Supplementary material

Table S1A. Preliminary tests on market returns for selected developed and emerging markets.

	Developed Markets							Emerging Markets				
Panel 1: Descriptive Statistics (Monthly frequency)												
	Canada	France	Germany	Italy	Japan	UK	US	Brazil	China	India	Israel	Malaysia
Mean	0.125	0.042	0.624	0.658	0.070	0.358	0.567	0.809	-0.209	0.539	0.616	0.339
Skewness	-0.471	-0.291	-1.391	-1.109	-0.051	-0.674	-0.859	-0.764	-0.003	-0.219	-0.896	-0.214
Kurtosis	3.851	5.763	7.327	7.100	3.378	4.989	4.651	5.482	4.474	3.585	5.404	7.598
CV	24.132	57.068	14.158	9.083	79.508	12.985	7.716	13.890	-48.109	16.435	12.981	24.930
J-B *prob.*	0.000	0.000	0.000	0.000	0.446	0.000	0.000	0.000	0.000	0.060	0.000	0.000
obs.	253	253	253	253	253	253	253	253	253	253	253	253
Q(1)	0.011	0.000	0.012	0.007	0.453	0.000	0.000	0.022	0.000	0.079	0.001	0.040
Q(12)	0.014	0.000	0.000	0.001	0.018	0.000	0.000	0.049	0.000	0.001	0.000	0.000
Q(24)	0.309	0.000	0.007	0.001	0.264	0.000	0.000	0.200	0.000	0.007	0.000	0.000
ARCH (12 lags)`	1.593	1.038	1.171	0.736	1.760	2.653	1.437	1.522	2.940	2.183	2.575	8.819
Prob`	0.095	0.415	0.306	0.715	(0.056)	0.003	0.151	0.118	(0.001)	(0.014)	0.003	(0.000)
ADF test Statistic`	-14.765	-12.414	-14.495	- 13.891	- 13.523	- 13.834	-14.368	-14.746	-14.409	-14.329	- 15.858	-7.940
Prob`	0.0000	0.0000	0.0000	0.0000	(0.000)	0.0000	0.0000	0.0000	(0.000)	(0.000)	0.0000	(0.000)
Panel 2: Descriptive Statistics (Daily frequency)												
Mean	0.0003	0.0002	0.0002	0.0001	0.0000	0.0002	0.0003	0.0003	-	0.0003	0.0001	0.0001
Skewness	-0.80	-0.04	-0.10	-0.05	0.05	-0.14	-0.27	-0.23	-	-0.15	-0.34	-1.11
Kurtosis	13.65	9.21	7.87	7.83	7.42	12.36	12.09	9.21	-	10.24	7.61	76.94
CV	44.40	80.52	65.62	165.11	514.57	83.89	42.03	69.83	-	63.87	104.81	124.26
J-B *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
obs.	5738	5738	5738	5738	5738	5738	5738	5738	-	5738	5738	5738
Unconditional	0.67	0.49	0.51	0.42	0.03	0.48	1.00	0.48	-	0.17	0.30	0.04
t-stat	69.21	42.37	44.83	35.14	2.63	40.88	-----	41.50	-	12.86	23.94	3.20
Q(1) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
Q(12) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
Q(36) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
Arch (8 lags) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
ADF test *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00

Notes: The Q-statistics are derived for squared returns. The *p values* are provided for the Q-statistics.

Table S1B. Preliminary analysis on some emerging and frontier market returns

	Emerging markets							Frontier markets					
Panel 1: Descriptive Statistics (Monthly frequency)													
	Korea	**Singapore**	**Taiwan**	**Argentina**	**Indonesia**	**Jordan**	**Mexico**	**Pakistan**	**Philippines**	Sri Lanka	South Africa	Turkey	Thailand
Mean	0.506	0.375	0.248	0.186	0.306	0.445	0.558	0.099	0.176	0.349	0.274	0.657	0.032
Skewness	0.169	-0.620	0.366	-0.755	-0.616	-0.696	-0.925	-1.232	-0.097	0.578	-0.312	-0.312	-0.441
Kurtosis	6.152	5.797	4.594	5.605	6.081	4.308	5.247	10.349	5.276	6.207	3.435	4.314	5.295
CV	21.246	20.154	34.784	62.395	42.274	13.585	12.183	112.190	50.840	28.382	26.693	23.239	353.424
J-B *prob.*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.000	0.000
obs.	253	253	253	253	253	253	253	253	253	253	253	253	253
Q(1)	0.000	0.011	0.629	0.035	0.000	0.000	0.004	0.381	0.516	0.465	0.121	0.421	0.032
Q(12)	0.000	0.000	0.011	0.167	0.000	0.002	0.049	0.706	0.000	0.473	0.003	0.477	0.000
Q(24)	0.000	0.000	0.237	0.301	0.000	0.091	0.642	0.993	0.000	0.645	0.027	0.008	0.000
ARCH (12)`	4.126	1.646	1.182	0.958	3.219	2.738	2.100	0.435	3.160	1.023	1.842	0.798	5.280
Prob`	(0.000)	(0.081)	(0.298)	0.490	(0.000)	0.002	0.018	(0.948)	(0.000)	(0.429)	0.043	0.652	(0.000)
ADF test Statistic`	-14.643	-14.707	-14.711	-14.108	-12.961	-14.636	-14.963	-15.490	-13.766	-14.549	-15.616	-15.087	-15.762
Prob`	(0.000)	(0.000)	(0.000)	0.0000	(0.000)	0.0000	0.0000	(0.000)	(0.000)	(0.000)	0.0000	0.0000	(0.000)
Panel 2: Descriptive Statistics (Daily frequency)													
Mean	0.0002	0.0002	0.0001	0.0000	0.0002	0.0000	0.0003	0.0001	-	0.0002	0.0002	0.0003	-
Skewness	0.13	-0.02	-0.03	-0.91	-1.07	-0.20	-0.40	-0.49	-	1.27	-0.39	-0.22	-
Kurtosis	16.41	9.89	5.94	17.33	33.09	13.17	13.80	9.94	-	39.09	8.79	9.38	-
CV	109.45	78.87	129.96	1500.13	158.71	1217.91	68.99	328.78	-	85.23	78.17	87.82	-
J-B *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	-
obs.	5738	5738	5738	5738	5738	5738	5738	5738	-	5738	5738	5738	-
Unconditional cor	0.13	0.22	0.09	0.41	0.06	-0.01	0.55	0.00	-	0.01	0.30	0.18	-
t-stat	9.99	16.72	6.54	33.56	4.55	-0.59	50.53	0.36	-	0.91	23.52	14.13	-
Q(1) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	-

Q(12) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	-
Q(36) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	-
Arch (8 lags) *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	-
ADF test *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	-

Notes: `The Q-statistics are derived for squared returns. Here for brevity, we present p values for the Q-statistics only. Daily data for Philippines and Thailand are not covered.

Table S2A. Descriptive statistics and other preliminary tests on the Filtered Probabilities of a bear market: Developed and Emerging markets

	Developed market							**Emerging market**					
Panel 1: Des. Stat	**Canada**	**France**	**Germany**	**Italy**	**Japan**	**UK**	**US**	**Brazil**	**China**	**India**	**Israel**	**Malaysia**	**Singapore**
Mean	0.485	0.475	0.021	0.214	0.609	0.438	0.508	0.152	0.437	0.011	0.066	0.2	0.345
Skewness	0.606	-0.179	6.794	1.631	-0.416	0.368	-0.043	2.595	0.254	11.075	4.166	1.618	0.844
Kurtosis	1.905	1.496	47.515	4.367	1.565	1.518	1.172	9.121	1.343	138.07	21.268	3.99	2.15
CV	0.605	0.673	6.604	1.297	0.556	0.808	0.825	1.452	0.88	6.526	2.378	1.625	0.988
J-B *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
obs.	253	253	253	253	253	253	253	253	253	253	253	253	253
Panel 2: ARCH (12)													
Statistic `	0.915	0.545	1.139	2.883	0.164	0.602	0.666	4.205	0.196	16.799	8.182	0.709	1.678
Prob`	0.532	0.884	0.33	0.001	-0.999	0.839	0.783	0	-0.999	0	0	-0.742	-0.073
Panel 3: ADF test													
Statistic`	-8.680	-5.568	-10.590	-4.957	-2.000	-3.631	-2.126	-6.851	-2.806	-5.701	-4.579	-3.235	-5.203
Prob`	0.000	0.000	0.000	0.000	-0.287	0.006	0.235	0.000	-0.059	0.000	0.000	-0.019	0.000

Notes: The *p values* are provided for the Q-statistics.

Table S2B. Descriptive statistics and other preliminary tests on the Filtered Probabilities of a bear market: Emerging and Frontier bear markets

	Emerging market		Frontier market									
	Korea	**Taiwan**	**Argentina**	**Indonesia**	**Jordan**	**Mexico**	**Sri Lanka**	**S. Africa**	**Pakistan**	**Philippines**	**Thailand**	**Turkey**
Mean	0.263	0.618	0.173	0.269	0.376	0.426	0.672	0.056	0.132	0.866	0.303	0.449
Skewness	1.103	-0.511	2.268	1.042	0.625	0.294	-1.23	4.047	2.472	-3.672	0.91	0.233
Kurtosis	2.366	1.611	7.038	2.273	1.741	1.355	3.295	19.901	8.206	17.079	2.16	1.549
CV	1.456	0.591	1.445	1.372	0.955	0.904	0.412	2.683	1.771	0.196	1.199	0.731
J-B *prob.*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
obs.	253	253	253	253	253	253	253	253	253	253	253	253
Panel 3: ARCH (12)												
Statistic `	0.228	0.606	5.894	0.077	0.821	0.521	2.258	1.297	4.146	2.249	0.769	0.149
Prob`	-0.997	-0.836	0.000	-1.000	0.629	0.900	-0.010	0.222	0.000	-0.025	-0.683	1.000
Panel 4: ADF test												
Statistic`	-2.282	-1.985	-6.582	-2.491	-3.392	-3.374	-8.332	-11.48	-5.926	-9.947	-3.254	-3.412
Prob`	-0.179	-0.294	0.00	-0.12	0.01	0.01	0.00	0.00	0.00	0.00	-0.02	0.01