

Big Growers Around the World: A Regional Comparison

The Best of the Best, Worldwide

- The world's Big Growers are the 150 large-cap stocks with the very best growth attributes in the developed and emerging worlds. We constructed the list using our growth scoring system that ranks companies based on their top-line growth, ability to fund it and valuations. High multiples are seen as an endorsement that the story has legs.
- U.S. stocks account for about a third of the world's Big Growers, while those in Japan, Pan-Europe and China each make up about 15% of it. Technology stocks comprise about a third of the universe, while health care issues account for a quarter of it. In this research we compare the Big Growers along a variety of metrics we believe in. First, we examine their riskiness based on their arbitrage risk and downside risk, and their exposure to interest rates. Then we compare their cash flow dynamics, capital spending and valuations. With growth the characteristic that unites them we sought to find what separates one from another, looking for those offering the best bang for the buck.

U.S. Big Growers are Less Risky...

- Concerns surrounding a trade war, a monetary policy mistake and regulatory headwinds in the tech sector have come to the fore this year, calling into some question the durability of what heretofore has been a slow-moving cycle. The Big Growers have become more controversial, particularly in emerging Asia where about half of them are now in the highest quintile of arbitrage risk (i.e., a measure of idiosyncratic volatility after accounting for beta). It's a similar story when the assessment is made using downside risk, that measures the volatility of a stock during months when it underperforms the market. Controversy and outsized downside exposure are enemies when expectations are high and stocks vulnerable on those scores have generally lagged their peers. We also looked at the Big Growers' interest rate sensitivity and didn't uncover a clear-cut relationship. Those in Japan, though, appear more sensitive than their peers.

...And Offer Better Cash Flow Dynamics...

- Three-quarters of the Big Growers' free cash flow output is produced by U.S. and Chinese companies, with Facebook, Tencent and Alibaba accounting for about a third of the total. At 16% the free cash flow margins of the U.S. Big Growers are about six percentage points better than those of the Chinese ones. Moreover, the U.S. Big Growers are less capital intensive than their peers, with capital spending consuming only 25% of their gross cash flow, half the draw seen elsewhere. Archetypes of globalization, the U.S. Big Growers are lean, mean, free-cash-flow-producing machines.

...While Priced at Comparable Valuations to their Counterparts

- Despite their superior free cash flow dynamic and lower risk exposure the average U.S. Big Grower isn't priced at an unreasonable premium to its counterparts in the rest of the world, while those based in China are priced at the lowest P/E ratios in this elite group. The anomaly is the Japanese and European issues that're priced to exorbitant multiples vis-à-vis their domestic markets. The little growth available in those regions has been bid up, making the stocks vulnerable to a significant shift in economic fundamentals in either direction.

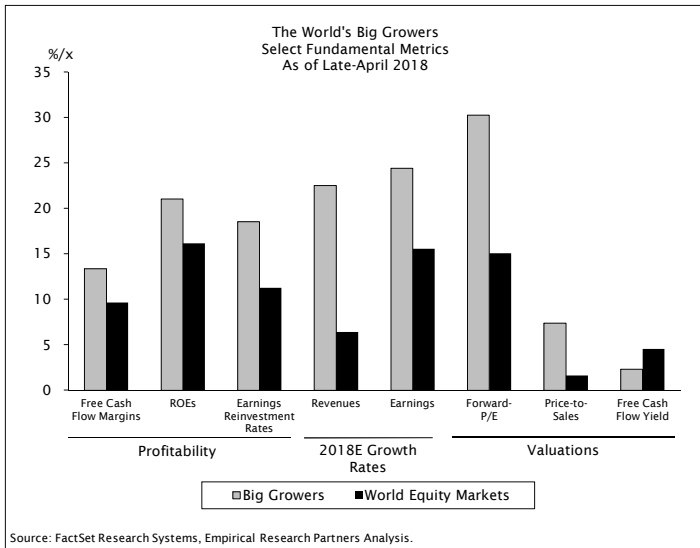
The U.S. Big Growers are First Among Equals

- **Appendix 1** that begins on page 11 lists the 150 world Big Growers sorted by their domicile and attractiveness in our world growth model. The model is a helpful tool in choosing winners among these high flyers, with stocks in the best quintile leading the world equity market by more than +5 percentage points per year since 1995. Today U.S. Big Growers are overrepresented in the best quintile, and we believe they offer the best bang for the buck given their cash flow profile and superior risk attributes. A recession would undermine their heady valuations, but until then we think they can carry the day.

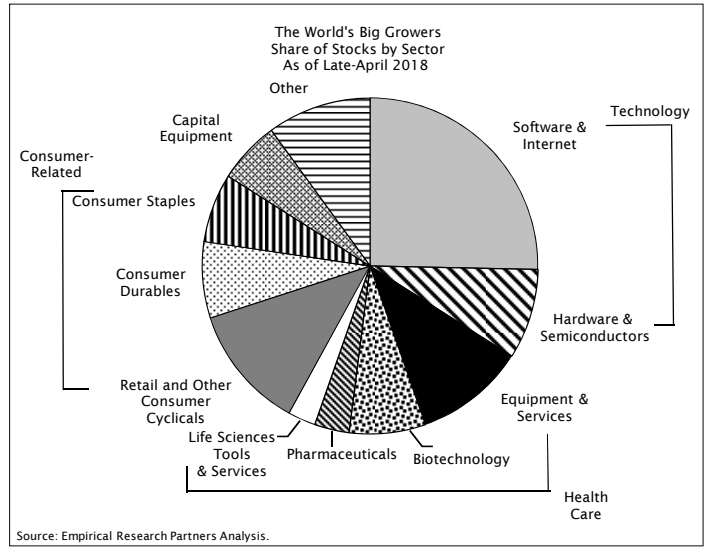
Sungsoo Yang (212) 803-7925 Nicole Price (212) 803-7935 Yi Liu (212) 803-7942 Yu Bai (212) 803-7919 Iwona Scanzillo (212) 803-7915

Conclusions in Brief

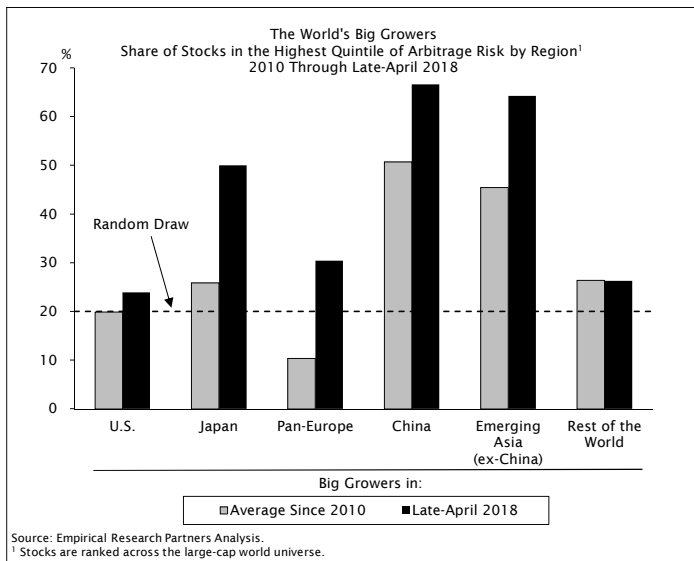
- The world's Big Growers are the 150 large-cap stocks in the developed and emerging world with the best growth profiles...



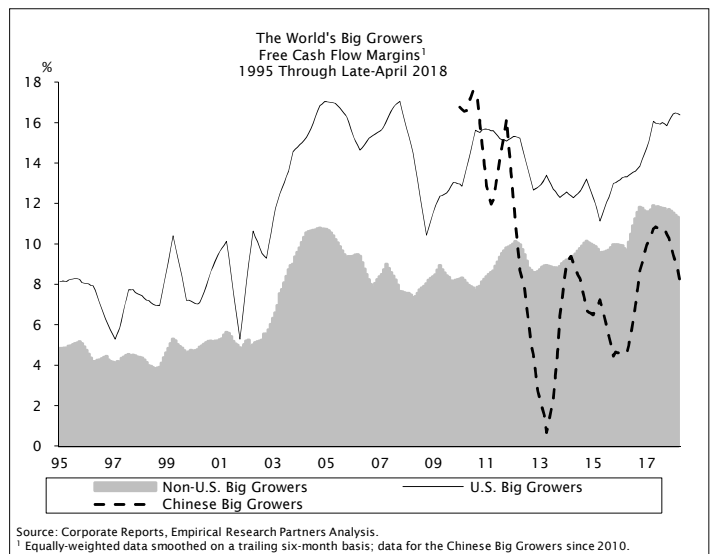
- ...With technology, health care and consumer cyclicals accounting for 3/4 of their numbers...



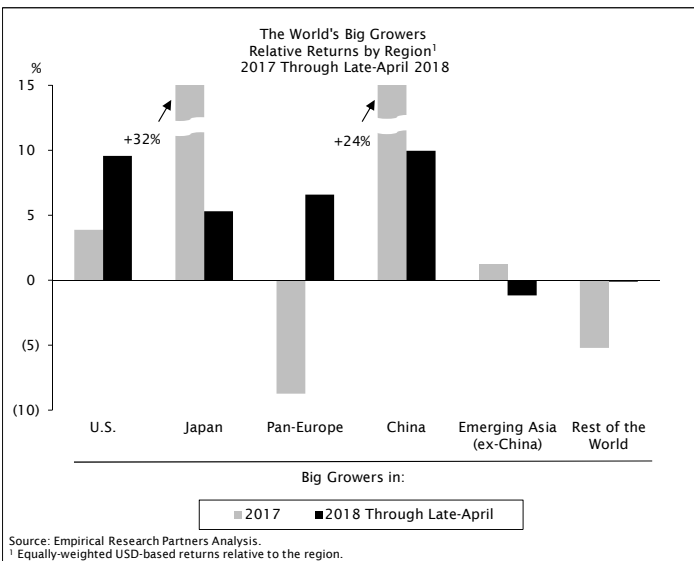
- U.S. Big Growers are less controversial than the rest...



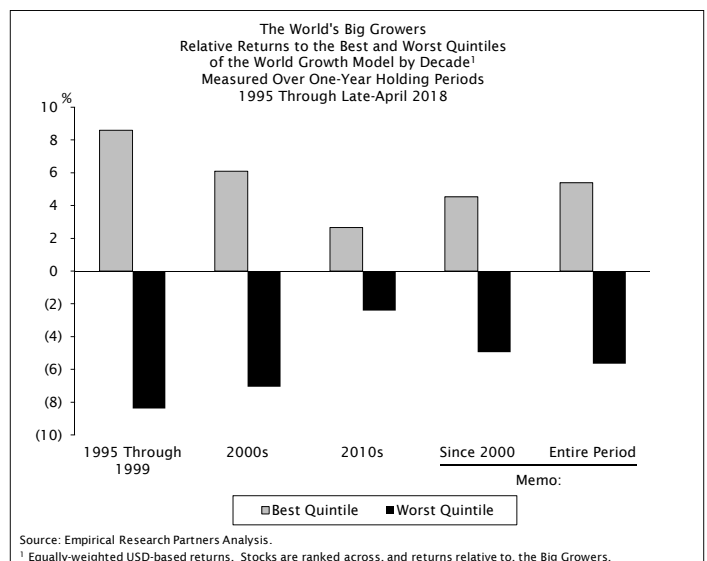
- ...And have a superior cash flow profile:



- Big Growers have done well in the past couple of years...



- ...And we have a framework to judge their attractiveness:



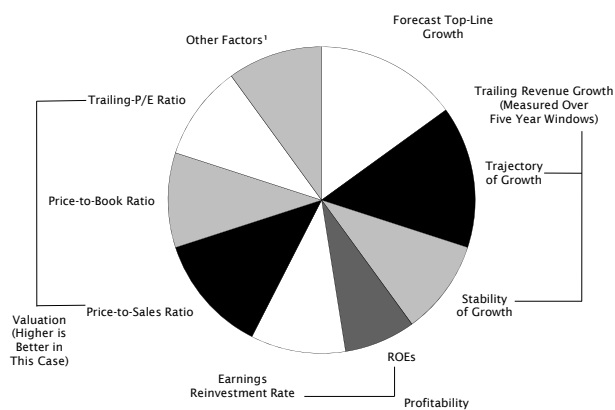
Big Growers Around the World: A Regional Comparison

The Best of the Best, Worldwide

Following on the footsteps of our U.S. Big Growers, the 75 large-cap issues with the best growth credentials in that market, we constructed a World Big Growers universe, that includes both developed (including the U.S.) and emerging market issues. We constructed the universe using our longstanding growth scoring methodology that identifies companies with strong top-line growth that appear profitable enough to fund that growth, where investors have endorsed the stories by bidding up the stocks to relatively-lofty valuations (see Exhibit 1). The world's top 150 issues based on that framework make it onto the list.

Exhibit 2 compares the Big Growers' fundamentals with those of the world equity markets. The Big Growers' superior growth rates and profitability are priced at a substantial premium.

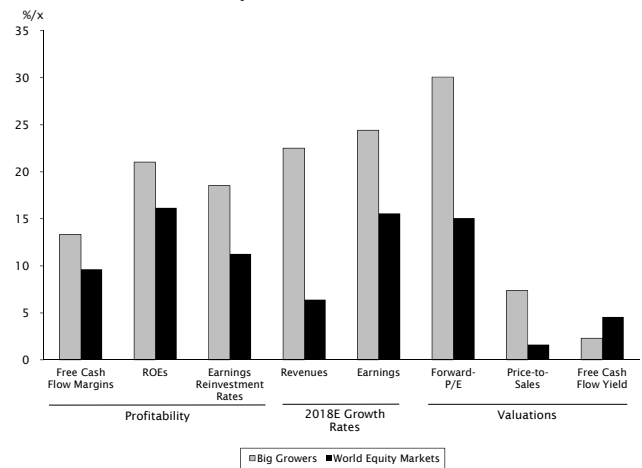
Exhibit 1: The Growth Score Composition of Factors As of Late-April 2018



Source: Empirical Research Partners Analysis.

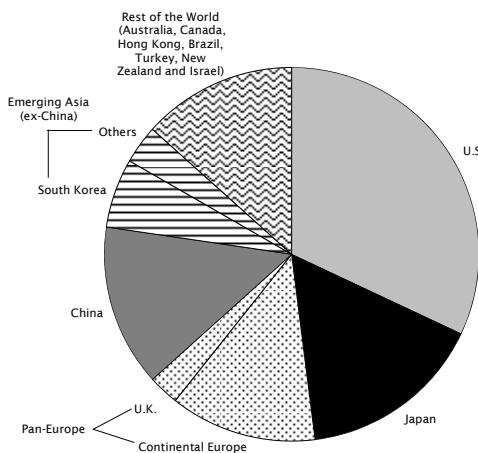
¹ Analyses of balance sheet accruals, earnings revisions and stock price trends.

Exhibit 2: The World's Big Growers Select Fundamental Metrics As of Late-April 2018



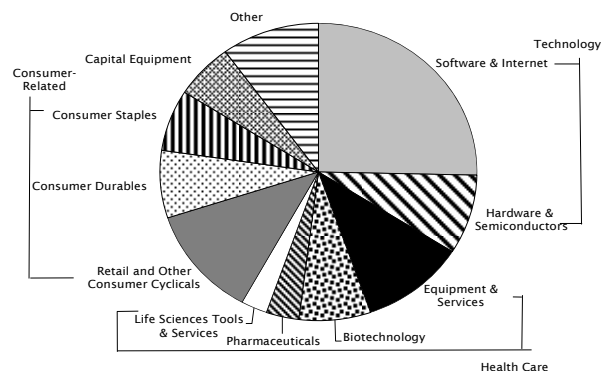
Source: FactSet Research Systems, Empirical Research Partners Analysis.

Exhibit 3: The World's Big Growers Share of Stocks by Region As of Late-April 2018



Source: Empirical Research Partners Analysis.

Exhibit 4: The World's Big Growers Share of Stocks by Sector As of Late-April 2018



Source: Empirical Research Partners Analysis.

U.S. stocks currently source about a third of the Big Growers, while Japanese, Pan-European and Chinese ones account for about 15% each (see Exhibit 3). Technology issues comprise about a third of the constituents, with health care ones representing about a quarter of them (see Exhibit 4). However it's worth pointing out that the makeup of the Big Growers in the U.S. looks somewhat different than that of their peers based elsewhere. For example, while technology and health care stocks comprise nearly ¾ of the Big Growers' numbers in the U.S., those two sectors

make up a smaller share of the Big Growers residing outside of it, accounting for only about half of the constituents (see Exhibits 5 and 6). Rather, we find more consumer cyclicals, staples and capital equipment stocks amongst the non-U.S. Big Growers, with those issues comprising about 40% of their numbers.

In this research we compare the Big Growers across the regions using a variety of metrics. First, we examine their return behavior by assessing their arbitrage risk, downside risk and sensitivity to interest rates to get a sense for the differences in their risk profiles. We then look at their fundamentals, evaluating their free cash flow production, capital spending and valuations. With growth the characteristic that unites them we sought to find what separates one from another, identifying where we get the best bang for the buck.

Exhibit 5: U.S. Big Growers
Share of Stocks by Sector
As of Late-April 2018

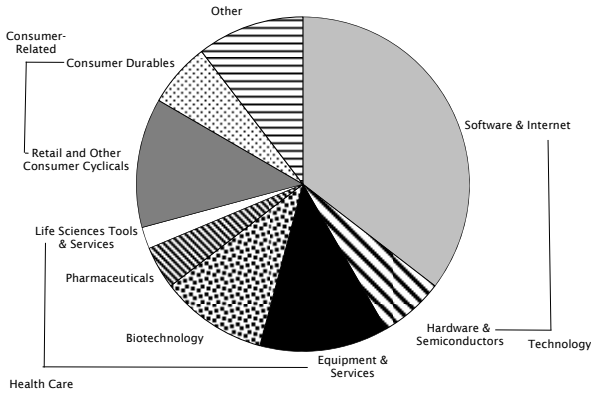
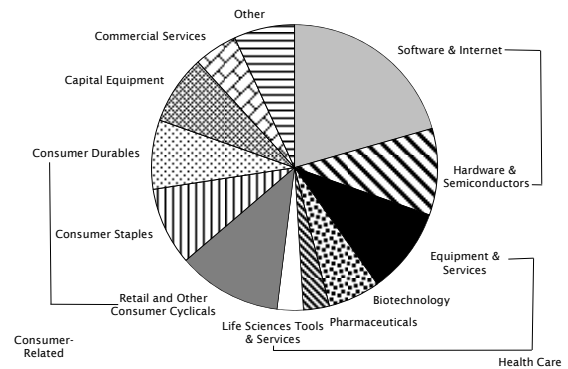


Exhibit 6: Non-U.S. Big Growers
Share of Stocks by Sector
As of Late-April 2018



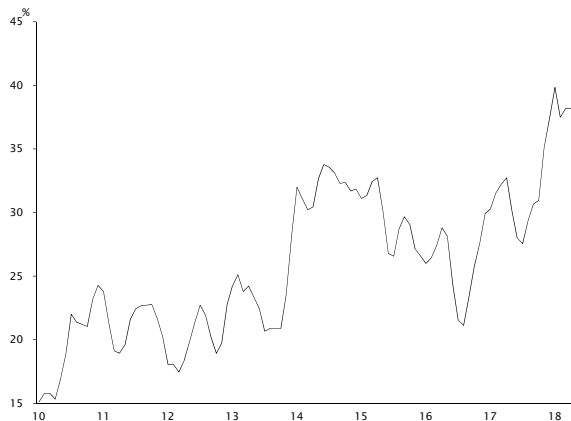
Source: Empirical Research Partners Analysis.

Source: Empirical Research Partners Analysis.

U.S. Big Growers are Less Risky...

So far this year it's been tempestuous sailing for investors, with worries surrounding a possible trade war, a higher probability of monetary policy error, and potential regulatory headwinds facing the technology stocks calling into some question the durability of what has heretofore been a slow-moving cycle. Lately the Big Growers have become more controversial and close to 40% of them are found in the market's highest quintile of arbitrage risk, a key measure of dispute that captures the idiosyncratic volatility of a stock after accounting for its beta (see Exhibit 7). When arbitrage risk runs high that's an indication that a fight has broken out between the bulls and the bears. Today the dispute is centered on Asia's Big Growers, and more than half of them populate the most-controversial quintile (see Exhibit 8). By comparison the U.S. Big Growers don't stand out among the controversial issues.

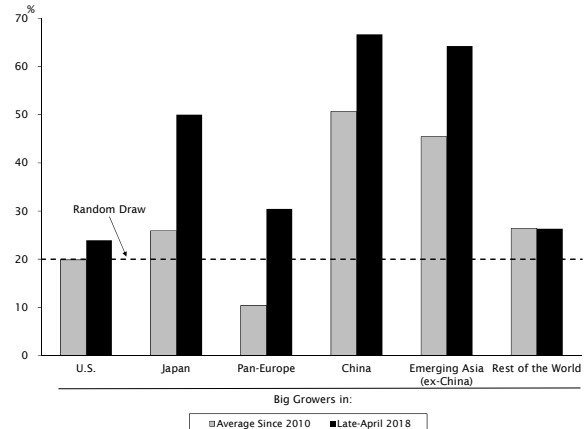
Exhibit 7: The World's Big Growers
Share of Stocks in the Highest Quintile of Arbitrage Risk¹
2010 Through Late-April 2018



Source: Empirical Research Partners Analysis.

¹ Stocks are ranked across the large-cap world universe; data smoothed on a trailing three-month basis.

Exhibit 8: The World's Big Growers
Share of Stocks in the Highest Quintile of Arbitrage Risk by Region¹
2010 Through Late-April 2018

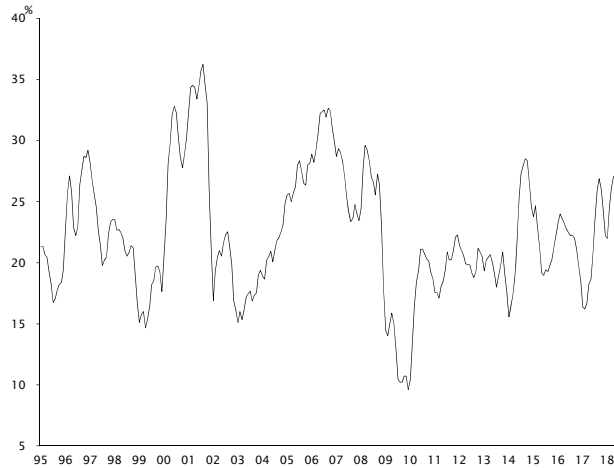


Source: Empirical Research Partners Analysis.

¹ Stocks are ranked across the large-cap world universe.

We also examined the Big Growers' downside risk exposure, that captures the volatility of a stock in months when it underperforms the market. Over a quarter of the Big Growers are drawn from the highest quintile of that metric, not a low number for sure but less than the share witnessed during the New Economy Era (see Exhibit 9). Once again the Asian Big Growers look riskier here too while the exposure is lower among the U.S. ones (see Exhibit 10).

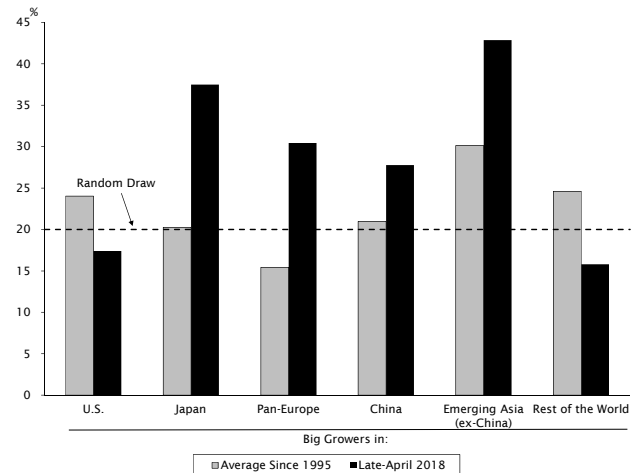
Exhibit 9: The World's Big Growers
Share of Stocks in the Highest Quintile of Downside Risk'
1995 Through Late-April 2018



Source: Empirical Research Partners Analysis.

¹ Stocks are ranked across the large-cap world universe; data smoothed on a trailing three-month basis.

Exhibit 10: The World's Big Growers
Share of Stocks in the Highest Quintile of Downside Risk by Region'
1995 Through Late-April 2018

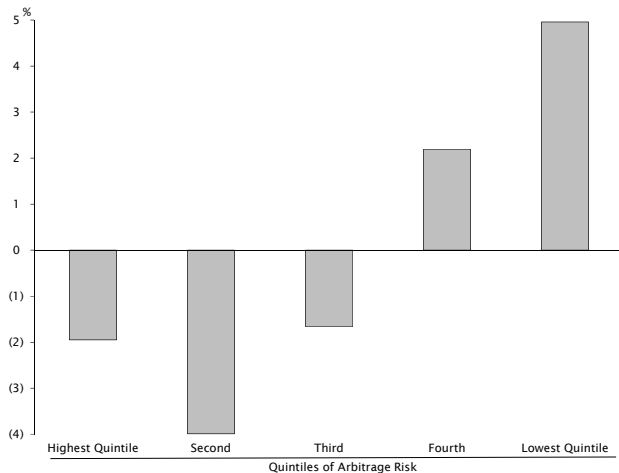


Source: Empirical Research Partners Analysis.

¹ Stocks are ranked across the large-cap universe.

Controversy isn't the friend of growth investors because ultimately they need the next investor to believe the story more than they do, and when a fight breaks out that increases the likelihood that the outcome will favor the bears' case (see Exhibit 11). In fact, Big Growers managing to steer clear of controversy have led their peers by close to +5 percentage points per annum in the post-Crisis years. Outsized downside risk has also been a harbinger of underperformance, and those Big Growers with the highest amounts of it have lagged their peers by (5) percentage points per annum over the last 20 years or so (see Exhibit 12).

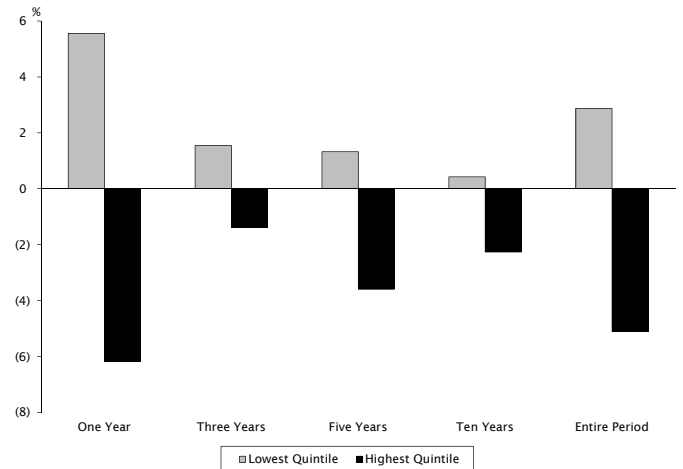
Exhibit 11: The World's Big Growers
Relative Returns by Quintile of Arbitrage Risk'
Monthly Data Compounded to Annual Periods
2010 Through Late-April 2018



Source: Empirical Research Partners Analysis.

¹ Equally-weighted USD-based returns. Stocks are ranked across, and returns relative to, the Big Growers.

Exhibit 12: The World's Big Growers
Relative Returns to the Highest and Lowest Quintiles of Downside Risk'
Monthly Data Compounded to Annual Periods'
1995 Through Late-April 2018



Source: Empirical Research Partners Analysis.

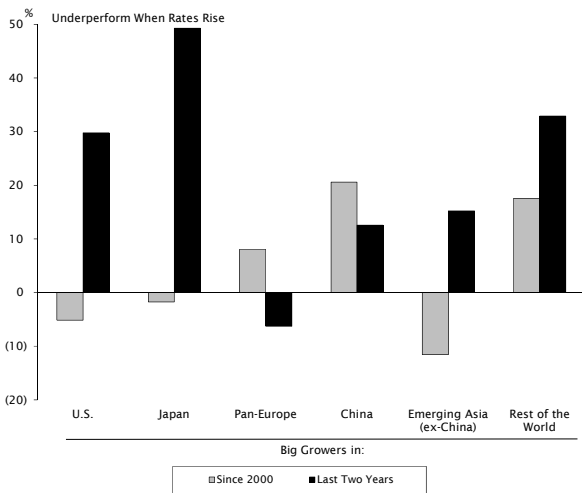
¹ Equally-weighted USD-based returns. Stocks are ranked across, and returns relative to, the Big Growers.

We believe that investors tend to underestimate the destructive consequences of controversy in high-expectation stocks they own. Once the battle lines are drawn they dig their foot in, believing they'll prevail. They systematically misjudge the peril to multiples that fights engender when the bar is set high. We exploit that bias in our failure models.

Clients have asked us whether the Big Growers stand to lose in a world of rising interest rates. To get a sense for the Big Growers' exposure we examined the correlations of their monthly relative returns with the performance of U.S. Ten-Year Treasury Bonds, using that bond as a proxy for the behavior of interest rates worldwide (see Exhibit 13). The grey bars in the exhibit show the correlations since 2000, while the black bars show them over the last two years. Over the longer span the correlations with the performance of the U.S. bond has been within $\pm 20\%$ across the regions, not a big number. That said over the last two years the Japanese Big Growers have been a lot more sensitive to moves in rates than usual, with their correlation reaching $+50\%$. Big Growers in Pan-Europe, China and the rest of emerging Asia haven't been particularly susceptible to moves in interest rates.

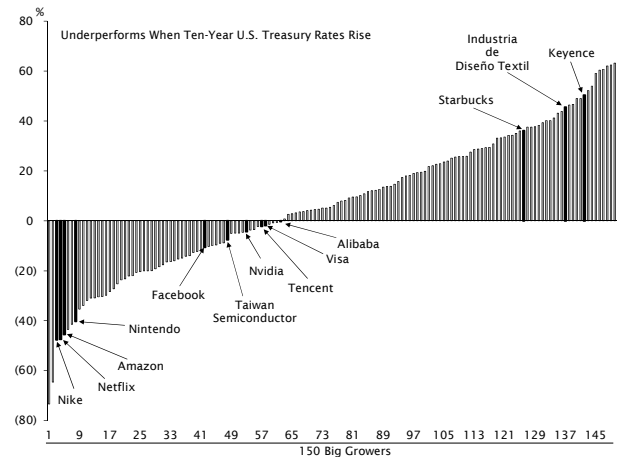
Exhibit 14 paints a more granular picture by comparing the correlations of the 150 Big Growers at the stock level. We've pointed out a few of the mega-cap stocks like Nike, Netflix, Amazon and Nintendo that have behaved more like anti-bonds than the rest of their peers, while Starbucks, Industria de Diseño Textil and Keyence stand on the other side of the spectrum. Not much rate exposure is evident for Facebook, Taiwan Semiconductor, Nvidia, Tencent, Visa nor Alibaba. All-in-all we don't believe that interest rates *alone* will prove the deterministic variable in deciding the fate of the Big Growers, rather, changes in end demand is the more likely driver.

Exhibit 13: The World's Big Growers
Correlation of Relative Returns with the Total Return of Ten-Year U.S. Treasury Bonds' 2000 Through Late-April 2018



Source: Empirical Research Partners Analysis.
 ' Returns are USD-based and relative to each region.

Exhibit 14: The World's Big Growers
Correlation of Relative Returns with the Total Return of Ten-Year U.S. Treasury Bonds at the Stock Level' Two Years Ended Late-April 2018



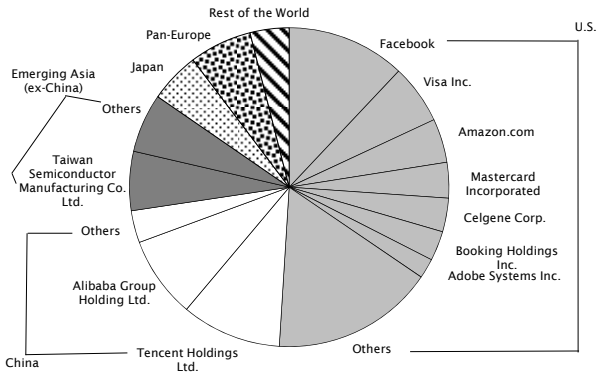
Source: Bloomberg L.P., Empirical Research Partners Analysis.
 ' Correlations computed based on local currency monthly returns relative to a world equity market composite over the previous two years.

... While Offering Better Cash Flow Dynamics

After assessing the Big Growers' risk characteristics, we turned our attention to their fundamentals, starting with their free cash flow production. Three quarters of the total is sourced by U.S. and Chinese companies, that also account for about $\frac{3}{4}$ of the Big Growers' capitalization. Remarkably three technology stocks alone, Facebook, Tencent and Alibaba, comprised about a third of the aggregate free cash flow output (see Exhibit 15). That speaks volumes about what's going on across the globe. More broadly, technology businesses have been sourcing more and more of the world's public companies' free cash flow, from a share of about 14% ten years ago to more than 20% more recently (see Exhibit 16).

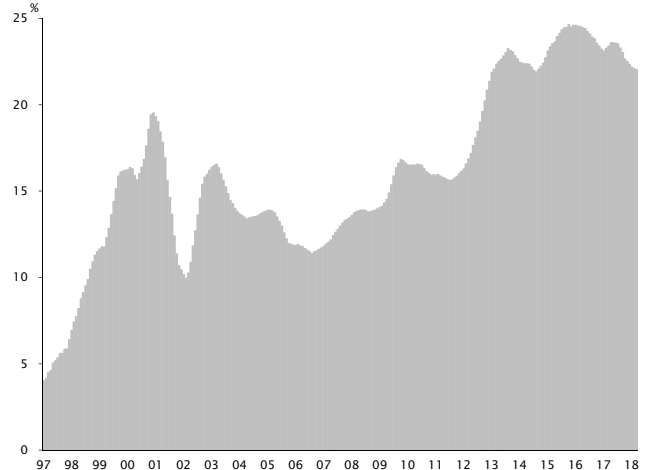
Exhibit 17 compares the trajectory of free cash flow margins of Big Growers in the U.S. with those outside of it over the last 20 years or so, with the dotted line depicting those of the Chinese Big Growers since 2010 (the year they began to populate the Big Growers' ranks more fully). The free cash flow margins of the U.S. Big Growers have been superior throughout and Exhibit 18 shows the current levels by region, with the weakest margins seen in China. Unlike in the past growth and profitability have gone hand in hand, a potent combination.

Exhibit 15: The World's Big Growers
Share of Free Cash Flows by Region
As of Late-April 2018



Source: FactSet Research Systems, Empirical Research Partners Analysis.

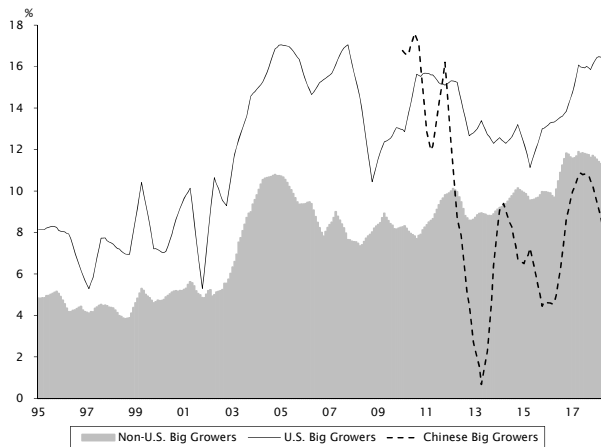
Exhibit 16: The World: Technology Stocks
Share of the Market's Free Cash Flow'
1997 Through March 2018



Source: Corporate Reports, Empirical Research Partners Analysis.

¹ Excluding financials and utilities; smoothed on a trailing six-month basis.

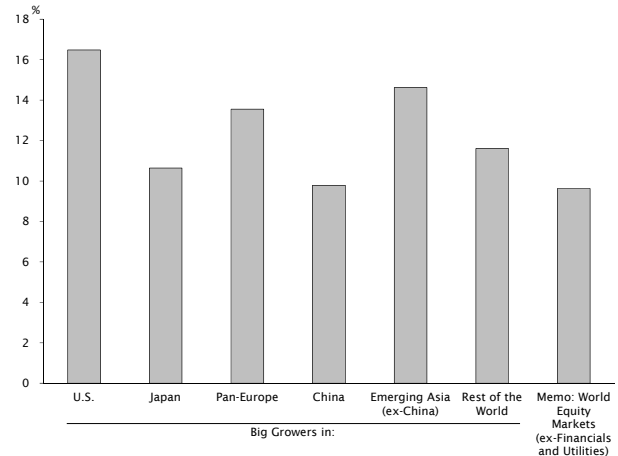
Exhibit 17: The World's Big Growers
Free Cash Flow Margins'
1995 Through Late-April 2018



Source: Corporate Reports, Empirical Research Partners Analysis.

¹ Equally-weighted data smoothed on a trailing six-month basis; data for the Chinese Big Growers since 2010.

Exhibit 18: The World's Big Growers
Free Cash Flow Margins by Region'
As of Late-April 2018



Source: Corporate Reports, Empirical Research Partners Analysis.

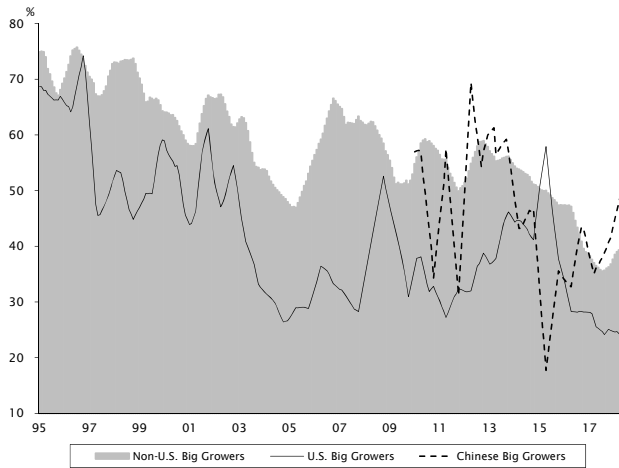
¹ Equally-weighted data.

Some of what we're seeing in the cash flow margins has to do with an ongoing reduction in capital intensity that began more than 20 years ago. Exhibit 19 compares the trajectory of capital spending as a share of gross cash flow for the aforementioned groups, with the U.S. ones the more capital-lite of the bunch. Exhibit 20 provides a regional snapshot of the Big Growers' capital spending intensity, with the Pan-European and emerging Asian ones more intensive than the rest. More so than their peers around the world the U.S. businesses represent the archetype of globalization, lean, mean, free-cash-flow producing machines. Some of their spending now appears on the cash flow statements of companies located in the emerging markets.

... While Priced at Comparable Valuations to their Counterparts

After studying the Big Growers' risk profile, free cash flow production and capital spending, we looked at how they're valued. Big Growth usually commands a substantial premium and that's certainly the case today. The average Big Grower is being valued at a multiple that's 30 times forward estimated earnings, about double that of the average large-cap stock (see Exhibit 21). With a P/E multiple of 22 times the Chinese Big Growers are the lowest-valued among the world's high-flyers. Exhibit 22 compares the trajectory of P/E ratios of U.S. and Chinese Big Growers relative to the world Big Growers' composite. In the post-Crisis years the U.S. Big Growers have generally commanded a premium to their peers around the world, while the opposite has been true for their Chinese counterparts. Right now the discount of the Chinese issues is exceptional.

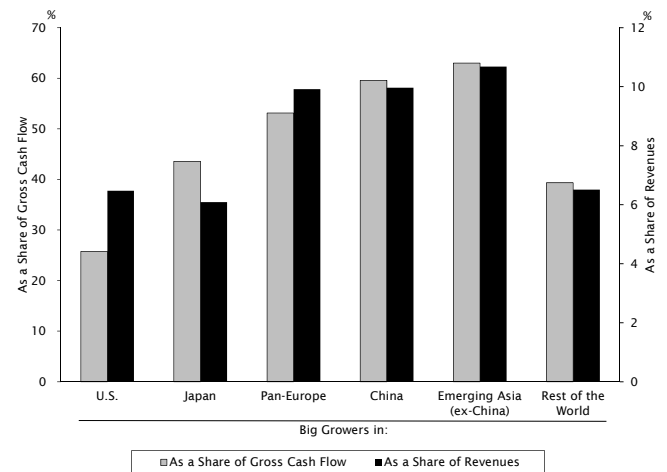
Exhibit 19: The World's Big Growers
Capital Spending as a Share of Gross Cash Flow'
1995 Through Late-April 2018



Source: Corporate Reports, Empirical Research Partners Analysis.

¹ Equally-weighted data smoothed on a trailing six-month basis; data for the Chinese Big Growers since 2010.

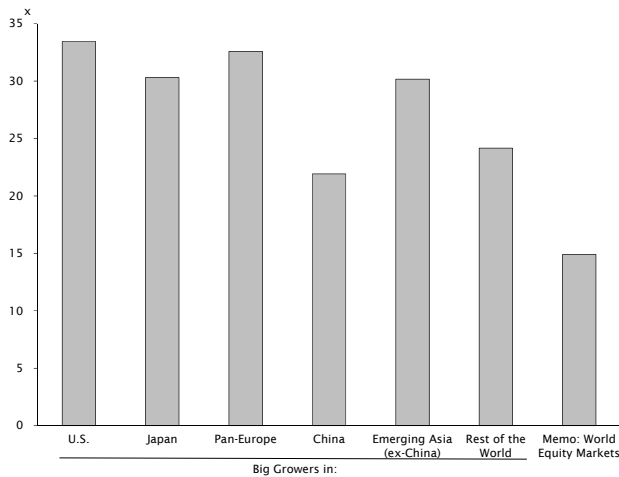
Exhibit 20: The World's Big Growers
Capital Spending as a Share of Gross Cash Flow and Revenues'
As of Late-April 2018



Source: Corporate Reports, Empirical Research Partners Analysis.

¹ Equally-weighted data.

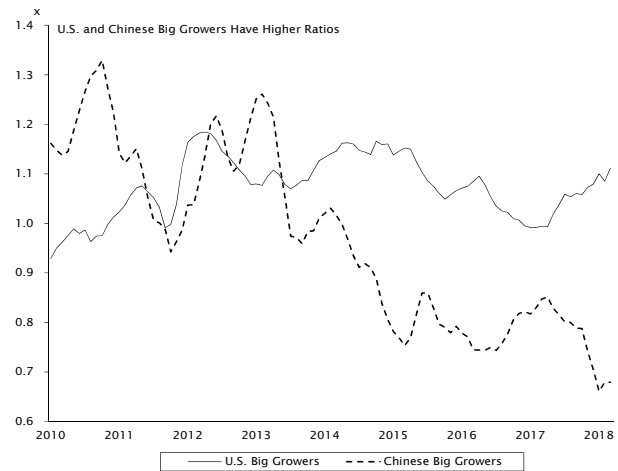
Exhibit 21: The World's Big Growers
Nominal Forward-P/E Ratios by Region'
As of Late-April 2018



Source: Corporate Reports, Empirical Research Partners Analysis.

¹ Big Growers' data are equally-weighted while the world's are cap-weighted.

Exhibit 22: U.S. and China: Big Growers
Forward-P/E Ratios Relative to the World's Big Growers'
2010 Through Late-April 2018



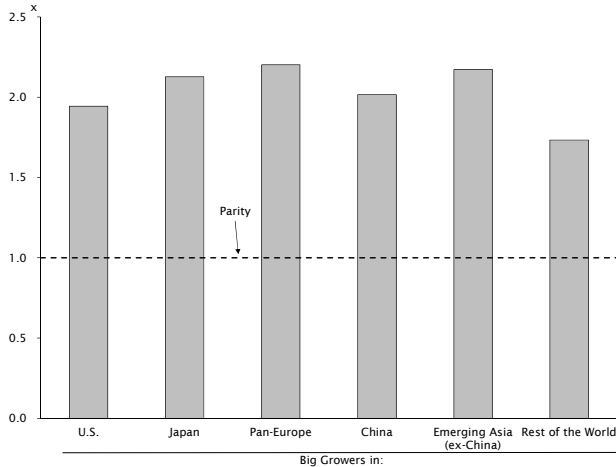
Source: Empirical Research Partners Analysis.

¹ Equally-weighted data; smoothed on a trailing three-month basis.

Exhibit 23 presents the current Big Growers' P/E ratios but *relative* to those of the regions where they're domiciled. On that basis Big Growers in Japan and Pan-Europe carry expensive price tags, as the little growth that can be found in those regions has already been bid up. The situation looks extreme and the trajectory of their P/E ratios vis-à-vis their local markets is shown in Exhibit 24.

The excitement around Japan's growth stocks seems linked to Abenomics' potential to (once-and-for-all) break away that economy from the chronic stagnation that's afflicted it for more than two decades. At the onset of Abenomics Japan's Big Growers were priced to a similar P/E multiple as that of the market's, while today they're priced to a premium of about two-to-one. The valuations of growth stocks in Europe moved higher last year, when confidence in the domestic economy became contagious. With 60% of their revenues sourced domestically the Big Growers there have been direct beneficiaries in the face of a strengthening Euro. As the little growth in Japan and Europe has been bid up to exorbitant levels, the stocks are vulnerable to anything that changes the outlooks for those economies, either good or bad.

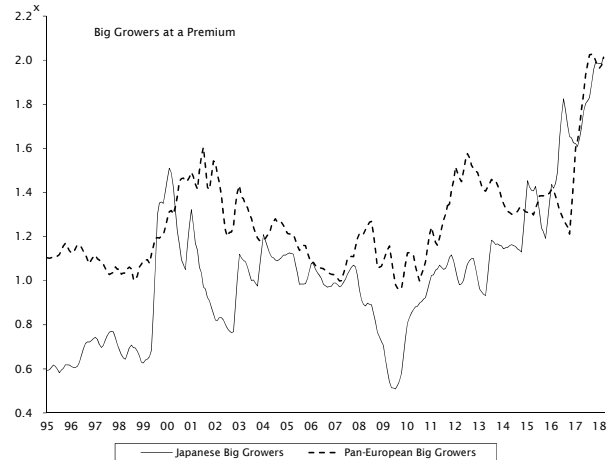
Exhibit 23: The World's Big Growers
Relative Forward-P/E Ratios by Region'
As of Late-April 2018



Source: Empirical Research Partners Analysis.

¹ Big Growers' data are equally-weighted while the regions' are cap-weighted.

Exhibit 24: Japan and Pan-Europe: Big Growers
Relative Forward-P/E Ratios'
1995 Through Late-April 2018



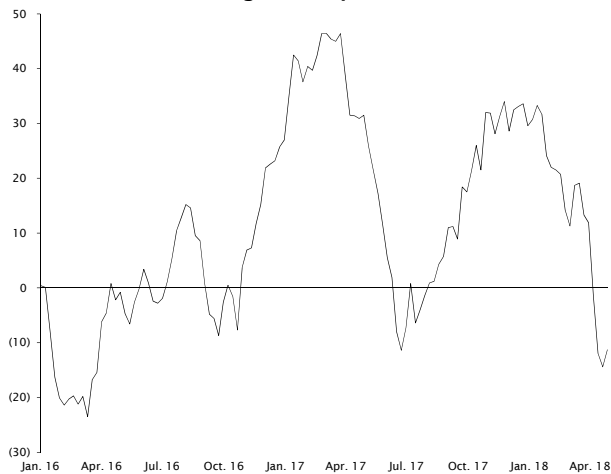
Source: Empirical Research Partners Analysis.

¹ Equally-weighted data relative to the region; smoothed on a trailing three-month basis.

Conclusion: The U.S. Big Growers are First Among Equals

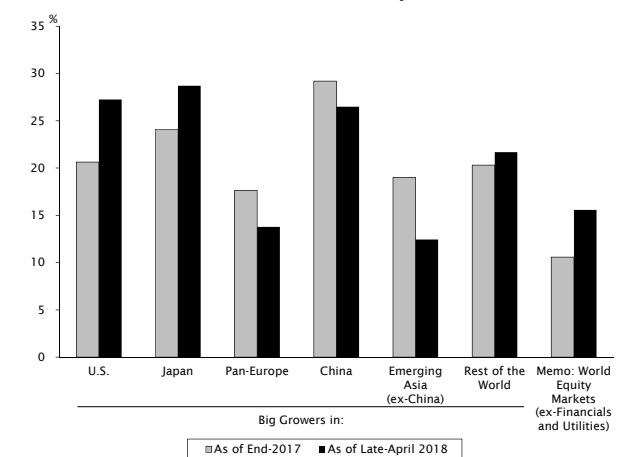
Heading into the close of last year the world economy surprised to the upside, but over the course of this year it's lost its luster and lately it's disappointed (see Exhibit 25). Analysts, however, have become more optimistic on the earnings outlook of the Big Growers in the U.S. and Japan, but less optimistic on those in Pan-Europe and emerging Asia, when compared to their forecasts at the end of last year (see Exhibit 26). Part of the Big Growers' advantage lies in their ability to power through in the face of economic headwinds, when their breakneck growth rates become more valuable. That's been true this year, and the average Big Grower has led a world equity market composite by about +6 percentage points, with the best results seen in the U.S. and China (see Exhibit 27).

Exhibit 25: The World Economic Surprise Index
2016 Through Late-April 2018



Source: Citigroup Global Markets, Bloomberg L.P.

Exhibit 26: The World's Big Growers
2018E EPS Growth by Region'
As of End-2017 and Late-April 2018



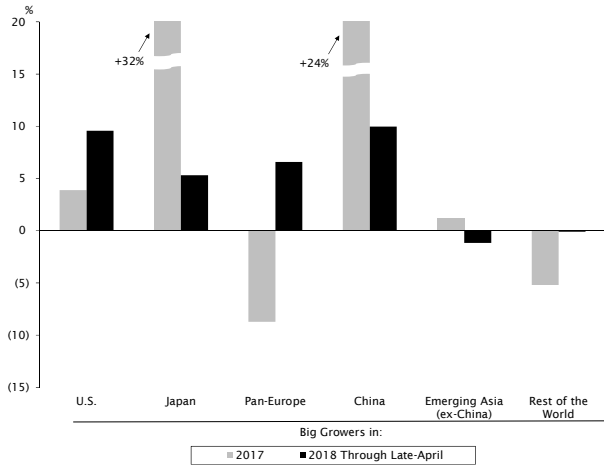
Source: FactSet Research Systems, Empirical Research Partners Analysis.

¹ Earnings-weighted data.

Appendix 1 that begins on page 11 presents the 150 world Big Growers sorted by region and by their attractiveness in our world growth model, with the U.S. ones overrepresented in the best quintile. Our world growth model has been a helpful approach in choosing among the world's high flyers. Exhibit 28 presents a backtest of the relative returns of Big Growers in the best and worst quintiles, with the most attractive issues leading the pack by +5.4 percentage points per annum over the last 20 years or so. That's been a better approach than betting on price trend-following strategies where the glory days were seen in the second-half of the 1990s (see Exhibit 29). Exhibit 30 compares the backtest win rates between the two approaches, with the growth model demonstrating greater odds of success.

As the nominals pick-up, gradually, we believe the U.S. Big Growers offer the best bang for the buck: their risk attributes are superior to the rest of their peers around the world, they offer stronger cash flow production and are priced at comparable valuations; they're first among equals. A recession would undermine their ability to sustain their heady multiples but until then we believe they can carry the day.

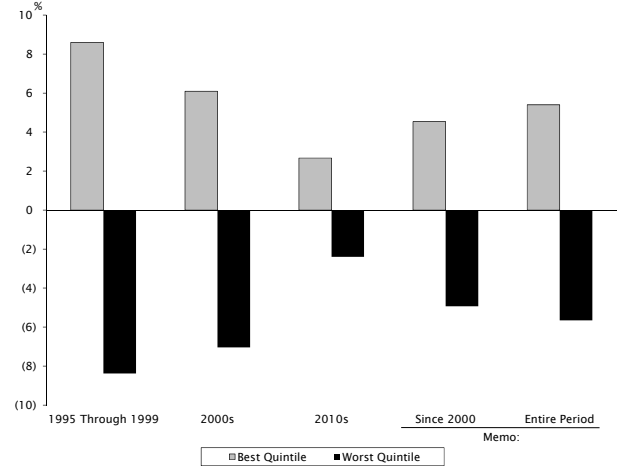
**Exhibit 27: The World's Big Growers
Relative Returns by Region¹
2017 Through Late-April 2018**



Source: Empirical Research Partners Analysis.

¹ Equally-weighted USD-based returns relative to the region.

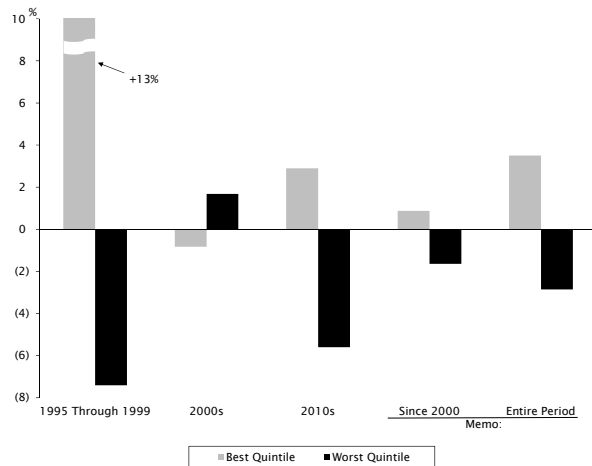
**Exhibit 28: The World's Big Growers
Relative Returns to the Best and Worst Quintiles
of the World Growth Model by Decade¹
Measured Over One-Year Holding Periods
1995 Through Late-April 2018**



Source: Empirical Research Partners Analysis.

¹ Equally-weighted USD-based returns. Stocks are ranked across, and returns relative to, the Big Growers.

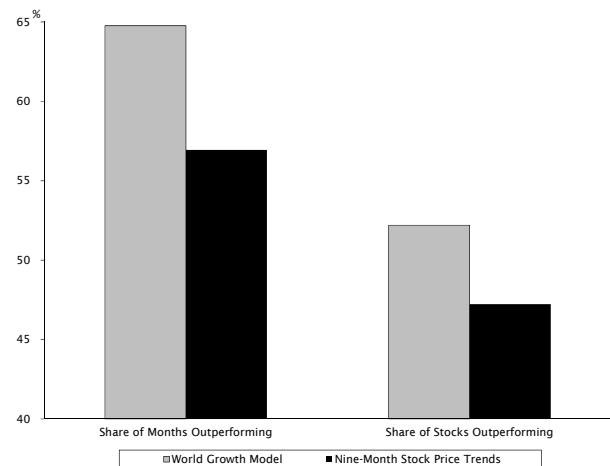
**Exhibit 29: The World's Big Growers
Relative Returns to the Best and Worst Quintiles
of Nine-Month Stock Price Trends by Decade¹
Measured Over One-Year Holding Periods
1995 Through Late-April 2018**



Source: Empirical Research Partners Analysis.

¹ Equally-weighted USD-based returns. Stocks are ranked across, and returns relative to, the Big Growers.

**Exhibit 30: The World's Big Growers
Best Quintiles of the World Growth Model
and Nine-Month Stock Price Trends
Share of Months and Stocks Outperforming¹
Measured Over One-Year Holding Periods
1995 Through Late-April 2018**



Source: Empirical Research Partners Analysis.

¹ Equally-weighted USD-based returns. Stocks are ranked across, and returns relative to, the Big Growers.

Appendix 1: The World's Big Growers
Sorted by Region, Growth Model Rank and Capitalization
As of Late-April 2018

Symbol	Company	Price (Local)	Quintiles				Quintiles (1=Best, 5=Worst)				World Growth Model	Memo: Correlation With U.S. Treasury Bonds ¹	Market Capitalization (USD Billion)		
			Growth Dynamics		Risk Assessment		Free Cash Flow Dynamics								
			Trailing Twelve-Month		(1=Fastest, 5=Slowest)	(1=Lowest, 5=Highest)	Capital		Free Cash Flow Margins	Spending-to- Gross Cash Flow				Capital Spending Growth	Free Cash Flow Yield
			Growth Rates	Arbitrage			Downside	Risk							
U.S.															
V US	Visa Inc. Class A	124.48	3	5	1	2	1	1	3	2	1	(2)	%	\$251.4	
MA US	Mastercard Incorporated Class A	179.46	4	5	1	1	1	1	4	3	1	(31)		183.1	
ADBE US	Adobe Systems Incorporated	231.10	2	2	1	1	1	1	3	3	1	(1)		110.2	
BKNG US	Booking Holdings Inc.	2,180.60	3	1	2	4	1	1	3	1	1	(32)		102.3	
CELG US	Celgene Corporation	91.01	4	1	2	5	1	1	3	1	1	12		66.3	
INTU US	Intuit Inc.	181.19	4	3	1	3	1	1	1	2	1	43		45.3	
ZTS US	Zoetis Inc. Class A	85.97	5	4	1	1	2	2	2	3	1	3		40.6	
ILMN US	Illumina Inc.	250.00	4	4	1	1	2	4	3	4	1	33		35.4	
RHT US	Red Hat Inc.	161.67	3	4	2	4	1	1	3	2	1	(22)		27.8	
CNC US	Centene Corporation	112.22	3	2	2	1	4	3	4	1	1	11		19.4	
PANW US	Palo Alto Networks Inc.	192.47	2	3	2	1	1	2	4	1	1	(30)		17.4	
CHKP US	Check Point Software Technologies Ltd.	365.93	5	4	1	3	1	1	3	1	1	25		16.9	
SPLK US	Splunk Inc.	106.80	2	3	3	3	2	1	1	4	1	14		15.5	
BR US	Broadridge Financial Solutions Inc.	111.70	2	3	1	1	3	2	5	1	1	28		12.7	
JAZZ US	Jazz Pharmaceuticals Plc	127.69	5	1	1	2	1	2	5	1	1	(31)		9.2	
NVDA US	NVIDIA Corporation	236.37	1	1	4	1	1	2	5	3	2	(4)		136.9	
CRM US	salesforce.com inc.	124.46	2	5	1	1	2	2	2	3	2	1		89.6	
VRTX US	Vertex Pharmaceuticals Incorporated	163.36	1	1	2	1	2	3	5	4	2	16		39.4	
EW US	Edwards Lifesciences Corporation	139.52	4	4	1	1	2	2	1	2	2	(16)		28.5	
VRSK US	Verisk Analytics Inc	107.99	5	3	1	4	2	2	3	2	2	(35)		17.3	
LULU US	Lululemon Athletica Inc	119.66	4	5	4	3	3	3	2	3	2	(12)		13.5	
VEEV US	Veeva Systems Inc Class A	74.87	2	1	5	2	2	1	4	4	2	(9)		10.5	
AMZN US	Amazon.com Inc.	1,527.84	2	3	1	2	4	5	5	4	3	(45)		700.9	
FB US	Facebook Inc. Class A	166.36	1	2	3	3	1	3	4	2	3	(11)		470.5	
NKE US	NIKE Inc. Class B	66.20	5	5	1	4	4	3	2	3	3	(48)		101.8	
PYPL US	PayPal Holdings Inc	80.34	3	3	2	1	3	2	3	3	3	(15)		93.8	
ISRG US	Intuitive Surgical Inc.	471.03	3	5	3	4	1	1	5	3	3	(30)		51.5	
MAR US	Marriott International Inc. Class A	138.31	2	4	2	2	3	2	3	1	3	5		47.4	
EA US	Electronic Arts Inc.	124.93	4	5	2	3	2	1	1	2	3	4		37.3	
APH US	Amphenol Corporation Class A	87.20	4	3	1	2	3	2	3	2	3	(9)		25.4	
NFLX US	Netflix Inc.	334.52	2	1	4	3	5	na	1	5	4	(47)		137.5	
SBUX US	Starbucks Corporation	59.50	5	5	1	3	3	4	2	2	4	36		80.4	
REGN US	Regeneron Pharmaceuticals Inc.	321.39	3	1	3	4	2	2	1	2	4	60		33.0	
MNST US	Monster Beverage Corporation	57.47	4	4	4	4	2	1	1	3	4	19		31.5	
NOW US	ServiceNow Inc.	174.30	1	2	2	2	5	2	4	5	4	(5)		29.6	
WDAY US	Workday Inc. Class A	132.60	2	3	2	2	3	3	2	4	4	4		27.4	
RMD US	ResMed Inc.	101.17	4	5	1	2	2	2	2	3	4	(28)		14.0	
ULTA US	Ulta Beauty Inc	233.04	3	2	4	4	4	4	3	3	4	(5)		13.9	
LNG US	Cheniere Energy Inc.	58.52	1	1	2	3	5	5	1	5	4	(4)		13.7	
DPZ US	Domino's Pizza Inc.	238.19	4	2	2	5	3	3	4	3	4	(20)		10.1	
TSLA US	Tesla Inc	293.35	1	5	5	5	5	na	5	5	5	(23)		46.8	
SNAP US	Snap Inc. Class A	14.65	1	5	5	5	5	na	3	5	5	(5)		16.6	
MELI US	MercadoLibre Inc.	6,951.18	1	5	5	3	3	3	1	4	5	(20)		14.7	
INCY US	Incyte Corporation	70.07	2	5	5	4	5	na	1	5	5	62		14.3	
BMRN US	BioMarin Pharmaceutical Inc.	84.42	3	2	3	4	5	na	3	5	5	4		14.1	
IT US	Gartner Inc.	118.14	2	5	1	5	4	4	5	4	5	(5)		10.5	
MIDD US	Middleby Corporation	126.44	5	3	2	3	3	2	5	1	5	5		6.9	
DXCM US	DexCom Inc.	73.50	2	3	4	5	4	5	3	4	5	39		6.4	
Japan															
3659 JP	NEXON Co. Ltd.	1,653.00	2	1	5	5	1	1	1	1	1	5	%	\$13.0	
7453 JP	Ryohin Keikaku Co. Ltd.	37,550.00	4	3	3	2	3	3	2	2	1	24		9.9	
6861 JP	Keyence Corporation	64,580.00	5	4	2	1	1	1	3	4	2	50		73.2	
6273 JP	SMC Corporation	43,470.00	3	2	3	5	2	2	3	1	2	8		27.5	
6869 JP	Sysmex Corporation	9,740.00	5	5	2	1	3	4	1	4	2	29		18.6	
4704 JP	Trend Micro Incorporated	6,400.00	4	4	3	3	1	3	4	1	2	15		8.5	
7747 JP	Asahi Intecc Co. Ltd.	3,945.00	3	2	4	3	3	4	3	4	2	49		4.8	
2413 JP	M3 Inc.	4,640.00	2	2	5	3	2	1	1	4	3	17		13.9	
4922 JP	Kose Corporation	21,120.00	4	2	4	5	4	5	4	4	3	40		12.2	
3092 JP	Start Today Co. Ltd.	3,040.00	2	3	4	5	2	1	5	4	3	59		9.2	
6146 JP	Disco Corporation	23,870.00	3	2	3	4	2	3	4	2	3	(13)		8.2	
3436 JP	SUMCO Corporation	2,798.00	3	1	5	4	3	3	1	1	3	(16)		7.9	
6383 JP	Daifuku Co. Ltd.	6,060.00	5	2	4	4	4	2	5	3	3	9		7.3	
4751 JP	CyberAgent Inc.	5,600.00	3	5	4	5	4	5	2	3	3	54		6.4	
2181 JP	PERSOL HOLDINGS CO. LTD.	2,861.00	3	5	4	2	4	2	3	1	3	33		6.3	
7974 JP	Nintendo Co. Ltd.	44,440.00	1	1	3	4	3	4	1	4	4	(40)		60.0	
6098 JP	Recruit Holdings Co. Ltd.	2,655.50	2	2	3	1	4	4	1	2	4	49		42.3	
6506 JP	Yaskawa Electric Corporation	4,785.00	4	1	4	3	4	4	na	3	4	7		12.2	
2127 JP	Nihon M&A Center Inc.	3,410.00	na	na	1	4	2	1	na	na	4	3		5.2	
9843 JP	Nitori Holdings Co. Ltd.	18,770.00	4	4	3	5	4	5	5	4	5	29		20.6	
3938 JP	LINE Corp.	4,095.00	3	5	3	4	5	5	5	5	5	(30)		9.3	
9962 JP	Misumi Group Inc.	3,145.00	3	2	3	4	4	4	2	4	5	34		8.3	
6324 JP	Harmonic Drive Systems Inc.	5,850.00	1	1	5	4	5	4	3	5	5	(20)		5.5	
4587 JP	Peptidream Inc.	4,850.00	5	5	5	5	5	5	1	5	5	4		5.3	
Pan-Europe															
AMS SM	Amadeus IT Group SA Class A	61.78	5	3	1	3	1	4	2	1	1	(22)	%	\$33.6	
WDI GY	Wirecard AG	110.70	1	5	2	1	1	2	1	1	1	24		16.9	
MONC IM	Moncler SpA	35.23	4	3	3	1	2	na	1	2	1	23		11.2	
TEMN SW	Temenos Group AG	118.20	4	3	4	5	1	1	1	2	1	38		8.7	
SOBI SS	Swedish Orphan Biovitrum AB	158.40	2	2	1	2	2	1	2	2	1	(43)		5.1	
IPN FP	Ipsen SA	128.50	3	4	2	3	2	4	2	2	2	(18)		13.3	
UBI FP	Ubisoft Entertainment SA	78.74	4	2	4	1	1	5	4	1	2	20		10.9	
RMV LN	Rightmove plc	44.60	4	4	1	3	1	1	3	2	2	47		5.8	
DIA IM	DiaSorin S.p.A.	77.60	4	3	3	5	2	3	2	2	2	26		5.4	
KER FP	Kering SA	434.60	2	2	2	4	3	3	3	1	3	13		67.9	
GEN DC	Genmab A/S	1,264.00	2	5	5	5	1	1	5	3	3	(1)		12.9	
DIM FP	Sartorius Stedim Biotech SA	77.05	5	4	3	3	4	5	4	4	4	(10)		8.8	
RAA GY	RATIONAL AG	525.00	4	4	1	2	3	2	5	3	4	8		7.4	
BME LN	B&M European Value Retail SA	3.91	3	3	1	3	4	4	2	3	4	40		5.6	
ITX SM	Industria de Diseno Textil S.A.	24.95	5	4	2	4	3	4	3	2	5	46		96.2	
ZAL GY	Zalando SE	43.55	3	5	2	2	5	5	4	5	5	(12)		13.4	
STMN SW	Straumann Holding AG	625.50	3	3	1	4	3	3	4	4	5	29		10.3	
ERF FP	Eurofins Scientific Societe Europeenne	435.00	3	3	3	4	4	5	3	3	5	(15)		9.5	
AMS SW	ams AG	104.15	1	2	5	4	5	na	5	5	5	(21)		9.1	
DHER GR	Delivery Hero AG	38.84	1	3	3	1	5	na	na	5	5	3		8.8	
ASC LN	ASOS plc	61.52	2	2	4	3	5	5	5	5	5	(10)		7.3	

Appendix 1 (Cont.): The World's Big Growers
Sorted by Region, Growth Model Rank and Capitalization
As of Late-April 2018

Symbol	Company	Price (Local)	Quintiles				Quintiles (1=Best, 5=Worst)					Memo: Correlation With U.S. Treasury Bonds ¹	Market Capitalization (USD Billion)	
			Growth Dynamics		Risk Assessment		Free Cash Flow Dynamics							
			Trailing Twelve-Month Growth Rates (1=Fastest, 5=Slowest)		(1=Lowest, 5=Highest)		Capital Spending-to- Gross							
			Revenues	Earnings	Arbitrage	Downside	Free Cash Flow Margins	Cash Flow	Capital Spending Growth	Free Cash Flow Yield	World Growth Model			
China														
881 HK	Zhongsheng Group Holdings Ltd.	21.20	3	1	4	2	4	4	2	1	1	5	%	\$6.1
1530 HK	3SBio Inc.	17.70	2	3	5	4	2	na	5	3	1	31		5.7
700 HK	Tencent Holdings Ltd.	400.00	1	1	3	4	1	3	4	2	2	(2)		484.2
175 HK	Geely Automobile Holdings Limited	21.85	1	1	4	5	3	5	5	1	2	6		25.0
1093 HK	CSPC Pharmaceutical Group Ltd.	20.30	2	2	5	1	2	4	3	4	2	14		16.1
002044 CH	Meinian Onehealth Healthcare Holdings	26.71	1	1	4	3	4	4	4	5	2	18		11.6
2269 HK	Wuxi Biologics (Cayman) Inc.	73.30	1	1	5	1	5	na	na	5	2	29		10.9
3799 HK	Dali Foods Group Co. Ltd.	6.06	5	4	3	5	3	na	5	2	2	(4)		10.6
135 HK	KunLun Energy Co. Ltd.	6.39	2	2	3	2	5	5	4	3	2	23		6.6
586 HK	China Conch Venture Holdings Ltd.	23.05	5	2	2	2	5	5	1	5	2	(65)		5.3
BABA US	Alibaba Group Holding Ltd. Sponsored ADR	182.68	1	1	2	3	1	3	4	3	3	0		450.5
JD US	JD.com Inc. Sponsored ADR Class A	40.18	1	1	3	4	4	4	na	4	3	(18)		55.4
NTES US	NetEase Inc. Sponsored ADR	277.22	1	5	2	2	2	1	5	1	3	20		35.3
WB US	Weibo Corp Sponsored ADR Class A	118.38	1	1	5	2	1	na	na	4	3	26		24.9
2382 HK	Sunny Optical Technology (Group) Co. Ltd.	145.30	1	1	5	5	4	5	5	4	3	(1)		20.3
1177 HK	Sino Biopharmaceutical Limited	15.68	5	2	4	2	2	na	5	2	3	(2)		16.8
2313 HK	Shenzhen International Group Holdings Ltd.	85.00	3	3	4	1	4	na	1	4	4	63		16.3
2020 HK	ANTA Sports Products Ltd.	44.10	3	3	4	1	3	2	1	3	4	18		15.1
3898 HK	Zhuzhou CRRC Times Electric Co. Ltd.	37.80	5	5	4	4	4	3	1	3	4	44		5.7
2018 HK	AAC Technologies Holdings Inc.	131.50	2	2	5	5	4	5	2	4	5	10		20.5
257 HK	China Everbright International Limited	10.70	1	3	2	2	5	na	4	5	5	(16)		6.1
Emerging Asia (ex-China)														
251270 KS	Netmarble Games Corp.	134,500.00	1	1	5	5	2	1	1	1	1	61	%	\$11.5
036570 KS	NCsoft Corporation	384,500.00	1	2	4	5	1	1	4	1	2	29		8.2
6488 TT	GlobalWafers Co. Ltd.	520.00	1	1	5	5	1	2	5	1	2	(14)		7.5
2330 TT	Taiwan Semiconductor Mfg. Co. Ltd.	238.00	5	4	1	4	2	4	2	1	3	(8)		212.4
068270 KS	Celltrion Inc.	284,500.00	1	1	5	3	1	3	4	4	3	(73)		31.9
035720 KS	Kakao Corp.	119,500.00	2	1	4	4	3	3	1	2	3	19		8.5
051900 KS	LG Household & Health Care Ltd	1,300,000.00	5	4	4	3	4	4	1	3	4	38		19.9
3008 TT	LARGAN Precision Co. Ltd.	3,525.00	4	4	5	5	1	2	5	1	4	12		15.5
DMART IN	Avenue Supermarts Ltd.	1,492.85	2	2	3	1	5	5	2	5	4	14		14.5
091990 KS	Celltrion Healthcare Co. Ltd.	91,400.00	na	na	5	3	na	na	na	na	4	(27)		11.7
BRIT IN	Britannia Industries Ltd	5,359.75	5	4	1	1	5	5	4	5	4	12		10.1
207940 KS	Samsung BioLogics Co. Ltd.	539,000.00	1	2	5	2	5	5	5	5	5	(20)		33.4
035420 KS	NAVER Corp.	752,000.00	4	4	1	4	3	4	5	3	5	10		23.2
090430 KS	Amorepacific Corp.	345,500.00	5	5	5	5	5	5	4	5	5	52		20.5
Rest of the World														
CSU CT	Constellation Software Inc.	896.01	5	5	2	2	2	1	1	2	1	41	%	\$15.0
ALL AT	Aristocrat Leisure Limited	25.11	4	2	2	4	2	3	1	1	1	22		12.5
ATM NZ	a2 Milk Company Ltd.	12.35	1	1	5	2	2	1	5	3	1	(25)		6.6
THYAO TI	Turk Hava Yollari A.O.	19.05	2	1	5	5	3	3	2	1	1	34		6.4
SEK AT	Seek Limited	19.16	3	1	2	2	2	3	4	1	1	(34)		5.2
CSL AT	CSL Limited	160.16	5	4	1	3	3	5	3	4	2	(41)		56.4
DOL CT	Dollarama Inc.	149.18	4	3	2	5	3	2	1	2	2	5		12.9
COH AT	Cochlear Limited	187.40	5	4	2	1	3	3	4	3	2	10		8.4
BIMAS TI	BIM Birlesik Magazalar A.S.	70.85	3	3	1	2	4	4	2	1	2	62		5.4
CCL/B CT	CCL Industries Inc. Class B	64.79	3	3	3	2	3	4	3	1	3	(24)		9.0
REA AT	REA Group Ltd	78.98	3	5	1	1	1	2	5	2	3	22		8.1
FRUT IT	Frutarom Industries Ltd	370.00	4	3	5	5	3	2	2	3	3	38		6.3
669 HK	Technonic Industries Co. Ltd.	44.35	4	4	4	3	4	4	2	2	4	46		10.4
LREN3 BZ	Lojas Renner S.A.	33.66	4	3	3	3	4	5	3	4	4	(14)		7.1
ASELS TI	Aselsan Elektronik Sanayi ve Ticaret A.S.	27.10	1	1	4	2	4	5	4	4	4	38		6.7
1910 HK	Samsonite International S.A.	36.95	2	3	4	2	4	3	3	2	4	34		6.7
FPH NZ	Fisher & Paykel Healthcare Corporation Ltd.	12.38	5	4	3	1	3	4	4	3	4	26		5.2
RADL3 BZ	Raia Drogasil S.A.	69.35	3	4	3	3	5	5	3	5	5	35		6.7
RENT3 BZ	Localiza Rent A Car S.A.	29.69	2	2	3	1	5	na	4	5	5	26		5.8
425 HK	Mint Group Limited	37.30	3	4	5	5	5	na	3	5	5	(19)		5.4

Source: Bloomberg L.P., Empirical Research Partners Analysis.

¹ Correlations computed using the stocks' local-currency relative returns over the trailing 24 months.