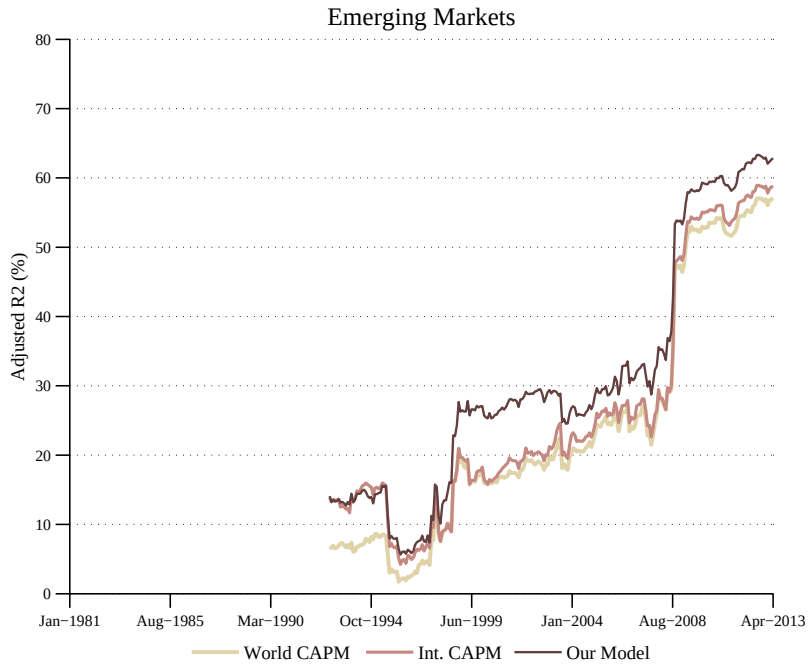
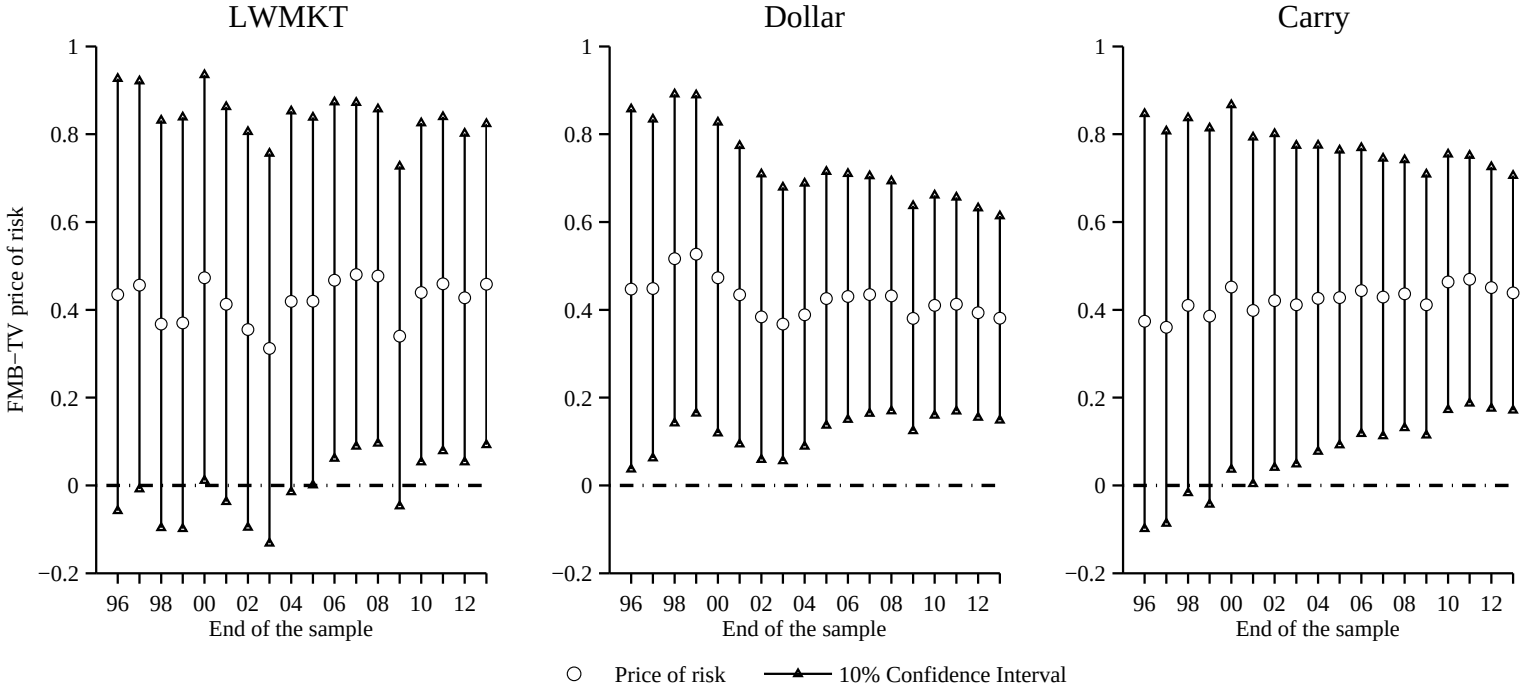

Emerging Markets
Adjusted R2 (%)
0
10
20
30
40
50
60
70
80
Jan−1981
Aug−1985
Mar−1990
Oct−1994
Jun−1999
Jan−2004
Aug−2008
Apr−2013
World CAPM
Int. CAPM
Our Model

Figure B.5
Robustness checks for FMB^{TV} asset pricing tests on our model

This figure shows average prices of risk (in white dot) for the pure equity factor, the dollar factor and the carry factor estimated over different samples via the FMB^{TV} procedure. Each estimate is reported along with its 10% confidence interval (in black solid-arrow line) based on Shanken (1992)-corrected standard errors. Test assets are equity excess returns for all countries and all asset types. In the first step of the procedure time-varying (TV) betas are estimated over 60-month rolling windows ending at time t. In the second-step, the market prices of risk are estimated at each time $t+1$ via a cross-sectional regression of country-level excess returns on these first-step conditional betas. Average market prices of risk are obtained taking the average of these second-stage estimates. In Panel I, the estimation sample starts in February 1976 and ends 20 (i.e., February 1996), 21, 22, ..., 37 years later. In Panel II, the estimation sample ends in April 2013 and starts approximately 20 (i.e., February 1993), 21, 22, ... , 37 years earlier.

Panel I: Sample starts in February 1976



Panel II: Sample ends in April 2013

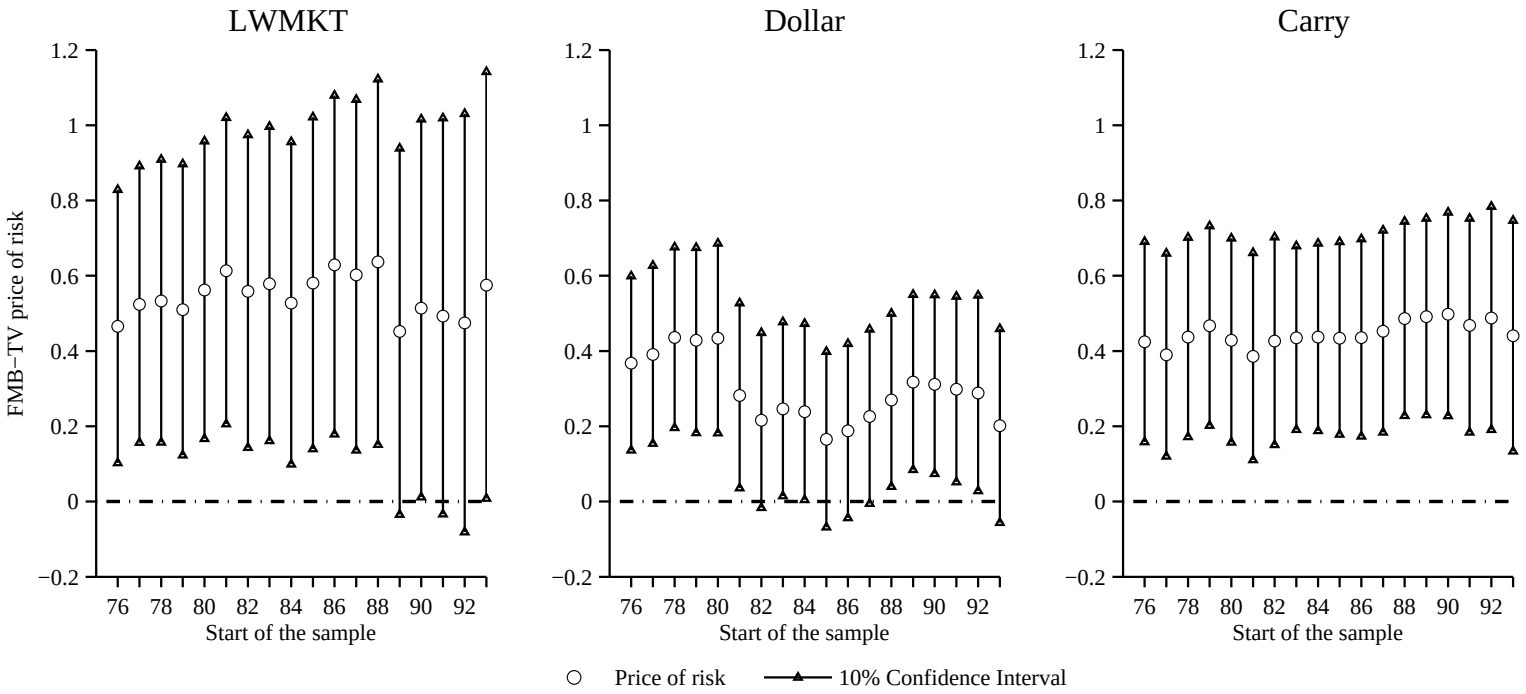


Figure B.6
Realized versus predicted average excess returns post-1990

This figure plots realized average excess returns against those predicted by the three global factor model (3GFM), the four global factor model (4GFM) and our empirical specification. All models are estimated conditionally. For each country the predicted average excess returns are computed as follows: a) Time-varying factor betas are estimated using 60-month rolling windows; b) At each time t estimated conditional betas are multiplied by the corresponding factor means computed over the same time-window (from time *t-59* to time *t*); c) Predicted values are averaged. The straight line is the 45-degree line through the origin. Average returns are in percentage points. Test assets are all asset types for both developed and emerging markets. The sample period is November 1990 to April 2013.