DOWNSIDE BETA AND EQUITY RETURNS AROUND THE WORLD

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ABSTRACT

We investigate the relation between downside beta and stock returns in a global context using more than 170 million daily return observations. Contrary to the findings in the U.S. equity market, we show that downside beta does not explain the cross-sectional differences in future and contemporaneous returns in an international setting. The results are robust to using different methods to estimate downside beta, omitting the U.S. stocks from the global sample, utilizing alternative global pricing factors, and replicating the analysis for various country groupings. Thus, we overturn the heavily cited finding on the relation between downside beta and equity returns.

Keywords: downside risk, downside beta, equity returns, asset pricing, international finance

JEL Codes: G10, G11, G12

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1. INTRODUCTION

The role of downside risk in asset pricing has long been recognized in the financial economics literature. More than 60 years ago, Roy (1952) introduced the concept of safety-first investors who are concerned about minimizing the probability of a dread event. Markowitz (1959) also underlined the importance of downside risk by suggesting the use of semi-variance rather than variance as a measure of risk. Subsequent authors such as Hogan and Warren (1974), Arzac and Bawa (1977), Bawa and Lindenberg (1979) and Harlow and Rao (1989) went beyond the simple CAPM framework and introduced models that incorporate lower partial moments in an equilibrium context. Kahneman and Tversky (1979) made an important theoretical contribution to this field with prospect theory suggesting that investors make decisions based on the potential value of losses and gains rather than expected outcomes. In this model, investors have asymmetric value functions that are concave for gains, convex for losses and steeper for losses than gains which collectively imply loss aversion.[1]

Building on this line of research, Ang, Chen and Xing (2006) are driven by the basic premise that assets that are more sensitive to market downturns than market uptrends are undesirable for loss-averse investors since such assets will provide their investors with low payoffs precisely when the wealth of those investors are decreasing. Ang et al. (2006) rely on the disappointment utility function of Gul (1991) to motivate a role for downside beta in asset pricing in a rational representative-agent framework. They investigate the significance of a relation between downside beta and the cross-section of contemporaneous and future returns of U.S. equities and find that stocks with higher sensitivities to downward market movements also have higher average returns.[2] Since earlier studies focus on a single market, the empirical

[1] The more recent literature focuses on the concept of skewness to investigate whether investors' asymmetric preferences for losses versus gains affect equity returns. See studies by Harvey and Siddique (2000), Ang, Chen, and Xing (2006), Bali, Cakici, and Whitelaw (2011), Chang, Christoffersen and Jacobs (2012), and Amaya, Christoffersen, Jacobs, and Vasquez (2015).
[2] The relation between downside risk and expected equity returns has also been investigated in the U.S. context. Huang et al. (2012) document that a measure of extreme downside risk is associated with a significant return

findings for the U.S. equity market may very well be data and sample-specific. Hence, in this paper, we overtake a significantly larger task and test the relation between downside beta and expected stock returns in a global context that spans 51 countries.

We measure downside beta in an analogous manner to Ang, Chen and Xing (2006) as the sensitivity of excess stock returns to excess market returns during market downturns. A market downturn is defined as periods during which the excess market return has been lower than its mean value during the past year. We sort global stocks into quintile portfolios based on their downside beta measures and show that downside beta does not provide a significantly positive one-month-ahead average return difference for zero-cost portfolios that buy equities with the highest downside market exposures and sell equities with the lowest downside market exposures. The abnormal returns for this zero-cost portfolio generated by a factor model that incorporates the global market, size, value and momentum factors are also insignificant. These results persist when we only use non-U.S. stocks in our analysis and/or omit stocks with a high proportion of zero-return days to control for illiquidity. Bivariate portfolio analyses that sort stocks into downside beta quintiles after conditioning on firm-specific variables such as the standard market beta, upside beta, firm size, book-to-market ratio, momentum, idiosyncratic volatility, liquidity, co-skewness, skewness and various funding liquidity measures corroborate the results from our univariate portfolio analysis. We also use these control variables in firm-level Fama-MacBeth (1973) cross-sectional regressions and find that various specifications reveal insignificant coefficients for the downside beta variable. We repeat our analyses by utilizing alternative measures of downside beta, excluding high volatility stocks from the sample, using the global market index to calculate downside beta, focusing on various country groupings and analyzing each country separately and still find no significant link between

premium. Bali, Cakici and Whitelaw (2014) associate a hybrid measure of stock return tail covariance risk with expected equity returns. Kelly and Jiang (2014) propose a tail risk measure that exploits monthly stock-level price crashes and document the association of this measure with equity returns both in the time-series and cross-section.

downside beta and future equity returns. We also calculate the transition probabilities of stocks from one downside quintile to another in future periods and show that downside beta is not a strongly persistent equity characteristic which certainly diminishes its predictive power. Finally, we also show that downside beta is not able to explain the cross-section of contemporaneous equity returns. Thus, using a much larger sample, we overturn one of the most cited findings on the determinants of expected stock returns.

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 explains the empirical methodology. Section 4 presents the empirical results. Section 5 provides a battery of robustness checks. Section 6 concludes.

2. DATA

The equity return data are obtained from Datastream. Daily returns for each stock are calculated using a daily total return index which is adjusted for stock splits and dividend payments. The number of firm-level return days used in this study is 173,119,727. We utilize returns denominated in US dollars to make the returns comparable across countries, to eliminate the effect of exchange rate risk on returns and to reflect the effect of different inflation rates across countries through purchasing power parity following Lee (2011). The data set includes stocks from 51 countries for the period of January 1988 to December 2014. The sample covers 24 developed market countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK, and the US) and 27 emerging market countries (Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, Turkey, Venezuela and Vietnam).

We follow other international equity market studies such as Bekaert, Harvey and Lundblad (2007), Lee (2011) and Karolyi, Lee and van Dijk (2012) to screen the data and omit some of the data errors in Datastream that have been reported in the prior literature. We select stocks only from major exchanges defined as those in which the majority of equities in a given country are traded. Most of the countries in the sample only have one major exchange except for China, Germany, Japan and the US. We only include common equities in our sample and exclude stocks with special features such as depository receipts, real estate investment trusts and preferred stocks. We retain all data for defunct stocks in the sample to avoid survivorship bias. Due to the presence of some unrealistically extreme returns in Datastream, we set the highest and lowest 1% of daily returns in each country-month to be missing. Market value of equity is winsorized at the 1% level in each country-month to deal with extreme observations. We also drop any day from the sample as a non-trading day if more than 90% of stocks in a given exchange have zero returns on that day. To implement this last screen, we calculate the returns using the total return indices denominated in local currencies since returns denominated in US dollars may be non-zero solely due to changes in exchange rates. After all these screens, we are left with 7,450,559 firm-months for which downside beta metrics can be calculated. The number of stocks in the sample gradually increases from 14,944 to 31,089 between 1988 and 2007 after which there is a slight decline to 29,122 stocks until 2014. Sample size varies across countries. The starting date of the sample also varies across countries with Vietnam and Russia, the two countries with the shortest sample periods, beginning in 2006 and 1995, respectively.

3. EMPIRICAL METHODOLOGY

We follow Bawa and Lindenberg (1977) and Ang, Chen and Xing (2006) in constructing our baseline downside beta measure. Specifically, downside beta is defined as the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns on the days that the market's excess return is less than the average market excess return during the past year:

$$Betadown_t^{i,j} = \frac{Cov_{t-250,t-1}(r^{i,j}, r^{m,j} | r^{m,j} < \mu^{m,j})}{Var_{t-250,t-1}(r^{m,j} | r^{m,j} < \mu^{m,j})} \quad (1)$$

where $r^{i,j}$ and $r^{m,j}$ are stock i's and market's excess return in country j and $\mu^{m,j}$ is the average market excess return in country j during the past 250 trading days. In other words, downside beta is the sensitivity of a stock's excess return towards the market's excess return on the days that the market's excess return has lagged behind its mean. In our subsequent analyses, we also use alternative cut-off points rather than the average market excess return to define the left-tail of the market excess return distribution. The risk-free rate used to calculate excess returns is the interest rate on one-month U.S. T-bills obtained from the Federal Reserve database. To estimate downside beta, we impose the restriction that at least 200 non-missing return observations should exist in the past year for a particular stock. In our baseline analysis, we use the local market index for each country to calculate the downside betas where the market index is a market capitalization-weighted index that we construct from all individual equity returns available on Datastream. In robustness tests, we also entertain the possibility of market integration and estimate downside betas for all stocks using a global equity index.

To test the relation between downside beta and one-month-ahead returns, we conduct a discrete quintile portfolio analysis by sorting stocks according to their downside betas and compare the relative performances of the highest downside beta portfolio and the lowest downside beta portfolio. Specifically, quintile portfolios are formed every month from January 1989 to December 2014 by sorting equities based on their downside betas where quintile 5 contains stocks with the highest sensitivity to downward market movements and quintile 1 contains stocks with the lowest sensitivity to downward market movements. In this analysis, we combine all equities in our sample, thus stocks in each quintile may come from a multitude of countries. We compute the value-weighted average one-month-ahead return for each quintile and investigate whether there is a significant return difference between the highest and lowest downside beta quintiles. We also check whether the return differences between the extreme downside beta quintiles can be explained by the four-factor model of Carhart (1997). To do so, we regress the monthly return differences between extreme downside beta quintiles on the global market, size, value and momentum factors and observe whether the intercept terms (or alphas) obtained from these regressions are significantly positive.

We employ two methods to calculate the global asset pricing factors. First, we directly use the market, size, value and momentum factors that Fama and French (2012) calculate on a global scale.[3] One drawback of using Fama and French's global factors is that they only use data from 23 countries. Hence, we follow their methodology and construct a second set of global factors by incorporating data from all 51 countries. In other words, we extend the Fama-French global factors to include all countries in our sample.

The existence or non-existence of a relation between downside beta and future returns may be attributed to the correlation between downside beta and a firm-specific variable that is known to impact equity returns and the resulting confounding effect. Therefore, in addition to univariate tests, we also employ conditional (dependent) double sorts on a multitude of firm-specific variables and downside beta to have a deeper understanding of the relation between downside beta and expected returns. Specifically, each month we sort stocks into quintile portfolios based on various firm-specific variables and then, within each of these quintiles, we sort stocks into additional quintiles based on downside beta. For each first-stage sorting variable, this bivariate analysis provides 25 conditionally double-sorted portfolios. Quintile 1 is the combined portfolio of stocks with the lowest downside betas in each firm-specific variable

[3] These global factors are described and available at the international research returns section of the data library on Kenneth French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

quintile and Quintile 5 is the combined portfolio of stocks with the highest downside betas in each firm-specific variable quintile. We investigate whether the average return or alpha difference between the two extreme downside beta portfolios is significant.

We draw on the prior literature to select the first-stage sorting variables. First, we calculate the standard market beta (*Beta*) and upside beta (*Betaup*) as in Ang, Chen and Xing (2006).[4] We continue to use local value-weighted aggregate returns that we construct as a proxy for the market index in each country and impose the restriction that at least 200 non-missing return observations should exist in the past year for a particular stock. To examine the possibility that the size and/or value effects of Fama and French (1992) impact the relation between downside beta and expected returns, we use the logarithm of a firm's market value of equity (*Size*) and the ratio of the book value of equity to market value of equity (*BM*) as additional first-stage sorting variables. Another sorting variable is *Momentum* measured as the 11-month cumulative return of a stock during months t-12 to t-2 following Jegadeesh and Titman (1993). Amihud (2002) establishes the relation between illiquidity and the cross-section of equity returns, hence, we use *Zeros* defined as the proportion of zero-return days in local currency in each month as a sorting variable.[5] Idiosyncratic volatility which has been shown to have a negative relation with future stock returns by Ang et al. (2006) is also used as a sorting variable and calculated as the standard deviation of the residuals from a regression of excess stock returns on the excess market return in each month. We require that at least 15 non-missing return observations should exist in a month when we calculate idiosyncratic volatility for each stock.

[4] Specifically, upside beta is equal to the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns on the days that the market's excess return is greater than the average market excess return during the past year. Similarly, market beta is equal to the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns during the past year.

[5] Amihud (2002) uses the absolute daily return divided by the daily dollar trading volume in a particular month to measure illiquidity. Since trading volume data is scarcely available in the international setting, we use an illiquidity measure based on the proportion of zero-return days to obtain a metric that can be calculated for a large number of equities following Bekaert, Harvey and Lundblad (2007) and Lee (2011).

Since our variable of interest is constructed from the left-tail of the equity return distribution, we employ two additional risk measures that capture the effect of asymmetric return distributions on stock returns as sorting variables. Co-skewness (*Coskew)*, shown by Harvey and Siddique (2000) to have a negative relation with equity returns, is calculated as the coefficient of the squared excess market return term from a regression of the daily excess returns of a stock on the daily excess market returns and the squared daily excess market returns during the past year. Skewness (*Skew*) is the skewness of daily equity returns over the past year. A restriction that at least 200 non-missing return observations should exist during the past year is imposed when co-skewness and skewness are calculated.

Our final set of first-stage sorting variables is motivated by Frazzini and Pedersen (2014) who explain the beta anomaly, the association between high market betas and low alphas, with a model based on leverage and margin requirements. In this model which hinges on the funding liquidity phenomena defined as the market-level characteristic that describes the general availability of financing to investors, levered investors will be forced to face more restrictive margin requirements during periods of low funding liquidity. As levered investors are forced to liquidate their positions at potentially inopportune times, the fact that different stocks have different margin requirements results in a cross-sectional relation between equity returns and sensitivities to aggregate funding liquidity. We follow Frazzini and Pedersen (2014) and Chen and Lu (2014) to construct three measures of funding liquidity. *BetaFlev* directly measures the ability of financial institutions to provide financing to investors and is calculated as the sensitivity of a stock's return to the ratio of the sum of total assets across all financial sector firms in a country to the total market value of equity of the firms in this sector in a given month.[6] The other two funding liquidity metrics make use of the TED spread which is calculated as the difference between the 3-month LIBOR rate and the 3-month US T-bill rate and indicates the

[6] Firms that belong to the financial sector are identified according to the sector-specific codes available on Datastream.

perceived credit risk in the economy. *BetaVarTED* is the sensitivity of a stock's return towards the variance of daily changes in TED spread in a given month. *BetaDeltaTED* is the sensitivity of a stock's return to the monthly changes in the TED spread. All three funding liquidity sensitivities are calculated as the slope coefficient from a regression of monthly excess equity returns on the corresponding funding liquidity variables using three years worth of lagged monthly data with the restriction that at least 24 monthly observations should be available.

We also complement our univariate and bivariate analysis with multivariate regressions. The regression procedure follows Fama and MacBeth (1973). A cross-sectional regression is estimated for each month in the sample period. For each of the 312 months in our sample, one-month-ahead stock returns are regressed on downside beta and firm-specific variables described earlier. These monthly regressions produce a time-series of slope coefficients on the aforementioned cross-sectional predictors.[7] These monthly estimates are averaged and tests of statistical significance are performed using the Newey-West (1987) standard errors that take into account autocorrelation and heteroscedasticity in the time-series of slope coefficients.[8] Asparouhova, Bessembinder and Kalcheva (2010, 2013) argue that microstructure noise in security prices biases the results of empirical asset pricing specifications and suggest a methodological correction to eliminate these biases. This issue is expected to be more prevalent in international markets due to less liquid equity markets, especially in developing countries. Hence, we follow their suggestion and perform each monthly cross-sectional regression using a weighted-least squares (WLS) specification where each return is weighted by the observed gross return on the same security in the prior period.

[7] First 12 months are used to compute the downside beta coefficients, therefore, the first available month to perform the cross-sectional regression analysis is January 1989.

[8] A lag of 6 is used for the Newey-West correction. Results are robust to several other choices.

4. EMPIRICAL RESULTS

In this section, we first present the descriptive statistics of the key variables used in our empirical analyses. Second, we perform a univariate portfolio-level analysis of downside beta and investigate its persistence through time. Third, we report the results from conditional bivariate portfolios of downside beta and a large set of control variables. Finally, we present the results from firm-level Fama-MacBeth cross-sectional regressions.

4.1 Descriptive Statistics

Table 1 presents descriptive statistics along with correlation measures for the variables used in this study.[9] Statistics in Panel A of Table 1 are computed as the time-series averages of the cross-sectional values. We present the mean, standard deviation, 25th percentile, median, 75th percentile, minimum, maximum, skewness and kurtosis statistics for the downside beta measure and other firm-specific variables. The average number of monthly observations for downside beta is 19,917. As presented in Table 1, stocks in our global sample have a mean (median) downside beta of 0.779 (0.766) with a standard deviation of 0.487. The lowest (highest) downside beta is -0.311 (2.787) and the distribution of downside beta is not pronouncedly skewed or leptokurtic. The upside beta measure has a mean (median) value of 0.654 (0.644) indicating that the average firm in the sample is more sensitive to market movements during the periods when the market excess return is lower than its annual mean compared to the periods when it is higher. The distributions of both the upside beta and the standard market beta measures exhibit a fair amount of symmetry and well-behaved tails with mean values close to median values and mild skewness and kurtosis statistics.

Given the fact that many small firms show up in the international sample, the mean (median) value of the logarithmic market value of equity of our sample firms is 4.629 (4.568).

[9] We present descriptive statistics for monthly returns and downside beta measures for each individual country in Table I of the online appendix.

The book-to-market equity ratio exhibits a highly leptokurtic distribution especially due to some very large observations. The average momentum return is 5.7% for the sample firms whereas the median value is only 0.60%. The momentum variable exhibits a leptokurtic distribution due to equities that have rapidly increased (by as much as 384%) or declined (by as much as 70%) in value in an 11-month period. The proportion of zero-return days has an average value of about 28.5% which underlines the importance of controlling for the illiquidity effect in portfolio and regression analysis. Mean monthly idiosyncratic volatility is 2.10% and the average sample firm exhibits negative co-skewness with the market. Both the co-skewness and skewness variables have highly leptokurtic distributions and large volatilities with extreme values far from their central tendency measures. Peaked empirical distributions are also observed for the funding liquidity variables which have much lower means and medians compared to their standard deviations.

Panel B of Table 1 includes the time-series averages of the cross-sectional correlations for all variables. Several observations are worth mentioning. The correlations between the downside, upside and market beta measures vary between 0.51 and 0.79. Although these correlations are fairly high as would be expected, they are still far from being perfect and highlight the fact that stocks have different sensitivities to favorable and unfavorable market movements. Firm size is also mildly positively correlated with all beta measures with correlation coefficients varying from 0.29 to 0.40. Stock illiquidity as measured by the proportion of zero-return days is mildly negatively correlated with all beta measures with correlation coefficients varying from -0.32 to -0.44. The correlation coefficients also indicate that larger firms tend to be more liquid and have lower idiosyncratic volatility. Another important observation is that co-skewness is negatively correlated with downside beta which comes as no surprise since both measures capture the effect of asymmetric higher order moments of the empirical return distribution. Also, negative skewness can be viewed as a proxy for downside risk so that stocks with negative skewness (and large in absolute magnitude) are expected to have higher downside beta. Finally, we observe that the funding liquidity measures are not strongly correlated with any of the other firm-specific variables.

4.2 Univariate Portfolio Analysis

In this section, we use portfolio analysis where quintiles are formed every month by sorting global stocks according to their downside betas. One-month-ahead value-weighted returns are calculated for each quintile to see whether the zero-cost portfolio that takes a long position in stocks with the highest downside betas and a short position in stocks with the lowest downside betas generates a significant return.[10]

Table 2 presents the time-series averages of downside beta and value-weighted returns for each of the downside beta-sorted quintiles. In Panel A, our results are based on the full sample that includes 7,450,559 firm-month observations. By construction, average downside beta increases from 0.04 to 1.56 as one moves from quintile 1 to quintile 5. The average raw returns of all quintiles are positive and significant, except quintile 5. More importantly, the pattern for the mean returns seems to be generally flat with only a -0.02% return difference between the extreme downside beta quintiles. When we look at the abnormal returns (alphas) from a four-factor model, we observe a similar picture. For the global pricing factors that we directly borrow from Fama and French (2012), none of the alphas are significant and the abnormal return difference between the extreme downside beta quintiles is -0.11% with a t-statistic of -0.70.[11] The results are similar from the global pricing factors that we self-

[10] Our main analysis focuses on the value-weighted returns to reduce the impact of companies with small market capitalizations on the results. However, we also repeat all the analysis based on equal-weighted portfolio returns. The results are qualitatively similar and are presented in Table II of the online appendix.

[11] The global pricing factors of Fama and French (2012) are available starting from July 1990. Therefore, although the downside beta quintiles start being formed in January 1989, the alpha results omit the 18-month gap between these two dates.

construct.[12] The alpha spread between quintiles 5 and 1 is economically and statistically insignificant; -0.18% with a t-statistic of -0.94.

In Panel B of Table 2, we recognize the fact that some equities in our global sample are illiquid and this may have an impact on our results. To remove the effect of illiquid stocks, we repeat our analysis by dropping a stock-month observation from the sample if the proportion of zero-return days based on local currency in that month is more than 80% similar to Lee (2011).[13] For this sample which includes 6,605,403 firm-month observations, the results are similar to those from the full sample. Specifically, the mean returns are generally flat across the quintiles with the lowest average returns being observed for quintile 5. The mean return and alpha differences for the zero-cost portfolio are never significantly positive. On the contrary, the return and alpha spreads in Table 2 Panel B, are negative with an average return difference of -0.11% and abnormal return difference of -0.24% or -0.42% depending on the global pricing factors being used.[14]

In Panels C and D, we exclude the U.S. stocks to see the relation between downside beta and equity returns in the rest of the world. This procedure yields about 5.9 million firm-month observations and the number drops further to about 5.1 million when we omit stocks that have a high proportion of zero-return days in a particular month. The range for average downside beta becomes tighter across the portfolios with quintile 1 (quintile 5) having an average downside beta of 0.12 (1.46). More importantly, the conclusions we draw from the full sample that includes the U.S. stocks remain valid when we exclude those stocks from the analysis. In

[12] We calculate the self-constructed global pricing factors in two alternative ways. First, we use the methodology in Fama and French (2012) and define big (small) stocks as those that are in the top 10% (bottom 90%) of market capitalization. Second, we follow the original Fama and French (1993) study and define big (small) stocks as those that are in the top 50% (bottom 50%) of market capitalization. All of our results are robust to using either of these self-constructed global pricing factors. We use the global pricing factors that we directly borrow from Kenneth French's website in the subsequent tables since they are publicly available.

[13] We report the results from imposing this illiquidity screen for only this section. All of our subsequent results are robust to omitting the stocks with an extreme proportion of zero-return days.

[14] Panel B of Table 2 shows that when the global market, size, value, and momentum factors of Fama-French (2012) are used, the alpha spread between the extreme downside beta quintiles turn out to be negative and significant; -0.42% per month with a *t*-statistic of -2.

both Panels C and D, the mean returns of all quintiles are positive and the pattern is mostly flat with the lowest average returns being observed for the highest downside beta stocks. The average return differences are -0.14% and -0.19% depending on whether we include illiquid stocks or not and these differences are statistically indistinguishable from zero. The alphas in both panels are negative and they become statistically significant as one moves to the higher downside beta quintiles. For the global pricing factors that we borrow from Fama and French (2012), the abnormal return difference between the extreme downside quintiles is -0.29% with a t-statistic of -1.77. When we omit the firm-months with an extreme proportion of zero-return days, the return to the zero-investment portfolio becomes -0.30% with a t-statistic of -1.88.

These results indicate that the positive relation between downside beta and equity returns does not exist in the global context. In fact, depending on the stock sample and factor model used to estimate abnormal returns, stocks with high (low) downside beta generate low (high) risk-adjusted returns, providing some evidence of a (weak) negative relation between downside beta and expected returns.[15]

The downside beta estimates and those underlying the portfolio sorts in Table 2 are for the portfolio formation month, not for the subsequent month over which we measure average returns and alphas. According to theory, investors are expected to pay high (low) prices for stocks that have exhibited low (high) downside beta in the past in the expectation that this behavior will be repeated in the future, but a natural question is whether these expectations are rational. We investigate this issue by examining the average portfolio transition matrix. Specifically, Table 3 presents the average probability that a stock in quintile *i* (defined by the

[15] The analysis in this section relies on self-constructed equity indices for each market to calculate downside beta metrics. Datastream also provides equity market indices for each country; however, these indices only use a subset of the firms that are listed. Hence, in order to provide a more complete coverage of each market, we construct our own local country indices for our baseline analysis. However, our results are robust to using Datastream country equity indices rather than our self-constructed local indices. These results are presented in Table III of the online appendix.

rows) in one month will be in quintile *j* (defined by the columns) in the subsequent 12 months.[16] If downside beta is completely random, then all the probabilities should be approximately 20%, since a high or a low downside beta in one month should say nothing about the downside beta values in the following 12 months. Table 3 shows that the diagonal elements vary between 24.54% and 42.04%. In other words, a particular stock is more likely to find itself in a different portfolio than its initial placement rather than staying put. These results suggest that downside beta is not a strongly persistent equity characteristic. Put differently, the historical estimates of downside beta do not predict future downside beta estimates and hence, *Betadown* observed over the past 12 months does not capture future downside risk that theoretically leads to higher stock returns.

4.3. Bivariate Portfolio Analysis

The lack of a relation between downside beta and equity returns in the univariate portfolio analysis may be due to existence of a confounding variable that is associated with both downside beta and equity returns. For example, Panel B of Table 1 reveals that larger and more liquid stocks have higher downside betas on average. Prior literature also suggests that firm size (Banz, 1981) and stock liquidity (Amihud, 2002) have a negative relation with the cross-section of expected equity returns. Therefore, it may be the case that a positive relation between downside beta and stock returns is being shadowed by the effect of such confounding variables. To test this conjecture, we use two-stage dependent sorts based on various firm-specific variables and downside beta.

Table 4 presents the results from the bivariate portfolio analysis. Panel A covers the full sample of global stocks, whereas Panel B excludes equities trading in the U.S. Looking at the

[16] As discussed earlier, downside beta is estimated using the past one year of daily data for each month in our sample. When constructing the transition matrix, putting a less than 12-month gap between the lagged and lead downside beta variables generates artificial persistence because of overlapping monthly observations. Hence, we investigate the 12-month-ahead persistence of downside beta in Table 3.

average returns for the individual downside beta quintiles, we observe that equities that belong to quintile 2 have the best average performance whereas the lowest mean returns are observed for quintile 5 in almost all cases. More important conclusions can be drawn from the last two columns of the table. For the sample of all global stocks in Panel A, we observe that the mean return difference between the extreme return quintiles is insignificant for all first-stage sorting variables. The most positive one-month-ahead high-minus-low downside beta return difference is observed for *BetaDeltaTED* and is equal to 0.08% with a t-statistic of 0.31. The most negative return difference is observed for *Zeros* and is equal to -0.23% with t-statistic of -0.81. When we look at the alphas for the zero-investment portfolios, we observe that they vary from -0.26% to 0.01% with t-statistics between -1.64 and 0.09. When the U.S. stocks are excluded from the sample in Panel B, the individual quintile return patterns remain similar; however, the magnitude of average returns drops across the board. We again find no evidence for a significantly positive relation between downside beta and equity returns for all first-stage sorting variables looking at both the mean and abnormal return differences between the extreme downside beta quintiles.

Indeed, in Panel B of Table 4, controlling for upside beta, size, momentum and illiquidity, we find a negative and significant risk-adjusted return spreads between the extreme downside beta portfolios. Specifically and respectively, the corresponding alpha spreads are -0.31% per month (t-stat. = -2.12), -0.37% per month (t-stat. = -2.59), -0.34% per month (t-stat. = -2.27), and -0.39% per month (t-stat. = -2.37).

4.4 Firm-Level Cross-Sectional Regressions

Following Fama and MacBeth (1973), we run firm-level cross-sectional regressions for each month, where the dependent variable is the one-month-ahead returns on each stock and the independent variables are lagged downside beta and various firm-specific controls. Each monthly regression is estimated using a weighted least squares methodology following Asparouhova, Bessembinder and Kalcheva (2010) where each observed return is weighted by one plus the observed prior return on the stock.[17] This analysis aims to control for factors that may complicate the detection of a significant link between downside beta and expected equity returns in a more comprehensive way.

Table 5 presents the regression coefficients from various specifications that employ different sets of control variables for both the full sample of global stocks and the subsample that excludes the U.S. stocks. The reported coefficients are time-series averages and the reported t-statistics are based on the time-series variation of regression coefficients adjusted using the Newey-West (1987) procedure. The first four specifications present results for the whole world. In the first specification that utilizes downside beta as the sole explanatory variable, we observe that the coefficient of *Betadown* is -0.0017 with an insignificant t-statistic of -0.97. The second regression adds upside beta and standard market beta to the specification and none of the beta measures have a significant relation with one-month-ahead returns. The third and fourth regressions iteratively include additional control variables and our main finding that downside beta has no predictive power for one-month-ahead equity returns persists. The last four specifications present results for the sample of non-U.S. stocks. The coefficients for *Betadown* vary from -0.0030 to 0.0015 and none of them are statistically significant with t-statistics between -1.50 and 1.36. Average R-squared values are in the range of 1.02% and 7.16% across the eight regressions presented in the table. These results support our earlier findings from portfolio analyses and collectively point out to a lack of a significant association between downside beta and expected returns in the global context.

To briefly summarize the coefficients of the control variables, a few points can be made. As pointed out earlier, neither upside beta nor standard market beta has a significant relation

[17] We also perform each monthly cross-sectional regression using the ordinary least squares method. Our results are qualitatively robust to these choices and are presented in Table IV of the online appendix.

with future stock returns. For the sample of all global stocks, the book-to-market ratio and momentum returns have significantly positive coefficients, whereas idiosyncratic volatility and skewness have significantly negative coefficients as suggested by the prior literature. However, the effects of book-to-market ratio and idiosyncratic volatility on equity returns become weaker in the non-U.S. sample. Finally, among the funding liquidity variables, only *BetaDeltaTED* has a positive and significant coefficient, consistent with Frazzini and Pedersen (2014).

5. ROBUSTNESS CHECK

In this section, we report our results from a battery of robustness checks. First, we repeat the portfolio-level analyses using alternative measures of downside beta. Second, we examine the main findings using a sample that excludes high volatility stocks. Third, we use the global market index to estimate downside beta and test if our results are sensitive to the choice of a market index. Fourth, we repeat our main analysis for various country groupings. Fifth, we analyze the cross-sectional relation between downside beta and future stock returns for each country separately. Finally, we provide evidence that downside beta does not explain the cross-sectional differences in contemporaneous returns.

5.1 Alternative Measures of Downside Beta

The analysis in Section 4 defines the periods when the market is down as the days during which the market excess return is lower than its mean during the past year. Realized average market returns are time-dependent and they may be particularly high or low during different periods. Thus, we construct two alternative measures of downside beta by choosing new cut-off points that do not depend on the empirical distribution of the market excess return to differentiate down markets. These cut-off points are zero and the risk-free rate of return. In Panels A and B of Table 6, downside beta is defined as the sensitivity of excess stock returns to excess market returns during days when the market excess return is less than zero and the risk-free rate (R_f), respectively:[18]

$$Zero\ Cutoff\ Betadown_t^{i,j} = \frac{Cov_{t-250,t-1}(r^{i,j}, r^{m,j} | r^{m,j} < 0)}{Var_{t-250,t-1}(r^{m,j} | r^{m,j} < 0)} \quad (2)$$

$$Risk - free\ Rate\ Cutoff\ Betadown_t^{i,j} = \frac{Cov_{t-250,t-1}(r^{i,j}, r^{m,j} | r^{m,j} < R_f)}{Var_{t-250,t-1}(r^{m,j} | r^{m,j} < R_f)} \quad (3)$$

The results show that, contrary to the U.S. findings in the literature, there is no premium to holding stocks with high downside beta. The raw return difference of the zero-cost portfolio is only 6 or 4 basis points with t-statistics of -0.22 or -0.16 depending on the downside beta measure being used. Similarly, the corresponding alpha differences between the extreme downside beta quintiles are 14 and 12 basis points with t-statistics of -0.96 and -0.81, respectively.

One criticism that could be pronounced for the baseline downside beta measure is that it treats market excess returns below the mean during the past year as market downturns and it does not really extract information from the tail of the market excess return distribution. To address this potential concern, we construct two more measures of downside beta by moving further on the left-tail to define down markets. Specifically, a down market is defined as the days during which the market excess return is less than its 25th or 10th percentile during the past year.

$$25th\ Percentile\ Betadown_t^{i,j} = \frac{Cov_{t-250,t-1}(r^{i,j}, r^{m,j} | r^{m,j} < P25^{m,j})}{Var_{t-250,t-1}(r^{m,j} | r^{m,j} < P25^{m,j})} \quad (4)$$

$$10th\ Percentile\ Betadown_t^{i,j} = \frac{Cov_{t-250,t-1}(r^{i,j}, r^{m,j} | r^{m,j} < P10^{m,j})}{Var_{t-250,t-1}(r^{m,j} | r^{m,j} < P10^{m,j})} \quad (5)$$

[18] In this table, we only present results for the whole sample of global stocks; however, our results are robust to the omission of U.S. stocks for each alternative downside beta metric and are presented in Table V of the online appendix.

where $P25^{m,j}$ and $P10^{m,j}$ denote the 25th and 10th percentiles of the market excess return distribution in country *j* during the past 250 trading days. Panels C and D of Table 6 present the results of this analysis. One observation is that the range for the downside beta measures is wider when down markets are defined further in the left tail. For example, quintile 1 (quintile 5) has an average downside beta of -0.64 (2.38) when we use the 10th percentile cut-off. The relationship between downside beta and one-month-ahead equity returns is still insignificant. For the 25th percentile cut-off, the mean return (alpha) difference between the extreme downside beta quintiles is 5 (-16) basis points per month, whereas for the 10th percentile cut-off, the raw return (alpha) difference is 3 (-15) basis points per month. All these return and alpha spreads are insignificantly different from zero.

Finally, in Panel E, we continue to define market downturns as the days during which market excess return is less than its average value; however, this time we extend the measurement period from one year to two years to calculate downside beta:

$$Extended\ Window\ Betadown_t^{i,j} = \frac{Cov_{t-500,t-1}(r^{i,j}, r^{m,j} | r^{m,j} < \mu^{m,j})}{Var_{t-500,t-1}(r^{m,j} | r^{m,j} < \mu^{m,j})} \quad (6)$$

Again, the average return and alpha of the zero-investment portfolio are insignificant with values equal to -1 and -12 basis points per month with t-statistics of -0.03 and -0.77, respectively. These results indicate that the lack of a significant relation between downside beta and expected returns is not driven by the way that downside beta is measured.

5.2 Excluding High Volatility Stocks

Ang, Chen and Xing (2006) suggest that stock return volatility can be a confounding factor while examining the relationship between downside beta and expected returns. The authors argue that there are two reasons why this complication may occur. First, when return volatility is high, downside beta estimates tend to contain substantial measurement error. Second, there is a mechanical relation between volatility and downside beta. After all, downside beta can be expressed as the downside correlation between a stock's excess return and the market's excess return multiplied by the ratio of the standard deviation of the stock's excess return to that of the market's excess return conditional on down markets. Therefore, holding the downside correlation constant, a higher stock volatility during down markets implies a higher downside beta. Since theory suggests that downside beta is positively related to expected returns and the empirical literature finds an anomalous negative relation between volatility and expected returns; the ability of downside beta to explain the cross-section of equity returns may be shadowed. Although we entertain this possibility in our bivariate and multivariate tests by including idiosyncratic volatility as a control variable, we use an alternative approach in this subsection.

Specifically, to remove stocks with high volatility from our sample, we calculate the standard deviation of daily returns for each stock every month and sort equities into quintiles based on return volatility for each country. Next, we drop the 20% of stocks in the highest volatility quintile from the sample for each country-month. Omitting the stocks with high volatility aims to uncover a significant link between downside beta and future stock returns that may have been blurred in our previous analyses. This screen brings the number of stocks in our global sample to about 6 million and about 4.8 million of those belong to non-U.S. markets. Table 7 presents the results for a univariate analysis of returns based on downside beta for this reduced sample. Panel A shows that the mean return difference between the extreme downside beta quintiles for all global stocks is only 6 basis points per month with a t-statistic of 0.23. Similarly, the abnormal return of the zero-investment portfolio is -6 basis points per month with a t-statistic of -0.35. In Panel B, when the U.S. stocks are excluded from the sample, we find that the average raw return and alpha differences between the highest and lowest downside beta stocks are -1 basis points and -20 basis points with t-statistics of -0.06 and -1.15, respectively. These results suggest that highly volatile equities are not the culprit behind the lack of a significant relation between downside beta and expected returns.

5.3 Using the Global Market Index

One potential criticism that may be brought forward for our results is that equity returns do not only react to changes in the local market index, but stock exposures to the global market index also play a major role in the cross-sectional pricing of individual stocks. Assuming so ignores the fact that equity markets in different countries are integrated. Hence, in this section, we use an alternative model where the expected return on a security is defined by its covariance with the global market portfolio.[19] The downside beta measure that takes market integration into account is calculated as the sensitivity of a stock's excess return to the excess return of the global market index on the days that the global market index excess return has lagged behind its mean during the past year. The global market index is taken from Datastream that constructs a market capitalization-weighted index using more than six thousand equities worldwide.

As in our baseline analysis, we form univariate quintiles each month based on the new downside beta measure and compare the performances of the highest and lowest downside beta portfolios. Panels A and B of Table 8 present the results of this analysis for all global stocks and all non-U.S. stocks, respectively. We find that the extreme downside beta quintiles have similar returns with 51 basis points for quintile 1 and 56 basis points for quintile 5 and the difference between these values is insignificant with a t-statistic of 0.15. Similar results apply to Panel B. When the U.S. stocks are excluded from the sample, the average return difference between the highest and lowest downside beta quintiles is negative but statistically insignificant; -0.22% per month with a t-statistic of -0.73. A notable point in Panel B of Table

[19] In the international asset pricing models of Solnik (1974) and Adler and Dumas (1983), exchange rate risk is also priced. In this study, we use U.S. dollar denominated returns, therefore, there is no effect of exchange rate risk on expected returns in our empirical analyses.

8 is that the alpha spread is negative and statistically significant; -0.51% per month with a t-statistic of -2.11. These results suggest that our main finding is robust to the assumption of complete market integration.

5.4 Country Groupings

In this subsection, rather than pooling all global equities together, we investigate whether a relation between downside beta and expected equity returns exists when we group countries based on their economic development levels or geographical locations.

The first dichotomy we use is developed versus emerging markets which are defined in Section 2. The results for the univariate portfolio analysis are presented in Panels A and B of Table 9. For developed markets, the mean return difference between the extreme downside quintiles is 0.13% with a t-statistic of 0.43 and the abnormal return of the zero-cost portfolio is -0.04% with a t-statistic of -0.18. The inability of downside beta to generate significant return differences between extreme quintiles also carries out to emerging markets. For this subsample, the mean return (alpha) for the zero-cost portfolio is -0.24% (-0.55%) with a t-statistic of -0.59 (-1.39).

Next, we focus on two subsamples among developed markets, namely G10 and G7. Countries included in G10 are Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, the United Kingdom and the United States whereas Belgium, Netherlands, Sweden and Switzerland are not included in G7. The result for the univariate analysis for these two subsamples are reported in Panels C and D of Table 9. We find that the mean return (alpha) of the zero-cost portfolio is 0.16% (0.00%) for the G10 sample and the analogous figures are 0.15% (-0.02%) for the G7 sample which are all statistically insignificant.

Finally, we repeat the analysis for Europe and the Asia-Pacific region separately in Panels E and F of Table 9. We again find no relation between downside beta and expected equity returns in these subsamples. The mean return (alpha) difference between extreme downside beta quintiles is 0.20% (0.12%) with a t-statistic of 0.66 (0.64) in Europe and -0.18% (-0.52%) with a t-statistic of -0.45 (-1.48) in the Asia-Pacific region. These results collectively show that our main results translate to various country groupings.

5.5 Individual Country Analysis

In our prior analysis, we pool equities from different markets and form univariate or bivariate portfolios using these combined samples. It is still possible that a significantly positive relation between downside beta and expected equity returns may exist in some countries; however, this relation may be shadowed in the large sample due to the lack of this relation in other countries. Therefore, in this subsection, we repeat our univariate portfolio analysis for each market separately.

We again calculate downside beta for each stock following Eq. (1) where the return for the market index is measured by the market capitalization-weighted aggregate return for the local country. However, this time, we form the downside quintiles using equities from a single market and we repeat this procedure for all 51 markets in our sample. As a result of this procedure, we are able to examine if downside beta can explain the cross-sectional dispersion in future stock returns for particular countries. Table 10 presents the value-weighted quintile returns and alphas associated with zero-cost portfolios for each country. For this analysis, we exclude high volatility stocks by dropping the 20% of stocks in the highest volatility quintile for each country-month as in Section 5.2.[20] The market, size, value and momentum factors used to calculate alphas are estimated separately for each country following Fama and French (1993)

[20] We repeat the analysis of this subsection both for the full sample that does not exclude high volatility stocks and for equally-weighted quintile returns. Our results indicate that there is no significantly positive relation between downside beta and expected equity returns and are presented in Table VI of the online appendix.

and Carhart (1997). Panels A and B of Table 10 present the results for developed and emerging markets, respectively.

The results for the developed countries in Panel A indicate that, for the zero-cost portfolio that buys stocks with the highest downside market exposures and sells stocks with the lowest downside market exposures, only one of the alpha spreads (for Luxembourg) is positive but insignificant with a t-statistic of 0.89. A notable point in Panel A is that the alpha spreads for 23 out of 24 developed countries are negative, 14 of which are significant at the 10% level or better. Specifically, the alpha spreads for nine countries (Australia, Denmark, France, Greece, Hong Kong, Israel, Italy, Singapore, and Sweden) are negative and economically large, in the range of -0.52% to -1.34% per month, and highly significant with t-statistics ranging from -2.26 to -4.75. The alpha spreads for five countries (Belgium, Canada, Japan, Switzerland, and UK) are negative, in the range of -0.34% to -0.42% per month, and marginally significant with t-statistics ranging from -1.65 to -1.83.

Similar to our findings for the developed countries, Panel B of Table 10 shows that 23 out of 27 emerging markets in our sample exhibit negative alphas. Moreover, none of the positive alphas are statistically significant. The most positive t-statistic associated with these abnormal returns is 0.83. One noteworthy point from Panel B is that the alpha spreads for eight emerging markets are negative and significant at the 10% level or better. Specifically, the alpha spreads for six emerging markets (Finland, Malaysia, Morocco, Philippines, Russia, and Sri Lanka) are negative and economically large, in the range of -0.73% to -1.08% per month, and highly significant with t-statistics ranging from -2.15 to -2.94. The alpha spreads for two countries (Hungary and South Korea) are negative and marginally significant.

The widespread lack of significant abnormal returns from strategies that are based on a hypothetical positive relation between downside betas and expected returns attests to the non-existence of this relation also at the individual country level.

5.5 Contemporaneous Returns

For our research design, we follow a long tradition in finance starting with Fama and MacBeth (1973) by calculating predictive betas based on conditional information at a particular period and examining one-period-ahead returns. This approach is also suitable in a practical sense since a return determinant must successfully predict future returns rather than be correlated with contemporaneous returns in order to present a trading strategy for investors to exploit. Still, in this subsection, we repeat our previous univariate portfolio analysis, but report the contemporaneous rather than one-month-ahead average returns and alphas for each downside quintile. We report 12-month contemporaneous returns to align the return measurement period with the downside beta measurement period and lend some comparability to our results with those of Ang, Chen and Xing (2006) who uncover a significant link between downside beta and contemporaneous equity returns for the U.S. market. In Panel A of Table 11, for the sample of all global stocks, the 12-month average contemporaneous return difference between the extreme downside beta quintiles is 7.59% with an insignificant t-statistic of 1.63. When we account for the global asset pricing factors, the abnormal return to the zero-investment portfolio is 7.13% with a t-statistic of 1.47. In Panel B, when only U.S. stocks are included in the sample, we find that there is a significantly positive relation between contemporaneous equity returns and downside beta consistent with Ang, Chen and Xing (2006). The raw return (alpha) difference between extreme downside beta quintiles is 20.60% (18.11%) with a t-statistic of 3.23 (3.03). Finally, when the U.S. stocks are omitted from the global sample in Panel C, it becomes clear that the significant link between downside beta and contemporaneous returns in the U.S. is an exception. The raw return (alpha) difference between the highest and lowest downside beta quintiles becomes 3.68% (3.07%) with a t-statistic of 0.92 (0.74). These results suggest that downside beta cannot explain the cross-sectional differences in contemporaneous stock returns in the global context.

6. CONCLUSION

Prior theoretical literature based on rational preferences, behavioral biases or investment constraints suggests a role for downside risk in explaining asset returns. If investors treat a downside loss differently from an upside gain of equal magnitude, there could be a significantly positive link between downside risk and expected stock returns. There have been various attempts in the past to test this relation in the U.S. context. Particularly, Ang, Chen and Xing (2006) find a downside risk premium in the cross-section of U.S. stocks. There also exist some international studies that investigate the relation between downside risk and equity returns, but almost all of these studies focus on aggregate market returns rather than the cross-section of individual stock returns. Our paper contributes to the literature by analyzing the downside risk-expected return relation at the firm-level in a global context that spans 51 countries.

The univariate analysis that sorts equities into portfolios based on their downside beta measures fails to find a significant average or abnormal return difference between extreme downside beta quintiles. Results from bivariate analyses that employ conditional double-sorts on various firm-specific variables and downside beta also generate insignificant risk premia for holding stocks with high downside betas. Firm-level cross-sectional regressions corroborate the results from portfolio analyses and reveal that specifications that regress one-month-ahead equity returns on downside beta and various firm-specific control variables produce insignificant coefficients for the downside beta variable. We test the robustness of our results by focusing on only non-U.S. equities, calculating new downside beta measures that employ alternative left-tail cut-offs for the market return distribution, excluding highly volatile and highly illiquid stocks from the sample, entertaining the possibility of market integration by using the global market index to calculate downside beta, focusing on various country groupings and placing each country under the microscope separately. None of these additional analyses are able to find a significant relation between downside beta and expected stock returns. To investigate the persistence of downside beta, we calculate the 12-month-ahead transition probabilities of stocks from one downside quintile to another and come to the conclusion that downside beta is not a strongly persistent firm characteristic. Finally, we find that there is no significant contemporaneous relation between downside beta and expected returns on individual stocks trading in international markets. Our results collectively suggest that downside beta does not have a significant role in explaining the cross-section of equity returns at a global scale.

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Table 1. Descriptive Statistics and Correlation Matrix

This table presents the descriptive statistics and correlation matrix for downside beta and various firm-specific variables calculated across 51 countries. *Betadown* (*Betaup*) is the monthly downside (upside) beta calculated as the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns on the days that the market's excess return is less (greater) than the average market excess return during the past year in each country. *Beta* is the monthly market beta calculated as the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns during the past year in each country. The return on the market index for each country corresponds to a value-weighted return constructed from individual equity returns. *Size* is the logarithm of market value of equity. *BM* is one plus the logarithm of the ratio of the book value of equity to the market value of equity. *Momentum* is the cumulative return of a stock during the past 11 months after skipping one month. *Zeros* is the proportion of zero-return days in local currency in each month. *Ivol* is the standard deviation of error terms calculated from a market model which uses daily returns in each month. *Coskew* is the coskewness calculated as the coefficient of the squared excess market return term from a regression of the daily excess returns of a stock on the daily excess market returns and the squared daily excess market returns in the past year. *Skew* is the skewness of daily returns during the past year. *BetaFlev* is the sensitivity of a stock's return towards the ratio of the sum of total assets across all financial sector firms in a country to the total market value of equity of the firms in this sector in a given month. *BetaVarTED* is the sensitivity of a stock's return towards the variance of daily changes in TED spread in a given month. *BetaDeltaTED* is the sensitivity of a stock's return towards monthly changes in the TED spread. TED spread is the difference between the 3-month LIBOR rate and the 3-month US T-bill rate. Panel A presents the average number of observations, mean, standard deviation, 25th percentile, median, 75th percentile, minimum, maximum, skewness and kurtosis statistics for each variable. Statistics are computed as the time-series averages of the monthly cross-sectional means. Panel B presents the time-series averages of the monthly correlations between the variables.

Panel A. Summary Statistics

	Avg. Obs	Mean	Std Dev	25th Per	Median	75th Per	Min	Max	Skewness	Kurtosis
Betadown	19,917	0.779	0.487	0.439	0.766	1.096	-0.311	2.787	0.180	3.400
Betaup	19,917	0.654	0.519	0.316	0.644	0.985	-0.628	2.914	0.074	3.810
Beta	19,917	0.708	0.397	0.415	0.680	0.977	-0.076	2.313	0.363	3.084
Size	19,302	4.629	2.084	3.209	4.568	6.016	-0.173	10.960	0.047	3.050
BM	15,757	0.564	0.365	0.317	0.515	0.757	-0.045	3.950	0.742	10.944
Momentum	19,917	0.057	0.421	-0.204	0.006	0.245	-0.697	3.844	1.431	8.539
Zeros	19,917	0.285	0.291	0.060	0.173	0.430	0.000	1.000	1.110	3.173
Ivol	19,613	0.021	0.013	0.012	0.018	0.027	0.002	0.086	1.186	4.828
Coskew	19,917	-2.308	10.856	-6.366	-1.392	2.652	-37.117	73.453	-0.501	9.009
Skew	19,917	0.270	0.646	0.014	0.241	0.489	-1.232	10.846	0.171	64.443
BetaFlev	17,703	-0.008	0.019	-0.014	-0.005	0.001	-0.075	0.086	-1.331	11.911
BetaVarTED	17,775	0.387	24.229	-14.850	-0.810	14.113	-54.052	148.517	-0.360	50.635
BetaDeltaTED	17,775	-0.078	0.143	-0.157	-0.067	0.011	-0.483	0.549	-0.393	4.870

Table 1 (continued)

Panel B. Correlation Matrix

	Betadown	Betaup	Beta	Size	BM	Momentum	Zeros	Ivol	Coskew	Skew	BetaFlev	BetaVarTED	BetaDeltaTED
Betadown	1.000												
Betaup	0.509	1.000											
Beta	0.790	0.763	1.000										
Size	0.292	0.328	0.398	1.000									
BM	-0.077	-0.071	-0.099	-0.205	1.000								
Momentum	0.013	0.007	0.019	0.174	0.007	1.000							
Zeros	-0.380	-0.316	-0.444	-0.517	0.105	-0.076	0.172	1.000					
Ivol	0.119	-0.006	0.072	-0.237	0.028	-0.100	0.157	-0.253	1.000				
Coskew	-0.402	0.443	0.030	0.047	0.000	-0.005	0.011	0.036	-0.105	1.000			
Skew	-0.070	-0.003	-0.042	-0.047	0.022	0.164	0.039	0.040	0.050	0.059	1.000		
BetaFlev	-0.097	-0.081	-0.113	-0.064	0.022	0.004	0.012	0.052	0.008	0.008	0.002	1.000	
BetaVarTED	-0.015	0.010	0.006	0.050	-0.014	-0.028	-0.009	-0.009	-0.026	0.025	0.002	0.055	1.000
BetaDeltaTED	-0.099	-0.058	-0.098	0.017	-0.003	0.032	0.004	0.048	-0.105	0.033	-0.011	0.019	0.097

Table 2. Value-Weighted Returns to Downside Beta Quintiles

This table presents return comparisons between equity quintiles formed based on *Betadown*. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns, two alpha measures for each quintile and number of observations. Alpha 1 is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). Alpha 2 is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors that we self-construct. The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Panels A and C present results for the whole world and the whole world excluding US, respectively. Panels B and D present results for the whole world and the whole world excluding US after dropping stocks with excessive zero-return days, respectively. *Betadown* is defined in Table 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Whole World

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.04	0.48	0.76	1.04	1.56	
Mean return	0.59	0.71	0.67	0.65	0.57	-0.02
	(3.31)	(3.74)	(2.89)	(2.21)	(1.49)	(-0.08)
Alpha 1	-0.01	0.10	-0.02	-0.09	-0.12	-0.11
	(-0.10)	(1.35)	(-0.30)	(-1.24)	(-1.36)	(-0.70)
Alpha 2	-0.29	-0.10	-0.19	-0.34	-0.47	-0.18
	(-1.79)	(-0.68)	(-1.02)	(-1.72)	(-2.32)	(-0.94)
Observations	7,450,559					

Panel B. Whole World Excluding Stocks with Excessive Zero-Return Days

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.07	0.55	0.82	1.09	1.60	
Mean return	0.66	0.75	0.66	0.67	0.55	-0.11
	(3.67)	(3.77)	(2.69)	(2.18)	(1.43)	(-0.38)
Alpha 1	-0.17	0.05	-0.15	-0.31	-0.59	-0.42
	(-1.25)	(0.34)	(-1.01)	(-1.76)	(-2.93)	(-2.00)
Alpha 2	-0.23	-0.02	-0.24	-0.35	-0.47	-0.24
	(-1.49)	(-0.12)	(-1.38)	(-1.75)	(-2.29)	(-1.33)
Observations	6,605,403					

Table 2 (continued)

Panel C. Whole World Excluding US

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.12	0.50	0.76	1.02	1.46	
Mean return	0.48	0.51	0.53	0.52	0.33	-0.14
	(2.20)	(2.24)	(2.03)	(1.65)	(0.85)	(-0.53)
Alpha 1	-0.19	-0.16	-0.20	-0.27	-0.48	-0.29
	(-1.30)	(-1.43)	(-1.71)	(-2.31)	(-3.62)	(-1.77)
Alpha 2	-0.34	-0.22	-0.27	-0.44	-0.67	-0.33
	(-1.73)	(-1.12)	(-1.23)	(-1.77)	(-2.76)	(-1.62)
Observations	5,893,093					

Panel D. Whole World Excluding U.S. Stocks and Stocks with Excessive Zero-Return Days

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.17	0.58	0.83	1.07	1.50	
Mean return	0.51	0.57	0.49	0.55	0.32	-0.19
	(2.15)	(2.43)	(1.79)	(1.66)	(0.79)	(-0.76)
Alpha 1	-0.19	-0.12	-0.25	-0.26	-0.49	-0.30
	(-1.33)	(-0.98)	(-2.38)	(-2.24)	(-3.59)	(-1.88)
Alpha 2	-0.30	-0.13	-0.38	-0.46	-0.67	-0.37
	(-1.31)	(-0.63)	(-1.76)	(-1.86)	(-2.69)	(-2.21)
Observations	5,076,942					

Table 3. Transition Matrix

This table presents the transition matrix for *Betadown* at a lag of twelve months. At each month *t*, all stocks in the sample are sorted into quintiles based on an ascending ordering of *Betadown*. The procedure is repeated in month *t*+12. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. For each *Betadown* quintile portfolio in month *t*, the percentage of stocks that fall into each of the month *t*+12 *Betadown* quintile portfolios is calculated. The table presents the time-series averages of these transition probabilities. Each row corresponds to a different month *t Betadown* portfolio and each column corresponds to a different month *t*+12 *Betadown* portfolio. *Betadown* is defined in Table 1.

	Quintile 1	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**
Quintile 1	33.33%	23.99%	17.75%	13.87%	11.05%
Quintile 2	24.37%	28.49%	21.99%	15.65%	9.50%
Quintile 3	17.65%	22.14%	24.54%	21.50%	14.17%
Quintile 4	13.40%	15.85%	21.80%	25.96%	22.99%
Quintile 5	10.10%	9.61%	14.64%	23.61%	42.04%

Table 4. Bivariate Portfolio Sorts

This table presents return comparisons between equity quintiles formed based on sequential double sorts of various firm-specific variables and *Betadown*. First, quintile portfolios are formed every month from January 1989 to December 2014 based on a particular firm-specific variable. Next, additional quintile portfolios are formed based on *Betadown* within each firm-specific variable quintile. Quintile 1 is the combined portfolio of stocks with the lowest downside betas in each firm-specific variable quintile. Quintile 5 is the combined portfolio of stocks with the highest downside betas in each firm-specific variable quintile. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports one-month-ahead returns for each quintile. The last two columns show the differences of monthly returns and alpha measures between quintiles 5 and 1. Alpha is the intercept term from a regression of monthly return differences on the global market, size, value and momentum factors calculated by Fama and French (2012). Panels A and B present results for the whole world and the whole world excluding US, respectively. All firm-specific variables and *Betadown* are defined in Table 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Whole World

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1	Alpha
Betaup	0.40	0.45	0.39	0.34	0.32	-0.08	-0.16
						(-0.37)	(-1.20)
Beta	0.39	0.41	0.38	0.35	0.34	-0.05	-0.07
						(-0.31)	(-0.69)
Size	0.46	0.44	0.42	0.35	0.29	-0.17	-0.25
						(-0.61)	(-1.77)
BM	0.30	0.44	0.37	0.37	0.31	0.01	-0.08
						(0.03)	(-0.48)
Momentum	0.36	0.51	0.49	0.39	0.25	-0.11	-0.20
						(-0.48)	(-1.36)
Ivol	0.30	0.42	0.36	0.38	0.32	0.03	-0.05
						(0.11)	(-0.35)
Zeros	0.47	0.50	0.40	0.36	0.24	-0.23	-0.26
						(-0.81)	(-1.64)
Coskew	0.31	0.50	0.42	0.35	0.31	0.00	-0.06
						(0.00)	(-0.44)
Skew	0.36	0.45	0.42	0.38	0.29	-0.07	-0.16
						(-0.27)	(-1.00)
BetaFlev	0.28	0.43	0.39	0.39	0.31	0.03	-0.10
						(0.10)	(-0.63)
BetaVarTED	0.30	0.46	0.42	0.38	0.30	0.00	-0.06
						(-0.01)	(-0.37)
BetaDeltaTED	0.26	0.42	0.37	0.42	0.34	0.08	0.01
						(0.31)	(0.09)

Table 4 (continued)

Panel B. Whole World Excluding US

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1	Alpha
Betaup	0.19	0.31	0.30	0.14	0.06	-0.14	-0.31
						(-0.71)	(-2.12)
Beta	0.19	0.31	0.25	0.16	0.05	-0.14	-0.18
						(-0.96)	(-1.18)
Size	0.27	0.29	0.27	0.22	0.03	-0.24	-0.37
						(-0.94)	(-2.59)
BM	0.16	0.28	0.19	0.27	0.06	-0.10	-0.24
						(-0.40)	(-1.49)
Momentum	0.23	0.31	0.31	0.28	0.04	-0.20	-0.34
						(-0.92)	(-2.27)
Ivol	0.17	0.24	0.19	0.24	0.13	-0.04	-0.12
						(-0.20)	(-0.74)
Zeros	0.30	0.30	0.29	0.22	-0.01	-0.31	-0.39
						(-1.20)	(-2.37)
Coskew	0.25	0.33	0.25	0.22	0.11	-0.13	-0.22
						(-0.55)	(-1.57)
Skew	0.21	0.32	0.21	0.27	0.05	-0.16	-0.28
						(-0.63)	(-1.76)
BetaFlev	0.16	0.22	0.22	0.28	0.08	-0.08	-0.24
						(-0.32)	(-1.59)
BetaVarTED	0.22	0.28	0.23	0.28	0.08	-0.14	-0.24
						(-0.61)	(-1.63)
BetaDeltaTED	0.15	0.26	0.21	0.27	0.11	-0.04	-0.15
						(-0.18)	(-0.90)

Table 5. Cross-Sectional Regressions of Equity Returns

This table presents results from the cross-sectional regressions of one-month-ahead equity returns on *Betadown* and control variables over the period from January 1989 to December 2014. Regressions are estimated using a weighted least squares methodology following Asparouhova, Bessembinder and Kalcheva (2010) where each observed return is weighted by one plus the observed prior return on the stock. Reported coefficients are time-series averages and the associated t-statistics are reported using the Newey-West (1987) procedure. Columns (1)-(4) present results for the whole world and columns (5)-(8) present results for the whole world excluding US. Average R-squared statistics and number of observations for each regression are presented in the last two rows. *Betadown* and all control variables are defined in Table 1.

	Whole World				Whole World Excluding US			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Betadown	-0.0017	-0.0003	-0.0005	0.0000	-0.0030	0.0005	0.0003	0.0015
	(-0.97)	(-0.29)	(-0.53)	(0.01)	(-1.50)	(0.43)	(0.36)	(1.36)
Betaup		0.0006	0.0003	-0.0006		-0.0012	-0.0007	-0.0016
		(0.71)	(0.40)	(-0.64)		(-1.09)	(-0.75)	(-1.20)
Beta		-0.0029	-0.0017	-0.0020		-0.0045	-0.0042	-0.0048
		(-1.19)	(-0.60)	(-0.72)		(-1.47)	(-1.24)	(-1.51)
Size			0.0000	-0.0004			-0.0001	-0.0006
			(0.03)	(-1.40)			(-0.40)	(-1.72)
BM			0.0001	0.0001			0.0001	0.0000
			(2.49)	(2.06)			(1.72)	(0.81)
Momentum			0.0156	0.0151			0.0156	0.0154
			(10.97)	(9.21)			(8.38)	(8.03)
Ivol			-0.2067	-0.2015			-0.1158	-0.1386
			(-3.12)	(-3.08)			(-1.32)	(-1.68)
Zeros				-0.0050				-0.0055
				(-2.63)				(-2.99)
Coskew				0.0001				0.0001
				(1.26)				(1.73)
Skew				-0.0006				-0.0006
				(-1.92)				(-1.76)
BetaFlev				-0.0151				-0.0221
				(-0.53)				(-0.79)
BetaVarTED				-0.0001				-0.0001
				(-0.47)				(-0.27)
BetaDeltaTED				0.0155				0.0164
				(2.56)				(2.16)
Intercept	0.0039	0.0045	0.0054	0.0113	0.0050	0.0063	0.0060	0.0119
	(1.64)	(1.89)	(2.66)	(4.33)	(2.08)	(2.69)	(3.13)	(4.36)
Avg. R^2	0.0102	0.0145	0.0478	0.0617	0.0107	0.0155	0.0529	0.0716
Observations	7,450,559	7,450,559	5,569,077	4,883,835	5,893,093	5,893,093	4,340,450	3,859,927

Table 6. Alternative Measures of Downside Beta

This table presents return comparisons between equity quintiles formed based on various measures of *Betadown* for the whole world. In Panel A, *Betadown* is calculated as the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns on the days that the market's excess return is less than zero during the past year in each country. In Panels B, C and D, the cut-off point for calculating downside beta corresponds to the risk-free rate of return, the 25th percentile of the market excess return distribution and the 10th percentile of the market excess return distribution, respectively. In Panel E, the cut-off point is the average market excess return where daily returns from the prior two years are utilized. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns and alpha for each quintile. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Zero Market Return Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.02	0.48	0.77	1.05	1.58	
Mean return	0.61	0.71	0.71	0.63	0.55	-0.06
	(3.43)	(3.77)	(3.05)	(2.16)	(1.44)	(-0.22)
Alpha	-0.01	0.11	0.00	-0.10	-0.15	-0.14
	(-0.08)	(1.49)	(0.06)	(-1.40)	(-1.71)	(-0.96)

Panel B. Risk-Free Rate of Return Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.02	0.48	0.76	1.05	1.57	
Mean return	0.60	0.73	0.70	0.63	0.55	-0.04
	(3.32)	(3.94)	(3.00)	(2.18)	(1.44)	(-0.16)
Alpha	-0.02	0.011	0.01	-0.11	-0.14	-0.12
	(-0.20)	(1.51)	(0.11)	(-1.42)	(-1.65)	(-0.81)

Panel C. 25% Left-Tail Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.18	0.48	0.81	1.13	1.78	
Mean return	0.51	0.67	0.68	0.70	0.56	0.05
	(2.49)	(3.13)	(2.69)	(2.32)	(1.54)	(0.23)
Alpha	-0.02	0.08	-0.01	-0.06	-0.18	-0.16
	(-0.14)	(1.15)	(-0.22)	(-0.78)	(-2.08)	(-1.01)

Table 6 (continued)

Panel D. 10% Left-Tail Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.64	0.36	0.82	1.28	2.38	
Mean return	0.54	0.73	0.71	0.61	0.57	0.03
	(2.15)	(3.02)	(2.64)	(2.00)	(1.71)	(0.25)
Alpha	0.01	0.10	-0.01	-0.15	-0.15	-0.15
	(0.08)	(1.37)	(-0.18)	(-1.78)	(-1.79)	(-1.41)

Panel E. Two Years of Daily Returns

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.11	0.54	0.77	1.02	1.44	
Mean return	0.61	0.74	0.73	0.66	0.60	-0.01
	(3.39)	(3.94)	(3.14)	(2.23)	(1.56)	(-0.03)
Alpha	0.02	0.10	0.01	-0.10	-0.10	-0.12
	(0.15)	(1.14)	(0.16)	(-1.33)	(-1.16)	(-0.77)

Table 7. Excluding High Volatility Stocks

This table presents return comparisons between equity quintiles formed based on *Betadown* after excluding stocks that belong in the top volatility quintile. Specifically, we calculate the standard deviation of daily returns in a month for each stock and drop the 20% of stocks with the highest volatilities in each country-month. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns, alpha for each quintile and number of observations. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Panels A and B present results for the whole world and the whole world excluding US, respectively. *Betadown* is defined in Table 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Whole World

	Quintile 1	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**	**5-1**
Betadown	0.08	0.46	0.72	0.99	1.46	
Mean return	0.63	0.75	0.73	0.69	0.69	0.06
	(3.57)	(4.23)	(3.37)	(2.55)	(1.99)	(0.23)
Alpha	0.04	0.15	0.05	-0.05	-0.02	-0.06
	(0.29)	(2.02)	(0.73)	(-0.74)	(-0.23)	(-0.35)
Observations	6,014,550					

Panel B. Whole World Excluding US

	Quintile 1	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**	**5-1**
Betadown	0.13	0.47	0.71	0.96	1.36	
Mean return	0.48	0.59	0.58	0.53	0.46	-0.01
	(2.24)	(2.77)	(2.33)	(1.79)	(1.28)	(-0.06)
Alpha	-0.16	-0.08	-0.13	-0.27	-0.37	-0.20
	(-1.04)	(-0.79)	(-1.06)	(-2.24)	(-2.92)	(-1.15)
Observations	4,750,350					

Table 8. Using the Global Market Index

This table presents return comparisons between equity quintiles formed based on *Betadown*. *Betadown* is the monthly downside beta calculated as the ratio of the covariance between daily excess returns of a stock and daily global excess market returns to the variance of daily global excess market returns on the days that the global market's excess return is less than the average global market excess return during the past year. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns and alpha for each quintile. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Panels A and B present results for the whole world and the whole world excluding US, respectively. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Whole World

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.29	0.22	0.52	0.88	1.63	
Mean return	0.51	0.65	0.74	0.73	0.56	0.04
	(2.27)	(3.11)	(3.13)	(2.66)	(1.44)	(0.15)
Alpha	-0.02	0.07	0.08	-0.02	-0.22	-0.20
	(-0.15)	(0.58)	(0.87)	(-0.19)	(-1.74)	(-0.88)

Panel B. Whole World Excluding US

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.28	0.21	0.48	0.81	1.50	
Mean return	0.52	0.57	0.59	0.58	0.30	-0.22
	(1.88)	(2.40)	(2.15)	(1.91)	(0.73)	(-0.73)
Alpha	-0.05	-0.07	-0.15	-0.17	-0.56	-0.51
	(-0.23)	(-0.47)	(-1.03)	(-1.36)	(-3.97)	(-2.11)

Table 9. Country Groupings

This table presents return comparisons between equity quintiles formed based on *Betadown* for various country groupings. *Betadown* is defined in Table 1. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports one-month-ahead returns for each quintile, the difference of alpha measures between quintiles 5 and 1 and the Newey-West (1987) adjusted t-statistics associated with these alphas. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors that we self-construct for each country grouping separately. Panels A to F present results for developed markets, emerging markets, G10 countries, G7 countries, Europe and Asia-Pacific region, respectively.

Panel A. Developed Markets

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.22	0.27	0.58	0.94	1.69	
Mean return	0.43	0.69	0.76	0.73	0.57	0.13
	(2.34)	(3.38)	(3.33)	(2.63)	(1.45)	(0.43)
Alpha	-0.17	0.08	0.11	-0.05	-0.21	-0.04
	(-1.46)	(0.76)	(1.29)	(-0.71)	(-1.63)	(-0.18)

Panel B. Emerging Markets

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.42	0.12	0.40	0.74	1.44	
Mean return	0.70	0.31	0.55	0.93	0.47	-0.24
	(1.41)	(0.74)	(1.53)	(2.23)	(0.98)	(-0.59)
Alpha	0.26	-0.23	-0.12	0.21	-0.29	-0.55
	(0.57)	(-0.62)	(-0.45)	(0.67)	(-0.90	(-1.39)

Panel C. G10 countries

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.22	0.28	0.59	0.97	1.73	
Mean return	0.40	0.69	0.77	0.68	0.56	0.16
	(2.19)	(3.49)	(3.50)	(2.50)	(1.44)	(0.51)
Alpha	-0.18	0.09	0.13	-0.07	-0.18	0.00
	(-1.37)	(0.83)	(1.58)	(-1.03)	(-1.30)	(-0.02)

Table 9 (continued)

Panel D. G7 Countries

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.23	0.28	0.60	0.98	1.75	
Mean return	0.41	0.67	0.75	0.66	0.55	0.15
	(2.19)	(3.40)	(3.39)	(2.45)	(1.41)	(0.45)
Alpha	-0.17	0.08	0.14	-0.07	-0.19	-0.02
	(-1.22)	(0.72)	(1.56)	(-1.14)	(-1.29)	(-0.08)

Panel E. Europe

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.07	0.26	0.50	0.80	1.38	
Mean return	0.36	0.52	0.85	0.71	0.56	0.20
	(1.47)	(2.18)	(3.23)	(2.15)	(1.33)	(0.66)
Alpha	-0.43	-0.30	0.00	-0.24	-0.31	0.12
	(-2.30)	(-2.15)	(0.02)	(-1.55)	(-1.71)	(0.64)

Panel F. Asia-Pacific Region

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.36	0.19	0.52	0.87	1.51	
Mean return	0.56	0.44	0.32	0.24	0.38	-0.18
	(1.34)	(1.35)	(0.97)	(0.64)	(0.82)	(-0.45)
Alpha	0.18	-0.10	-0.31	-0.45	-0.33	-0.52
	(0.56)	(-0.40)	(-1.46)	(-2.12)	(-1.16)	(-1.48)

Table 10. Individual Country Analysis

This table presents return comparisons between equity quintiles formed based on *Betadown* in each market separately. *Betadown* is defined in Table 1. The quintile portfolios are formed every month from January 1989 to December 2014 after excluding high volatility stocks but the beginning of the sample period varies between markets depending on data availability. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports one-month-ahead returns for each quintile, the difference of alpha measures between quintiles 5 and 1 and the Newey-West (1987) adjusted t-statistics associated with these alphas. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors that we self-construct for each country separately. Panels A and B present results for developed markets and emerging markets, respectively.

Panel A. Developed Markets

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Alpha	t-stat
Australia	0.88	0.80	0.96	1.07	0.82	-0.52	-2.26
Austria	0.62	0.53	0.74	0.62	0.65	-0.26	-1.13
Belgium	0.72	0.70	0.59	0.90	0.75	-0.36	-1.75
Canada	0.77	0.95	1.09	0.87	0.87	-0.35	-1.65
Denmark	0.59	0.96	0.94	1.02	0.71	-0.53	-2.37
France	0.99	0.84	0.75	1.00	0.71	-0.56	-3.62
Germany	0.43	0.64	0.74	0.72	0.80	-0.20	-0.88
Greece	1.01	0.59	0.41	0.55	0.52	-0.89	-2.39
Hong Kong	0.77	1.06	1.00	1.06	1.06	-0.70	-2.27
Ireland	0.77	1.40	1.48	0.88	1.00	-0.14	-0.42
Israel	1.57	1.07	1.22	1.23	0.95	-0.72	-2.75
Italy	0.51	0.45	0.53	0.46	0.44	-0.69	-3.57
Japan	0.43	0.34	0.22	0.11	0.07	-0.34	-1.67
Luxembourg	-0.05	0.58	0.56	0.84	1.05	0.26	0.89
Netherlands	0.46	0.56	0.86	0.95	0.94	-0.33	-1.51
New Zealand	1.09	0.75	0.90	1.47	0.88	-0.28	-1.20
Norway	0.64	0.85	0.89	1.01	1.10	-0.32	-1.63
Portugal	0.30	0.22	-0.03	0.56	0.22	-0.34	-1.29
Singapore	1.33	0.89	1.31	1.03	0.86	-1.34	-4.75
Spain	0.37	0.42	0.69	0.95	0.69	-0.11	-0.45
Sweden	0.95	1.15	0.97	0.92	1.07	-0.84	-3.19
Switzerland	0.71	0.75	0.66	1.11	0.92	-0.42	-1.65
UK	-0.03	0.29	0.23	0.90	0.62	-0.40	-1.83
USA	0.86	0.99	1.08	1.12	1.18	-0.40	-1.60

Table 10 (continued)

Panel B. Emerging Markets

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Alpha	t-stats
Argentina	1.89	2.48	2.34	3.16	1.88	-0.31	-1.01
Brazil	-0.99	-1.89	-0.76	-0.61	0.15	0.06	0.07
Chile	1.00	0.86	0.76	1.06	1.53	-0.27	-1.04
China	1.31	1.67	1.44	1.81	1.30	-0.27	-0.67
Colombia	0.81	0.27	0.18	0.36	1.28	-0.26	-0.93
Czech Rep	0.14	0.09	0.18	0.23	0.37	0.18	0.83
Egypt	0.80	0.47	-0.05	0.80	0.29	-0.36	-0.90
Finland	0.63	0.69	0.92	1.08	0.58	-0.73	-2.15
Hungary	0.79	0.63	0.62	0.89	1.54	-0.70	-1.66
India	0.53	1.13	1.01	1.32	1.33	-0.14	-0.29
Indonesia	0.70	0.48	0.03	0.89	1.01	0.17	0.33
Malaysia	0.79	0.78	1.00	0.64	0.67	-0.95	-2.94
Mexico	0.93	0.36	0.49	1.30	1.42	-0.28	-0.96
Morocco	0.99	1.27	0.75	1.12	0.86	-0.82	-2.34
Pakistan	1.49	0.93	0.97	1.19	1.08	-0.66	-1.59
Peru	1.26	0.19	0.28	0.73	1.37	0.09	0.26
Philippines	0.81	0.18	-0.18	0.87	1.12	-0.87	-2.38
Poland	0.64	1.70	1.16	1.24	1.02	-0.36	-0.54
Russia	1.21	-0.45	0.46	1.05	1.78	-1.08	-2.43
South Africa	0.97	0.87	1.17	1.33	1.01	-0.09	-0.41
South Korea	0.97	1.19	0.94	0.59	0.13	-0.93	-1.78
Sri Lanka	1.07	1.03	0.75	0.86	0.74	-0.87	-2.44
Taiwan	0.43	0.19	0.55	0.50	0.44	-0.22	-0.61
Thailand	0.90	0.84	1.06	1.37	0.84	-0.25	-0.75
Turkey	0.91	1.78	1.85	2.57	1.92	-0.40	-0.92
Venezuela	0.92	0.64	-0.46	0.25	0.96	-0.64	-1.08
Vietnam	-0.28	0.25	1.16	-0.15	-0.72	-1.01	-1.03

Table 11. Contemporaneous Returns to Downside Beta Quintiles

This table presents return comparisons between equity quintiles formed based on *Betadown*. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted 12-month contemporaneous portfolio returns are calculated for each portfolio. The table reports the average downside beta, contemporaneous returns and alpha for each quintile. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Panels A, B and C present results for the whole world, only US and the whole world excluding US, respectively. *Betadown* is defined in Table 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Whole World

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.04	0.48	0.76	1.04	1.56	
Mean return	17.13	15.57	16.04	17.28	24.72	7.59
	(10.75)	(9.75)	(7.43)	(5.90)	(4.80)	(1.63)
Alpha	12.78	11.19	11.73	12.85	19.91	7.13
	(7.08)	(6.01)	(4.88)	(4.07)	(3.64)	(1.47)

Panel B. Only US

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.11	0.48	0.81	1.16	1.83	
Mean return	15.95	15.84	17.50	20.86	36.63	20.69
	(8.75)	(8.91)	(8.29)	(7.67)	(5.47)	(3.23)
Alpha	11.25	11.10	12.39	15.31	29.36	18.11
	(6.09)	(6.07)	(5.80)	(5.75)	(4.72)	(3.03)

Panel C. Whole World Excluding US

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.12	0.50	0.76	1.02	1.46	
Mean return	16.55	15.15	15.41	16.34	20.23	3.68
	(7.38)	(6.65)	(5.57)	(4.92)	(3.98)	(0.92)
Alpha	12.34	11.07	11.25	12.00	15.41	3.07
	(5.02)	(4.36)	(3.77)	(3.37)	(2.82)	(0.74)

ONLINE APPENDIX FOR
"DOWNSIDE BETA AND EQUITY RETURNS AROUND THE WORLD"

Yigit Atilgan, Turan G. Bali, K. Ozgur Demirtas, and A. Doruk Gunaydin

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Table I. Country Descriptive Statistics for Equity Returns and Downside Betas

This table presents the descriptive statistics for monthly returns (Panel A) and downside betas (Panel B) calculated for 51 distinct countries. *Betadown* is the monthly downside beta calculated as the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns on the days that the market's excess return is less than the average market excess return during the past year in each country. The return on the market index for each country corresponds to a value-weighted return constructed from individual equity returns. The table presents the average number of observations, mean, standard deviation, 25th percentile, median, 75th percentile, minimum, maximum, skewness and kurtosis statistics for each variable. Statistics are computed as the time-series averages of the monthly cross-sectional means.

Panel A. Monthly Returns

	Mean	Std Dev	25th Per	Median	75th Per	Min	Max	Skewness	Kurtosis
Argentina	0.90	12.65	-4.76	-0.01	5.28	-53.88	215.56	1.97	21.27
Australia	0.17	14.32	-7.27	-0.20	6.57	-79.35	164.66	0.77	7.50
Austria	0.57	7.31	-3.06	0.33	3.76	-44.70	77.21	0.61	8.50
Belgium	0.60	6.64	-3.00	0.47	4.02	-38.04	56.63	0.26	5.95
Brazil	0.62	11.18	-4.56	0.00	5.52	-66.82	110.84	0.50	8.04
Canada	0.32	13.63	-6.38	0.00	6.15	-78.08	358.15	0.95	11.63
Chile	0.76	6.79	-2.49	0.28	3.51	-40.05	64.61	0.88	8.57
China	1.20	12.37	-6.36	0.35	7.72	-56.20	173.23	0.72	6.03
Colombia	0.60	6.01	-2.09	0.22	2.64	-40.92	77.71	1.23	11.85
Czech	-0.11	15.01	-6.23	-0.27	4.47	-74.90	245.80	1.81	17.46
Denmark	0.47	7.44	-3.41	0.36	4.22	-50.72	87.86	0.26	7.08
Egypt	0.36	11.02	-4.99	-0.04	4.34	-58.32	137.91	1.57	13.07
Finland	0.51	9.32	-4.68	0.23	5.40	-55.48	66.58	0.31	5.89
France	0.57	8.77	-3.90	0.36	4.75	-61.10	98.93	0.40	7.08
Germany	-0.33	11.52	-5.64	-0.25	4.77	-69.48	249.42	0.51	9.97
Greece	0.55	16.12	-7.93	-0.73	6.93	-61.13	288.45	1.66	13.40
Hong Kong	0.00	13.47	-6.93	-0.25	5.71	-73.15	205.24	0.96	8.91
Hungary	0.16	11.26	-5.41	-0.11	5.17	-57.40	123.46	0.98	11.56
India	0.51	17.41	-9.14	-0.59	7.65	-87.19	405.37	1.76	16.09
Indonesia	0.65	15.25	-5.94	-0.09	5.85	-81.68	254.84	1.56	16.32
Ireland	0.44	9.04	-4.15	0.35	4.75	-59.96	92.51	0.25	7.23
Israel	0.57	12.32	-6.03	-0.07	6.22	-68.19	140.38	0.67	6.58
Italy	-0.38	9.33	-5.64	-0.44	4.73	-50.79	69.90	0.19	5.02
Japan	-0.01	10.15	-5.85	-0.44	5.17	-51.73	141.04	0.57	5.97
Luxembourg	0.60	5.47	-1.75	0.16	2.75	-36.03	99.47	1.25	22.13
Malaysia	0.19	12.63	-6.00	-0.26	5.39	-72.00	191.93	1.15	11.56
Mexico	0.81	8.47	-2.80	0.29	4.04	-59.37	92.18	0.36	8.56
Morocco	0.66	6.89	-3.07	0.30	3.84	-38.65	64.07	0.78	7.51
Netherlands	0.40	7.83	-3.94	0.36	4.73	-43.06	72.25	0.11	5.36
New Zealand	0.56	8.41	-3.99	0.45	4.97	-45.92	59.48	0.31	5.61
Norway	0.24	10.52	-5.23	0.19	5.71	-61.09	126.41	0.19	6.73
Pakistan	0.78	11.94	-4.58	-0.14	4.55	-61.31	169.32	1.47	12.12
Peru	0.60	6.65	-1.11	0.15	1.67	-51.14	114.27	2.05	25.89
Philippines	0.34	12.49	-5.16	-0.20	4.39	-73.69	161.70	1.35	12.41
Poland	-0.12	15.13	-8.59	-0.87	7.10	-61.94	163.86	0.87	7.91
Portugal	-0.06	7.73	-3.56	0.00	3.22	-51.04	95.81	0.73	10.42
Russia	-0.03	13.87	-6.40	-0.39	5.09	-73.29	190.97	1.27	13.38
Singapore	0.57	12.89	-5.67	0.01	5.65	-66.77	156.35	1.23	10.80
South Africa	0.38	10.88	-5.24	0.15	5.81	-61.89	106.96	0.34	6.69
South Korea	0.83	18.33	-8.57	-0.70	7.71	-83.18	752.39	4.49	91.36
Spain	0.16	8.38	-4.13	0.15	4.25	-50.22	93.06	0.27	6.46
Sri Lanka	0.67	10.97	-4.26	-0.31	4.15	-50.68	137.91	1.53	11.83
Sweden	-0.13	11.53	-6.35	-0.14	5.93	-65.83	149.52	0.34	6.82
Switzerland	0.58	7.24	-3.41	0.49	4.38	-48.19	56.08	0.14	5.73
Taiwan	0.52	13.78	-7.01	-0.52	6.40	-73.76	252.32	1.43	11.97
Thailand	0.55	12.33	-5.22	0.13	5.50	-74.72	258.64	1.16	13.90
Turkey	1.41	18.55	-9.10	0.00	9.79	-67.89	296.19	1.41	11.60
UK	-0.45	7.66	-4.63	-0.40	3.66	-62.13	74.82	0.06	5.08
USA	0.50	13.45	-6.34	0.00	6.67	-82.05	281.96	0.74	8.65
Venezuela	0.80	12.00	-2.66	0.00	3.37	-54.36	171.28	1.54	17.32
Vietnam	0.24	14.68	-7.76	-0.85	6.47	-59.99	171.92	1.32	9.79

Table I (continued)

Panel B. Downside Betas

	Mean	Std Dev	25th Per	Median	75th Per	Min	Max	Skewness	Kurtosis
Argentina	0.63	0.46	0.20	0.63	1.00	-0.13	1.72	0.17	1.91
Australia	0.79	0.43	0.50	0.75	1.06	-0.41	2.26	0.39	3.27
Austria	0.66	0.36	0.38	0.64	0.91	-0.06	1.64	0.34	2.46
Belgium	0.59	0.34	0.34	0.58	0.83	-0.19	1.55	0.21	2.56
Brazil	0.75	0.36	0.46	0.75	1.02	-0.03	1.64	0.10	2.21
Canada	0.74	0.63	0.37	0.71	1.10	-1.69	2.92	-0.03	4.13
Chile	0.66	0.30	0.46	0.63	0.83	0.03	1.71	0.63	3.29
China	1.11	0.30	0.93	1.13	1.32	0.04	1.79	-0.49	3.20
Colombia	0.65	0.31	0.41	0.61	0.85	0.05	1.75	0.74	3.33
Czech	0.65	0.45	0.34	0.64	0.98	-0.77	1.97	-0.02	2.97
Denmark	0.60	0.33	0.36	0.58	0.82	-0.14	1.55	0.31	2.63
Egypt	0.84	0.54	0.41	0.87	1.24	-0.21	2.15	0.04	2.11
Finland	0.61	0.37	0.34	0.61	0.88	-0.25	1.59	0.11	2.45
France	0.51	0.37	0.25	0.47	0.75	-0.36	1.63	0.41	2.79
Germany	0.58	0.43	0.26	0.52	0.86	-0.45	1.93	0.49	2.82
Greece	0.90	0.46	0.56	0.93	1.23	-0.17	2.05	-0.07	2.36
Hong Kong	0.75	0.49	0.37	0.74	1.11	-0.39	2.03	0.12	2.34
Hungary	0.53	0.33	0.30	0.52	0.77	-0.34	1.42	0.09	2.52
India	0.83	0.46	0.53	0.86	1.15	-0.44	2.14	-0.16	2.71
Indonesia	0.71	0.42	0.34	0.67	1.02	-0.15	1.86	0.33	2.26
Ireland	0.54	0.34	0.30	0.52	0.75	-0.22	1.54	0.37	2.84
Israel	0.69	0.41	0.34	0.66	1.00	-0.17	1.81	0.29	2.25
Italy	0.72	0.32	0.49	0.73	0.96	-0.10	1.49	-0.06	2.41
Japan	0.83	0.38	0.55	0.83	1.10	-0.09	1.83	0.06	2.47
Luxembourg	0.43	0.40	0.13	0.39	0.62	-0.47	2.06	1.03	4.54
Malaysia	1.05	0.52	0.68	1.03	1.39	-0.22	2.57	0.20	2.73
Mexico	0.67	0.36	0.37	0.60	0.95	0.05	1.66	0.51	2.35
Morocco	0.69	0.40	0.39	0.67	0.98	-0.36	1.73	0.11	2.49
Netherlands	0.71	0.38	0.43	0.73	0.99	-0.21	1.66	-0.04	2.39
New	0.75	0.28	0.58	0.76	0.94	-0.08	1.51	-0.18	2.90
Norway	0.68	0.39	0.37	0.64	0.95	-0.18	1.88	0.39	2.61
Pakistan	0.54	0.50	0.12	0.42	0.91	-0.29	2.01	0.67	2.49
Peru	0.56	0.44	0.28	0.43	0.71	-0.26	2.57	1.60	5.82
Philippines	0.64	0.46	0.25	0.58	0.97	-0.28	2.02	0.50	2.49
Poland	0.79	0.34	0.57	0.80	1.02	-0.29	1.79	-0.09	3.10
Portugal	0.66	0.39	0.34	0.67	0.94	-0.20	1.67	0.11	2.28
Russia	0.64	0.40	0.28	0.66	0.97	-0.16	1.50	0.01	1.88
Singapore	0.85	0.50	0.49	0.84	1.19	-0.47	2.23	0.11	2.61
South Africa	0.69	0.33	0.45	0.67	0.90	-0.15	1.81	0.35	3.01
South Korea	0.93	0.36	0.69	0.94	1.18	-0.09	1.86	-0.12	2.73
Spain	0.69	0.38	0.38	0.67	0.98	-0.09	1.63	0.19	2.20
Sri Lanka	0.78	0.58	0.30	0.76	1.16	-0.40	2.41	0.34	2.44
Sweden	0.72	0.34	0.48	0.72	0.96	-0.20	1.70	0.06	2.67
Switzerland	0.62	0.36	0.35	0.60	0.89	-0.15	1.59	0.20	2.35
Taiwan	0.92	0.36	0.68	0.95	1.18	-0.12	1.79	-0.30	2.69
Thailand	0.74	0.44	0.39	0.72	1.08	-0.15	1.94	0.25	2.26
Turkey	0.98	0.24	0.84	1.00	1.14	0.12	1.59	-0.52	3.38
UK	0.60	0.33	0.35	0.58	0.83	-0.14	1.56	0.28	2.57
USA	0.81	0.63	0.38	0.80	1.22	-1.07	2.79	0.14	3.00
Venezuela	0.66	0.49	0.07	0.86	1.02	-0.39	2.55	-0.14	2.24
Vietnam	0.87	0.40	0.60	0.92	1.15	-0.30	1.83	-0.40	2.82

Table II. Equal-Weighted Returns to Downside Beta Quintiles

This table presents return comparisons between equity quintiles formed based on *Betadown*. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The equal-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns and alpha for each quintile. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Panels A and C present results for the whole world and the whole world excluding US, respectively. Panels B and D present results for the whole world and the whole world excluding US after dropping stocks with excessive zero-return days, respectively. *Betadown* is defined in Table 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Whole World

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.04	0.48	0.76	1.04	1.56	
Mean return	0.47	0.48	0.46	0.48	0.20	-0.28
	(2.03)	(1.77)	(1.49)	(1.36)	(0.48)	(-1.09)
Alpha	-0.05	-0.16	-0.22	-0.17	-0.34	-0.29
	(-0.48)	(-1.39)	(-1.69)	(-1.09)	(-1.85)	(-1.81)

Panel B. Whole World Excluding Stocks with Excessive Zero-Return Days

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.07	0.55	0.82	1.09	1.60	
Mean return	0.54	0.53	0.47	0.49	0.17	-0.37
	(1.95)	(1.80)	(1.45)	(1.36)	(0.40)	(-1.54)
Alpha	-0.03	-0.13	-0.20	-0.14	-0.35	-0.32
	(-0.28)	(-1.16)	(-1.53)	(-0.92)	(-1.90)	(-1.99)

Panel C. Whole World Excluding US

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.12	0.50	0.76	1.02	1.46	
Mean return	0.57	0.47	0.42	0.44	0.17	-0.40
	(2.35)	(1.65)	(1.28)	(1.17)	(0.38)	(-1.52)
Alpha	-0.07	-0.23	-0.30	-0.26	-0.52	-0.44
	(-0.56)	(-1.52)	(-1.81)	(-1.28)	(-1.98)	(-2.15)

Table II (continued)

Panel D. Whole World Excluding U.S. Stocks and Stocks with Excessive Zero-Return Days

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.17	0.58	0.83	1.07	1.50	
Mean return	0.65	0.51	0.42	0.46	0.11	-0.53
	(2.18)	(1.60)	(1.18)	(1.21)	(0.25)	(-2.26)
Alpha	-0.06	-0.23	-0.31	-0.22	-0.57	-0.51
	(-0.38)	(-1.47)	(-1.78)	(-1.05)	(-2.12)	(-2.55)

Table III. Returns to Downside Beta Quintiles using Datastream Indices

This table presents return comparisons between equity quintiles formed based on *Betadown* for the whole world. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted and equal-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns and alpha for each quintile. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Panels A and B present results for value-weighted and equal-weighted returns, respectively. Panels C and D present results value-weighted and equal-weighted returns after dropping stocks with excessive zero-return days, respectively. *Betadown* is defined in Table 1; however, the market equity indices used for each country are taken directly from Datastream rather than self-constructed. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Value-Weighted Returns

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.11	0.40	0.66	0.93	1.46	
Mean return	0.52	0.71	0.68	0.63	0.60	0.07
	(2.87)	(3.68)	(2.85)	(2.17)	(1.60)	(0.26)
Alpha	-0.13	0.08	-0.02	-0.12	-0.06	0.07
	(-1.30)	(1.00)	(-0.22)	(-1.65)	(-0.71)	(0.50)

Panel B. Equal-Weighted Returns

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.11	0.40	0.66	0.93	1.46	
Mean return	0.44	0.47	0.43	0.42	0.27	-0.17
	(1.92)	(1.71)	(1.37)	(1.19)	(0.66)	(-0.69)
Alpha	-0.09	-0.16	-0.24	-0.23	-0.23	-0.15
	(-0.84)	(-1.33)	(-1.84)	(-1.48)	(-1.35)	(-0.95)

Panel C. Value-Weighted Returns after Excluding Stocks with Excessive Zero-Return Days

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.03	0.47	0.73	0.98	1.50	
Mean return	0.61	0.71	0.67	0.64	0.60	-0.01
	(3.13)	(3.51)	(2.72)	(2.14)	(1.58)	(-0.02)
Alpha	-0.06	0.07	-0.04	-0.10	-0.04	0.02
	(-0.55)	(0.91)	(-0.61)	(-1.37)	(-0.40)	(0.13)

Table III (continued)

Panel D. Equal-Weighted Returns after Excluding Stocks with Excessive Zero-Return Days

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.03	0.47	0.73	0.98	1.50	
Mean return	0.51	0.51	0.43	0.44	0.25	-0.26
	(1.85)	(1.68)	(1.32)	(1.20)	(0.59)	(-1.12)
Alpha	-0.06	-0.15	-0.24	-0.20	-0.24	-0.18
	(-0.56)	(-1.22)	(-1.83)	(-1.27)	(-1.35)	(-1.12)

Table IV. Cross-Sectional Regressions of Equity Returns using OLS

This table presents results from the cross-sectional regressions of one-month-ahead equity returns on *Betadown* and control variables over the period from January 1989 to December 2014. Regressions are estimated using the ordinary least squares methodology. Reported coefficients are time-series averages and the associated t-statistics are reported using the Newey-West (1987) procedure. Columns (1)-(4) present results for the whole world and columns (5)-(8) present results for the whole world excluding US in both panels. Average R-squared statistics and number of observations for each regression are presented in the last two rows. *Betadown* and all control variables are defined in Table 1.

	Whole World				**Whole World Excluding US**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Betadown	-0.0014	-0.0005	-0.0005	-0.0002	-0.0025	0.0002	0.0001	0.0011
	(-0.83)	(-0.45)	(-0.55)	(-0.19)	(-1.32)	(0.17)	(0.11)	(1.03)
Betaup		0.0010	0.0003	-0.0004		-0.0004	-0.0004	-0.0012
		(1.22)	(0.40)	(-0.40)		(-0.43)	(-0.41)	(-0.99)
Beta		-0.0026	-0.0015	-0.0018		-0.0042	-0.0036	-0.0040
		(-1.06)	(-0.53)	(-0.67)		(-1.36)	(-1.11)	(-1.29)
Size			0.0002	-0.0002			0.0000	-0.0004
			(0.63)	(-0.82)			(-0.03)	(-1.14)
BM			0.0001	0.0001			0.0001	0.0000
			(2.48)	(2.05)			(1.28)	(0.54)
Momentum			0.0150	0.0145			0.0149	0.0147
			(10.55)	(8.82)			(8.13)	(7.85)
Ivol			-0.2269	-0.2192			-0.1431	-0.1575
			(-3.45)	(-3.44)			(-1.69)	(-2.00)
Zeros				-0.0046				-0.0044
				(-2.49)				(-2.27)
Coskew				0.0001				0.0001
				(1.10)				(1.74)
Skew				-0.0007				-0.0007
				(-2.50)				(-2.31)
BetaFlev				-0.0178				-0.0188
				(-0.61)				(-0.66)
BetaVarTED				-0.0001				0.0000
				(-0.34)				(-0.13)
BetaDeltaTED				0.0141				0.0144
				(2.34)				(1.91)
Intercept	0.0025	0.0030	0.0042	0.0100	0.0033	0.0044	0.0047	0.0099
	(1.09)	(1.28)	(2.06)	(4.04)	(1.42)	(1.95)	(2.54)	(3.64)
Avg. R^2	0.0099	0.0144	0.0477	0.0615	0.0102	0.0151	0.0526	0.0710

Table V. Alternative Measures of Downside Beta for Whole World Excluding US

This table presents return comparisons between equity quintiles formed based on various measures of *Betadown* for the whole world excluding US. In Panel A, *Betadown* is calculated as the ratio of the covariance between daily excess returns of a stock and daily excess market returns to the variance of daily excess market returns on the days that the market's excess return is less than zero during the past year in each country. In Panels B, C and D, the cut-off point for calculating downside beta corresponds to the risk-free rate of return, the 25th percentile of the market excess return distribution and the 10th percentile of the market excess return distribution, respectively. In Panel E, the cut-off point is the average market excess return where daily returns from the prior two years are utilized. The quintile portfolios are formed every month from January 1989 to December 2014. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted monthly portfolio returns are calculated for each portfolio. The table reports the average downside beta, one-month-ahead returns and alpha for each quintile. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors calculated by Fama and French (2012). The last column shows the differences of monthly returns and alpha measures between quintiles 5 and 1. Newey-West (1987) adjusted t-statistics are presented in parentheses.

Panel A. Zero Market Return Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.10	0.50	0.76	1.03	1.47	
Mean return	0.46	0.57	0.51	0.51	0.34	-0.12
	(2.15)	(2.51)	(1.95)	(1.61)	(0.86)	(-0.46)
Alpha	-0.22	-0.12	-0.22	-0.29	-0.47	-0.25
	(-1.55)	(-1.06)	(-1.95)	(-2.47)	(-3.58)	(-1.60)

Panel B. Risk-Free Rate of Return Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.11	0.49	0.76	1.02	1.47	
Mean return	0.48	0.56	0.50	0.51	0.35	-0.13
	(2.21)	(2.51)	(1.91)	(1.62)	(0.87)	(-0.49)
Alpha	-0.21	-0.13	-0.22	-0.28	-0.48	-0.26
	(-1.49)	(-1.21)	(-1.93)	(-2.42)	(-3.58)	(-1.68)

Panel C. 25% Left-Tail Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.06	0.51	0.80	1.09	1.66	
Mean return	0.42	0.48	0.53	0.56	0.30	-0.12
	(1.74)	(1.97)	(1.85)	(1.71)	(0.79)	(-0.54)
Alpha	-0.21	-0.17	-0.22	-0.25	-0.53	-0.32
	(-1.37)	(-1.55)	(-2.04)	(-2.07)	(-4.05)	(-1.85)

Table V (continued)

Panel D. 10% Left-Tail Cut-off

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	-0.47	0.41	0.81	1.24	2.12	
Mean return	0.40	0.57	0.54	0.47	0.34	-0.07
	(1.43)	(2.09)	(1.78)	(1.41)	(0.93)	(-0.52)
Alpha	-0.26	-0.13	-0.26	-0.33	-0.48	-0.22
	(-1.94)	(-1.12)	(-2.11)	(-2.80)	(-3.59)	(-1.88)

Panel E. Two Years of Daily Returns

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	5-1
Betadown	0.24	0.55	0.77	0.99	1.36	
Mean return	0.46	0.51	0.53	0.43	0.33	-0.13
	(2.14)	(2.26)	(1.96)	(1.32)	(0.81)	(-0.43)
Alpha	-0.18	-0.17	-0.18	-0.33	-0.46	-0.28
	(-1.17)	(-1.42)	(-1.61)	(-2.74)	(-3.49)	(-1.65)

Table VI. Alternative Results for Individual Country Analysis

This table presents return comparisons between equity quintiles formed based on *Betadown* in each market separately. *Betadown* is defined in Table 1. The quintile portfolios are formed every month from January 1989 to December 2014 but the beginning of the sample period varies between markets depending on data availability. Quintile 1 is the portfolio of stocks with the lowest downside betas and Quintile 5 is the portfolio of stocks with the highest downside betas. The value-weighted and equal-weighted monthly portfolio returns are calculated for each portfolio. The table reports one-month-ahead returns for each quintile, the difference of alpha measures between quintiles 5 and 1 and the Newey-West (1987) adjusted t-statistics associated with these alphas. Alpha is the intercept term from a regression of portfolio returns on the global market, size, value and momentum factors that we self-construct for each country separately. Panel A presents results for value-weighted portfolio returns without excluding high volatility stocks. Panels B and C present results for equal-weighted portfolio returns after and without excluding high volatility stocks, respectively

Panel A. Value-Weighted Portfolio Returns without Excluding High Volatility Stocks

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Alpha	t-stat
Argentina	2.00	2.91	2.77	3.44	1.82	-0.27	-0.76
Australia	0.74	0.73	0.91	1.14	0.61	-0.57	-2.24
Austria	0.96	0.61	0.55	0.69	0.72	-0.37	-1.66
Belgium	0.63	0.63	0.52	0.85	0.61	-0.34	-1.67
Brazil	-2.16	-1.37	-0.85	-0.34	0.00	1.00	0.97
Canada	0.77	0.92	1.05	0.85	0.84	-0.31	-1.31
Chile	0.96	1.07	0.65	1.22	1.56	-0.30	-1.21
China	1.32	1.69	1.61	1.23	1.50	-0.31	-0.72
Colombia	0.74	0.26	0.33	1.02	1.69	-0.06	-0.22
Czech	-0.08	0.29	0.11	0.11	0.40	0.37	1.61
Denmark	0.32	0.86	0.98	0.80	0.81	-0.11	-0.58
Egypt	0.46	0.59	-0.10	0.86	0.59	-0.13	-0.30
Finland	0.27	0.78	0.94	0.89	1.04	-0.13	-0.44
France	0.88	0.68	0.76	0.91	0.57	-0.43	-3.02
Germany	0.40	0.55	0.77	0.66	0.76	-0.10	-0.43
Greece	1.09	0.47	0.66	0.45	0.38	-1.15	-2.95
Hong Kong	0.84	0.91	1.05	1.03	0.84	-0.77	-2.13
Hungary	0.55	0.35	0.61	0.57	1.72	-0.59	-1.83
India	0.40	1.26	0.91	1.35	1.41	0.09	0.20
Indonesia	0.95	0.44	0.49	0.94	0.83	-0.02	-0.04
Ireland	0.54	1.31	1.05	0.97	0.46	-0.06	-0.13
Israel	1.44	1.04	1.18	1.60	0.62	-0.93	-3.37
Italy	0.42	0.27	0.51	0.56	0.54	-0.68	-2.97
Japan	0.31	0.34	0.18	0.03	-0.03	-0.20	-0.89
Luxembourg	0.01	0.56	1.01	1.01	0.94	0.03	0.13
Malaysia	0.72	0.96	0.87	0.43	0.35	-1.15	-2.85
Mexico	0.82	0.38	0.79	1.39	1.70	0.01	0.04
Morocco	1.05	1.20	0.85	1.04	0.70	-0.92	-2.63
Netherlands	0.46	0.65	0.93	1.10	0.85	-0.51	-2.41
New Zealand	0.95	0.83	0.99	1.19	0.81	-0.14	-0.68
Norway	0.60	0.78	0.94	0.98	1.02	-0.27	-1.24
Pakistan	1.39	1.00	1.35	1.16	0.97	-0.90	-2.39
Peru	0.99	0.20	0.42	0.96	1.41	0.07	0.16
Philippines	0.56	0.38	0.25	0.94	1.10	-0.88	-2.55
Poland	1.19	1.42	1.26	1.25	1.11	-0.75	-1.11
Portugal	0.24	0.15	0.16	0.42	-0.03	-0.51	-1.87
Russia	1.15	-0.17	0.24	1.92	1.75	-1.27	-2.77
Singapore	1.32	1.02	1.03	0.96	0.69	-1.46	-4.99
South Africa	0.79	0.69	1.23	1.25	0.79	0.00	0.00
South Korea	0.94	1.24	0.86	0.48	0.12	-0.71	-1.23
Spain	0.18	0.38	0.81	0.84	0.62	0.16	0.60
Sri Lanka	1.04	1.04	0.88	0.79	0.58	-0.91	-2.72
Sweden	0.69	1.00	0.95	0.77	1.07	-0.61	-2.23
Switzerland	0.69	0.72	0.83	0.89	1.08	-0.28	-1.20
Taiwan	0.43	0.12	0.59	0.53	0.67	-0.21	-0.54
Thailand	0.92	0.90	1.07	1.09	0.42	-0.87	-2.27
Turkey	0.73	2.12	2.23	2.48	2.21	-0.11	-0.21
UK	-0.15	0.02	0.32	0.73	0.38	-0.17	-0.99
USA	0.84	0.96	1.07	1.07	1.08	-0.50	-1.92
Venezuela	0.98	0.76	-0.05	0.70	0.54	-0.46	-0.77
Vietnam	-0.20	0.34	0.53	-0.31	-0.23	-0.97	-1.06

Table VI (continued)

Panel B. Equal-Weighted Portfolio Returns after Excluding High Volatility Stocks

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Alpha	t-stat
Argentina	2.71	2.35	1.92	1.85	0.65	-0.90	-3.27
Australia	0.85	0.64	0.70	0.54	0.14	-0.90	-5.62
Austria	0.73	0.52	0.62	0.60	0.65	-0.22	-1.16
Belgium	0.75	0.60	0.58	0.65	0.57	-0.42	-2.74
Brazil	-1.24	-1.92	-1.81	-0.98	-0.09	0.10	0.15
Canada	0.70	0.70	0.74	0.58	0.25	-0.78	-4.47
Chile	1.04	0.49	0.58	1.03	1.31	0.07	0.42
China	1.61	2.10	2.12	2.30	1.68	-0.18	-0.60
Colombia	0.47	0.10	-0.02	0.31	1.22	0.07	0.39
Czech	0.21	0.13	0.22	0.28	0.07	-0.25	-1.55
Denmark	0.75	0.47	0.58	0.49	0.62	-0.51	-3.38
Egypt	0.55	0.52	0.21	0.53	0.18	-0.86	-2.29
Finland	0.62	0.66	0.78	0.88	0.55	-0.45	-2.54
France	1.00	0.73	0.80	0.65	0.63	-0.57	-3.48
Germany	0.32	0.33	0.32	0.35	0.40	-0.10	-0.55
Greece	1.30	1.43	0.80	0.54	0.33	-1.28	-3.88
Hong Kong	0.62	0.66	0.65	0.48	0.42	-0.78	-2.71
Hungary	0.78	0.28	0.56	0.36	0.35	-1.30	-3.79
India	1.13	1.05	1.04	0.78	0.65	-1.24	-4.79
Indonesia	1.38	0.79	0.99	0.79	0.79	-1.23	-3.59
Ireland	0.60	0.80	0.80	0.95	0.96	-0.02	-0.08
Israel	1.30	1.01	0.98	1.18	0.95	-0.69	-2.75
Italy	0.11	-0.04	-0.15	-0.29	-0.08	-0.59	-3.00
Japan	0.51	0.37	0.25	0.12	0.02	-0.58	-3.26
Luxembourg	0.08	0.61	0.49	0.58	0.97	0.34	1.66
Malaysia	0.71	0.88	0.80	0.67	0.53	-0.58	-1.97
Mexico	0.75	0.15	0.49	1.03	1.33	-0.08	-0.36
Morocco	0.95	0.94	0.88	0.93	0.97	-0.52	-1.96
Netherlands	0.36	0.35	0.43	0.64	0.57	-0.26	-1.56
New Zealand	0.92	0.54	0.78	1.13	0.83	-0.30	-1.41
Norway	0.66	0.52	0.54	0.71	0.61	-0.53	-2.45
Pakistan	1.17	0.87	1.16	1.33	1.14	-0.81	-2.59
Peru	0.99	0.23	0.29	0.61	1.11	-0.21	-1.00
Philippines	0.88	0.36	0.02	0.65	1.07	-0.98	-3.67
Poland	1.26	1.37	0.93	1.42	0.72	-0.40	-0.76
Portugal	0.62	0.38	0.23	0.10	0.05	-0.67	-2.88
Russia	0.71	-0.12	-0.57	0.52	1.60	-0.67	-1.90
Singapore	1.04	0.94	0.92	0.94	0.67	-0.97	-3.67
South Africa	0.56	0.38	0.54	0.98	0.92	0.19	1.19
South Korea	1.36	1.16	0.73	0.52	0.30	-1.29	-1.69
Spain	0.42	0.21	0.18	0.39	0.40	-0.31	-1.59
Sri Lanka	1.12	0.92	0.99	0.92	0.67	-1.05	-3.19
Sweden	0.28	0.48	0.58	0.49	0.17	-0.51	-2.19
Switzerland	0.66	0.57	0.57	0.76	0.72	-0.38	-2.05
Taiwan	0.62	0.54	0.75	0.62	0.57	-0.24	-0.97
Thailand	1.31	1.21	1.12	1.00	0.68	-1.10	-3.96
Turkey	2.03	2.02	2.19	2.31	2.04	-0.79	-2.23
UK	-0.51	-0.38	-0.37	-0.22	0.12	0.34	2.75
USA	0.59	0.86	0.91	1.00	0.95	-0.45	-2.39
Venezuela	0.83	0.27	-0.56	0.29	0.94	-0.45	-1.01
Vietnam	0.22	0.56	0.86	0.17	0.25	-0.51	-0.88

Table VI (continued)

Panel C. Equal-Weighted Portfolio Returns without Excluding High Volatility Stocks

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Alpha	t-stat
Argentina	2.54	2.25	2.10	2.18	0.72	-0.85	-2.94
Australia	0.48	0.49	0.37	0.15	-0.66	-1.23	-7.46
Austria	0.83	0.54	0.59	0.44	0.65	-0.32	-1.61
Belgium	0.60	0.54	0.53	0.47	0.38	-0.34	-2.20
Brazil	-1.78	-1.87	-1.03	-1.27	-0.46	0.59	0.98
Canada	0.72	0.64	0.56	0.27	-0.08	-1.00	-5.68
Chile	1.04	0.54	0.76	1.05	1.18	-0.19	-1.00
China	1.51	2.13	2.20	1.71	1.90	-0.18	-0.69
Colombia	0.47	0.13	0.08	0.74	1.44	-0.07	-0.37
Czech	0.08	0.17	0.13	0.20	-0.01	-0.15	-1.07
Denmark	0.54	0.43	0.44	0.26	0.41	-0.47	-3.65
Egypt	0.33	0.56	0.33	0.64	0.56	-0.56	-1.44
Finland	0.45	0.53	0.64	0.65	0.24	-0.73	-2.65
France	0.83	0.67	0.66	0.40	0.01	-0.87	-4.64
Germany	-0.07	0.09	0.00	-0.17	-0.25	-0.18	-0.83
Greece	1.56	1.42	1.00	0.54	0.41	-1.56	-4.47
Hong Kong	0.52	0.44	0.37	-0.01	-0.23	-1.19	-3.64
Hungary	0.57	0.09	0.33	-0.18	0.29	-1.13	-3.21
India	1.18	1.30	1.03	0.89	0.61	-1.33	-4.23
Indonesia	1.29	0.91	0.81	0.92	0.35	-1.60	-5.71
Ireland	0.38	0.63	0.55	0.82	0.27	-0.23	-0.63
Israel	1.21	1.04	0.89	1.00	0.47	-1.18	-4.57
Italy	-0.04	-0.26	-0.36	-0.52	-0.22	-0.54	-2.67
Japan	0.30	0.19	-0.02	-0.18	-0.36	-0.61	-3.13
Luxembourg	0.17	0.70	0.63	0.85	0.82	0.02	0.13
Malaysia	0.65	0.77	0.61	0.41	0.04	-0.92	-2.91
Mexico	0.66	0.23	0.71	1.15	1.31	-0.23	-0.79
Morocco	1.02	0.99	0.82	0.86	0.80	-0.65	-2.49
Netherlands	0.23	0.13	0.34	0.36	0.27	-0.40	-1.90
New Zealand	0.69	0.54	0.73	0.90	0.68	-0.26	-1.26
Norway	0.48	0.40	0.36	0.32	0.22	-0.64	-3.23
Pakistan	1.02	1.02	1.15	0.99	0.46	-1.51	-5.20
Peru	1.19	0.23	0.47	0.93	1.37	-0.44	-1.44
Philippines	0.59	0.60	0.16	0.56	0.70	-1.50	-5.97
Poland	1.23	1.26	0.97	0.96	0.46	-0.91	-1.95
Portugal	0.61	0.27	0.16	-0.10	-0.46	-1.09	-4.91
Russia	0.65	0.03	-0.38	1.28	1.57	-1.09	-2.47
Singapore	0.99	0.85	0.80	0.68	0.23	-1.41	-5.59
South Africa	0.38	0.32	0.43	0.81	0.57	0.10	0.47
South Korea	1.44	1.26	0.84	0.55	0.46	-0.96	-1.24
Spain	0.30	0.08	-0.16	-0.01	0.07	-0.28	-1.46
Sri Lanka	1.11	0.99	0.94	0.85	0.25	-1.44	-4.19
Sweden	-0.07	0.16	0.13	-0.09	-0.33	-0.60	-2.48
Switzerland	0.56	0.49	0.52	0.53	0.67	-0.27	-1.38
Taiwan	0.95	0.68	0.87	0.69	0.82	-0.53	-1.84
Thailand	1.44	1.12	1.06	0.83	0.31	-1.77	-4.90
Turkey	1.94	2.40	2.14	2.17	2.09	-0.87	-2.55
UK	-0.60	-0.48	-0.44	-0.39	-0.15	0.24	2.03
USA	0.14	0.55	0.63	0.61	0.31	-0.51	-2.34
Venezuela	1.08	0.50	-0.30	0.74	0.50	-0.84	-1.83
Vietnam	0.19	0.61	0.38	0.01	0.19	-0.65	-1.04