Black Swans in Emerging Markets

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Many investors think that their long-term returns are earned smoothly and steadily over time, that their capital compounds slowly but safely. This view has been both suggested and encouraged by many academics who, based on the hypothesis of normally-distributed returns, think of outliers (very large positive or negative returns) as extremely unlikely events, as anomalies that might as well be ignored. Reality, however, tells a different story.

Estrada [2008] quantifies the impact of outliers (black swans) on the long-term performance of developed equity markets; this article complements that inquiry by quantifying the impact of outliers on the long-term performance of emerging equity markets. Are investors likely to successfully and consistently predict the best days to be in and out of these markets? Should investors attempt to time these markets? Those are the ultimate issues addressed here.

The evidence, based on more than 110,000 daily returns from 16 emerging equity markets, is unequivocal: Outliers have a massive impact on long-term performance. On average across all 16 markets, missing the best 10 days resulted in portfolios 69.3% less valuable than a passive investment; and avoiding the worst 10 days resulted in portfolios 337.1% more valuable than a passive investment. Given that 10 days represent 0.15% of the days considered in the average market, the odds against consistently successful market timing are staggering. Hence, as concluded by Estrada ([2008] and [2009]), of the countless strategies that academics and practitioners have devised to generate alpha, market timing is one very unlikely to succeed.

The rest of the article is organized as follows. The next section introduces the issue at stake and discusses the concept of black swans and the assumption of normality. The section after that discusses the evidence from a sample of 16 emerging equity markets. The last section concludes with an assessment and some final thoughts.

THE ISSUE

Taleb [2007] defines a black swan as an event with three attributes: 1) It is an outlier, lying outside the realm of regular expectations because nothing in the past can convincingly point to its occurrence; 2) it carries an extreme impact; and 3) despite being an outlier, plausible explanations for its occurrence can be found after the fact, thus giving it the appearance that it can be explainable and predictable. In short, then, a black swan has three characteristics: Rarity, extreme impact, and retrospective predictability.

As an example from financial markets, consider Black Monday. Between inception on May 26, 1896 and October 16, 1987, the Dow had only twice in its history fallen by more than 10% in one day. This happened on back-to-back days in the midst of the crash of 1929; on

October 28 and October 29, 1929 the Dow fell 12.8% and 11.7%. But nothing in the 90-plus years of history of the Dow pointed out to the possibility of a 22.6% fall like that observed on October 19, 1987. And yet, the unexpected and inconceivable did happen. Black Monday was an extremely rare event; it did have a very significant impact on investors' portfolios; and, as discussed by Haugen [1999] and others, many and varied stories were advanced to explain it ex-post. In short, Black Monday was a black swan.

As discussed below, daily swings in the markets do not have to be so dramatic to have a substantial impact on long-term performance. For this reason, the focus of this article is on "large" daily swings, as informally defined below. Although some attention is paid to daily returns more than three standard deviations away from the mean, as well as to the best and worst 10, 20, and 100 daily returns, no attempt is made here to formally define a black swan.

Importantly, these large daily swings on which this article focuses have a negligible probability of occurring under the assumption of normality. This assumption, often used and abused in finance, can be seriously questioned both theoretically (Peters [1991]) and empirically (Mandelbrot [1963], Fama [1965], and Aparicio and Estrada [2001]), and the evidence discussed below points strongly against it. Mandelbrot and Hudson [2005] propose to simply replace the hypothesis of normally distributed returns with a fractal view of risk, ruin, and reward.

As for the impact of outliers on investors' long-term performance, Mauboussin [2006] argues that over the January 3, 1978 to October 31, 2005 period, the S&P 500 delivered a mean annual return of 9.6%; excluding the best 50 days (out of over 7,000) lowers the mean return to 2.2%, and excluding the worst 50 days increases the mean return to 18.4%.[1] More recently, Estrada [2008] finds that across 15 developed markets, missing the best 10 days (less than 0.1% of the days considered in the average market) resulted in portfolios 50.8% less valuable than a passive investment, and avoiding the worst 10 days resulted in portfolios 150.4% more valuable than a passive investment. This evidence strongly suggests that the odds against successful market timing are in fact staggering.

THE EVIDENCE

Exhibit 1 shows the 16 emerging markets in the sample, the index representing each market, the number

EXHIBIT 1
Data

This exhibit describes the data, including the markets in the sample; the index representing each market; the numbers of years and days in the sample of each market; and the first day in each market (Start). P10, P20, and P100 are the proportions that 10, 20, and 100 days represent relative to the total number of days in the sample of each market. All indices are in local currency and account for capital gains but not for dividends. All data through December 31, 2007.

Market	Index	Years	Days	P10	P20	P100	Start
Argentina	Buenos Aires SE General	31	7,697	0.13%	0.26%	1.30%	12/30/1976
Brazil	Bovespa	36	9,090	0.11%	0.22%	1.10%	12/31/1971
Chile	Santiago SE General	33	8,229	0.12%	0.24%	1.22%	01/02/1975
India	Bombay SE Sensitive	28	6,224	0.16%	0.32%	1.61%	12/22/1979
Indonesia	Jakarta SE Composite	24	5,886	0.17%	0.34%	1.70%	12/30/1983
Israel	Tel Aviv SE Mishtamin-100	20	4,868	0.21%	0.41%	2.05%	12/31/1987
Korea	Kospi	46	13,009	0.08%	0.15%	0.77%	01/04/1962
Malaysia	KLSE Composite	28	6,930	0.14%	0.29%	1.44%	12/31/1979
Mexico	IPC	23	5,750	0.17%	0.35%	1.74%	12/31/1984
Peru	Lima SE General	26	6,464	0.15%	0.31%	1.55%	12/31/1981
Philippines	Manila SE Composite	22	5,446	0.18%	0.37%	1.84%	12/31/1985
South Africa	FTSE/JSE All-Share	21	5,319	0.19%	0.38%	1.88%	12/30/1986
Sri Lanka	Colombo SE All-Share	23	5,605	0.18%	0.36%	1.78%	12/31/1984
Taiwan	Taiwan SE Cap-Weighted	41	11,523	0.09%	0.17%	0.87%	01/05/1967
Thailand	Thailand SET General	32	7,956	0.13%	0.25%	1.26%	12/31/1975
Turkey	Istanbul SE IMKB-100	20	4,983	0.20%	0.40%	2.01%	12/31/1987
Average		**28**	**7,186**	**0.15%**	**0.30%**	**1.51%**	

of years and trading days in each market, and the date when the sample for each market begins (ending, in all cases, at the end of 2007).[2] The exhibit also shows the proportion that 10, 20, and 100 days are relative to the period considered for each market. All indices are in local currency and account for capital gains but not for dividends.

As the exhibit shows, the market with the smallest sample is Israel (4,868 trading days in 20 years) and the one with the largest sample is Korea (13,009 trading days in 46 years), with an average of 7,186 days (28 years) across all 16 markets. The full sample consists of 16 markets, 454 years, and 114,979 trading days.

Exhibit 2 shows summary statistics for the distributions of daily returns of all 16 markets in the sample; these include the minimum and maximum return, arithmetic and geometric mean return, standard deviation, and measures of skewness and kurtosis. Note that all markets have very large daily swings. The highest of the maximum daily returns is in Korea (51.24%) with an average of 24.50% across markets; the lowest of the minimum daily returns is also in Korea (–51.16%) with an average of –20.27% across markets. All markets but one (Mexico) have a significant degree of skewness, and all of them have a significant degree of kurtosis.[3] The departures from normality are thus clear in all 16 markets.

Exhibit 3 shows the number of outliers, defined as those daily returns more than three standard deviations away from the mean. To illustrate the interpretation of the figures in this exhibit, consider Argentina. The lower end of the interval three standard deviations around the mean is –8.76%; and although 10 returns lower than this magnitude were expected, 29 such returns were observed. The upper end of the same interval is 9.45%; and although 10 returns higher than this magnitude were expected, 80 are observed. That yields a total of 109 observed outliers, over five times as many as the 21 expected.[4]

As the exhibit shows, not just in Argentina but in all 16 markets the number of outliers observed was far larger than the number of those expected. Across all markets, an average of 111 outliers were observed, over five times as many as the 19 expected. In all 16 markets, then, assuming normally distributed returns would have led investors to substantially underestimate risk.

Panel A of Exhibit 4 shows, for each market, the mean daily return over the whole sample period as well as the mean return of the best and worst 10, 20, and

EXHIBIT 2
Summary Statistics

This exhibit shows, for the indexes and sample periods in Exhibit 1, summary statistics for the series of daily returns, including minimum (Min) and maximum (Max) return; arithmetic (AM) and geometric (GM) mean return; standard deviation (SD); coefficients of skewness (Skw) and kurtosis (Krt); and coefficients of standardized skewness (SSkw) and standardized kurtosis (SKrt).

Market	Min	Max	AM	GM	SD	Skw	Krt	SSkw	SKrt
Argentina	–43.96%	45.41%	0.35%	0.30%	3.03%	1.4	23.2	51.8	416.0
Brazil	–46.03%	36.06%	0.38%	0.34%	2.83%	0.5	17.4	17.8	338.8
Chile	–11.58%	15.79%	0.14%	0.13%	1.12%	1.6	23.3	59.5	430.8
India	–12.76%	13.14%	0.10%	0.08%	1.69%	0.1	5.1	4.1	82.0
Indonesia	–20.17%	49.65%	0.07%	0.06%	1.69%	5.5	153.2	172.8	2399.6
Israel	–10.64%	10.91%	0.09%	0.07%	1.52%	–0.2	4.1	–5.4	57.9
Korea	–51.16%	51.24%	0.07%	0.05%	1.97%	0.0	115.4	–1.7	2687.9
Malaysia	–21.46%	23.14%	0.04%	0.03%	1.49%	0.5	34.7	15.4	590.3
Mexico	–18.32%	26.60%	0.17%	0.15%	1.88%	0.0	18.0	0.3	278.4
Peru	–9.32%	17.85%	0.36%	0.34%	1.79%	1.3	8.0	42.7	130.8
Philippines	–13.19%	17.56%	0.08%	0.06%	1.75%	0.7	11.3	21.0	170.6
South Africa	–11.86%	7.54%	0.06%	0.05%	1.15%	–0.9	10.1	–27.7	149.9
Sri Lanka	–12.98%	20.07%	0.06%	0.06%	1.14%	1.5	39.8	45.4	608.9
Taiwan	–7.88%	9.38%	0.05%	0.04%	1.53%	–0.1	2.9	–3.7	63.1
Thailand	–14.84%	12.02%	0.04%	0.03%	1.47%	0.2	9.0	8.5	163.8
Turkey	–18.11%	35.60%	0.22%	0.18%	2.96%	0.4	7.3	12.8	105.1
Average	**–20.27%**	**24.50%**	**0.14%**	**0.12%**	**1.81%**	**0.8**	**30.2**	**25.9**	**542.1**

EXHIBIT 3

Outliers—Expected and Observed

This exhibit shows, for the indexes and sample periods in Exhibit 1, the expected (Exp) and observed (Obs) number of daily returns three standard deviations (SD) below and above the arithmetic mean return (AM); the ratio between the number of these observed and expected returns; and the total number of expected (TE) and observed (TO) returns more than three SDs away from the mean. "Exp" figures are rounded to the nearest integer.

	Lower Tail				Upper Tail						
Market	AM – 3 · SD	Exp	Obs	Ratio	AM + 3 · SD	Exp	Obs	Ratio	TE	TO	Ratio
Argentina	–8.76%	10	29	2.8	9.45%	10	80	7.7	21	109	5.2
Brazil	–8.09%	12	44	3.6	8.86%	12	77	6.3	25	121	4.9
Chile	–3.22%	11	48	4.3	3.50%	11	98	8.8	22	146	6.6
India	–4.99%	8	40	4.8	5.18%	8	46	5.5	17	86	5.1
Indonesia	–4.99%	8	31	3.9	5.14%	8	50	6.3	16	81	5.1
Israel	–4.47%	7	30	4.6	4.64%	7	31	4.7	13	61	4.6
Korea	–5.83%	18	99	5.6	5.97%	18	106	6.0	35	205	5.8
Malaysia	–4.43%	9	54	5.8	4.51%	9	46	4.9	19	100	5.3
Mexico	–5.48%	8	41	5.3	5.82%	8	38	4.9	16	79	5.1
Peru	–5.00%	9	28	3.2	5.71%	9	107	12.3	17	135	7.7
Philippines	–5.18%	7	40	5.4	5.34%	7	44	6.0	15	84	5.7
South Africa	–3.39%	7	50	7.0	3.51%	7	26	3.6	14	76	5.3
Sri Lanka	–3.36%	8	44	5.8	3.49%	8	46	6.1	15	90	5.9
Taiwan	–4.54%	16	105	6.8	4.64%	16	84	5.4	31	189	6.1
Thailand	–4.38%	11	62	5.8	4.46%	11	81	7.5	21	143	6.7
Turkey	–8.65%	7	33	4.9	9.10%	7	38	5.6	13	71	5.3
Average	**–5.30%**	**10**	**49**	**5.0**	**5.58%**	**10**	**62**	**6.4**	**19**	**111**	**5.7**

100 days. Note that, on average across all 16 markets, the mean return of the best 10 (100) days was over 100 (almost 50) times larger than the sample-wide mean return. In absolute value, and again across all 16 markets, the mean return of the worst 10 (100) days was over 80 (40) times larger than the sample-wide mean return. Panel B, in turn, shows the number of standard deviations away from the sample-wide mean for these best and worst mean returns. For perspective, note that under the assumption of normality, 99.73% of the observations should be contained in the interval three standard deviations around the mean return.

Finally, consider Exhibit 5, which displays the most interesting figures for investors. Panel A shows the terminal wealth resulting from passively investing one unit of local currency between the beginning and the end of each market's sample period. It also shows the terminal wealth resulting from not being invested during each market's best and worst 10, 20, and 100 days. Some markets were subject to high inflation during the period considered, which is reflected in very large terminal values in nominal (and local currency) terms.

Panel B shows the impact on terminal wealth of not being invested during the best and worst 10, 20, and 100 days in each market. On average across all 16 markets, missing the best 10, 20, and 100 days resulted in a reduction in terminal wealth, relative to a passive investment, of 69.3%, 84.8%, and 99.4%. Avoiding the worst 10, 20, and 100 days, in turn, resulted in an increase in terminal wealth of 337.1%, 1,060.0%, and 381,672.6%, again relative to a passive investment. Obviously, a very small number of days has a massive impact on the long-term performance of emerging equity markets.

Finally, Panel C shows, for all markets, the mean annual compound returns of a passive investment, as well as those resulting from not being invested during the best and worst 10, 20, and 100 days. Note that, on average across all 16 markets, missing the best 10 days (0.15% of the days considered in the average market) resulted in a decrease of almost 7 percentage points in mean annual compound returns from 41.7% to 34.8%. Avoiding the worst 10 days, in turn, resulted in an increase of almost 7 percentage points in mean annual compound returns from 41.7% to 48.4%. Furthermore, missing the best 100 days (1.51% of the days considered in the average market) resulted in a decrease of almost 32 percentage points in mean annual compound returns, from 41.7% to just 9.8%;

EXHIBIT 4

Outliers—Averages and Likelihoods

Panel A of this exhibit shows, for the indexes and sample periods in Exhibit 1, the arithmetic mean return for the whole sample (All); the mean return of the best 10, 20, and 100 days (B10, B20, and B100); and the mean return of the worst 10, 20, and 100 days (W10, W20, and W100). Panel B shows the number of standard deviations away from the arithmetic mean return for these last six magnitudes.

Market	All	B10	B20	B100	W10	W20	W100
Panel A: Averages							
Argentina	0.35%	27.95%	23.30%	13.75%	–16.75%	–13.52%	–8.67%
Brazil	0.38%	23.60%	18.49%	11.46%	–16.38%	–13.19%	–8.80%
Chile	0.14%	11.36%	9.05%	5.35%	–7.23%	–6.17%	–3.75%
India	0.10%	10.15%	8.80%	5.74%	–8.98%	–7.86%	–5.32%
Indonesia	0.07%	19.61%	14.24%	6.77%	–11.34%	–9.34%	–5.30%
Israel	0.09%	7.51%	6.71%	4.37%	–8.11%	–6.95%	–4.48%
Korea	0.07%	25.84%	20.06%	10.11%	–24.12%	–18.01%	–9.50%
Malaysia	0.04%	14.00%	10.59%	5.54%	–12.72%	–9.95%	–5.50%
Mexico	0.17%	13.25%	10.50%	6.31%	–14.38%	–11.35%	–6.16%
Peru	0.36%	12.01%	10.62%	7.90%	–7.98%	–7.11%	–4.72%
Philippines	0.08%	13.25%	10.59%	6.19%	–9.66%	–8.35%	–5.43%
South Africa	0.06%	5.67%	5.04%	3.31%	–8.55%	–7.03%	–3.99%
Sri Lanka	0.06%	10.39%	8.17%	4.36%	–8.26%	–6.72%	–3.83%
Taiwan	0.05%	7.02%	6.80%	5.46%	–6.82%	–6.66%	–5.64%
Thailand	0.04%	10.22%	9.20%	5.94%	–9.05%	–8.08%	–5.40%
Turkey	0.22%	16.96%	13.97%	9.47%	–13.97%	–12.10%	–8.41%
Average	**0.14%**	**14.30%**	**11.63%**	**7.00%**	**–11.52%**	**–9.52%**	**–5.93%**
Panel B: Likelihoods							
Argentina		9.1	7.6	4.4	5.6	4.6	3.0
Brazil		8.2	6.4	3.9	5.9	4.8	3.2
Chile		10.0	7.9	4.7	6.6	5.6	3.5
India		5.9	5.1	3.3	5.4	4.7	3.2
Indonesia		11.6	8.4	4.0	6.8	5.6	3.2
Israel		4.9	4.4	2.8	5.4	4.6	3.0
Korea		13.1	10.2	5.1	12.3	9.2	4.9
Malaysia		9.4	7.1	3.7	8.6	6.7	3.7
Mexico		6.9	5.5	3.3	7.7	6.1	3.4
Peru		6.5	5.7	4.2	4.7	4.2	2.8
Philippines		7.5	6.0	3.5	5.6	4.8	3.1
South Africa		4.9	4.3	2.8	7.5	6.2	3.5
Sri Lanka		9.0	7.1	3.8	7.3	5.9	3.4
Taiwan		4.6	4.4	3.5	4.5	4.4	3.7
Thailand		6.9	6.2	4.0	6.2	5.5	3.7
Turkey		5.7	4.6	3.1	4.8	4.2	2.9
Average		**7.8**	**6.3**	**3.8**	**6.5**	**5.4**	**3.4**

and avoiding the worst 100 days resulted in an increase of over 37 percentage points in mean annual compound returns from 41.7% to 79.1%.

As these figures show, in all cases a very small number of days accounts for the bulk of returns delivered by emerging equity markets. Investors in these markets do not obtain their long-term returns smoothly and steadily over time but largely as a result of booms and busts. A negligible proportion of days determines a massive creation or destruction of wealth. Being invested on the good days and not invested on the

EXHIBIT 5
Terminal Values

Panel A of this exhibit shows, for the indexes and sample periods in Exhibit 1, the terminal value of one unit of local currency (TV1) invested on the date indicated in the "Start" column in Exhibit 1 and held passively through December 31, 2007, not including dividends; such terminal value without being invested during the best 10, 20, and 100 days (–B10, –B20, and –B100); and such terminal value without being invested during the worst 10, 20, and 100 days (–W10, –W20, and –W100). Panel B shows the percent changes of these last six terminal values with respect to TV1. Panel C shows the mean annual compound return in all the scenarios considered. The "*m*" and "*b*" after some numbers denote millions and billions.

Market	TV1	–Best10	–Best20	–Best100	–Worst10	–Worst20	–Worst100
Panel A: Terminal Values							
Argentina	10.6*b*	915.8*m*	165.7*m*	30,646	71.6*b*	212.2*b*	104,340.7*b*
Brazil	32,839.9*b*	3,994.7*b*	1,138.3*b*	691.6*m*	215,512.2*b*	618,813.1*b*	376,653,683.9*b*
Chile	61,201	20,920	10,902	340	129,934	219,495	2.8*m*
India	171	65	32	1	439	882	41,021
Indonesia	32	6	2	0	108	231	7,679
Israel	38	18	10	1	88	160	3,734
Korea	629	65	17	0	11,670	41,417	19.1*m*
Malaysia	7	2	1	0	28	58	2,110
Mexico	7,314	2,128	1,008	17	34,695	82,847	4.5*m*
Peru	3.3*b*	1.1*b*	439.7*m*	1.7*m*	7.6*b*	14.4*b*	420.3*b*
Philippines	28	8	4	0	76	159	7,500
South Africa	16	9	6	1	39	69	961
Sri Lanka	25	10	5	0	60	103	1,282
Taiwan	92	47	25	0	186	365	30,614
Thailand	10	4	2	0	26	55	2,678
Turkey	8,252	1,750	617	1	37,313	109,682	55.9*m*
Panel B: Variation in Terminal Values							
Argentina		–91.4%	–98.4%	–100.0%	574.9%	1900.3%	983653.5%
Brazil		–87.8%	–96.5%	–100.0%	556.3%	1784.3%	1146839.4%
Chile		–65.8%	–82.2%	–99.4%	112.3%	258.6%	4519.6%
India		–61.9%	–81.4%	–99.6%	156.7%	416.3%	23913.8%
Indonesia		–82.7%	–92.6%	–99.8%	235.6%	618.9%	23843.9%
Israel		–51.5%	–72.7%	–98.6%	133.4%	323.2%	9786.5%
Korea		–89.7%	–97.3%	–100.0%	1754.7%	6482.2%	3035588.7%
Malaysia		–72.8%	–86.4%	–99.5%	292.9%	728.7%	29913.7%
Mexico		–70.9%	–86.2%	–99.8%	374.4%	1032.7%	61324.3%
Peru		–67.7%	–86.7%	–99.9%	129.8%	337.6%	12651.3%
Philippines		–71.1%	–86.5%	–99.7%	176.7%	474.5%	27068.6%
South Africa		–42.4%	–62.6%	–96.1%	145.0%	331.6%	5890.3%
Sri Lanka		–62.5%	–79.0%	–98.5%	137.5%	304.5%	4943.7%
Taiwan		–49.2%	–73.2%	–99.5%	102.7%	296.6%	33183.5%
Thailand		–62.2%	–82.8%	–99.7%	158.7%	441.1%	26141.7%
Turkey		–78.8%	–92.5%	–100.0%	352.2%	1229.1%	677499.3%
Average		**–69.3%**	**–84.8%**	**–99.4%**	**337.1%**	**1060.0%**	**381672.6%**
Panel C: Mean Annual Compound Returns							
Argentina	110.6%	94.6%	84.1%	39.5%	124.0%	131.9%	183.3%
Brazil	137.4%	123.9%	116.2%	76.0%	150.1%	157.6%	207.8%
Chile	39.7%	35.2%	32.5%	19.3%	42.9%	45.2%	56.9%
India	20.2%	16.1%	13.1%	–1.5%	24.3%	27.4%	46.1%
Indonesia	15.5%	7.4%	3.7%	–11.6%	21.5%	25.4%	45.2%
Israel	19.9%	15.7%	12.4%	3.2%	25.1%	28.9%	50.9%
Korea	15.0%	9.5%	6.4%	–6.4%	22.6%	26.0%	44.0%
Malaysia	7.2%	2.3%	–0.2%	–11.4%	12.6%	15.6%	31.4%
Mexico	47.2%	39.5%	35.1%	13.0%	57.5%	63.6%	94.6%
Peru	132.3%	122.4%	115.0%	73.5%	139.9%	145.9%	179.9%
Philippines	16.3%	9.9%	6.2%	–11.4%	21.8%	25.9%	50.0%
South Africa	14.1%	11.2%	8.9%	–2.2%	19.1%	22.4%	38.7%
Sri Lanka	15.1%	10.3%	7.6%	–4.2%	19.5%	22.3%	36.5%
Taiwan	11.7%	9.8%	8.1%	1.9%	13.6%	15.5%	28.7%
Thailand	7.5%	4.3%	1.8%	–10.2%	10.8%	13.4%	28.0%
Turkey	57.0%	45.3%	37.9%	0.1%	69.3%	78.7%	144.0%
Average	**41.7%**	**34.8%**	**30.5%**	**9.8%**	**48.4%**	**52.8%**	**79.1%**

bad days is key to long-term performance. But the odds of successfully and consistently predicting the days to be in and out of the markets are, unfortunately, close to negligible.

AN ASSESSMENT

Large daily swings that have a significant impact on long-term performance, unexpected ex-ante though seemingly predictable ex-post, occur far more often in emerging markets than what the normality assumption would lead investors to believe. Black swans do exist in emerging markets, and their impact on long-term performance is even larger than in developed markets.

The evidence discussed in this article, based on 16 emerging equity markets and over 110,000 daily returns, clearly shows that black swans have a massive impact on long-term performance. On average across all 16 markets, missing the best 10 days (0.15% of the days considered in the average market) resulted in portfolios 69.3% less valuable than a passive investment; and avoiding the worst 10 days resulted in portfolios 337.1% more valuable than a passive investment. These results complement and strengthen those reported by Estrada [2008] for developed markets.

Two recommendations seem to follow from these results, both based on the fact that black swans in emerging markets are largely unpredictable and have a massive impact on long-term performance. First, investors should diversify broadly in order to mitigate exposure to negative black swans while at the same time preserving some exposure to positive black swans. Second, investors should not try to predict the best days to be in and out of emerging markets. Attempting to predict the negligible proportion of days that determines an enormous creation or destruction of wealth is a losing proposition; like playing roulette, it may be exciting and entertaining, but not a good way to generate long-term returns. Black swans render market timing in emerging markets a goose chase.

ENDNOTES

Gabriela Giannattasio provided valuable research assistance. The views expressed below and any errors that may remain are entirely the author's.

[1]None of these figures account for dividends.

[2]Countries with less than 20 years of data were not included in the sample. This rule motivated the exclusion of two BRICs, China and Russia.

[3]Under normality, the coefficients of standardized skewness and kurtosis are asymptotically distributed as $N(0, 6/T)$ and $N(0, 24/T)$, where T is the number of observations in the sample. Hence, values of these coefficients outside the range (−1.96, 1.96) indicate, at the 5% level of significance, significant departures from normality.

[4]The number of returns expected outside the interval considered must be split equally between the upper and the lower tails of the distribution. For clarity, throughout this table all expected and observed figures have been rounded to the nearest integer; for this reason, the sum of the values in the two "Exp" columns may not add up exactly to the values in the "TE" column.

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