School of Finance

University of St.Gallen

IN SEARCH OF CUSHION? CRASH AVERSION AND THE CROSS-SECTION OF EXPECTED STOCK RETURNS WORLDWIDE

FLORIAN WEIGERT

WORKING PAPERS ON FINANCE NO. 2013/25

SWISS INSTITUTE OF BANKING AND FINANCE (S/BF – HSG)

OCTOBER 2012

THIS VERSION: MARCH 2013

In Search of Cushion? Crash Aversion and the Cross-Section of Expected Stock Returns Worldwide

Florian Weigert *

First Version: October 2012
This Version: March 2013

Abstract

This paper examines whether investors receive a compensation for holding stocks with a strong sensitivity to extreme market downturns in a worldwide sample covering 40 different countries. I find that stocks with strong crash sensitivity earn higher average returns than stocks with weak crash sensitivity. The risk premium is particularly strong in countries that rank high on the individualism index developed by Hofstede (2001). My findings are consistent with the 'cushion hypothesis' by Weber and Hsee (1998) and Hsee and Weber (1999): Crash sensitivity is only marginally compensated in socially-collectivist countries where an investor's social network serves as a cushion in the case of large financial losses. However, there exists a statistically and economically important premium in individualistic countries where investors personally bear the risk of large financial losses.

Keywords: Asset Pricing, Asymmetric Dependence, Copulas, Coskewness, Crash Aversion, Cultural Finance, Cushion Hypothesis, Downside Risk, Individualism, Tail Risk

JEL Classification Numbers: C12, G01, G11, G12, G15, G17, F30.

---

*Florian Weigert is from the Chair of International Finance and CDSB at the University of Mannheim, Address: L9, 1-2, 68131 Mannheim, Germany, Telephone: ++49-621-181-1625, e-mail: *weigert@bwl.uni-mannheim.de*. The author thanks Stefan Ruenzi, Erik Theissen, and seminar participants at the University of Mannheim for their helpful comments. All errors are my own.

In Search of Cushion? Crash Aversion and the Cross-Section of Expected Stock Returns Worldwide

Abstract

This paper examines whether investors receive a compensation for holding stocks with a strong sensitivity to extreme market downturns in a worldwide sample covering 40 different countries. I find that stocks with strong crash sensitivity earn higher average returns than stocks with weak crash sensitivity. The risk premium is particularly strong in countries that rank high on the individualism index developed by Hofstede (2001). My findings are consistent with the 'cushion hypothesis' by Weber and Hsee (1998) and Hsee and Weber (1999): Crash sensitivity is only marginally compensated in socially-collectivist countries where an investor's social network serves as a cushion in the case of large financial losses. However, there exists a statistically and economically important premium in individualistic countries where investors personally bear the risk of large financial losses.

Keywords: Asset Pricing, Asymmetric Dependence, Copulas, Coskewness, Crash Aversion, Cultural Finance, Cushion Hypothesis, Downside Risk, Individualism, Tail Risk

JEL Classification Numbers: C12, G01, G11, G12, G15, G17, F30.

1 Introduction

Since the pioneering work of Roy (1952), economists have recognized that individuals are aware of rare disaster events (e.g., stock market crashes) and take precautions to reduce their likelihood of being affected by such a catastrophe occurring. If agents derive disproportionately strong disutility from large financial losses, there should be a risk premium for the occurence of infrequent, yet heavy tail events (Rietz (1988)). Indeed, Gabaix (2012) shows that a time-varying rare disaster risk framework can explain several puzzles in macro-finance and Bollerslev and Todorov (2011) find that the compensation for rare events accounts for a large fraction of the U.S. equity risk premium.[1]

In addition to explaining the development of aggregate stock market returns, rare disasters and crash aversion are shown to have an impact on the pricing of individual stocks in the cross-section. Ruenzi and Weigert (2013) find that, in the U.S. setting, crash-sensitive stocks, i.e., stocks that are likely to perform particularly badly when the market crashes, earn significantly higher average returns than crash-insensitive stocks, i.e., stocks that offer some protection against market downturns.[2] This finding is consistent with investors being particularly averse against suffering large financial losses during stock market crashes and thus requiring an additional return premium for holding such stocks.[3]

This paper examines the impact of investors' crash aversion on the cross-sectional pricing of individual stocks worldwide. First, I investigate whether the premium for the crash sensitivity of a stock also holds out-of-sample across different international stock markets besides the United States. Second, I use differences in investor, firm, and market characteristics across countries to investigate the determinants of the crash sensitivity premium. In particular, I examine whether the premium for a stock's crash sensitivity is greater in those countries where investors are likely to exhibit a higher degree of aversion against large financial losses during market crashes.

[1]However, these findings are not without dissension. Julliard and Ghosh (2012) document that it is unlikely that an equity premium puzzle of the same magnitude as the historical one would arise, if aggregate stock market returns are generated by a rare events distribution.

[2]In related papers, Kelly (2012) and Cholette and Lu (2011) show that there exists a premium for stocks with heavy tail risk exposure. They document that stocks with high systematic tail risk exposure earn significantly higher expected returns than stocks with low systematic tail risk exposure.

[3]Crash aversion is also documented in the empirical option pricing literature. Rubinstein (1994) and Bates (2008) find that instruments that offer protection against extreme market downturns (such as deep out-of-the-money puts) have high implied volatility and are relatively expensive.

Following the methodology of Ruenzi and Weigert (2013), I use copula methods based on extreme value theory to determine the crash sensitivity of a stock. Specifically, I capture the crash sensitivity of an individual stock based on the extreme dependence between the stock's return and the market return in the lower left tail of their joint distribution (also called lower tail dependence, LTD).[4] My empirical results indicate that a quintile portfolio consisting of stocks with the strongest LTD underperforms a quintile portfolio consisting of stocks with the weakest LTD by more than 8% on a monthly basis *during* periods of heavy market downturns. Consequently, from an equlilibrium perspective, investors who are sensitive to large losses during market crashes will require a premium for holding stocks with strong LTD in the long run.[5]

Investigating data from 40 countries, I find strong support for a LTD risk premium in the cross-section of average stock returns. In the pooled worldwide sample including U.S. stocks (excluding U.S. stocks) from 1981 to 2011, top quintile LTD stocks outperform bottom quintile LTD stocks by 7.67% (6.16%) p.a. on average. The premium for LTD is positive and significant (at least at the 5% level) across all different geographical subsamples with a return spread between the strong LTD quintile portfolio and the weak LTD quintile portfolio ranging from 13.49% p.a. in America to 3.82% p.a. in Asia. Results from multivariate regression analyses reveal that the LTD premium cannot be explained by other risk- and firm characteristics, such as market beta (Sharpe (1964) and Lintner (1965)), size (Banz (1981)), book-to-market (Basu (1983)), liquidity (Amihud (2002)), momentum (Jegadeesh and Titman (1993)), idiosyncratic volatility (Ang, Hodrick, Xing, and Zhang (2009)), and coskewness (Harvey and Siddique (2000)). Controlling for these variables, I find that an increase of one standard deviation in LTD is associated with an increase of average returns by 3.03% (2.18%) p.a. based on the worldwide sample including the U.S. (excluding the U.S.).

Although LTD has a strong positive impact on average stock returns both in the pooled

[4]When focusing on joint extreme events of stock returns, the linear correlation is not the appropriate dependence concept. The linear correlation cannot capture joint extreme events if the underlying bivariate distribution is non-normal (see Embrechts, McNeil, and Straumann (2002)).

[5]Similar to the calculation of LTD, I also capture the extreme dependence between the stock's return and the market return in the upper right tail of their joint distribution (upper tail dependence, UTD). Stocks with strong UTD realize their highest payoffs in times of stock market booms, i.e. have high upside potential. Following the theoretical framework of Ang, Chen, and Xing (2006), investors are willing to hold stocks with high upside potential at a discount.

worldwide sample as well as in all geographical subsamples, there still exist large differences in the magnitude of the premium across countries. Separate examinations of each stock market reveal that the impact of LTD on average stock returns is significantly positive at the 10% level (5% level, 1% level) in 18 (15, 8) of the 40 countries. The largest return spreads between the top quintile LTD portfolio and the bottom quintile LTD portfolio are found in the U.S. (14.64% p.a.), Australia (12.79% p.a.), and the Netherlands (11.22% p.a.). Although not statistically significant, negative LTD premiums (i.e., LTD discounts) are found in China (-5.30% p.a.), South Korea (-3.46% p.a.), Taiwan (-3.05% p.a.), and the Philippines (-0.29% p.a.). Hence, these results lead to the question of how the magnitude of the LTD premium is related to country-specific differences in investor, firm, and market characteristics.

I regress the average country-specific LTD premium on a number of potential determinants that are known to vary across countries. The magnitude of the LTD premium is possibly related to cultural variables (as in Chui, Titman, and Wei (2010)), differences in religion and language (as in Stulz and Williamson (2003)), macroeconomic fundamentals and aggregate stock market characteristics, country-wide differences in accounting standards and variables proxying for investor protection (LaPorta, Lopez-De-Silanes, Shleifer, and Vishny (1998) and LaPorta, Lopez-De-Silanes, and Shleifer (2006)), as well as differences in a country's stock market integration (Bekaert, Hodrick, and Zhang (2009)), government social spending, and investor characteristics. My explorative investigation reveals a surprising result: Cross-country differences in the LTD premium are most strongly correlated with differences in one cultural variable, the Hofstede (2001) individualism dimension.[6]

How can one explain this empirical finding? My main hypothesis is that the premium for a stock's LTD is higher (lower) in those countries where local investors are likely to exhibit a higher (lower) degree of crash aversion.[7] Experimental studies in psychology and

[6]Hofstede (2001) studies work-related values around the world with reported data from 88,000 IBM employees in 76 countries over the time period from 1967 to 1973. According to his classification, cultures differ in their emphasis on five dimensions: individualism, masculinity, power distance, uncertainty avoidance, and long-term orientation. His model provides scales from 0 to 100 for each dimension for a total of 76 countries, and each country has a position on each scale or index, relative to other countries. Countries with a score on the high side of the individualism dimension represent a society where people look after themselves and their immediate family only. In contrast, countries with a score on the low side of this dimension, i.e., collectivistic countries, represent a society where people belong to in-groups that look after them in exchange for loyalty.

[7]I implicitly assume that most stocks in a country are held by local investors and that local investors hold a disproportional amount of their wealth in domestic assets. French and Poterba (1991) find strong

management (such as Weber and Hsee (1998) and Hsee and Weber (1999)) indicate that there exists a strong connection between financial risk taking of individuals and their cultural background. In particular, they find that individuals in individualistic countries tend to be more *risk-averse* in financial decisions than individuals in collectivistic countries.[8] This result is explained in terms of a *cushion hypothesis*. The strong social network among individuals in a collectivistic country (such as China) allows for the joint development of mechanisms to hedge against financial risk. In particular, the tightly-knit society, and the increased awareness of family and friends, provides help if an individual suffers from a large financial loss (i.e., individuals are 'cushioned' if they fall). Conversely, this financial 'insurance' from the social network is not readily available to individuals in individualistic societies (such as the U.S.). Consequently, investors in individualistic countries are expected to require a higher premium for a stock's LTD than investors in collectivistic countries.[9]

I find that the LTD premium is significantly higher in individualistic countries than in collectivistic countries.[10] The return spread between the top quintile LTD portfolio and the bottom quintile LTD portfolio in those countries with individualism indexes in the top 20% (bottom 20 %) is 12.68% (-0.13%) p.a. Hence, the yearly returns on a long minus short LTD portfolio are more than 12.81% higher in those countries with individualism indexes in the top 20% than in those countries with individualism indexes in the bottom 20%. The positive relationship between the LTD premium and individualism is stable to a battery of different robustness checks, such as different portfolio sorting procedures, the use of a different individualism measure from the GLOBE study (see House, Hanges, Javidan, Dorfman, and Gupta (2004)), and different sample sizes.

My study is related to three strands of literature. First, I contribute to the literature on crash risk and asset pricing. Bali, Demirtas, and Levy (2009) examine the intertemporal relation between the univariate crash risk of a stock (measured by its Value at risk (VaR),

---

empirical support for this so-called 'home-bias'.

[8]Individuals in individualistic countries were found to be more risk-averse *only* in investment decisions, but not in medical or university decisions.

[9]Empirical evidence consistent with the 'cushion hypothesis' comes from Agrarwal, Chomsisengphet, and Liu (2011) who investigate the role of individual social capital on personal bankruptcy and default outcomes in the consumer credit market. They find that people who can expect to rely on family and friends for financial support are less likely to default than people who cannot expect to rely on family and friends when financial support is required.

[10]Regressing the average LTD premium on the Hofstede (2001) individualism index yields an R-squared of 0.42. Individualism has a positive coefficient and is statistically significant at the 1% level.

expected shortfall, and tail risk) and its expected return. They find a positive and significant relationship between univariate crash risk and the returns on U.S. stocks. Ang, Chen, and Xing (2006) document a significant risk premium for stocks with a high downside beta, i.e., stocks that have high betas conditional on market downturns. Kelly (2012) and Ruenzi and Weigert (2013) investigate the impact of systematic crash risk on the cross-section of expected stock returns. They show that investors demand additional compensation for stocks that are crash-prone, i.e. stocks that have particularly bad returns that coincide with market crashes. In this paper, I extend the literature by analyzing whether systematic crash risk is a priced factor among 40 stock markets around the world.

Second, my paper contributes to the literature on the cross-sectional pricing of stocks in an international context. Fama and French (1998) find that value stocks tend to have higher returns than growth stocks around the world. Furthermore, Griffin (2002) shows that country-specific versions of Fama and French (1993)'s three-factor model better explain time-series variation in international stock returns than global factor models. Griffin, Ji, and Martin (2003) document economically large and statistically significant momentum profits in a global setting and provide evidence that macroeconomic risk factors cannot explain those abnormal return patterns. In a similar vein, Hou, Karolyi, and Kho (2011) provide evidence that a momentum factor and cash flow/price factor-mimicking portfolios, together with a global market factor, capture substantial common variation in international stock returns. This paper enhances the existing literature by investigating a new factor to explain the cross-section of stock returns worldwide - the crash sensitivity of a stock.

Third, I extend the literature on culture and finance. Guiso, Sapienza, and Zingales (2006) define 'culture' as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation".[11] Although the view that culture is a determinant of economic growth has a long tradition (see, e.g., Weber (1930)), its importance for financial research has only started to gain attention during the last two decades.[12] In particular, Grinblatt and Keloharju (2001) find that cultural proximity has an impact on investors' stock trading behaviour and Stulz and Williamson (2003) show that

[11] A more detailed definition of culture is given in Matsumoto and Juang (2008), who define 'culture' as "a unique meaning and information system, shared by a group and transmitted across generations, that allows the group to meet basic needs of survival, pursue happiness and well-being, and derive meaning from life."

[12] For an overview of recent developments in 'Cultural Finance', see e.g. Hens and Wang (2007) and Breuer and Quinten (2009).

a country's culture, proxied by differences in religion and language, help to explain cross-country differences in investor protection. More recently, Chui, Titman, and Wei (2010) document that cultural differences influence the returns of momentum strategies. This paper proceeds to document that cultural differences towards financial risk taking can help to explain cross-country differences in the premium for a stock's crash sensitivity (proxied by LTD).

My paper proceeds as follows. In Section 2, I explain the estimation procedure for the LTD coefficients and summarize the international stock market data. Section 3 shows that stocks with strong LTD earn high average returns worldwide and across geographical subsamples. In Section 4, I investigate how the magnitude of the LTD premium is related to country-specific explanatory variables. Finally, I provide concluding comments in Section 5.

2 Measuring Crash Sensitivity and Stock Market Data

This part explains the methodology how to capture the crash sensitivity of individual stocks (Section 2.1). I use copula methods to estimate the lower tail dependence (LTD) between individual stock returns and the market return. Subsequently, I describe the stock market data and the development of aggregate LTD over time (Section 2.2). Finally, I show that LTD captures the crash sensitivity of a stock by demonstrating that strong LTD portfolios heavily underperform weak LTD portfolios during financial crises (Section 2.3).

2.1 Measuring Crash Sensitivity

My approach to capturing the crash sensitivity of a stock follows the method of Ruenzi and Weigert (2013). I formalize the idea of capturing crash sensitivity by introducing the lower tail dependence (LTD) coefficient between an individual stock return r_i and the market return r_m. Following Sibuya (1960), LTD is defined as

$$\text{LTD} := \text{LTD}(r_i, r_m) := \lim_{u \to 0+} P(r_i \leq F_i^{-1}(u) | r_m \leq F_m^{-1}(u)), \tag{1}$$

where F_i (F_m) denotes the marginal distribution function of stock return r_i (the market return r_m) and $u \in (0, 1)$ is the argument of the distribution function. Stocks with strong LTD are likely to have their lowest return realization at the same time when the market displays its lowest return realization, i.e., these stocks are particularly sensitive to market crashes. As an example, consider the following two illustrations of 2000 simulated bivariate realizations based on different dependence structures between (r_i, r_m) shown in Figure 1.

[Insert Figure 1 about here]

Panel A shows an example with no tail dependence in either tail of the distribution. In contrast, Panel B is an example of increased lower tail dependence (LTD).

Similarly, the coefficient of upper tail dependence (UTD) can be defined as

$$\text{UTD} := \text{UTD}(r_i, r_m) = \lim_{u \to 1-} P(r_i \geq F_i^{-1}(u) | r_m \geq F_m^{-1}(u)).$$

Since LTD (UTD) is the limit of a conditional probability, it can take values between zero and one. If LTD (UTD) is equal to zero, the two variables are asymptotically independent in the lower (upper) tail.

I compute LTD and UTD coefficients in terms of a copula function C fitted to the bivariate distribution of (r_i, r_m).[13] Following McNeil, Frey, and Embrechts (2005), simple expressions for LTD and UTD in terms of the copula C of the bivariate distribution can be derived based on

$$\text{LTD} = \lim_{u \to 0+} \frac{C(u,u)}{u} \tag{2}$$

and

$$\text{UTD} = \lim_{u \to 1-} \frac{1 - 2u + C(u,u)}{1-u} \tag{3}$$

if F_1 and F_2 are continuous. Equations (2) and (3) have closed form solutions for many parametric copulas. In this study, I use 12 different basic copula functions. A detailed overview of these basic copulas and the corresponding lower tail dependencies (and upper tail dependencies) is given in Table A.1 in Appendix A.

[13] Copula functions $C : [0,1]^2 \mapsto [0,1]$ allow to isolate the dependence structure of the bivariate distribution from the univariate marginal distributions. Sklar (1959) shows that all bivariate distribution functions $F(x_1, x_2)$ can be completely described based on the univariate marginal distributions F_1 and F_2 and a copula function C.

Analogous to Ruenzi and Weigert (2013), I then form convex combinations of the basic copulas consisting of one copula (out of four) that allows for asymptotic dependence in the lower tail, C_{LTD}, one copula (out of four) that is asymptotically independent, C_{NTD}, and one copula (out of four) that allows for asymptotic dependence in the upper tail, C_{UTD}:

$$\begin{aligned} C(u_1, u_2, \Theta) &= w_1 \cdot C_{\text{LTD}}(u_1, u_2; \theta_1) + w_2 \cdot C_{\text{NTD}}(u_1, u_2; \theta_2) \\ &\quad +(1 - w_1 - w_2) \cdot C_{\text{UTD}}(u_1, u_2; \theta_3), \end{aligned} \tag{4}$$

where Θ denotes the set of the basic copula parameters θ_i, $i = 1, 2, 3$ and the convex weights w_1 and w_2.

To determine which convex copula combination best fits the bivariate distributions of individual stock returns r_i and the market return r_m in a specific country, I use the first year of data available for each country as my pre-sample period. Based on daily return data, I fit all 64 possible convex copula combinations to the bivariate distribution of (r_i, r_m) for all stocks i in a country. I then select the respective copula combination $C^*(\cdot, \cdot; \Theta^*)$ that is chosen most frequently based on the estimated log-likelihood value for each country. Table A.2 reports the results of this selection method.

Once the copula combination has been selected for each country, my estimation approach for the LTD and UTD coefficients follows a two-step procedure. First, for each stock i and month t, I estimate the set of copula parameters $\Theta^*_{i,t}$ for the bivariate distribution of (r_i, r_m) based on a rolling 12-month horizon using daily data.[14] The copula parameters are estimated via the canonical maximum likelihood procedure of Genest, Ghoudi, and Rivest (1995). Second, for each stock i and month t, I compute LTD and UTD coefficients implied by the estimated parameters $\Theta^*_{i,t}$ using equations (2) and (3). Hence, I end up with a panel of tail dependence coefficients $\text{LTD}_{i,t}$ and $\text{UTD}_{i,t}$ at the firm-month level. I use $\text{LTD}_{i,t}$ ($\text{UTD}_{i,t}$) as a proxy for the crash sensitivity (upward potential) of stock i in month t. For a more detailed description of the estimation method, see Appendix A.

[14] I compute the daily market return as the value-weighted average return of all stocks in the corresponding country. When computing the market return for stock i, I exclude stock i in the computation. This approach removes potential endogeneity problems when calculating tail dependence coefficients for each stock.

2.2 Stock Market Data and the Evolution of Aggregate LTD

I obtain daily stock return and accounting data for the U.S. from CRSP and Compustat and daily stock return and accounting data for the remaining countries from Datastream International. The starting date for each country in my sample varies according to the availability of data on Datastream International with the earliest date (for some countries) being January 1980.[15] I include all common stock (both dead and alive) that are listed on the major stock exchanges in each country to circumvent any potential survivorship bias.

As discussed by Ince and Porter (2006), the quality of stock market data (in particular for emerging markets) obtained from Datastream International has to be handled with care. Following Chui, Titman, and Wei (2010), I exclude very small and/or illiquid stocks. A daily return is treated as missing if the market capitalization of the stock is below the fifth percentile of all stocks within a given country on any day. In addition, to retain a stock in a given month, the stock must have at least 5 daily returns different from zero. To ensure that my results are not driven by extreme outliers in the data, daily returns are winsorized at the one percent level. I retain a stock in a given year if it has at least 70 daily non-missing return observations.[16] To obtain meaningful results in my portfolio sorts, all countries in our analysis must have at least 30 stocks that meet the stock selection criteria in any month during the sample period. In addition, all countries need to have monthly data on a stock's market capitalization and yearly data on a stock's book-to-market value for at least half of the stocks in the sample period.[17]

My final sample consists of 45,881 individual stocks from 40 different countries during the time period from January 1980 to December 2011. I estimate LTD (and UTD) coefficients for each firm and each month based on rolling windows of 12 months using daily data. Table 1 provides summary statistics.

[Insert Table 1 about here]

[15]To be comparable with the international stock market data, I restrict the sample of U.S. stocks to begin from January 1980 as well. My U.S. sample consists of all common stocks (CRSP share codes 10 and 11) from CRSP trading on the NYSE and AMEX.

[16]My results on the relationship between crash sensitivity and average stock returns are not affected by the screening process.

[17]In addition, all countries in our sample must be available in the cross-country psychological survey of Hofstede (2001) and possess a valid individualism index value.

Columns (1)-(3) of Table 1 report the start date, end date and length of the sample period for each country. The sample period starts when the first estimates of LTD and UTD are available, i.e., after an estimation period of 12 months. In columns (4)-(7), I provide summary statistics of the total number of firms (at specific dates in time) for each country. The U.S. has the highest number of unique stocks (7,591), followed by the United Kingdom (5,118) and Japan (3,358). The countries with the lowest number of unique stocks are Argentina (99), Ireland (111), and Mexico (180).[18]

Columns (8) and (9) display the average equal-weighted monthly return and volatility over all stocks per country. On average, the monthly return (volatility) over all countries in my sample is 1.23% (6.92%) per month. The country with the highest (lowest) equal-weighted monthly return in my sample period is Turkey (Portugal) with a value of 4.86% (0.20%) per month. Turkey (Belgium) has the highest (lowest) monthly volatility of all countries with a value of 16.42% (3.79%) per month.[19]

In column (10), I report the average equal-weighted LTD over all months and stocks in each country. The average LTD over all countries is 0.21 with Taiwan (0.37), China (0.33), and Turkey (0.32) having the highest values and Canada (0.12), Australia (0.13), and New Zealand (0.14) having the lowest values. The average equal-weighted UTD over all stocks in the sample is 0.14 with China having the highest value (0.22) and Australia and United Kingdom having the lowest value (0.08). Finally, in column (12), I report the average of the difference between LTD and UTD in each country. The difference is positive and statistically significant in all countries in my sample, supporting the conclusion that return dependencies generally increase in down markets at the international level (see, e.g. Ang and Chen (2002) and Poon, Rockinger, and Tawn (2004)).

I investigate the time series behavior of aggregate LTD and aggregate UTD in Figure 2. Aggregate LTD ($\text{LTD}_{m,t}$) is defined as the monthly cross-sectional, equally-weighted, average of $\text{LTD}_{i,t}$ over all stocks i and countries in my sample. Analogously, I define aggregate UTD ($\text{UTD}_{m,t}$) as the monthly cross-sectional, equally-weighted, average of $\text{UTD}_{i,t}$ over all stocks i and countries in my sample. Panel A plots the time series of $\text{LTD}_{m,t}$ and $\text{UTD}_{m,t}$.

[18]The number of stocks in my study is similar to the number of stocks in Chui, Titman, and Wei (2010). In December 1996 (June 2003), my average sample size per country only differs by 2.84% (5.19%) from the sample size in Chui, Titman, and Wei (2010).

[19]The average equal-weighted monthly return (volatility) per country is highly correlated with the average return (volatility) of the MSCI performance index for each country with a correlation coefficient of 0.72 (0.74).

[Insert Figure 2 about here]

The graph reveals that there is a slightly increasing trend in worldwide $\text{LTD}_{m,t}$ in recent years.[20] Occasional spikes in $\text{LTD}_{m,t}$ roughly correspond to worldwide financial crises; the highest value in $\text{LTD}_{m,t}$ corresponds to early 2008 – the year of a worldwide financial crisis following the bursting of the U.S. housing bubble and the Lehman Brothers bankruptcy. Another spike in aggregate LTD occurs during 1987 – the year of Black Monday with the largest one-day percentage decline in U.S. stock market history. In contrast, when investigating the time series of aggregate UTD, there is no increasing trend in recent years. The time series of $\text{LTD}_{m,t}$ and $\text{UTD}_{m,t}$ are moderately correlated with a linear correlation coefficient of 0.14.

Panel B shows the development of aggregate LTD for different geographical subsamples. The average correlation between the different aggregate LTD series is around 0.60 with the highest correlation occurring between Europe and America (0.74) and the lowest correlation between Africa/Oceania and Asia (0.27). The average aggregate LTD is 0.22 for Asia, 0.18 for Europe, 0.16 for America, and 0.13 for Africa/Oceania.[21]

2.3 Returns of LTD-sorted Portfolios During Financial Crises

If LTD really captures the crash sensitivity of an individual stock with the market, one would expect to see an underperformance of strong LTD stocks during periods of heavy market decline. I now examine whether strong LTD stocks indeed underperform weak LTD stocks during periods of financial crises. Each month, I sort stocks into five quintiles based on their estimated LTD over the past 12 months. I compute average realized monthly returns of these portfolios during months in which the local market return is below its respective 5% quantile (measured over the whole market return time series for the respective country). Results for the strong LTD portfolio (portfolio 5), the weak LTD portfolio (portfolio 1), and the strong - weak LTD portfolio for the 40 countries in my sample are presented in Table 2.

[Insert Table 2 about here]

[20] I perform an augmented Dickey-Fuller test to assess the stationarity of $\text{LTD}_{m,t}$. I cannot reject the null hypothesis that aggregate LTD contains a unit root with a p-value smaller that 10%.

[21] I use Africa/Oceania as one geographical subsample because there is only one country in Africa (South Africa) and there are only two countries in Oceania (Australia and New Zealand) in my sample.

As expected, strong LTD stocks strongly underperform weak LTD stocks during market crashes for each country in my sample. The differences are economically large: the monthly return of the strong LTD portfolio is between 2.70% to 14.70% *lower* than that of the weak LTD portfolio. On average, strong LTD stocks underperform weak LTD stocks by -8.12% per month, if the local market return is below its respective 5% quantile. This effect is statistically significant at the 1% level with a t-statistic of -6.76.

These findings show that LTD effectively captures the crash sensitivity of an individual stock. During periods of heavy market downturns, strong LTD stocks underperform while weak LTD stocks can serve as an insurance against very low market returns. Consequently, investors who are sensitive to large losses during market crashes will require a premium for holding stocks with strong LTD. Section 3 investigates the existence and magnitude of this LTD premium worldwide and for geographical subsamples.

3 LTD and Realized Stock Returns Worldwide

If there is a cross-sectional relationship between a stock's crash sensitivity and expected returns, one should observe patterns between realized LTD and average realized returns.[22] Hence, when documenting the impact of LTD on expected returns, I relate realized tail dependence coefficients to portfolio and individual security returns over the same time period. This procedure closely follows papers such as Ang, Chen, and Xing (2006) as well as Lewellen and Nagel (2006) and is mainly motivated by the fact that risk exposures (such as market beta) are known to be time-varying (see, e.g., Fama and French (1992), and Ang and Chen (2007)).

Although many cross-sectional asset pricing studies work in horizons of one month, I follow Kothari, Shanken, and Sloan (1995) and Ang, Chen, and Xing (2006) and use intervals of 12 months. This annual horizon offsets two concerns: First, I need a large number of observations to get reliable estimates for the LTD and UTD coefficients. Second, I can account for time-varying tail dependence by investigating relations over relatively short horizons.[23] Although the estimation of risk factors is performed over a one-year horizon, I evaluate 12-

[22]This assertion implicitly assumes that realized returns are, on average, a good proxy for expected returns.

[23]Figure 2 shows that aggregate LTD and UTD indeed display temporal variation over time.

month returns at a monthly frequency. The use of overlapping information in asset pricing exercises is more efficient and has greater statistical power, but also induces moving average effects at the same time.[24] To adjust for these effects, t-statistics are reported using 12 Newey and West (1987) lags.[25] The maximum sample period is from January 1981 to December 2011, with my last 12-month return period starting in January 2011.

3.1 Portfolio Sorts and Factor Models

To investigate whether stocks with strong LTD earn a premium worldwide and within geographical subsamples, I first look at simple univariate portfolio sorts. In each month t, I sort stocks into five quintiles based on realized LTD per country over the past 12 months.[26] I report the average annual realized equal-weighted local currency returns for these quintile portfolios as well as differences in average returns between quintile portfolio 5 (strong LTD) and quintile portfolio 1 (weak LTD) in Panel A of Table 3.

[Insert Table 3 about here]

Panel A indicates that stocks with strong LTD have significantly higher average returns than stocks with weak LTD on a worldwide scale. In the pooled worldwide sample, stocks in the quintile with the lowest (highest) LTD earn an annual average return of 12.43% p.a. (20.10% p.a). The return spread between quintile portfolio 5 and 1 is 7.67% p.a., which is statistically significant at the 1% level. Panel A also reports the relationship between LTD and average realized returns for different geographical areas. I find that stocks with strong LTD have significantly higher average returns than stocks with weak LTD in all geographical subsamples. The annual return spread between quintile portfolio 5 and 1 is large and statistically significant at the 1% level for the worldwide sample exluding U.S. stocks (6.16% p.a.), America (13.49% p.a.), Europe (8.05% p.a.), and Africa/Oceania (10.71% p.a.). The smallest annual return spread of 3.82% p.a. is found in Asia.

[24]Statistical power is of high interest in my setting because some countries only have a short time series of stock market data available.

[25]In unreported tests, I find that the results of my asset pricing tests are stable if I use non-overlapping intervals of one year.

[26]Since LTD levels vary among countries (see Table 1), stocks are sorted into portfolios based on realized LTD within their respective country. My main results remain unchanged if I sort stocks into portfolios based on realized LTD within the worldwide sample or geographical subsamples.

Panel B displays the results of value-weighted portfolio sorts using local currency returns.[27] I only report differences in average returns between quintile portfolio 5 (strong LTD) and quintile portfolio 1 (weak LTD). Similar to Panel A, the return spread between quintile portfolio 5 and 1 is economically large and statistically significant for the worldwide sample (9.64% p.a.) and all geographical subsamples except from Asia. The spread ranges from 9.98% p.a. in America to 5.15% p.a. in Asia. Hence, one could assume that my results are not driven by return patterns of very small firms.

In Panel C, I investigate whether the results are stable when performing equal-weighted portfolio sorts using USD-denominated returns. As before, the annual return spread between quintile portfolio 5 and 1 is large and statistically significant at the 1% level for the worldwide sample including U.S. stocks (8.03% p.a.), the worldwide sample exluding U.S. stocks (6.51% p.a.), America (13.95% p.a.), Europe (7.85% p.a.), and Africa/Oceania (11.08% p.a.). Asia shows the smallest annual return spread of 4.36% p.a., which is statistically significant at the 5% level.

Finally, Panel D reports the results of equal-weighted portfolio sorts with USD-denominated returns adjusted by the four-factor Carhart (1997) model.[28] The spreads in alphas between quintile portfolio 5 (strong LTD) and quintile portfolio 1 (weak LTD) again are statistically significant (at least at the 5% level) for the worldwide sample including U.S. stocks (4.23% p.a.), the worldwide sample exluding U.S. stocks (2.98% p.a.), America (8.78% p.a.), Europe (7.46% p.a.), and Africa/Oceania (7.87% p.a.).[29]

The results of Table 3 suggest that LTD has an impact on the cross-section of average stock returns worldwide. Stocks with strong LTD earn high average returns in both the pooled worldwide sample and in different geographical subsamples. This finding is consistent with the view that investors are crash-averse worldwide and require additional compensation for stocks that perform particularly poorly during market crashes. However, strong LTD stocks may earn high average returns because LTD is correlated with other risk- and firm characteristics at the same time. Definitions of all risk- and firm characteristics used in

[27]Stocks in each respective quintile portfolio are weighted according to their USD market capitalization.

[28]International Fama and French (1993) factors and momentum factors are obtained from Kenneth French's website. Carhart (1997) alphas are estimated based on yearly portfolio and factor returns over the whole sample period using factors for the entire global region and continent/geographical areas, respectively.

[29]The return spread in Asia (4.25% p.a.) is not found to be statistically significant at the 10% level.

the asset pricing tests are contained in Panel A of Table B.1 in the Appendix. Correlations among individual tail dependence coefficients and other stock characteristics in the worldwide sample are displayed in Panel A of Table B.2 in the Appendix.[30]

3.2 Multivariate Regression Analysis

I run Fama-MacBeth (1973) regressions of yearly firm returns on LTD and different risk- and firm characteristics for the pooled worldwide sample and geographical subsamples from 1981 to 2011 using data on the individual firm level.[31] Panel A of Table 4 presents the regression results for the pooled worldwide sample and geographical subsamples.

[Insert Table 4 about here]

Regressions (1)-(6) refer to the pooled worldwide sample. In regression (1), I include LTD as the only explanatory variable. It has a positive point estimate of 0.178 and is statistically significant at the 1% level. LTD is also economically relevant: A one standard deviation increase in LTD leads to additional returns of 2.55% p.a. In regression (2), I add a stock's UTD coefficient. Consistent with the idea that investors are willing to hold stocks with high upside potential at a discount, I find that UTD has a significantly negative impact on returns worldwide. Regression (3) also controls for a stock's beta, size, book-to-market, and its past yearly return. My results confirm a standard set of cross-sectional return patterns: β (+), size (-), book-to-market (+) and past return (+) are significant variables for the cross-section of stock returns.[32] More importantly in this context, LTD remains statistically significant

[30]Based on the worldwide sample, LTD and UTD are positively correlated with a coefficient of 0.29. In addition, individual LTD has strong positive correlations with downside beta (0.61), beta (0.57) and size (0.21) and is negatively correlated with coskewness (-0.29). Individual UTD is positively correlated with beta (0.51), size (0.33), and coskewness (0.29) and negatively correlated with idiosyncratic volatility (-0.21).

[31]In contrast to using portfolios as test assets, this econometric procedure has the disadvantage that risk factors are estimated less precisely. However, creating portfolios lessens information by reducing the dispersion of risk factors which leads to larger standard errors. Ang, Liu and Schwarz (2010) show that the smaller standard errors of risk factor estimates from creating portfolios do not necessarily lead to smaller standard errors of cross-sectional coefficient estimates.

[32]Firm size (book-to-market) is shown to have a negative (positive) impact on expected returns in the U.S. (e.g., Fama and French (1992) and Fama and French (1993)) as well as on international stock markets (e.g., Fama and French (1998) and Griffin (2002)). Past winner (loser) stocks over the previous 3 to 12 months are found to continue to perform well (poorly) over the subsequent 3 to 12 months in the U.S. (e.g., Jegadeesh and Titman (1993)) and throughout the world (e.g. Rouwenhorst (1998) and Griffin, Ji, and Martin (2003)).

at the 1% level when including these additional variables. In regression (4), I expand my model by including a stock's illiquidity level (*illiq*), idiosyncratic volatility (*idio vola*), and coskewness (*coskew*).[33] Once again, I find that the premium for LTD is robust to controlling for the impact of these variables. In regression (5), I replace beta by UTD. My results remain unchanged; LTD is a highly significant determinant of the cross-section of expected stock returns worldwide. The inclusion of different control variables does not affect the economic relevance of LTD: A one standard deviation increase in LTD leads to additional returns of 3.03% p.a. In contrast, UTD loses its statistical and economic significance with the inclusion of different control variables.[34] Finally, in regression (6), I add a stock's downside beta (β^{-}) to my model. In line with results of Ang, Chen, and Xing (2006) for the U.S., I find that β^{-} has a positive influence on average stock returns; moreover, the positive impact of LTD remains stable.

Regressions (7)-(11) report the results of regression (5) for different geographical subsamples.[35] The LTD point estimate ranges from 0.523 for America to 0.140 for Asia, implying that a one standard deviation increase in LTD leads to additional returns of 6.93% p.a. in America (2.05% p.a. in Asia). The impact of UTD for different geographical subsamples is considerably weaker. I only find evidence of a statistical significant impact of UTD in America (point estimate of -0.124) and in Asia (point estimate of -0.071).

In Panel B of Table 4, I investigate whether there is a stronger impact of LTD on average returns for stocks with high return volatility. LTD, as defined in equation (1), reveals the likelihood that a stock realizes its worst returns at the exact same time the market realizes its worst return. However, LTD does not take into account the severity of the stock's actual worst return. Thus, I follow the investigation setup of Ruenzi and Weigert (2013) and examine whether the impact of LTD is stronger if the worst return realization of a stock is expected to be particularly low. To capture the severity of a bad outcome, I use a stock's

[33] There is empirical evidence that *illiq* (*idio vola*, *coskew*) has a positive (negative) impact on the cross-section of expected stock returns. See Amihud (2002) for the impact of *illiq*, Ang, Hodrick, Xing, and Zhang (2006) and Ang, Hodrick, Xing, and Zhang (2009) for the impact of *idio vola*, and Harvey and Siddique (2000) for the impact of *coskew* in the U.S. and international markets.

[34] A one standard deviation increase in UTD only leads to a return discount of 0.67% p.a.

[35] I use regression setup (5) instead of setup (6) for the multivariate analysis of different geographical subsamples and countries (see Section 3.3). Performing regressions including both β^{-} and LTD for stock markets with a low number of unique stocks often leads to multicollinearity problems.

annual standard deviation based on daily returns as an ad-hoc proxy.[36] For each geographical area, stocks are sorted into two groups, from low (bottom 50%) to high (top 50%), based on their return volatility estimated over the past 12 months. I repeat regression (5) of Panel A for these two subsamples.

I find that the impact of LTD on returns is larger among high volatility firms as compared to low volatility firms. Based on the worldwide sample including U.S. stocks, the LTD coefficient for firms with volatility above the median is more than two times as large as the LTD coefficient for firms with a below-median volatility. I find similar (but slightly weaker) patterns for the other geographical subsamples. Hence, the results confirm my conjecture that LTD has a higher impact on returns of more risky (measured in a univariate sense) firms.

Finally, I conduct two additional robustness tests to confirm the main results from Table 3 and Table 4. I document that the impact of LTD is stable over time and robust to different estimation procedures for the LTD coefficients. Detailed results of these robustness checks are shown in Appendix C.

3.3 Country-specific LTD Premiums

In this section, I present the results of country-specific LTD premiums. Table 5 reports the results of equal-weighted univariate portfolio sorts with local currency returns (as in Panel A of Table 3) and Fama and MacBeth (1973) regressions of yearly firm returns on LTD and different risk- and firm characteristics (as in Panel A of Table 4) for each of the 40 countries in my sample. I report the average yearly return for the top (bottom) quintile LTD portfolio, the return difference for the strong - weak LTD portfolio, and the coefficient estimate for LTD from the same regression (5) setup found in Panel A of Table 4.[37]

[Insert Table 5 about here]

Columns (1)-(3) display the results of the country-specific portfolio sorts. I find that in all but four countries (China, South Korea, Taiwan, and the Philippines), the return spread

[36] In unreported tests, I obtain similar results using the annual 5% percentile of a stock's daily returns as an alternative ad-hoc proxy.

[37] Although all control variables of regression (5) are included for each country, I only report the coefficient estimate for LTD.

of the strong - weak LTD portfolio is positive. The difference is statistically significant at the 10% level (5% level, 1% level) in 18 (15, 8) of the 40 countries. The countries with the highest return spread are the U.S. (14.64% p.a.), Australia (12.79% p.a.), and the Netherlands (11.22% p.a.). The lowest spreads are found in China (-5.30% p.a.), South Korea (-3.46% p.a.), and Taiwan (-3.05% p.a.).

In column (4), I display the results of the country-specific LTD coefficient in the Fama and MacBeth (1973) regressions. Except for four countries (Taiwan, China, Brazil, and Malaysia), the LTD coefficient estimate is positive. Furthermore, the LTD coefficient is statistically significant at the 10% level (5% level, 1% level) in 25 (23, 21) of the 40 countries. The countries with the highest LTD coefficient are Argentina (0.891), Canada (0.697), and the U.S. (0.695). The countries with the lowest LTD coefficients are Taiwan (-0.288), China (-0.243), and Brazil (-0.195).

4 LTD Around the World: Determinants of the LTD Premium

The results in Section 3 reveal that LTD has an impact on the cross-section of average stock returns worldwide. However, the risk premium for a stock's LTD drastically varies across countries. Most notably, the LTD premium is found to be lower across Asian stock markets as compared to countries in America, Europe, and Africa/Oceania. Hence, I next turn to the question of which factors drive the differences in the magnitude of the LTD premium. In Section 4.1, I relate the country-specific average LTD premiums to possible explanatory variables that vary across countries. Section 4.2 provides evidence that countries that rank high on Hofstede (2001)'s individualism index display a higher premium for LTD than collectivistic countries.

4.1 Determinants of the LTD Premium

In this section, I examine the possible cross-country determinants of the LTD premium to better understand the variance in magnitude across countries. This step is achieved by regressing the average country-specific LTD premium on cultural variables, macroeconomic fundamentals and stock market characteristics, country-wide differences in disclosure, accounting standards and variables proxying for investor protection, as well as a country's market integration, government social spending, and different investor characteristics.[38] All cross-country variables are defined in Panels B-E of Table B.1. Correlations between the cross-country variables are given in Panels B-E of Table B.2.

4.1.1 Cultural Variables

Intuitively, the country-specific LTD premium should be higher (lower) in countries where investors are likely to exhibit a higher (lower) degree of aversion against large financial losses. As already discussed above, research in psychology indicates a strong association between cultural background and individuals' attidudes towards financial risk taking. Thus, as in Chui, Titman, and Wei (2010), I investigate whether cultural differences in societies are correlated with the LTD premium. In specification (1) of Table 6, I regress the average country-specific LTD premium on the main cultural dimensions in the model of Hofstede (2001): individualism (IND), uncertainty avoidance (UAI), power distance (PDI), and masculinity (MAS). Scales from 0 to 100 for each dimension for my sample of 40 countries are displayed in Table B.3 in the Appendix.

[Insert Table 6 about here]

I find that two cultural dimensions are significantly correlated to the average LTD premium. First, IND is positively related to the country-specific LTD premium. This result is in line with experimental results in cross-cultural psychology that conclude that individuals in individualistic countries are significantly *more* risk-averse than individuals in collectivistic countries when making decisions on risky financial gambles.[39] Weber and Hsee (1998) and

[38]Since most explanatory variables are not time-varying, I use a standard cross-sectional OLS framework in the estimation procedure. I average time-varying variables over the overall sample period of the respective country. Due to the large number of variables and limited space I only display t-statistics of statistically significant explanatory variables.

[39]Consistent results are found in Fan and Xiao (2006), Lau and Ranyard (2006), and Statman (2010). Fan and Xiao (2006) compare risk preference attitudes and behavior between a sample of workers from China (collectivistic country) and the U.S. (individualistic country) from the Survey of Consumer Finances. They find that Chinese workers are more risk tolerant than American workers. Using uncertainty questionnaires and a hypothetical horse racing task, Lau and Ranyard (2006) find that Chinese individuals exhibit significantly riskier gambling attitudes than individuals from the United Kingdom. Statman (2010) explores the links between culture and risk tolerance based on surveys conducted in 23 countries. In line with prior research, he documents that people in collectivistic countries are more risk tolerant regarding investments than people in individualistic countries.

Hsee and Weber (1999) explain this finding in terms of a *cushion hypothesis*: In collectivistic countries a tightly-knit social network serves as a cushion in the case of large financial losses – consequently, investors only require a marginal compensation for a stock's LTD. In contrast, there is a substantial LTD premium in individualistic countries where investors personally have to insure against the risk of large financial losses.

In addition, my results indicate that UAI is positively related to the average country-wide LTD premium. The UAI dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity.[40] The positive relationship between UAI and LTD makes intuitive sense because it is likely that investors that feel uncomfortable with uncertainty require a high risk premium for crash-sensitive stocks.

In regression (2), I expand the model by adding Hofstede (2001)'s long-term orientation (LTO) dimension. However, only 21 out of the 40 countries in my sample have an available LTO index. Within this smaller sample, IND is the only variable that is positively correlated to the average LTD premium with statistical significance at the 1% level.

In specification (3), I regress the average LTD premium on IND and UAI as well as the fraction of a country's population that is Catholic (CATH) and Protestant (PROT). In addition, I expand my model by adding dummy variables that take the value one if the primary language of the country is English (Spanish, German) and zero otherwise.[41] Within this model, IND again is the only statistically significant variable to be related with country-wide differences in the magnitude of the LTD premium.

4.1.2 Macroeconomic Variables and Stock Market Characteristics

Differences in the magnitude of the country-specific LTD premium may additionally be related to macroeconomic variables and various aggregate stock market characteristics. I investigate the impact of these variables in regressions (4)-(5) of Table 6.

In specification (4), I regress the average LTD premium on a country's average GDP per capita growth rate (GDPGROWTH), the log of income per capita (INCOME), the average of exports and imports scaled by GDP (TRADE), a country's credit rating (CREDIT), and

[40] According to Hofstede (2001), countries exhibiting high UAI maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviour and ideas. To the contrary, low UAI societies maintain a more relaxed attitude in which practice counts more than principles.

[41] I obtain data for CATH, PROT, ENGLISH, SPANISH, and GERMAN from Stulz and Williamson (2003) and the 2000 CIA Factbook.

the ratio of stock market capitalization to GDP (CAP).[42] I find that GDPGROWTH is the only significant variable which is negatively related to the average LTD premium. This finding is consistent with the notion that investors seek 'opportunities' and neglect a stock's crash risk in countries that experience rapid economic progression during the sample period (as in the case for China, Hong Kong, and South Korea).

In regression (5), I regress the average LTD premium on the average monthly MSCI local stock market return (RETURN), the average monthly MSCI local stock market volatility (VOLA), the average underperformance of strong LTD stocks to weak LTD stocks during crisis periods (LTDLOSS, see Table 2), the total value of stocks traded as a percentage of GDP (TRADING), a stock market's turnover (TURN), the average of the ratio of stock market capitalization held by small shareholders to GDP (SMALLMKTCAP), and the ratio of the number of domestic firms listed in a given country to its population in millions (DOMFIRMS).[43] My results reveal that the only significant variable in regression (5) is SMALLMKTCAP, which has a positive impact on LTD. This relationship seems intuitive due to the fact that small shareholders are likely to be more crash-averse than large institutional investors and, thus, require a higher risk premium for LTD.

4.1.3 Disclosure, Accounting Standards and Investor Protection

The average LTD premium is potentially related to country-wide differences in disclosure, accounting standards, and investor protection. The impact of these variables is examined in regression (6) of Table 6.

I regress the average LTD premium on a country's disclosure requirements index (DISCLOSE), a country's corporate transparancy level (CIFAR), a proxy for a country's prevalance of insider trading (INSIDER), an index capturing investor protection (PROTECT), dummy variables that take on the value one if the country is from common-law (CO LAW), French law (FR LAW), or German law (GE LAW) legal origin and zero otherwise, the efficiency of a country's legal environment (EFFJUDGE), and a political risk

[42] Data for GDPGROWTH is obtained from Datastream International. Data for INCOME is obtained from Aghion, Algan, Cahuc, and Shleifer (2010). I obtain data for TRADE, CREDIT and CAP from Chan, Covrig, and Ng (2005).

[43] Data for RETURN and VOLA is obtained from Datastream International. I obtain data for TRADING, TURN, SMALLMKTCAP, and DOMFIRMS from LaPorta, Lopez-De-Silanes, and Shleifer (2006).

index (POLRISK).[44] I do not find any evidence of a significant relationship between these variables and the average LTD premium.

4.1.4 Market Integration, Government Social Spending, and Investor Characteristics

Regression (7) of Table 6 investigates the relationship between the average LTD premium and differences in a country's stock market integration, government social spending, and investor characteristics. I regress the average LTD premium on a country's stock market integration (MARKETINT), a government's social spending (SOCIAL), a country's trust level (TRUST), local mutual funds' domestic bias (DOMESTIC), local mutual funds' foreign bias (FOREIGN), a country's inhabitant's average life expectancy (LIFE), and a country's inhabitant's average length of schooling (SCHOOL).[45] Consistent with the idea that SOCIAL serves as an additional insurance against large financial losses, I find that the magnitude of the LTD premium is lower in countries with high social spending; however, the effect is not statistically significant. Moreover, I do not find any evidence to support that the variables in regression (7) have a significant impact on the average LTD premium.

Finally, in specification (8), I regress the average LTD premium on variables that had statistical significance in regressions (1)-(7) of Table 6. Hence, LTD is regressed on IND, UAI, GDPGROWTH, and SMALLMKTCAP. When pooling all significant variables in a joint model, I find that IND, UAI, and SMALLMKTCAP all have a positive statistically significant impact on LTD. Among these variables, IND is the most significant variable correlated with the average country-wide LTD premium. In addition, IND displays the highest pairwise correlation with the average LTD premium among all cross-country variables used in Table 6. I investigate the relationship between LTD and IND more thoroughly in Section 4.2.

[44] Data for DISCLOSE, CIFAR, INSIDER, and PROTECT is obtained from LaPorta, Lopez-De-Silanes, and Shleifer (2006). Data for CO LAW, FR LAW, GE LAW, and EFFJUDGE is taken from LaPorta, Lopez-De-Silanes, Shleifer, and Vishny (1998). I obtain data for POLRISK from Berkman, Jacobsen, and Lee (2011).

[45] I obtain data for MARKETINT from Bekaert, Hodrick, and Zhang (2009) and data for SOCIAL from the OECD statistics database. Data for TRUST comes from Guiso, Sapienza, and Zingales (2008), and data for DOMESTIC and FOREIGN comes from Chan, Covrig, and Ng (2005). Data for LIFE is obtained from Shleifer (2009) and data for SCHOOL is obtained from Barro and Lee (2000).

4.2 LTD and Individualism

4.2.1 LTD and Individualism: Portfolio Sorts and Multivariate Regressions

The explorative investigation in Section 4.1 documents a strong positive relationship between a country's score on the individualism index by Hofstede (2001) and the magnitude of the average country-wide LTD premium. Figure 3 displays this relationship graphically.

[Insert Figure 3 about here]

The relationship is substantial: A univariate regression of the average LTD premium on individualism yields an R-squared of 0.42. Additionally, individualism is statistically significant at the 1% level and has a positive coefficient of 0.112, i.e., a country with a 10 point higher individualism score is predicted to have a 1.12% higher average annual LTD premium.

Panel A of Table 7 investigates the relationship between individualism and the LTD premium at the portfolio level. I classify countries into five groups, from low (bottom 20%) to high (top 20%), based on their scores on the individualism index. In each month t, I sort stocks into five quintiles based on their realized LTD (over the past 12 months) within each individualism index group. I then report differences in average realized returns between quintile portfolio 5 (strong LTD) and quintile portfolio 1 (weak LTD) for each individualism portfolio.

[Insert Table 7 about here]

Panel A reveals that the LTD premium monotonically increases with the score of a portfolio's individualism index. While the return spread in the lowest individualism portfolio is negative with -0.13% p.a. and statistically insignificant, the spread in the highest individualism portfolio is 12.68% p.a. and significant at the 1% level. The spread in average returns between the high individualism portfolio and the low individualism portfolio is 12.81%, which is also significant at the 1% level.

The results from the portfolio sorts in Panel A are univariate in nature and could be influenced by different explanatory variables. To control for other potential determinants, I perform Fama and MacBeth (1973) regressions at the individual stock level for the five different individualism groups. The results are displayed in Panel B. I find that the point estimate for the impact of LTD on stock returns monotonically increases from the low individualism group to the high individualism group. It ranges from 0.0076 in group 1 to 0.4175 in group 5, implying additional returns of 5.43% (0.09%) p.a. given a one standard deviation increase in LTD for group 5 (1). The LTD estimate is not significant for the first individualism group, but statistically significant at the 1% level for individualism groups 3-5.

4.2.2 LTD and Individualism: Trading Strategy

My empirical results suggest that LTD has a strong impact on the cross-section of contemporaneous returns worldwide and, in particular, on stock markets of individualistic countries. My next step is to examine whether LTD is persistent over time and also whether it *predicts* cross-sectional differences in returns. In untabulated results, I find evidence of predictive power of past LTD on current LTD. Regressing current LTD (LTD at month t) on past LTD (LTD at month $t-12$) in a univariate model delivers a highly significant coefficient estimate of 0.385 and a R-squared of 0.28.[46] These patterns indicate that there exists predictability in LTD; with this information, I now investigate whether a profitable trading strategy could be implemented solely based on prior information about past LTD.

My strategy consists of buying stocks with strong past LTD and selling stocks with weak past LTD with monthly rebalancing. The stocks are again sorted into five portfolios at the beginning of each month based on past LTD estimated over the previous twelve months within five individualism index groups (based on their respective scores on the individualism index). Then, I investigate equally-weighted returns of these portfolios over the following month and calculate the return difference between the strongest and the weakest LTD portfolio. Panel C of Table 7 reports the results.

The return spread between the strong and weak LTD portfolios is significantly positive only for the quintile of countries with the highest individualism index. In these countries, the trading strategy yields an economically significant future return of 0.27%, which translates into an average return premium of 3.24% p.a.[47] I find that the return spread between the strong and weak LTD portfolios is smaller and not significantly positive for countries with

[46] The predictive power of past LTD on current LTD is also stable across the geographical subsamples. The regression of current LTD on past LTD yields a highly significant estimate of 0.425 for the worldwide sample (excl. the U.S.), 0.311 for America, 0.407 for Europe, 0.433 for Africa, and 0.463 for Asia.

[47] My results remain stable when I adjust the abnormal returns of the trading strategies for exposures to the global four-factor Carhart (1997) model. I obtain a significant monthly (under-) outperformance of (-0.48%) 0.29% for the quintile of countries with the (lowest) highest individualism index.

lower individualism scores.[48]

As expected, the results remain stable in a multivariate setting. In Panel D of Table 7, I run Fama and MacBeth (1973) regressions of future monthly returns on past LTD and other control variables for the five different individualism groups. I find that the point estimate for the impact of LTD on future returns almost monotonically increases from the low individualism group to the high individualism group. The impact ranges from -0.00038 in group 1 to 0.01475 in group 4 and 0.01269 in group 5, implying additional annualized returns of -0.16% p.a. for group 1, 2.30% p.a. for group 4, and 1.98% p.a. for group 5 (given an increase of one standard deviation in LTD). The point estimate of LTD is significantly positive for the individualism quintiles (4) and (5). Overall, these findings suggest that it is possible to create a profitable trading strategy based on LTD within individualistic countries.[49]

4.2.3 LTD and Individualism: Robustness Checks

The stability of the relationship between individualism and LTD is investigated in different robustness checks. Panel A of Table 8 analyzes the relationship between individualism and LTD using different portfolio sorting procedures. All countries are again classified into five groups based on their scores on the Hofstede (2001) individualism index. In each month t, I sort stocks into five quintiles based on their realized LTD (over the past 12 months) within each individualism index group. I perform (i) univariate value-weighted portfolio sorts with local currency returns, (ii) equal-weighted portfolio sorts with USD-denominated returns, and (iii) equal-weighted portfolio sorts adjusted by the four-factor Carhart (1997) model in Panel A of Table 8, respectively.[50]

[Insert Table 8 about here]

In each case I find that the return spread between strong LTD stocks and weak LTD stocks in the lowest individualism portfolio is not significant, while the spread in the highest

[48] The return spread is negative for the bottom three individualism portfolios, and even significantly negative for the bottom portfolio. However, this negative spread diminishes when controlling for other risk- and firm characteristics in Panel D of Table 7.

[49] However, these results do not take into account any forms of trading costs and other limits of arbitrage.

[50] To adjust the portfolio returns, I use global Fama and French (1993) factors and the global momentum factor from Kenneth French's website. Carhart (1997) alphas are then estimated based on yearly portfolio and factor returns over the whole sample period.

individualism portfolio is significant at the 1% level. The strong LTD - weak LTD spread in average returns between the high individualism portfolio and the low individualism portfolio is 8.68% p.a. for the value-weighted sorts, 12.78% p.a. for the equal-weighted sorts with USD-denominated returns, and 8.90% p.a. for the equal-weighted portfolio sorts adjusted for the four-factor Carhart (1997) model.

One potential concern is that the results between LTD and a culture's individualism are specific to the Hofstede (2001)'s individualism index. To ensure robustness, I use an alternative measure of individualism that comes from the GLOBE (Global Leadership and Organizational Behavior Effectiveness) project. I use country scores from GLOBE's institutional collectivism index from House, Hanges, Javidan, Dorfman, and Gupta (2004).[51] Panel B investigates the relationship between LTD and the GLOBE individualism index on the portfolio level. Again, I classify countries into five groups, from low (bottom 20%) to high (top 20%), based on their scores on GLOBE individualism and sort stocks into five quintiles based on their realized LTD (over the past 12 months) within each individualism index group. The strong LTD - weak LTD spread in average returns between the high individualism portfolio and the low individualism portfolio is 4.60% p.a. and statistically significant at the 10% level.

All investigations thus far were performed using LTD as my measure of crash-sensitivity. Panel C of Table 8 investigates the relationship between individualism and the premium for a related measure of systematic crash risk of a stock - the Ang, Chen, and Xing (2006) downside beta (β^-).[52] Following the same portfolio sorting technique as above, I find that the strong β^- - weak β^- spread in average returns between the high individualism portfolio and the low individualism portfolio is 5.33% p.a. and statistically significant at the 10% level.

Finally, the relationship between LTD and individualism could be specific to the sample size of investigated countries. To combat this issue, I perform univariate equal-weighted portfolio sorts with local currency returns for three additional country sample sizes, respec-

[51] I obtain country scores for 35 of the countries in my sample from GLOBE's institutional collectivism index. In contrast to Hofstede (2001)'s measure, GLOBE's institutional collectivism index measures the degree of collectivism in each country. Hence, the higher a country's score in this index, the higher its degree of collectivism. To be consistent with Hofstede (2001)'s individualism index, I multiply the GLOBE's institutional collectivism index by -1 to define a GLOBE individualism index. Subsequently, a higher value of GLOBE individualism of a country indicates that this country has a higher degree of individualism. Scales for the GLOBE individualism index for 35 countries in my sample are displayed in Table B.3 in the Appendix.

[52] The computation of downside beta is described in Panel A of Table B.1.

tively. Again, I find that the relationship holds. The strong LTD - weak LTD spread in average returns between the high individualism portfolio and the low individualism portfolio is 7.08% p.a. for the sample without Asian countries, 9.91% p.a. for the sample with developed countries only, and 16.70% p.a. for the sample with stock market data starting from 1997.[53]

In short, my results reveal that the relationship between LTD and individualism is robust to a battery of robustness checks, including different portfolio sorting procedures, an alternative individualism measure from the GLOBE study, and different country samples.

5 Conclusion

This paper examines the impact of a stock's crash sensitivity on the cross-section of expected stock returns around the world. If investors derive disproportionately large disutility from large losses, they should require a risk premium for holding crash-sensitive stocks. Investigating stock market data from 40 countries, I find that crash sensitivity (as measured by a stock return's lower tail dependence (LTD) with the market return) has a strong positive impact on the cross-section of average stock returns. Stocks with strong LTD exposure earn significantly higher returns than stocks with weak LTD exposure not only worldwide, but also in geographically subsamples and for most individual countries. Controlling for a wide array of different risk- and firm characteristics, an increase of one standard deviation in LTD is associated with an average return premium of about 3% p.a., based on the worldwide sample.

Even though the positive impact of LTD on stock returns is found both in the pooled worldwide sample as well as in geographical subsamples, there exist large country-wide differences in the magnitude of this risk premium. I find empirical evidence that the magnitude of the LTD premium is related to investors' cultural attidudes. In particular, I document that the LTD premium is significantly higher in individualistic countries than in collectivistic

[53]The sample without Asian countries consists of 27 remaining countries. I exclude China, India, Indonesia, Israel, Japan, Hong Kong, Malaysia, Pakistan, the Philippines, Singapore, South Korea, Taiwan, and Thailand. The sample with developed countries consists of 25 countries: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, United Kingdom, and the U.S.

countries. My results align nicely with the 'cushion hypothesis' of Weber and Hsee (1998) and Hsee and Weber (1999): A stock's LTD is only marginally compensated in socially-collectivist countries. In these countries an investor's social network serves as a 'cushion' in the case of large financial losses. However, there exists a statistically and economically important premium in individualistic countries where investors are more likely to bear the risk of large financial losses themselves.

Although culture is found to have a stable and long-term impact on how individuals perceive their environment and form decisions, its influence has not garnered much attention in financial research.[54] This paper documents that cultural differences are helpful in explaining differences in cross-sectional risk premiums of stocks, in particular when institutional or macroeconomic variables lack the ability to predict such heterogeneity. These results provide numerous potential benefits to the finance literature; in particular, the incorporation of cultural factors might improve the quality of country-specific cost of capital calculations, performance measurement, and risk analysis. Further analyses on these topics could lead to interesting opportunities for future research.

[54]Notable exceptions documenting the importance of culture in finance include Grinblatt and Keloharju (2001) when investigating cross-country differences in stock trading behaviour, Stulz and Williamson (2003) when analyzing investor protection, and Chui, Titman, and Wei (2010) when examining profits of momentum portfolios.

A Appendix: Estimating LTD

A.1 The Estimation Procedure

Technical details regarding the copula estimation and selection procedure and the calculation of the respective tail dependence coefficients are provided in Appendix A. The estimation procedure follows the approach of Ruenzi and Weigert (2013).

Coefficients of tail dependence have analytical solutions for several parametric copulas (see Table A.1), but these basic copulas do not allow us to model upper and lower tail dependence simultaneously. However, Tawn (1988) proves that every convex combination of existing copula functions is again a copula. Thus, if $C_1(u_1, u_2)$, $C_2(u_1, u_2)$, ..., $C_n(u_1, u_2)$ are bivariate copula functions, then

$$C(u_1, u_2) = w_1 \cdot C_1(u_1, u_2) + w_2 \cdot C_2(u_1, u_2) + \ldots + w_n \cdot C_n(u_1, u_2)$$

is again a copula for $w_i \geq 0$ and $\sum_{i=1}^{n} w_i = 1$.

For the computation of tail dependence coefficients, I consider all 64 possible convex combinations of the basic copulas from Table A.1, each of which consists of one copula that allows for asymptotic dependence in the lower tail, C_{LTD}, one copula that is asymptotically independent, C_{NTD}, and one copula that allows for asymptotic dependence in the upper tail, C_{UTD}:

$$\begin{aligned} C(u_1, u_2, \Theta) = & \, w_1 \cdot C_{\text{LTD}}(u_1, u_2; \theta_1) \\ & + w_2 \cdot C_{\text{NTD}}(u_1, u_2; \theta_2) + (1 - w_1 - w_2) \cdot C_{\text{UTD}}(u_1, u_2; \theta_3), \end{aligned}$$

where Θ denotes the set of the basic copula parameters θ_i, $i = 1, 2, 3$ and the convex weights w_1 and w_2.

My estimation approach can be divided into two different sample periods: the pre-sample period (the first year of available daily data for each country) and the main sample period (all daily data after the first year).

Estimation in the Pre-Sample Period

The pre-sample period is used to determine the copula convex combination that best fits the distribution between an individual stock return r_i and the market return r_m for all stocks i in a country. First, based on daily returns, a set of copula parameters Θ_j for $j = 1, \ldots, 64$ different copulas $C_j(\cdot, \cdot; \Theta_j)$ is estimated between an individual stock return r_i and the market return r_m for each stock i based on a 12-month horizon. Each of these convex combinations requires the estimation of five parameters: one parameter θ_i $(i = 1, 2, 3)$ for each of the three basic copulas and two parameters for the weights w_1 and w_2. The copula parameters Θ_j are estimated via the canonical maximum likelihood procedure of Genest, Ghoudi, and Rivest (1995). The details of this step are described in Section A.2.

Second, for each stock i, I compare the estimated log-likelihood values of all 64 copulas C_j and select the parametric copula $C_j^*(\cdot, \cdot; \Theta^*)$ that has the highest log-likelihood value. As best-fitting copula for the bivariate distribution between a stock's return and market return for the respective country, I select copula $C^*(\cdot, \cdot; \Theta^*)$, which is the copula selected most frequently within the sample of all stocks. The result of this step is summarized in Table A.2 where the highest absolute and percentage frequency copula combination is presented for each country in the sample.

Estimation in the Main Sample Period

In the main sample period, I use the best-fitting copula $C^*(\cdot, \cdot; \Theta^*)$ in the respective country for the estimation of the copula parameters $\Theta^*_{i,t}$ between an individual stock return $r_{i,t}$ and the market return $r_{m,t}$ for each stock i and month t based on a rolling 12-month horizon. Again, the copula parameters $\Theta^*_{i,t}$ are estimated via the canonical maximum likelihood procedure of Genest, Ghoudi, and Rivest (1995) (see Section A.2).

Finally, the LTD coefficients (and UTD coefficents) implied by the estimated parameters $\Theta^*_{i,t}$ of the selected copula $C^*(\cdot, \cdot; \Theta^*)$ are computed. The computation of LTD is straightforward if the copula in question has a closed form, which holds for all copulas in the study. Column (3) of Table A.1 displays the closed-form solutions to determine LTD for the respective copula.[55] The LTD coefficient of the convex combination is calculated as the weighted

[55]Column (4) of Table A.1 displays the closed-form solutions to determine UTD for the respective copula.

sum of the LTD coefficients from the individual copulas, i.e., $\text{LTD}^* = w_1^* \cdot \text{LTD}(\theta_1^*)$.[56] Since this procedure is repeated for each stock and month, the end result is a panel of $\text{LTD}_{i,t}$ (and $\text{UTD}_{i,t}$) coefficients at the stock-month level.

A.2 Estimation of the Copula Parameters

The estimation of the set of copula parameters Θ for a copula $C(\cdot,\cdot;\Theta)$ is performed as follows (see also Genest, Ghoudi, and Rivest (1995) and Ruenzi and Weigert (2013)):

Let $\{r_{i,k}, r_{m,k}\}_{k=1}^n$ be a random sample from the bivariate distribution

$$F(r_i, r_m) = C(F_i(r_i), F_m(r_m))$$

between an individual stock return r_i and the market return r_m, where n denotes the number of daily return observations in a 12-month period. I estimate the marginal distributions F_i and F_m of an individual stock return r_i and the market return r_m non-parametrically by their scaled empirical distribution functions

$$\widehat{F}_i(x) = \frac{1}{n+1}\sum_{k=1}^{n} \mathbb{1}_{r_{i,k} \leq x} \quad \text{and} \quad \widehat{F}_m(x) = \frac{1}{n+1}\sum_{k=1}^{n} \mathbb{1}_{r_{m,k} \leq x}. \tag{5}$$

The estimation of F_i and F_m by their empirical counterparts avoids any incorrect specification of marginal distributions. The set of copula parameters Θ are estimated via the maximum likelihood estimator

$$\widehat{\Theta} = \text{argmax}_{\Theta}\, L(\Theta) \quad \text{with} \quad L(\Theta) = \sum_{k=1}^{n} \log\left(c(\widehat{F}_{i,r_{i,k}}, \widehat{F}_{m,r_{m,k}}; \Theta)\right), \tag{6}$$

where $L(\Theta)$ denotes the log-likelihood function and $c(\cdot,\cdot;\Theta)$ the copula densitiy. Assuming that $\{r_{i,k}, r_{m,k}\}_{k=1}^n$ is an i.i.d. random sample, $\widehat{\Theta}$ is shown to be a consistent and asymptotic normal estimate of the set of copula parameters Θ under standard regularity conditions.[57]

[56] The UTD-coefficient of the convex combination is calculated as $\text{UTD}^* = (1 - w_1^* - w_2^*) \cdot \text{UTD}(\theta_3^*)$.

[57] Daily return data often violates the assumption of an i.i.d. random sample. Hence, an alternative approach to the problem of non-i.i.d. data due to serial correlation in the first and the second moment of the time series would be to specify an ARMA-GARCH model for the univariate processes and analyze the dependence structure of the residuals. I decide not to filter the data, since filtering will also change the data's dependence structure (see Jalal and Rockinger (2008)).

Table A.1: Bivariate Copula Functions with Tail Dependence Coefficients

Copula	Parametric Form	LTD	UTD
Clayton (1)	$C_{\text{Cla}}(u_1,u_2;\theta)=(u_1^{-\theta}+u_2^{-\theta}-1)^{-1/\theta}$	$2^{-1/\theta}$	–
Rotated-Gumbel (2)	$C_{\text{RGum}}(u_1,u_2)=u_1+u_2-1+\exp\left(-((-\log(\overline{u}_1))^\theta+(-\log(\overline{u}_2))^\theta)^{1/\theta}\right)$	$2-2^{1/\theta}$	–
Rotated-Joe (3)	$C_{\text{RJoe}}(u_1,u_2)=u_1+u_2-(u_1^\theta+u_2^\theta-u_1^\theta\cdot u_2^\theta)^{1/\theta}$	$2-2^{1/\theta}$	–
Rotated-Galambos (4)	$C_{\text{RGal}}(u_1,u_2)=u_1+u_2-1+(\overline{u}_1)\cdot(\overline{u}_2)\cdot\exp\left(((-\log(\overline{u}_1))^{-\theta}+(-\log(\overline{u}_2))^{-\theta})^{-1/\theta}\right)$	$2^{-1/\theta}$	–
Gauss (A)	$C_{\text{Gau}}(u_1,u_2;\theta)=\Phi_\theta(\Phi^{-1}(u_1),\Phi^{-1}(u_2))$	–	–
Frank (B)	$C_{\text{Fra}}(u_1,u_2;\theta)=-\theta^{-1}\log\left(\frac{1-\exp(-\theta)-(1-\exp(-\theta u_1))(1-\exp(-\theta u_2))}{1-\exp(-\theta)}\right)$	–	–
Plackett (C)	$C_{\text{Pla}}(u_1,u_2;\theta)=\frac{1}{2}(\theta-1)^{-1}\left\{1+(\theta-1)(u_1+u_2)-[(1+(\theta-1)(u_1+u_2))^2-4\theta u_1u_2]^{1/2}\right\}$	–	–
F-G-M (D)	$C_{\text{Fgm}}(u_1,u_2;\theta)=u_1u_2(1+\theta(1-u_1)(\overline{u}_2))$	–	–
Joe (I)	$C_{\text{Joe}}(u_1,u_2;\theta)=1-((\overline{u}_1)^\theta+(\overline{u}_2)^\theta-(\overline{u}_1)^\theta\cdot(\overline{u}_2)^\theta)^{1/\theta}$	–	$2-2^{1/\theta}$
Gumbel (II)	$C_{\text{Gum}}(u_1,u_2;\theta)=\exp\left(-((-\log(u_1))^\theta+(-\log(u_2))^\theta)^{1/\theta}\right)$	–	$2-2^{1/\theta}$
Galambos (III)	$C_{\text{Gal}}(u_1,u_2;\theta)=u_1\cdot u_2\cdot\exp\left(((-\log(u_1))^{-\theta}+(-\log(u_2))^{-\theta})^{-1/\theta}\right)$	–	$2^{-1/\theta}$
Rotated-Clayton (IV)	$C_{\text{RCla}}(u_1,u_2)=u_1+u_2-1+((\overline{u}_1)^{-\theta}+(\overline{u}_2)^{-\theta}-1)^{-1/\theta}$	–	$2^{-1/\theta}$

This table is taken from Ruenzi and Weigert (2013). It reports the parametric forms of the bivariate copula functions considered in this study in the second column and the corresponding lower and upper tail dependence coefficients, LTD and UTD, in the last two columns. The Clayton-, the Rotated Joe-, the Rotated Gumbel-, and the Rotated Galambos-copula exhibit lower tail dependence. The Gauss-, the Frank-, the Plackett-, and the FGM-copula are asymptotically independent in both tails. The Joe-, the Gumbel-, the Galambos-, and the Rotated Clayton-copula exhibit upper tail dependence. In brackets I assign a label to each basic copula. I define $\overline{u}_1=1-u_1$ and $\overline{u}_2=1-u_2$. Furthermore, Φ denotes the standard normal $N(0,1)$ distribution function, Φ^{-1} the functional inverse of Φ and Φ_θ is the bivariate standard normal distribution function with correlation θ.

Table A.2: Copula Selection

Country	Copula	Name	Freq	Perc
Argentina	3-C-II	Rotated Joe - Plackett - Gumbel	4	8.33%
Australia	2-D-I	Rotated-Gumbel - FGM - Joe	8	5.37%
Austria	1-A-II	Clayton - Gauss - Gumbel	4	9.52%
Belgium	3-D-I	Rotated-Joe - FGM - Joe	5	9.62%
Brazil	2-B-III	Rotated-Gumbel - Frank - Galambos	3	9.68%
Canada	2-D-I	Rotated-Gumbel - FGM - Joe	16	5.16%
Chile	1-A-II	Clayton - Gauss - Gumbel	4	6.78%
China	3-D-II	Rotated-Joe - FGM - Gumbel	6	4.72%
Denmark	3-D-I	Rotated-Joe - FGM - Joe	7	8.33%
Finland	1-D-I	Clayton - FGM - Joe	3	8.82%
France	1-D-I	Clayton - FGM - Joe	10	7.09%
Germany	1-A-II	Clayton - Gauss - Gumbel	9	6.34%
Greece	1-B-II	Clayton - Frank - Gumbel	6	13.04%
Hong Kong	2-D-I	Rotated-Gumbel - FGM - Joe	7	11.29%
India	4-A-I	Rotated-Galambos - Gauss - Joe	16	5.10%
Indonesia	2-B-III	Rotated-Gumbel - Frank - Galambos	5	7.35%
Ireland	4-D-IV	Rotated-Galambos - FGM - Rotated-Clayton	2	4.65%
Israel	1-A-II	Clayton - Gauss - Gumbel	20	7.33%
Italy	4-B-II	Rotated-Galambos - Frank - Gumbel	7	8.54%
Japan	4-D-I	Rotated-Galambos - FGM - Joe	30	3.78%
Malaysia	4-A-I	Rotated-Galambos - Gauss - Joe	10	5.32%
Mexico	3-C-II	Rotated-Joe - Plackett - Gumbel	2	4.08%
Netherlands	4-D-I	Rotated-Galambos - FGM - Joe	9	5.81%
New Zealand	3-C-I	Rotated-Joe - Plackett - Joe	3	6.25%
Norway	4-D-I	Rotated-Galambos - FGM - Joe	3	8.57%
Pakistan	1-B-II	Clayton - Frank - Gumbel	7	7.45%
Philippines	4-B-II	Rotated-Galambos - Frank - Gumbel	3	7.69%
Poland	1-A-II	Clayton - Gauss - Gumbel	5	9.09%
Portugal	2-D-III	Rotated-Gumbel - FGM - Galambos	8	11.59%
Singapore	4-D-I	Rotated-Galambos - FGM - Joe	9	10.11%
South Africa	3-D-I	Rotated-Joe - FGM - Joe	7	9.21%
South Korea	2-D-III	Rotated-Gumbel - FGM - Galambos	15	6.58%
Spain	1-A-II	Clayton - Gauss - Gumbel	4	7.14%
Sweden	2-C-IV	Rotated-Gumbel - Plackett - Rotated-Clayton	7	10.94%
Switzerland	2-C-IV	Rotated-Gumbel - Plackett - Rotated-Clayton	11	13.92%
Taiwan	4-D-I	Rotated-Galambos - FGM - Joe	23	15.97%
Thailand	3-C-I	Rotated-Joe - Plackett - Joe	8	8.89%
Turkey	1-B-II	Clayton - Frank - Gumbel	4	8.89%
United Kingdom	3-C-I	Rotated-Joe - Plackett - Joe	93	5.98%
USA	3-D-I	Rotated-Joe - FGM - Joe	69	3.36%

This table reports the absolute and percentage frequency of the selected parametric copula combinations in the pre-sample period (first year of available data) for each country. Based on daily return data, I fit all 64 possible convex copula combinations to the distribution between an individual stock return r_i and the market return r_m for all stocks i in a country. For each country I select the respective copula combination $C^*(\cdot, \cdot; \Theta^*)$ that is chosen most frequently based on the estimated log-likelihood value. Labels of the respective copula combinations are based on the basic copula subsets from Table A.1.

B Appendix: Variable Definitions and Correlations

Table B.1: Brief Definitions of Main Variables

Panel A: Return-based Variables and Firm Characteristics

Variable Name	Description	Source
Return	Yearly raw return of a stock.	CRSP, Datastream
LTD	Lower tail dependence coefficient of a stock. Estimated based on daily data from the past 12 months as detailed in Section 2.1 and Appendix A.	CRSP, Datastream, EST
UTD	Upper tail dependence coefficient of a stock. Estimated based on daily data from the past 12 months as detailed in Section 2.1 and Appendix A.	CRSP, Datastream, EST
β	Factor loading on the (country-specific local) market factor from a CAPM one-factor regression estimated based on daily data from the past 12 months: $\beta = \frac{Cov(r_i,r_m)}{Var(r_m)}$.	CRSP, Datastream, EST
size	The natural logarithm of a firm's equity market capitalization denominated in USD.	CRSP, Datastream
btm	A firm's book-to-market ratio. For the U.S., btm is computed as the ratio of CS book value of equity per share (i.e., book value of common equity less liquidation value (CEQL) divided by common share outstanding (CSHO)) to share price (i.e., market value of equity per share). For the remaining countries, btm is directly taken from the Datastream database.	CS, Datastream
past return	A stock's raw return over the past 12 months.	CRSP, Datastream
illiq	A stock's illiquidity level measured as the frequency of daily zero returns in the past 12 months following Lesmond, Ogden, and Trzcinka (1999).	CRSP, Datastream, EST
idio vola	A stock's idiosyncratic volatility, defined as the standard deviation of the CAPM-residuals of its daily returns.	CRSP, Datastream, EST
coskew	Coskewness of a stock's daily returns with the market: $coskew = \frac{E[(r_i-\mu_i)(r_m-\mu_m)^2]}{\sqrt{\text{Var}(r_i)}\text{Var}(r_m)}$.	CRSP, Datastream, EST
β^-	Downside beta estimated based on daily return data from the past 12 months as defined in Ang, Chen, and Xing (2006): $\beta^- = \frac{Cov(r_i,r_m \mid r_m<\mu_m)}{Var(r_m \mid r_m<\mu_m)}$, where μ_m denotes the average market return over the past 12 months.	CRSP, Datastream, EST

Table B.1: Continued

Panel B: Cross-Country Cultural Variables

Variable Name	Description	Source
IND	A country's individualism score. Individualism is defined as a preference for a loosely-knit social framework in which individuals are expected to take care of themselves and their immediate families only. A higher score indicates a higher degree of individualism.	Hofstede (2001)
UAI	A country's uncertainty avoidance score. The uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. A higher score indicates a higher degree of uncertainty avoidance.	Hofstede (2001)
MAS	A country's masculinity score. The masculinity dimension represents a preference in society for achievement, heroism, assertiveness and material reward for success. A higher score indicates a higher degree of masculinity.	Hofstede (2001)
PDI	A country's power distance score. Power distance expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. A higher score indicates a higher degree of power distance.	Hofstede (2001)
LTO	A country's long-term orientation score. The long-term orientation dimension can be interpreted as dealing with society's search for virtue. A higher score indicates a higher degree of long-term orientation.	Hofstede (2001)
CATH	Percentage of inhabitants of a country that is Catholic.	Stulz and Williamson (2003)
PROT	Percentage of inhabitants of a country that is Protestant.	Stulz and Williamson (2003)
ENGLISH	Dummy that takes the value one if the primary language of the country is English.	Stulz and Williamson (2003)
SPANISH	Dummy that takes the value one if the primary language of the country is Spanish.	Stulz and Williamson (2003)
GERMAN	Dummy that takes the value one if the primary language of the country is German.	Stulz and Williamson (2003)

Table B.1: Continued

Panel C: Cross-Country Macroeconomic Variables and Stock Market Characteristics

Variable Name	Description	Source
GDPGROWTH	Average GDP per capita growth rate (in USD) computed as the average over a country's sample period.	CRSP, Datastream, EST
INCOME	A country's (ln) income per capita taken from the World Bank for the year 2001.	Aghion, Algan, Cahuc, and Shleifer (2010)
TRADE	A country's trade volume as a percentage of GDP in the year 1999.	Chan, Covrig, and Ng (2005)
CREDIT	A country's credit rating in the year 1999.	Chan, Covrig, and Ng (2005)
CAP	Average of the ratio of stock market capitalization to gross domestic product for the period 1999-2003.	Chan, Covrig, and Ng (2005)
RETURN	Average monthly aggregate MSCI stock market return computed over a country's sample period.	Datastream, EST
VOLA	Average monthly aggregate MSCI stock market volatility computed over a country's sample period.	Datastream, EST
LTDLOSS	Average monthly underperformance of strong LTD stocks to weak LTD stocks during financial crisis periods. See also Table 2.	CRSP, Datastream, EST
TRADING	Total value of stocks traded as a percentage of GDP computed as the average over a country's sample period from 1996-2000.	LaPorta, Lopez-De-Silanes, and Shleifer (2006)
TURN	Total value of stocks traded as a fraction of the shares outstanding computed as the average over a country's sample period from 1996-2000.	LaPorta, Lopez-De-Silanes, and Shleifer (2006)
SMALLMKTCAP	Average of the ratio of stock market capitalization held by small shareholders to GDP computed as the average over a country's sample period from 1996-2000.	LaPorta, Lopez-De-Silanes, and Shleifer (2006)
DOMFIRMS	Ratio of the number of domestic firms listed in a given country to its population (in millions) taken from the International Finance Corporation: Emerging Markets Database and the World Bank for the year 2001.	LaPorta, Lopez-De-Silanes, and Shleifer (2006)

Table B.1: Continued

Panel D: Cross-Country Disclosure, Accounting Standards, and Investor Protection

Variable Name	Description	Source
DISCLOSE	A country's index of disclosure requirements computed as average of 'prospect', 'compensation', 'shareholders', 'inside ownership', 'contracts irregular', and 'transactions'.	LaPorta, Lopez-De-Silanes, and Shleifer (2006)
CIFAR	A country's corporate transparancy level created by examining and rating companies' 1995 annual reports on their inclusion or omission of 90 items.	Bushman, Piotroski, and Smith (2004)
INSIDER	A country's index for the prevalence of insider trading. Taken from Schwab, Porter, Sachs, Warner, and Levinson (1999).	LaPorta, Lopez-De-Silanes, and Shleifer (2006)
PROTECT	A country's index for the protection of investors on stock markets computed as the principal component of 'disclosure', 'liability standards', and 'anti-director rights'.	LaPorta, Lopez-De-Silanes, and Shleifer (2006)
CO LAW	Dummy that takes the value one if a country's legal origin is common.	LaPorta, Lopez-De-Silanes, Shleifer, and Vishny (1998)
FR LAW	Dummy that takes the value one if a country's legal origin is French.	LaPorta, Lopez-De-Silanes, Shleifer, and Vishny (1998)
GE LAW	Dummy that takes the value one if a country's legal origin is German.	LaPorta, Lopez-De-Silanes, Shleifer, and Vishny (1998)
EFFJUDGE	A country's index of the efficiency and integrity of the legal environment as it affects business, particularly foreign firms.	LaPorta, Lopez-De-Silanes, Shleifer, and Vishny (1998)
POLRISK	A country's index of its exposure to political risk, in particular for political stability and absence of violence.	Berkman, Jacobsen, and Lee (2011)

Table B.1: Continued

Panel E: Cross-Country Market Integration, Government Social Spending, and Investor Characteristics

Variable Name	Description	Source
MARKETINT	Ratio of the variance of a country's stock market returns explained by a global factor asset pricing model over the variance explained by both global and local asset pricing factors for the period from 1980-2003.	Bekaert, Hodrick, and Zhang (2009)
SOCIAL	Average total public social expenditure as a percentage of GDP over a country's sample period.	OECD Database, EST
TRUST	A country's level of trust created by answers to the question in the World Values Survey: 'Generally speaking, would you say that most people can be trusted or that you have to be very careful in dealing with people?' Trust is subsequently defined as a dummy variable equal to one if individuals choose the option 'Most people can be trusted'.	Guiso, Sapienza, and Zingales (2008)
DOMESTIC	Domestic bias in portfolio holdings of domestic mutual funds. The domestic bias of a country reflects the deviation of the share of the home country in its mutual fund holdings from the world market capitalization weight of the country.	Chan, Covrig, and Ng (2005)
FOREIGN	Foreign bias in portfolio holdings of foreign mutual funds. The foreign bias reflects the deviation of the share of the country in its mutual fund holdings for each host country from the world market capitalization weight of the country.	Chan, Covrig, and Ng (2005)
LIFE	A country's inhabitant's average life expectancy at birth obtained from the World Bank.	Shleifer (2009)
SCHOOL	A country's inhabitant's average years of schooling.	Barro and Lee (2000)

This table briefly defines the main variables used in the empirical analysis. In Panel A, I describe return-based variables and firm characteristics (as in Section 3). Panels B-E define cross-country variables (as in Section 4). The data sources are: (i) CRSP: CRSP Stocks Database, (ii) Datastream: Datastream International from Thomson Reuters, (iii) CS: Compustat. EST indicates that the variable is estimated or computed based on original variables from the respective data sources.

Table B.2: Correlations

Panel A: Return-based Variables and Firm Characteristics

	LTD	UTD	β	size	btm	past return	*illiq*	*idio vola*	*coskew*	β^-
LTD	1.00	-	-	-	-	-	-	-	-	-
UTD	0.29	1.00	-	-	-	-	-	-	-	-
β	0.57	0.51	1.00	-	-	-	-	-	-	-
size	0.21	0.33	0.30	1.00	-	-	-	-	-	-
btm	-0.04	-0.04	-0.04	-0.08	1.00	-	-	-	-	-
past return	0.11	0.01	0.10	0.04	-0.06	1.00	-	-	-	-
illiq	-0.09	-0.06	-0.07	-0.14	0.01	-0.02	1.00	-	-	-
idio vola	0.00	-0.21	0.00	-0.49	0.08	-0.02	-0.07	1.00	-	-
coskew	-0.29	0.29	-0.04	-0.01	0.00	-0.09	0.00	0.06	1.00	-
β^-	0.61	0.27	0.83	0.21	-0.04	0.10	-0.06	0.04	-0.26	1.00

Panel B: Cross-Country Cultural Variables

	IND	UAI	PDI	MAS	LTO	CATH	PROT	ENGL	SPAN	GERM
IND	1.00	-	-	-	-	-	-	-	-	-
UAI	-0.22	1.00	-	-	-	-	-	-	-	-
PDI	-0.65	0.11	1.00	-	-	-	-	-	-	-
MAS	0.049	0.13	0.08	1.00	-	-	-	-	-	-
LTO	-0.47	0.23	0.39	0.14	1.00	-	-	-	-	-
CATH	0.12	0.36	0.07	0.23	-0.21	1.00	-	-	-	-
PROT	0.51	-0.41	-0.55	-0.50	-0.43	-0.33	1.00	-	-	-
ENGLISH	0.57	-0.34	-0.35	0.29	-0.40	-0.01	0.13	1.00	-	-
SPANISH	-0.19	0.32	0.16	-0.01	-	0.49	-0.21	-0.16	1.00	-
GERMAN	0.14	0.02	-0.34	0.33	-0.12	0.17	0.13	-0.13	-0.10	1.00

Panel C: Cross-Country Macroeconomic Variables and Stock Market Characteristics

	GDP	INC.	TRA.	CRE.	CAP	RET.	VOL.	LTD.	TRA.	TUR.	MKT.	DOM.
GDPGROWTH	1.00	-	-	-	-	-	-	-	-	-	-	-
INCOME	-0.25	1.00	-	-	-	-	-	-	-	-	-	-
TRADE	0.41	0.12	1.00	-	-	-	-	-	-	-	-	-
CREDIT	-0.20	0.61	0.16	1.00	-	-	-	-	-	-	-	-
CAP	-0.15	0.41	0.16	0.41	1.00	-	-	-	-	-	-	-
RETURN	0.02	-0.41	-0.27	-0.60	-0.18	1.00	-	-	-	-	-	-
VOLA	0.33	-0.44	0.08	-0.56	-0.21	0.63	1.00	-	-	-	-	-
LTDLOSS	0.04	0.19	-0.11	0.21	0.31	-0.13	-0.19	1.00	-	-	-	-
TRADING	0.01	0.36	-0.01	0.37	0.62	-0.17	-0.11	0.27	1.00	-	-	-
TURN	0.26	0.11	-0.14	0.04	-0.05	0.11	0.29	-0.01	0.52	1.00	-	-
SMALLMKTCAP	-0.13	0.44	0.09	0.48	0.73	-0.27	-0.32	0.42	0.75	-0.03	1.00	-
DOMFIRMS	0.12	0.48	0.38	0.43	0.46	-0.31	-0.18	0.29	0.25	-0.09	0.43	1.00

Table B.2: Continued

Panel D: Cross-Country Disclosure, Accounting Standards, and Investor Protection

	DISCLOSE	CIFAR	INSIDER	PROTECT	CO LAW	FR LAW	GE LAW	EFFJUDGE	POLRISK
DISCLOSE	1.00	-	-	-	-	-	-	-	-
CIFAR	0.39	1.00	-	-	-	-	-	-	-
INSIDER	0.04	0.59	1.00	-	-	-	-	-	-
PROTECT	0.68	0.28	0.09	1.00	-	-	-	-	-
CO LAW	0.70	0.39	0.22	0.62	1.00	-	-	-	-
FR LAW	-0.49	-0.43	-0.42	-0.24	-0.56	1.00	-	-	-
GE LAW	-0.13	-0.21	0.12	-0.39	-0.33	-0.33	1.00	-	-
EFFJUDGE	0.11	0.62	0.71	0.15	0.24	-0.53	0.09	1.00	-
POLRISK	0.17	0.40	0.35	0.03	-0.02	-0.23	0.15	0.36	1.00

Panel E: Cross-Country Market Integration, Government Social Spending, and Investor Characteristics

	MARKETINT	SOCIAL	TRUST	DOMESTIC	FOREIGN	LIFE	SCHOOL
MARKETINT	1.00	-	-	-	-	-	-
SOCIAL	0.47	1.00	-	-	-	-	-
TRUST	-0.16	-0.22	1.00	-	-	-	-
DOMESTIC	0.14	0.41	0.04	1.00	-	-	-
FOREIGN	0.48	0.21	0.14	-0.26	1.00	-	-
LIFE	0.06	-0.19	0.09	-0.24	0.24	1.00	-
SCHOOL	-0.37	-0.34	0.68	-0.29	-0.03	0.19	1.00

This table displays linear correlations between the independent variables used in this study. Panel A reports correlations between return-based variables and firm characteristics (as in Section 3). Panels B-E report cross-correlations between cross-country variables (as in Section 4). In Panel B, I report correlations between cultural variables. In Panel C, I report correlations between macroeconomic variables and stock market characteristics. Panel D reports cross-correlations between variables proxying for disclosure, accounting standards, as well as investor protection and Panel E shows cross-correlations between variables proxying for market integration, government social spending, and investor characteristics.

Table B.3: Cultural Variables of Hofstede (2001) and the GLOBE Study

Country	IND	UAI	PDI	MAS	LTO	GLOBE IND
Argentina	46	86	49	56	-	-3.66
Australia	90	51	36	61	31	-4.29
Austria	55	70	11	79	-	-4.30
Belgium	75	94	65	54	-	-
Brazil	38	76	69	49	65	-3.83
Canada	80	48	39	52	23	-4.38
Chile	23	86	63	28	-	-
China	20	30	80	66	118	-4.77
Denmark	74	23	18	16	-	-4.80
Finland	63	59	33	26	-	-4.63
France	71	86	68	43	-	-3.93
Germany	67	65	35	66	31	-3.79
Greece	35	112	60	57	-	-3.25
Hong Kong	25	29	68	57	96	-4.13
India	48	40	77	56	61	-4.38
Indonesia	14	48	78	46	-	-4.54
Ireland	70	35	28	68	-	-4.63
Israel	54	81	13	47	-	-4.46
Italy	76	75	50	70	-	-3.68
Japan	46	92	54	95	80	-5.19
Malaysia	26	36	104	50	-	-4.61
Mexico	30	82	81	69	-	-4.06
Netherlands	80	53	38	14	44	-4.46
New Zealand	79	49	22	58	30	-4.81
Norway	69	50	31	8	20	-
Pakistan	14	70	55	50	0	-
Philippines	32	44	94	64	19	-4.65
Poland	60	93	68	64	32	-4.53
Portugal	27	104	63	31	-	-3.92
Singapore	20	8	74	48	48	-4.90
South Africa	65	49	49	63	-	-4.62
South Korea	18	85	60	39	75	-5.20
Spain	51	86	57	42	-	-3.85
Sweden	71	29	31	5	33	-5.22
Switzerland	68	58	34	70	-	-4.06
Taiwan	17	69	58	45	87	-4.59
Thailand	20	64	64	34	56	-4.03
Turkey	37	85	66	45	-	-
United Kingdom	89	35	35	66	25	-4.27
USA	91	46	40	62	29	-4.20

This table provides scales for the cultural dimensions used in Hofstede (2001)'s model and the GLOBE study by House, Hanges, Javidan, Dorfman, and Gupta (2004) for all countries included in this study. Country scores for 35 of the countries in my sample are obtained from GLOBE's institutional collectivism index. In contrast to Hofstede (2001)'s measure, GLOBE's institutional collectivism index measures the degree of collectivism in each country. To be consistent with Hofstede (2001)'s individualism index, I multiply the GLOBE's institutional collectivism index by -1 to define a GLOBE individualism (GLOBE IND) index.

C Appendix: Additional Robustness Checks

Appendix C contains two additional robustness checks to confirm the main results of Section 3. I examine whether the impact of the LTD premium is stable over time and robust to different LTD estimation procedures.

C.1 Temporal Stability

To investigate whether the premium for LTD is stable over time, I reproduce the results of the univariate portfolio sorts in Table 3 for the time period from January 1981 to December 1996 and from January 1997 to December 2011. Columns (1)-(2) of Panel A in Table C.1 report the average annual realized equal-weighted local currency return differences between quintile portfolio 5 (strong LTD) and quintile portfolio 1 (weak LTD) for the two time periods.

In both time periods, strong LTD stocks outperform weak LTD stocks in the worldwide sample including U.S. stocks, the worldwide sample exluding U.S. stocks, America, Europe, and Africa/Oceania.[58] For the worldwide sample including U.S. stocks and all geographical subsamples except from Africa/Oceania, my results reveal that the LTD premium is higher in the 1981-1996 period than in the 1997-2011 period. In columns (3)-(4), I look at the results from multivariate regression (5) of Panel A in Table 4 with the full set of explanatory variables for the time periods from January 1981 to December 1996 and from January 1997 to December 2011. For emphasis, I only report the estimate of the LTD coefficient for both subsamples. Again, I find significant positive coefficient estimates for LTD in both periods. Hence, my results reveal that the cross-sectional impact of LTD on average returns is robust over time.

[58] As already documented in Section 3.1, I do not find strong evidence for a significant LTD premium in Asia. The positive premium in the first subsample from 1981-1996 is mainly due to high LTD premiums in Japan and Hong Kong with stock market data starting from 1981 whereas data for most other Asian countries (with low LTD premiums) is only available from the end of the 1980s and early 1990s. If I perform separate analyses for Asia during the time periods from January 1990 - December 2000 and January 2001 - December 2011, I do not find evidence for significantly positive LTD premiums in each of the subsamples.

C.2 Different Estimation Procedures

In Sections 3.1 and 3.2, LTD is estimated using a best-fitting copula function for each country and a market return computed as the value-weighted average return of all stocks in the corresponding country. One concern is that my results are specific to this particular copula selection and the market return.

In order to ensure the robustness of my results, I now vary the estimation procedure by two aspects: First, I apply different market returns for the estimation of LTD. Second, I estimate LTD using randomly chosen copula functions. To investigate whether the impact of LTD on average stock returns is stable among different market returns and copulas, I perform multivariate Fama and MacBeth (1973) regressions as in setup (5) of Panel A in Table 4. Panel B of Table C.1 reports the results of the LTD coefficient estimates.

As for different market returns, I select (i) a market return computed as the equal-weighted average return of all stocks in the corresponding country, (ii) the local MSCI price index return, (iii) the world MSCI price index return, and (iv) the U.S. MSCI price index return. I find that LTD has a significant impact on average stock returns in the pooled worldwide sample and in all geographical subsamples when computed as in (i)-(iii). Intuitively, my results indicate a weaker relationship between LTD and average stock returns when LTD is estimated with the world MSCI price index return. This finding is consistent with results from Griffin (2002) who documents that country-specific factor models better capture temporal variation in stock returns than global factor models. Moreover, supporting the notion that investors are particularly crash-averse to *local* stock market crashes, I do not find a statistical significant impact of LTD in the worldwide sample excluding U.S. stocks, Africa/Oceania, and Asia when LTD is estimated using the U.S. MSCI price index return.

In regards to different copula functions, I randomly select copulas (1)-(B)-(I), (2)-(B)-(I), (3)-(B)-(IV), and (4)-(D)-(IV) from Table A.1 in the LTD estimation process. Overall, the impact of LTD is stable across different copulas. For each copula, I find significant positive LTD coefficients for the worldwide sample including U.S. stocks and all geographical subsamples. In summary, my results reveal that the cross-sectional impact of LTD on average stock returns is robust to different LTD estimation procedures.

Table C.1: LTD and Realized Stock Returns Worldwide: Robustness Checks

Panel A: Temporal Stability

	Portfolio Sorts		FMB Estimate	
	(1)	(2)	(3)	(4)
	1981-1996	1997-2011	1981-1996	1997-2011
LTD	10.27%***	4.90%*	0.344***	0.163***
Worldwide incl. U.S.	(7.94)	(1.86)	(6.60)	(2.64)
LTD	7.99%***	4.34%*	0.227***	0.166**
Worldwide excl. U.S.	(6.28)	(1.65)	(3.96)	(2.60)
LTD	15.54%***	11.31%***	0.601***	0.522***
America	(8.78)	(3.86)	(9.46)	(7.78)
LTD	8.81%***	7.29%**	0.256***	0.288***
Europe	(6.06)	(1.98)	(5.68)	(4.77)
LTD	7.06%**	14.32%***	0.399***	0.511***
Africa / Oceania	(2.09)	(4.12)	(3.42)	(5.28)
LTD	7.49%***	0.02%	0.277***	0.081
Asia	(3.47)	(0.06)	(3.50)	(1.03)

Panel B: Different Market Returns and Estimation Procedures

	Worldwide (incl.USA)	Worldwide (excl.USA)	America	Europe	Africa/ Oceania	Asia
LTD	0.227***	0.159***	0.572***	0.276***	0.409***	0.093*
EW Market	(4.85)	(3.65)	(11.91)	(5.58)	(5.26)	(1.63)
LTD	0.208***	0.143***	0.535***	0.213***	0.373***	0.160***
MSCI Local	(4.40)	(3.17)	(12.56)	(4.78)	(5.43)	(2.76)
LTD	0.161***	0.078***	0.519***	0.115***	0.104**	0.084**
MSCI World	(4.39)	(2.64)	(12.19)	(3.81)	(2.33)	(2.13)
LTD	0.105***	0.000	0.487***	0.041*	−0.014	−0.008
MSCI U.S.	(3.42)	(0.01)	(11.15)	(1.70)	(−0.38)	(−0.39)
LTD	0.255***	0.204***	0.570***	0.284***	0.555***	0.180***
Copula (1)-(B)-(I)	(5.75)	(4.65)	(12.49)	(7.31)	(6.26)	(2.96)
LTD	0.237***	0.188***	0.561***	0.317***	0.640***	0.157**
Copula (2)-(B)-(I)	(5.16)	(3.89)	(12.39)	(7.08)	(6.51)	(2.33)
LTD	0.224***	0.158***	0.562***	0.252***	0.520***	0.120**
Copula (3)-(B)-(IV)	(4.99)	(3.77)	(12.74)	(6.48)	(6.14)	(2.17)
LTD	0.207***	0.150***	0.550***	0.249***	0.451***	0.143**
Copula (4)-(D)-(IV)	(4.10)	(2.96)	(12.46)	(4.83)	(5.64)	(2.13)

Table C.1: Continued

Panel A of this table shows the results of temporal stability checks worldwide and for different geographical subsamples. Columns (1)-(2) report the results of portfolio sorts of average equal-weighted local currency returns for the time periods from January 1981 to December 1996 and from January 1987 to December 2011. I report the difference between the returns of the strong LTD portfolio 5 and the weak LTD portfolio 1 with corresponding statistical significance levels. Columns (3)-(4) repeat Fama and MacBeth (1973) regression specification (5) from Panel A of Table 4 for the two time periods. I only report the coefficient estimate for the impact of LTD; all other explanatory variables are included in the regressions, but their coefficient estimates are suppressed. Panel B reports the results of Fama and MacBeth (1973) regressions with different market returns and estimation procedures for the worldwide sample and geographical subsamples. I estimate LTD with a market return calculated as the equal-weighted average of all stocks in our sample, the MSCI local country market return, the MSCI world market return, and the MSCI U.S. market return. Furthermore, LTD is estimated with different randomly selected copulas. Again, I only report the coefficient estimates for the impact of LTD and truncate all control variable coefficients. The sample covers data from common stocks in 40 markets all over the world. The maximum sample period is from January 1981 to December 2011. t-statistics are computed using Newey and West (1987) adjusted standard errors. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

References

Aghion, P., Algan, Y., Cahuc, P., Shleifer, A., 2010. Regulation and Distrust. Quarterly Journal of Economics 125, 1015-1049.

Agrarwal, S., Chomsisengphet, S, Liu, C., 2011. Consumer bankruptcy and default: The role of individual social capital. Journal of Economic Psychology 32, 632-650.

Amihud, Y., 2002. Illiquidity and Stock Returns: Cross-Section and Time-Series Effects. Journal of Financial Markets 5, 31-56.

Ané, T., Kharoubi, C., 2003. Dependence Structure and Risk Measure. Journal of Business 76, 411-438.

Ang, A., Chen, J., 2002. Asymmetric Correlations of Equity Portfolios. Journal of Financial Economics 63, 443-494.

Ang, A., Chen, J., 2007. CAPM Over the Long-Run: 1926-2001. Journal of Empirical Finance 14, 1-40.

Ang, A., Chen, J., Xing, Y., 2006. Downside Risk. Review of Financial Studies 19, 1191-1239.

Ang, A., Hodrick, R.J., Xing, Y., Zhang, X., 2006. The Cross-Section of Volatility and Expected Returns. Journal of Finance 61, 259-299.

Ang, A., Hodrick, B., Xing, Y., Zhang, X., 2009. High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence. Journal of Financial Economics 91, 1-23.

Ang, A., Liu, J., Schwarz, K., 2010. Using Stocks or Portfolios in Tests of Factor Models. Unpublished Working Paper, Columbia University and University of Pennsylvania.

Bali, T.G., Demirtas, K.O., Levy, H., 2009. Is There an Intertemporal Relation between Downside Risk and Expected Returns? Journal of Financial and Quantitative Analysis 44, 883-909.

Banz, R., 1981. The Relation between Return and Market Value of Common Stocks. Journal of Financial Economics 9, 3-18.

Barro, R.J., Lee, J.W., 2000. International Data on Educational Attainment Updates and Implications. Unpublished Working Paper, National Bureau of Economic Research.

Basu, S., 1983. The Relationship between Earnings Yield, Market Value, and Return for NYSE Common Stocks: Further Evidence. Journal of Financial Economics 12, 129-156.

Bates, D.S., 2008. The Market for Crash Risk. Journal of Economic Dynamics and Control 32, 2291-2321.

Bekaert, G., Hodrick, R.J., Zhang, X., 2009. International Stock Return Comovements. Journal of Finance 64, 2591-2626.

Berkman, H., Jacobsen, B., Lee, J.B., 2011. Time-varying rare disaster risk and stock returns. Journal of Financial Economics 101, 313-332.

Bollerslev, T., Todorov, V., 2011. Tails, Fears, and Risk Premia. Journal of Finance 66, 2165-2211.

Breuer, W., Quinten, B., 2009. Cultural Finance. Unpublished Working Paper, RWTH Aachen.

Breuer, W., Riesener, M., Salzmann, A.J., 2011. Risk Aversion vs. Individualism: What drives risk taking in household finance? Unpublished Working Paper, RWTH Aachen.

Bushman, R.M., Piotroski, J.D., Smith, A.J., 2004. What Determines Corporate Transparency? Journal of Accounting Research 42, 207-252.

Carhart, M., 1997. On Persistence in Mutual Fund Performance. Journal of Finance 52, 57-82.

Chan K., Covrig, V., Ng, L., 2005. What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide. Journal of Finance 60, 1495-1534.

Cholette, L., Lu, C.-C., 2011. The Market Premium for Dynamic Tail Risk. Unpublished Working Paper, University of Stavanger and National Chengchi University.

Chui A.C.W., Titman, S., Wei, K.C.J., 2010. Individualism and Momentum around the World. Journal of Finance 65, 361-392.

Embrechts, P:, McNeil, A., Straumann, D., 2002. Correlation and dependence in risk management: properties and pitfalls. in: M.A.H. Dempster (ed.), Risk Management: Value at Risk and Beyond, Cambridge University Press, Cambridge, 176-223.

Fama, E.F., 1965. The Behavior of Stock Market Prices. Journal of Business 38, 34-105.

Fama, E.F., French, K.R., 1992. The Cross-Section of Expected Stock Returns. Journal of Finance 47, 427-465.

Fama, E.F., French, K.R., 1993. Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics 33, 3-56.

Fama, E.F., French, K.R., 1998. Value versus Growth: The International Evidence. Journal of Finance 53, 1975-1999.

Fama, E.F., MacBeth, J.D., 1973. Risk, Return, and Equilibrium: Empirical Tests. Journal of Political Economy 81, 607-636.

Fan, J.X., Xiao, J.J., 2006. Cross-cultural differences in risk tolerance: A comparison between Chinese and Americans. Unpublished Working Paper, University of Utah and University of Rhode Island.

Fisher, R.A., Tippett, L.H.C., 1928. Limiting forms of the frequency distributions of the largest or smallest member of a sample. Proceedings of the Cambridge Philosophical Society 24, 180-190.

French, K.R., Poterba, J.M., 1991. Investor diversification and international equity markets. American Economic Review 81, 222-226.

Gabaix, X., 2012. Variable rare disasters: an exactly solved framework for ten puzzles in macro-finance. Quarterly Journal of Economics 127, 645-700.

Genest, C., Ghoudi, K., Rivest, L.P., 1995. A semiparametric estimation procedure of dependence parameters in multivariate families of distributions. Biometrika 82, 543-552.

Griffin, J.M., 2002. Are the Fama and French Factors Global or Country Specific? Review of Financial Studies 15, 783-803.

Griffin, J.M., Ji, X., Martin, J.S., 2003. Momentum investing and business cycle risk: Evidence from pole to pole. Journal of Finance 58, 2515-2547.

Grinblatt, Keloharju, M., 2001. How distance, language and culture influence stockholdings and trades. Journal of Finance 58, 1053-1073.

Guiso, L., Sapienza, P., Zingales, L., 2006. Does culture affect economic outcomes? The Journal of Economic Perspectives 20, 23-48.

Guiso, L., Sapienza, P., Zingales, L., 2008. Trusting the Stock Market. Journal of Finance 63, 2557-2600.

Gul, F., 1992. A Theory of Disappointment Aversion. Econometrica 59, 667-686.

Harvey, C.R., Siddique, A., 2000. Conditional Skewness in Asset Pricing Tests. Journal of Finance 55, 1263-1295.

Hens, T., Wang, T., 2007. Does Finance have a cultural dimension? Unpublished Working Paper, University of Zurich.

Hofstede, G., 2001. Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations, 2nd ed. (Sage Publication, Beverly Hills, CA).

Hou, K., Karolyi, G.A., Kho, B.-C., 2011. What Factors Drive Global Stock Returns. Review of Financial Studies 24, 2527-2574.

House, R.J., Hanges, P.J., Javidan, M., Dorfman, P.W., Gupta, V., 2004. Culture, Leadership, and Organizations: The GLOBE study of 62 societies. (Sage Publication: Thousand Oaks, CA).

Hsee, C.K., Weber, E.U., 1999. Cross-National Differences in Risk Preference and Lay Predictions. Journal of Behavioral Decision Making 12, 165-179.

Ince, O.S., Porter, R.B., 2006. Individual Equity Return Data From Thomson Datastream: Handle with Care! Journal of Financial Research 29, 463-479.

Jalal, A., Rockinger, M., 2008. Predicting tail-related risk measures: The consequences of using GARCH filters for non GARCH data. Journal of Empirical Finance 5, 868-877.

Jegadeesh, N., Titman, S., 1993. Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. Journal of Finance 48, 65-91.

Joe, H., 1997. Multivariate Models and Dependence Concepts. Chapman & Hall / CRC Monographs on Statistics & Applied Probability.

Julliard, C., Ghosh, A., 2012. Can rare events explain the equity premium puzzle? Review of Financial Studies 25, 3037-3076.

Kelly, B., 2012. Tail Risk and Asset Prices. Unpublished Working Paper, University of Chicago.

Kothari, S.P., Shanken, J., Sloan, R.G., 1995. Another Look at the Cross Section of Expected Stock Returns. Journal of Finance 50, 185-224.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and Finance. Journal of Political Economy 106, 1113-1155.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., 2006. What works in securities laws? Journal of Finance 61, 1-32.

Lau, L.-Y., Ranyard, R., 2006. Chinese and English Probabilistic Thinking and Risk Taking in Gambling. Journal of Cross-Cultural Psychology 36, 621-627.

Lesmond, D.A., Ogden, J.P., Trzcinka, C.A., 1999. A New Estimate of Transaction Costs. Review of Financial Studies 12, 1113-1141.

Lewellen, J., Nagel, S., 2006. The Conditional CAPM does not Explain Asset-Pricing Anomalies. Journal of Financial Economics 82, 289-314.

Lintner, J., 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. Review of Economics and Statistics 47, 13-37.

Longin, F., Solnik, B., 2001. Extreme Correlation of International Equity Markets. Journal of Finance 56, 649-676.

McNeil, A.J., Frey,R., Embrechts, P., 2005. Quantitative Risk Management. Princeton University Press.

Matsumoto, D., Juang, L., 2008. Culture & Psychology. Wadsworth, Fourth Edition.

Newey, W.K., West, K.D., 1987. A Simple Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. Econometrica 55, 703-708.

Patton, A.J., 2004. On the Out-of-Sample Importance of Skewness and Asymmetric Dependence for Asset Allocation. Journal of Financial Econometrics 2, 130-168.

Patton, A.J., 2009. Are "Market Neutral" Hedge Funds Really Market Neutral? Review of Financial Studies 22, 2495-2530.

Poon, S.H., Rockinger, M., Tawn, J., 2004. Extreme Value Dependence in Financial Markets: Diagnostics, Models, and Financial Implications. Review of Financial Studies 17, 581-610.

Rietz, T.A., 1988. The Equity Risk Premium: A Solution. Journal of Monetary Economics 22, 117-131.

Rodriguez, J.C., 2007. Measuring Financial Contagion: A Copula Approach. Journal of Empirical Finance 14, 401-423.

Rouwenhorst, K.G., 1998. International momentum strategies. Journal of Finance 53, 267-284.

Roy, A.D., 1952. Safety First and the Holdings of Assets. Econometrica 20, 431-449.

Rubinstein, M., 1994. Implied Binomial Trees. Journal of Finance 49, 771-813.

Ruenzi, S., Weigert, F., 2013. Crash Sensitivity and the Cross-Section of Expected Stock Returns. Unpublished Working Paper, University of Mannheim.

Schwab, K., Porter, M.E., Sachs, J.E., Warner, A.M., Levinson, M., 1999. The Global Competitiveness Report 1999. Oxford University Press, New York, NY.

Sibuya, M., 1960. Bivariate extreme statistics. Annals of the Institute of Statistical Mathematics 11, 195-210.

Sharpe, W.F., 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. Journal of Finance 19, 425-442.

Shleifer, A., 2009. The Age of Milton Friedman. Journal of Economic Literature 47, 123-135.

Sklar, A., 1959. Fonctions de répartition à n dimensions et leurs marges. Publications de l'Institut de Statistique de l'Université de Paris 14, 229-231.

Statman, M., 2008. Countries and Culture in Behavioral Finance. CFA Institute Conference Proceedings Quarterly.

Statman, M., 2010. The Cultures of Risk Tolerance. Unpublished Working Paper, Santa Clara University.

Stulz, R.M., Wiliamson, R., 2003. Culture, openness, and finance. Journal of Financial Economics 70, 313-349.

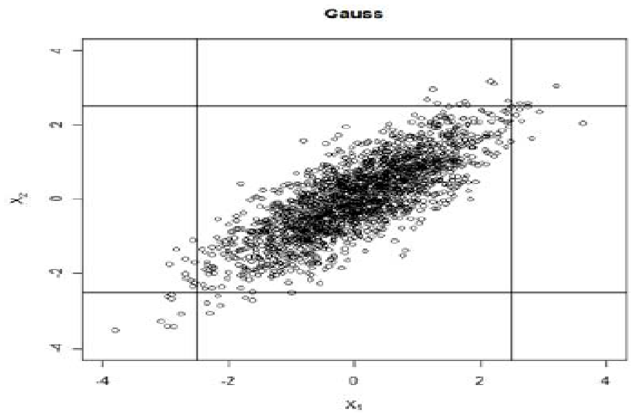
Tawn, J., 1988. Bivariate extreme value theory: models and estimation. Biometrika 75, 397-415.

Triandis, H. C., 2001. Individualism-Collectivism and Personality. Journal of Personality 69, 907-924.

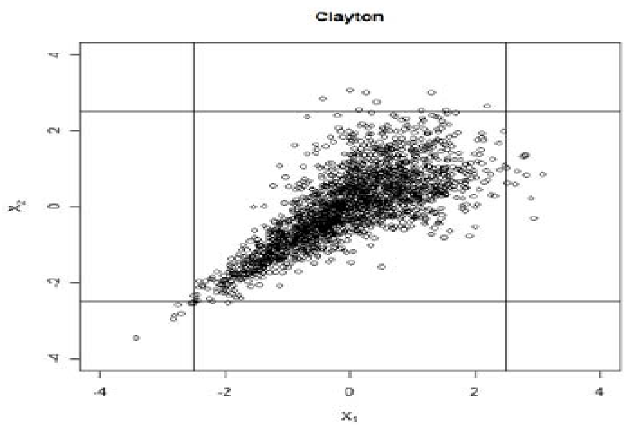
Weber, M., 1930. The Protestant Ethic and the Spirit of Capitalism. Harper Collins, New York.

Weber, E.U., Hsee, C.K., 1998. Cross-National Differences in Risk Perception, but Cross-cultural Similarities in Attitudes Towards Perceived Risk. Management Science 44, 1205-1217.

Figure 1: Different Copula Dependence Structures



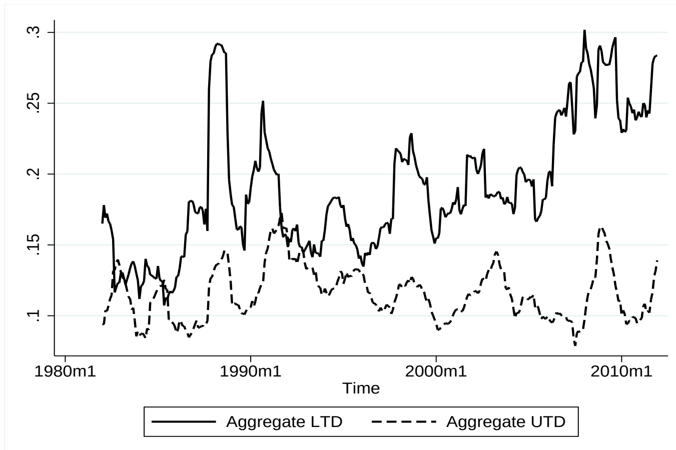
(a) Panel A: No extreme dependence



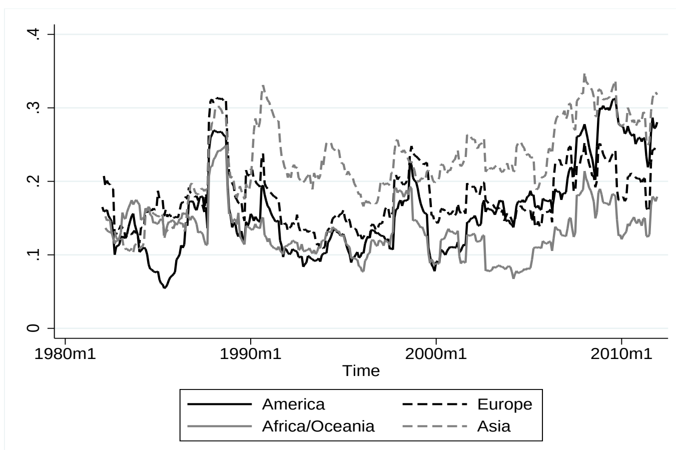
(b) Panel B: LTD

This figure displays 2,000 random variates from two bivariate distributions with standard normal marginal distributions and dependence structures exhibiting either no extreme dependence (Panel A) or extreme dependence in the lower left tail, i.e., LTD (Panel B). In each case, the linear correlation is set to 0.8.

Figure 2: Aggregate LTD and UTD over Time



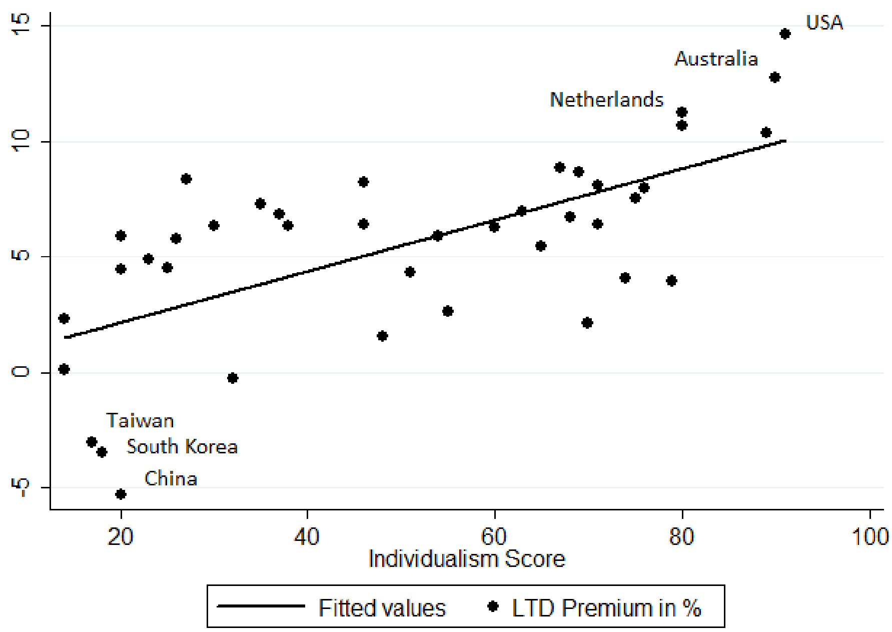
(a) Panel A: Worldwide Aggregate LTD and UTD



(b) Panel B: Aggregate LTD: Continents

Panel A of this figure displays the evolution of worldwide aggregate LTD and worldwide aggregate UTD over time. Worldwide aggregate LTD ($\text{LTD}_{m,t}$) is defined as the monthly cross-sectional, equal-weighted, average of $\text{LTD}_{i,t}$ over all stocks i in all countries in our sample. Worldwide aggregate UTD ($\text{UTD}_{m,t}$) is defined as the monthly cross-sectional, equal-weighted, average of $\text{UTD}_{i,t}$ over all stocks i in all countries in my sample. Panel B displays the development of aggregate LTD subdivided by geographical regions. The sample covers 40 international countries with a maximum sample period from January 1981 to December 2011.

Figure 3: Average LTD Premium and Individualism



This figure displays the relationship between the average annual LTD premium per country (in percentage) and a country's individualism score measured by the Hofstede (2001) scale. The sample covers 40 international countries with a maximum sample period from January 1981 to December 2011.

Table 1: Summary Statistics

Country	(1) Start	(2) End	(3) Number of Months	(4) Firms Total	(5) Firms Dec 1996	(6) Firms June 2003	(7) Firms Dec 2011	(8) Average Mon. Ret.	(9) Average Mon. Std.Dev.	(10) Average LTD	(11) Average UTD	(12) Average LTD - UTD
Argentina	Aug1994	Dec2011	208	99	54	54	56	1.50%	8.27%	0.27	0.18	0.09***
Australia	Jan1981	Dec2011	371	2864	762	974	1271	1.09%	5.55%	0.13	0.08	0.05***
Austria	Feb1986	Dec2011	310	208	84	59	55	0.64%	4.63%	0.18	0.12	0.06***
Belgium	Jan1981	Dec2011	371	327	113	139	128	0.92%	3.79%	0.14	0.10	0.04***
Brazil	Jan1997	Dec2011	179	200	-	65	150	2.25%	7.13%	0.21	0.13	0.07***
Canada	Jan1981	Dec2011	371	3085	971	980	1051	1.13%	5.04%	0.12	0.08	0.04***
Chile	Aug1990	Dec2011	256	218	112	76	85	1.57%	5.29%	0.17	0.15	0.02**
China	Aug1993	Dec2011	220	2120	308	1110	1922	1.81%	10.50%	0.33	0.22	0.11***
Denmark	Oct1983	Dec2011	338	358	152	120	156	0.48%	4.19%	0.15	0.10	0.05***
Finland	Aug1992	Dec2011	232	198	75	116	110	1.17%	5.80%	0.19	0.14	0.05***
France	Jan1981	Dec2011	371	1817	541	720	597	1.07%	4.99%	0.16	0.10	0.06***
Germany	Jan1981	Dec2011	371	1511	339	743	832	0.59%	4.59%	0.16	0.10	0.06***
Greece	Sep1989	Dec2011	267	438	189	316	188	0.97%	10.39%	0.28	0.20	0.08***
Hong Kong	Feb1981	Dec2011	370	1376	448	668	1014	1.46%	9.07%	0.25	0.15	0.10***
India	Jan1991	Dec2011	251	1554	713	770	1387	2.12%	11.31%	0.26	0.15	0.11***
Indonesia	Jul1991	Dec2011	245	470	171	199	268	1.99%	9.56%	0.19	0.13	0.06***
Ireland	May1988	Dec2011	283	111	37	40	38	0.82%	5.83%	0.15	0.12	0.03**
Israel	Jan1987	Dec2011	299	858	518	280	406	0.94%	7.48%	0.20	0.16	0.04***
Italy	Jan1981	Dec2011	371	547	171	251	250	0.62%	5.74%	0.24	0.16	0.08***
Japan	Jan1981	Dec2011	371	3358	2182	2417	2374	0.61%	5.86%	0.21	0.15	0.06***
Malaysia	Jan1987	Dec2011	299	1165	483	688	793	1.30%	9.39%	0.24	0.20	0.04***
Mexico	Feb1993	Dec2011	226	180	71	65	79	1.67%	5.67%	0.22	0.14	0.08***
Netherlands	Jan1981	Dec2011	371	372	163	146	98	0.98%	4.66%	0.21	0.15	0.06***
New Zealand	Feb1989	Dec2011	274	251	78	86	79	0.83%	4.34%	0.14	0.11	0.03**
Norway	Mar1982	Dec2011	357	496	104	119	181	1.19%	6.35%	0.19	0.12	0.07***
Pakistan	Jul1993	Dec2011	221	386	110	245	166	1.43%	8.49%	0.23	0.14	0.09***
Philippines	Feb1992	Dec2011	239	255	140	83	171	1.79%	9.27%	0.18	0.14	0.04***
Poland	Aug1997	Dec2011	172	356	-	159	262	1.27%	7.39%	0.19	0.10	0.09***
Portugal	May1989	Dec2011	271	200	82	52	39	0.20%	4.82%	0.18	0.12	0.06***
Singapore	Jan1984	Dec2011	335	750	203	337	419	1.05%	8.47%	0.22	0.19	0.03**
South Africa	Jan1981	Dec2011	371	918	359	249	247	1.70%	5.48%	0.16	0.12	0.04***
South Korea	Jul1985	Dec2011	317	2417	660	1389	1630	1.41%	9.16%	0.28	0.18	0.10***
Spain	Mar1988	Dec2011	285	232	118	129	116	0.62%	5.44%	0.25	0.15	0.10***
Sweden	Jan1983	Dec2011	347	958	161	296	392	0.86%	6.15%	0.19	0.12	0.07***
Switzerland	Jan1981	Dec2011	371	450	173	243	234	0.79%	4.12%	0.18	0.11	0.07***
Taiwan	Sep1988	Dec2011	279	932	328	629	753	0.77%	9.67%	0.37	0.21	0.16***
Thailand	Jan1988	Dec2011	287	744	401	299	464	1.35%	8.08%	0.24	0.15	0.09***
Turkey	Feb1990	Dec2011	262	393	186	271	322	4.86%	16.42%	0.32	0.19	0.13***
United Kingdom	Jan1981	Dec2011	371	5118	1189	1112	955	0.77%	4.78%	0.19	0.08	0.11***
USA	Jan1981	Dec2011	371	7591	2069	1704	2045	0.71%	5.66%	0.18	0.11	0.07***
Average	Oct1986	Dec2011	302	1147	395	460	545	1.23%	6.92%	0.21	0.14	0.07***

Table 1: continued

This table reports summary statistics of individual stocks from 40 markets around the world. Except for the U.S. market data, all data is collected from the Thomson Reuters Datastream database. The U.S. market data is collected from the CRSP database. I only include common stocks (both domestic and foreign stocks) that are listed on the major exchanges in each country. Columns (1)-(3) report the start date, end date and length of the sample period for each country. In columns (4)-(7), I provide summary statistics of the total number of different stocks, the number of different stocks in December 1996, the number of different stocks in June 2003, and the number of different stocks in December 2011. Column (8) and column (9) display the average equal-weighted monthly return and volatility per country. Finally, in columns (10)-(12), I report the average equal-weighted LTD, UTD and the LTD - UTD difference for all stocks per country. The maximum sample period is from January 1981 to December 2011. t-statistics are in parentheses. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Table 2: LTD Returns During Crisis Periods

(1) Country	(2) Mean Crisis Return	(3) Strong LTD	(4) Weak LTD	(5) Strong - Weak
Argentina	−15.20%	−19.37%	−9.75%	−9.62%*** (−5.52)
Australia	−12.26%	−15.67%	−8.55%	−7.12%*** (−5.13)
Austria	−10.74%	−16.68%	−4.37%	−12.31%*** (−13.28)
Belgium	−8.14%	−11.98%	−4.75%	−7.23%*** (−6.88)
Brazil	−14.46%	−19.89%	−9.60%	−10.29%*** (−5.97)
Canada	−11.46%	−14.59%	−7.82%	−6.77%*** (−7.80)
Chile	−8.13%	−9.61%	−5.07%	−4.53%*** (−3.63)
China	−18.78%	−20.01%	−17.31%	−2.70%** (−2.51)
Denmark	−9.75%	−12.97%	−6.97%	−6.00%*** (−5.32)
Finland	−10.91%	−14.79%	−7.67%	−7.12%*** (−6.11)
France	−10.66%	−14.99%	−6.28%	−8.72%*** (−11.04)
Germany	−10.60%	−16.04%	−4.64%	−11.40%*** (−11.00)
Greece	−17.55%	−21.32%	−12.29%	−9.03%*** (−6.87)
Hong Kong	−19.68%	−23.68%	−13.84%	−9.84%*** (−7.65)
India	−19.17%	−22.81%	−15.88%	−6.93%*** (−5.29)
Indonesia	−17.13%	−23.95%	−10.71%	−13.25%*** (−7.52)
Ireland	−13.13%	−16.17%	−9.38%	−6.80%*** (−4.05)
Israel	−16.43%	−22.41%	−10.28%	−12.14%*** (−7.29)
Italy	−11.27%	−14.59%	−6.47%	−8.13%*** (−10.42)
Japan	−11.96%	−14.07%	−9.01%	−5.06%*** (−5.89)
Malaysia	−17.60%	−20.23%	−13.72%	−6.51%*** (−5.07)
Mexico	−11.19%	−15.70%	−6.92%	−8.78%*** (−5.86)
Netherlands	−11.19%	−15.67%	−6.63%	−9.03%*** (−12.70)
New Zealand	−7.86%	−8.90%	−5.61%	−3.29%*** (−3.58)
Norway	−14.14%	−18.50%	−8.82%	−9.68%*** (−7.26)
Pakistan	−16.07%	−22.43%	−7.72%	−14.70%*** (−4.84)
Philippines	−16.10%	−19.98%	−12.12%	−7.86%*** (−5.69)
Poland	−13.29%	−16.82%	−10.50%	−6.32%*** (−6.59)
Portugal	−9.62%	−14.38%	−3.96%	−10.42%*** (−7.70)
Singapore	−15.87%	−19.61%	−11.44%	−8.17%*** (−6.31)
South Africa	−10.35%	−14.34%	−6.72%	−7.62%*** (−3.05)
South Korea	−16.72%	−18.90%	−11.57%	−7.33%*** (−4.30)
Spain	−11.28%	−13.80%	−7.30%	−6.50%*** (−6.60)
Sweden	−13.20%	−16.81%	−9.13%	−7.68%*** (−6.86)
Switzerland	−10.20%	−14.39%	−4.73%	−9.66%*** (−14.65)
Taiwan	−18.44%	−20.27%	−15.30%	−4.98%*** (−4.52)
Thailand	−15.67%	−23.10%	−8.55%	−14.55%*** (−7.93)
Turkey	−22.39%	−25.31%	−17.33%	−7.97%*** (−6.40)
United Kingdom	−11.50%	−13.57%	−8.55%	−5.02%*** (−6.42)
USA	−12.05%	−13.25%	−9.66%	−3.59%*** (−4.86)
Average	−13.55%	−17.29%	−9.17%	−8.12%*** (−6.76)

This table reports equal-weighted monthly returns of stocks sorted by realized LTD during crisis periods. Each month t, I rank stocks into quintiles (1-5) based on their estimated LTD over the past 12 months and form equal-weighted portfolios at the beginning of each monthly period. I investigate realized monthly returns of the strong LTD portfolio (portfolio 5), the weak LTD portfolio (portfolio 1) as well as the strong - weak LTD portfolio during periods of market crashes in the respective countries. I define periods as market crashes if the local value-weighted market return is below its 5% percentile. The sample covers data from common stocks in 40 markets all over the world. The maximum sample period is from January 1981 to December 2011. t-statistics are in parentheses. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Table 3: LTD and Realized Stock Returns Worldwide

Panel A: Equal-weighted Univariate Sorts: LTD and Local Currency Returns

Portfolio	Worldwide (incl.USA)	Worldwide (excl.USA)	America	Europe	Africa/ Oceania	Asia
1 Weak LTD	12.43%	15.49%	5.99%	13.91%	15.81%	16.97%
2	13.68%	16.02%	9.69%	14.92%	17.12%	16.65%
3	14.42%	16.27%	12.08%	16.20%	18.08%	15.72%
4	16.32%	17.85%	15.12%	17.93%	21.14%	17.23%
5 Strong LTD	20.10%	21.64%	19.48%	21.97%	26.52%	20.78%
Strong - Weak	7.67%***	6.16%***	13.49%***	8.05%***	10.71%***	3.82%**
	(5.07)	(4.02)	(7.83)	(4.05)	(4.26)	(2.03)

Panel B: Value-weighted Univariate Sorts: LTD and Local Currency Returns

Portfolio	Worldwide (incl.USA)	Worldwide (excl.USA)	America	Europe	Africa/ Oceania	Asia
Strong - Weak	9.64%***	5.59%***	9.98%***	4.73%**	6.15%***	5.15%
	(5.35)	(2.68)	(5.65)	(2.48)	(3.29)	(1.59)

Panel C: Equal-weighted Univariate Sorts: LTD and USD-denominated Returns

Portfolio	Worldwide (incl.USA)	Worldwide (excl.USA)	America	Europe	Africa/ Oceania	Asia
Strong - Weak	8.03%***	6.51%***	13.95%***	7.85%***	11.08%***	4.36%**
	(5.15)	(4.12)	(8.10)	(3.95)	(4.01)	(2.09)

Panel D: Equal-weighted Univariate Sorts: LTD and Carhart (1997) Four-Factor Alphas

Portfolio	Worldwide (incl.USA)	Worldwide (excl.USA)	America	Europe	Africa/ Oceania	Asia
Strong - Weak	4.23***	2.98%**	8.78%***	7.46%***	7.87%***	4.25%
	(3.45)	(2.27)	(5.95)	(3.63)	(2.72)	(1.30)

This table reports results from univariate portfolio sorts based on realized LTD. Panel A of this table reports the results of equal-weighted portfolio sorts of average local currency returns sorted by realized LTD worldwide and for different geographical subsamples. In each month t, I sort stocks into five quintiles (1-5) based on realized LTD over the past 12 months, form equal-weighted portfolios at the beginning of each monthly period, and report average returns over the same year. The row labelled 'Strong - Weak' reports the difference between the returns of portfolio 5 and portfolio 1 with corresponding statistical significance levels. For the remaining Panels (B)-(D), I only report the row labelled 'Strong - Weak' which captures the difference between the returns of portfolio 5 and portfolio 1 with corresponding significance levels. Panel B reports the results of value-weighted portfolio sorts of average local currency returns sorted by realized LTD worldwide and for different geographical subsamples. Panel C shows the results of equal-weighted portfolio sorts of average USD-denominated returns sorted by realized LTD worldwide and for different geographical subsamples. Finally, Panel D shows the results of equal-weighted portfolio sorts of average USD-denominated returns adjusted for the Carhart (1997) four-factor alphas worldwide and for different geographical subsamples. Carhart (1997) alphas are estimated based on yearly portfolio and factor returns over the whole sample period using factors for the global region and respective continent/geographical areas, respectively. The sample covers data from common stocks in 40 markets all over the world. The maximum sample period is from January 1981 to December 2011. t-statistics are computed using Newey and West (1987) adjusted standard errors. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Table 4: Multivariate Regressions

Panel A: Fama-MacBeth (1973) Regressions

	(1) Return	(2) Return	(3) Return	(4) Return	(5) Return	(6) Return	(7) Worldwide (excl. USA)	(8) America	(9) Europe	(10) Africa/ Oceania	(11) Asia
LTD	0.178*** (5.05)	0.201*** (5.88)	0.153*** (3.99)	0.088** (2.12)	0.212*** (4.22)	0.139*** (3.56)	0.151*** (3.10)	0.520*** (12.33)	0.252*** (5.36)	0.446*** (6.03)	0.140** (2.18)
UTD		-0.187*** (-7.72)			-0.061 (-1.61)	-0.088** (-2.11)	0.0005 (0.01)	-0.124*** (-3.15)	0.058 (1.21)	0.090 (1.15)	-0.071* (-1.82)
β			0.0678** (2.29)	0.0768*** (3.23)							
size			-0.0138*** (-4.66)	-0.0116*** (-3.58)	-0.00912*** (-3.00)	-0.0097*** (-3.01)	-0.00924** (-2.61)	-0.0228*** (-5.74)	-0.0202*** (-3.87)	-0.0275*** (-2.80)	-0.00983* (-1.91)
btm			0.0324*** (6.45)	0.0370*** (7.21)	0.0364*** (7.15)	0.0366*** (7.22)	0.0533*** (6.34)	0.0327*** (6.32)	0.0476*** (5.62)	0.101*** (6.80)	0.110*** (7.69)
past return			0.0505*** (2.94)	0.0447*** (3.11)	0.0409** (2.51)	0.0446*** (2.99)	0.0531*** (3.09)	0.0336** (2.16)	0.0985*** (5.07)	0.0323** (2.15)	0.00948 (0.55)
illiq				0.0162 (1.29)	0.0054 (0.46)	0.0093 (0.81)	-0.0147 (-0.41)	0.0133 (1.39)	-0.0465 (-1.53)	0.0675 (1.07)	-0.0652 (-1.27)
idio vola				-0.270 (-0.74)	-0.227 (-0.62)	-0.270 (-0.72)	0.307*** (2.94)	-0.574* (-1.63)	0.112 (0.67)	-0.396*** (-4.20)	0.762*** (4.50)
coskew				-0.145*** (-3.56)	-0.102** (-2.03)	-0.076 (-1.45)	-0.137*** (-2.80)	0.0812* (1.76)	-0.0231 (-0.57)	-0.105* (-1.94)	-0.134** (-2.49)
β^-						0.041* (1.94)					
cons	0.1000*** (4.08)	0.136*** (5.00)	0.119*** (3.61)	0.0728 (1.52)	0.0661 (1.35)	0.0841* (1.66)	0.00888 (0.23)	0.221*** (3.45)	0.0888* (1.88)	0.217*** (2.71)	-0.146* (-1.83)
N	5,020,456	5,020,456	3,660,725	3,660,157	3,660,157	3,660,157	3,093,702	773,843	1,026,970	233,905	1,625,439

Table 4: Continued

Panel B: Conditional Fama-MacBeth (1973) Regressions

	Below Median Volatility	Above Median Volatility
LTD	0.111***	0.253***
Worldwide incl. U.S.	(4.05)	(6.89)
LTD	0.139***	0.197***
Worldwide excl. U.S.	(4.19)	(3.37)
LTD	0.407***	0.551***
America	(4.44)	(5.34)
LTD	0.202***	0.322***
Europe	(4.71)	(5.34)
LTD	0.341***	0.432**
Africa / Oceania	(4.74)	(2.55)
LTD	0.139***	0.186**
Asia	(3.27)	(2.03)

This table displays the results of multivariate Fama and MacBeth (1973) regressions. Panel A displays the results of monthly Fama and MacBeth (1973) regressions of 1-year returns on LTD, UTD, beta (β), the log of market capitalization (size), book-to-market ratio (btm), past returns, illiquidity (*illiq*), idiosyncratic volatility (*idio vola*), coskewness (*coskew*), and downside beta (β^-) for the pooled worldwide sample and for different geographical subsamples. Definitions of all risk- and firm characteristics are listed in Panel A of Table B.1 in the Appendix. All risk characteristics are calculated contemporaneously to the yearly return. Regressions (1)-(6) refer to the pooled worldwide sample. Regressions (7)-(11) report the results of regression (5) for different geographical subsamples. Panel B repeats the Fama and MacBeth (1973) regression specification (5) from Panel A conditional on a stock's standard deviation above (below) the median within the pooled worldwide sample and different geographical subsamples. I only report the coefficient estimate for the impact of LTD. All other explanatory variables are included in the regressions, but their coefficient estimates are suppressed. The sample covers data from common stocks in 40 markets all over the world. The maximum sample period is from January 1981 to December 2011. t-statistics are computed using Newey and West (1987) adjusted standard errors. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Table 5: LTD Premium per Country

Country	(1) Strong LTD	(2) Weak LTD	(3) Strong - Weak	(4) FMB LTD Estimate
Argentina	28.86%	20.65%	8.21% (1.47)	0.891*** (4.35)
Australia	26.20%	13.41%	12.79%*** (4.23)	0.606*** (6.07)
Austria	13.11%	10.50%	2.61% (0.78)	0.245 (1.41)
Belgium	19.03%	11.51%	7.53%*** (2.86)	0.248*** (3.15)
Brazil	40.53%	34.17%	6.36% (0.77)	−0.195 (−0.24)
Canada	22.90%	12.20%	10.70%*** (4.10)	0.697*** (5.78)
Chile	31.88%	26.97%	4.90% (1.40)	0.311* (1.85)
China	21.81%	27.11%	−5.30% (−0.92)	−0.243 (−1.08)
Denmark	13.16%	9.10%	4.06% (1.15)	0.278*** (3.41)
Finland	22.42%	15.45%	6.97% (1.16)	0.422*** (3.05)
France	21.72%	13.59%	8.13%** (2.41)	0.352*** (3.74)
Germany	17.48%	8.64%	8.83%*** (3.07)	0.379*** (4.81)
Greece	36.76%	29.45%	7.31% (0.72)	0.615*** (2.64)
Hong Kong	26.29%	21.79%	4.50% (1.41)	0.503*** (4.62)
India	39.96%	38.42%	1.54% (0.20)	0.371 (1.37)
Indonesia	34.83%	32.53%	2.31% (0.52)	0.134 (1.46)
Ireland	15.18%	13.03%	2.15% (0.81)	0.271** (2.06)
Israel	20.49%	14.60%	5.89%* (1.87)	0.226 (1.20)
Italy	15.18%	7.18%	7.99%** (2.09)	0.297* (1.87)
Japan	12.73%	6.33%	6.40%** (2.58)	0.316*** (3.97)
Malaysia	20.23%	14.45%	5.77% (1.60)	−0.068 (−0.42)
Mexico	31.56%	25.20%	6.36% (1.54)	0.464*** (3.49)
Netherlands	20.83%	9.60%	11.22%*** (4.47)	0.638*** (7.21)
New Zealand	16.26%	12.30%	3.95%** (2.10)	0.603*** (5.97)
Norway	27.86%	19.18%	8.68%** (1.96)	0.461*** (2.75)
Pakistan	23.22%	23.12%	0.10% (0.02)	0.306 (1.52)
Philippines	28.37%	28.66%	−0.29% (−0.06)	0.185 (0.79)
Poland	25.54%	19.27%	6.28% (1.12)	0.473 (1.36)
Portugal	11.49%	3.11%	8.38%* (1.87)	0.290* (1.96)
Singapore	19.94%	14.02%	5.91%** (2.27)	0.130 (0.89)
South Africa	29.37%	23.94%	5.43% (1.51)	0.352*** (3.63)
South Korea	19.51%	22.96%	−3.46% (−0.80)	0.003 (0.02)
Spain	13.65%	9.32%	4.34%* (1.66)	0.408*** (3.39)
Sweden	19.34%	12.91%	6.43%** (2.00)	0.435*** (4.97)
Switzerland	15.62%	8.91%	6.70%*** (2.78)	0.220*** (3.09)
Taiwan	10.77%	13.82%	−3.05% (−0.98)	−0.288 (−1.13)
Thailand	25.29%	20.86%	4.43% (0.78)	0.268** (2.04)
Turkey	59.23%	52.40%	6.82% (0.55)	0.445 (1.56)
United Kingdom	19.77%	9.39%	10.38%*** (5.25)	0.523*** (7.13)
USA	14.48%	−0.17%	14.64%*** (7.63)	0.695*** (10.59)

This table presents the results of equal-weighted univariate portfolio sorts with local currency returns based on realized LTD and Fama and MacBeth (1973) regressions of yearly firm returns on LTD and different risk and firm characteristics for each country in my sample. Column (1) and column (2) report the average yearly return for the top and bottom quintile LTD portfolios. Column (3) shows the return difference for the strong - weak LTD portfolios and column (4) reports the coefficient estimate for LTD in the multivariate regression setup (5) from Panel A of Table 4 for each country. The sample covers data from common stocks in 40 markets all over the world. The maximum sample period is from January 1981 to December 2011. t-statistics are computed using Newey and West (1987) adjusted standard errors. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Table 6: Cross-Country Determinants

	(1)	Culture (2)	(3)	Macro (4)	Stock Market (5)	Protection (6)	Other (7)	Final (8)
	LTD	LTD	LTD	LTD	LTD	LTD	LTD	LTD
IND	0.146***	0.149***	0.121***					0.0740***
	(5.41)	(3.03)	(3.33)					(2.88)
UAI	0.0378*	-0.00487	0.0207					0.0393*
	(1.87)	(-0.13)	(0.78)					(1.71)
PDI	0.0480	0.00411						
MAS	-0.0307	0.000633						
LTO		-0.0215						
CATH			-0.0000981					
PROT			-0.0000772					
ENGLISH			-0.346					
SPANISH			1.784					
GERMAN			-0.915					
GDPGROWTH				-1.071**				-0.356
				(-2.64)				(-0.69)
INCOME				0.956				
TRADE				-0.0239				
CREDIT				0.0143				
CAP				0.0118				
RETURN					1.659			
VOLA					-0.379			
LTDLOSS					-0.021			
TRADING					-0.0319			
TURN					-0.000445			
SMALLMKTCAP					6.126*			3.243**
					(1.94)			(2.32)
DOMFIRMS					0.00852			
DISCLOSE						-1.200		
CIFAR						-0.00913		
INSIDER						1.436		
PROTECT						0.127		
CO LAW						1.476		
FR LAW						3.240		
GE LAW						-2.526		
EFFJUDGE						0.563		
POLRISK						0.163		
MARKETINT							0.064	
SOCIAL							-0.150	
TRUST							0.502	
DOMESTIC							-1.093	
FOREIGN							-0.600	
LIFE							-0.591	
SCHOOL							0.306	
cons	-5.190	-1.290	-1.236	-1.436	5.127*	-6.205	52.12	-1.019
	(-1.66)	(-0.20)	(-0.60)	(-0.21)	(1.78)	(-0.86)	(0.97)	(-0.32)
N	40	21	38	32	38	36	18	37
R^2	0.515	0.682	0.455	0.546	0.358	0.404	0.348	0.494

Table 6: continued

This table displays OLS regressions of the average country-specific LTD premium on the cultural variables individualism (IND), uncertainty avoidance (UAI), power distance (PDI), masculinity (MAS), long-term orientation (LTO), the percentage of a country that is catholic (CATH), the percentage of a country that is protestant (PROT), and on dummy variables that take on the value one if the primary language of a country's population is English (ENGL), Spanish (SPAN), or German (GERM) and zero otherwise in regressions (1)-(3). In regression (4), LTD is regressed on macroeconomic variables including a country's GDP per capita growth rate (GDPGROWTH), income per capita (INCOME), trade volume per GDP (TRADE), credit rating (CREDIT), and stock market capitalization to GDP (CAP). In regression (5), I regress LTD on stock market characteristics, such as the average monthly MSCI local market return (RETURN), the average monthly MSCI local market volatility (VOLA), the LTD loss in case of a market crash (LTDLOSS), the total value of stocks traded as a percentage of GDP (TRADING), stock market turnover (TURN), the average of the ratio of stock market capitalization held by small shareholders to GDP (SMALLMKTCAP), and the ratio of the number of domestic firms listed in a given country to its population (DOMFIRMS). In regression (6), I regress LTD on a disclosure requirements index (DISCLOSE), a country's corporate transparancy level index (CIFAR), the prevalance of insider trading (INSIDER), an index capturing investor protection (PROTECT), dummy variables that take on the value one if the country is from common-law (CO LAW), French law (FR LAW), or German law (GE LAW) legal origin and zero otherwise, the efficiency of a country's legal environment (EFFJUDGE), and a political risk index (POLRISK). In regression (7), LTD is regressed on a country's stock market integration (MARKETINT), government's social spending (SOCIAL), a country's trust level (TRUST), investors' domestic bias (DOMESTIC), investors' foreign bias (FOREIGN), a country's inhabitants life expectancy (LIFE), and years of average schooling (SCHOOL). Finally, in regression (8), LTD is regressed on variables that are statistically significant at the 10% level within regressions (1)-(7). Definitions of all cross-country variables are contained in Panels B-E of Table B.1 in the Appendix. The sample covers data from common stocks in 40 markets all over the world. The maximum sample period is from January 1981 to December 2011. ***, **, and * indicate significance at the one, five, and ten percent level, respectively. Due to the large number of variables and limited space I only display t-statistics of statistically significant explanatory variables.

Table 7: LTD and Individualism

Panel A: LTD and Individualism: Portfolio Sorts

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	18.25	21.31%	21.44%	−0.13% (−0.05)
2	31.25	31.36%	25.88%	5.48%** (2.27)
3	52.88	18.86%	13.03%	5.83%** (2.29)
4	69.38	20.22%	12.94%	7.28%*** (3.07)
5 High IND	82.50	19.71%	7.03%	12.68%*** (7.51)
High - Low	64.25	−1.60%	−14.41%	12.81%*** (6.81)

Panel B: LTD and Individualism: FMB Regressions

	1 Low IND	2	3	4	5 High IND
LTD	0.0076	0.1692*	0.2125***	0.2906***	0.4175***
	(0.08)	(1.89)	(3.81)	(6.16)	(9.80)

Panel C: LTD and Individualism: Predictive Portfolio Sorts

Portfolio	Strong LTD	Weak LTD	Strong - Weak
1 Low IND	1.16%	1.63%	−0.47%** (−2.14)
2	1.77%	2.09%	−0.32% (−0.93)
3	0.81%	1.10%	−0.29% (−1.51)
4	1.00%	0.91%	0.09% (0.38)
5 High IND	0.92%	0.65%	0.27%* (1.65)
High - Low	−0.24%	−0.98%	0.74%*** (3.87)

Panel D: LTD and Individualism: Predictive FMB Regressions

	1 Low IND	2	3	4	5 High IND
LTD	-0.00038	0.00024	0.00477	0.01475***	0.01269***
	(-0.06)	(0.03)	(1.23)	(2.98)	(3.71)

Table 7: continued

This table investigates the relationship between LTD and individualism on the portfolio level and in Fama and MacBeth (1973) regressions. In Panel A, I sort countries into quintiles based on their Hofstede (2001)'s individualism index. Within each quintile, I perform equal-weighted univariate portfolio sorts based on realized LTD. The column 'Strong LTD' ('Weak LTD') reports the average realized yearly return for the top (bottom) quintile LTD portfolio and column (4) shows the return difference for the strong - weak LTD portfolio with corresponding t-statistics. The row 'High - Low' displays differences of portfolio returns beween the quintile with the countries with the highest individualism index and the ones with lowest individualism index. Panel B reports separate Fama-MacBeth (1973) regressions on the full set of control variables (similar to the multivariate regression model from Panel A of Table 4) for the five different individualism quintiles. Although all control variables of regression (5) are included, I only report the coefficient estimates of LTD. In Panel C, I sort countries into quintiles based on their Hofstede (2001)'s individualism index. Within each quintile, I perform equal-weighted univariate portfolio sorts based on realized LTD. The column 'Strong LTD' ('Weak LTD') reports the average monthly future return for the top (bottom) quintile LTD portfolio and the column ('Strong - Weak') shows the return difference for the strong - weak LTD portfolio with corresponding t-statistics. The row 'High - Low' displays differences of monthly future portfolio returns between the quintiles of the countries with the highest individualism score and the lowest individualism score. Panel D reports separate Fama-MacBeth (1973) regressions of future monthy returns on the full set of control variables as in regression (5) of Panel A in Table 4 for the five different individualism quintiles. Although all control variables of regression (5) are included, I only report the LTD coefficient estimates. The sample covers data from common stocks in 40 markets all over the world. The overall sample period is from January 1981 to December 2011. t-statistics are computed using Newey and West (1987) adjusted standard errors. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Table 8: LTD and Individualism: Robustness Checks

Panel A: Different Portfolio Sorts

Value-weighted Sorts: LTD and Local Currency Returns

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	18.25	15.01%	13.38%	1.63% (0.58)
5 High IND	82.50	9.91%	−0.40%	10.31%*** (6.05)
High - Low	64.25	−5.10%	−13.78%	8.68%*** (4.23)

Equal-weighted Sorts: LTD and USD-denominated Returns

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	18.25	23.17%	23.16%	0.01% (0.01)
5 High IND	82.50	19.73%	6.94%	12.79%*** (7.50)
High - Low	64.25	−3.44%	−16.22%	12.78%*** (6.49)

Equal-weighted Sorts: LTD and Carhart (1997) Four-Factor Alphas

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	18.25	10.40%	12.90%	−2.50% (−1.55)
5 High IND	82.50	7.08%	0.68%	6.40%*** (2.62)
High - Low	64.25	−3.32%	−12.22%	8.90%*** (3.73)

Panel B: Alternative Cultural Model (GLOBE Study)

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	−4.98	16.48%	13.20%	3.28%*** (1.81)
5 High IND	−3.71	19.99%	12.11%	7.88%*** (2.90)
High - Low	1.27	3.51%	−1.09%	4.60%* (1.85)

Panel C: Equal-weighted Sorts: Downside Beta and Local Currency Returns

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	18.25	25.01%	20.84%	4.17% (1.03)
5 High IND	82.50	18.11%	8.61%	9.50%*** (3.86)
High - Low	64.25	−6.90%	−12.23%	5.33%* (1.81)

Table 8: continued

Panel D: Different Sample Sizes

Sample without Asian Countries

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	31.70	38.75%	32.76%	5.99% (1.09)
5 High IND	84.80	20.11%	7.04%	13.07%*** (7.73)
High - Low	53.10	−18.64%	−25.72%	7.08%*** (5.01)

Sample with Developed Countries Only

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	24.80	20.98%	17.70%	3.28%* (1.71)
5 High IND	86.00	20.17%	6.98%	13.19%*** (7.50)
High - Low	61.20	−0.79%	−10.72%	9.91%*** (5.37)

Sample: Time Period 1997-2011

Portfolio	(1) Index on Individualism	(2) Strong LTD	(3) Weak LTD	(4) Strong - Weak
1 Low IND	18.25	17.08%	21.47%	−4.39% (−1.29)
5 High IND	82.50	18.52%	6.21%	12.31%*** (7.50)
High - Low	64.25	1.44%	−15.26%	16.70%*** (6.13)

This table presents robustness checks regarding the relationship between LTD and individualism. As in Panel A of Table 7, I sort countries into quintiles based on their individualism index. Within each quintile, I perform univariate portfolio sorts based on realized LTD. The column 'Strong LTD' ('Weak LTD') reports the average realized yearly return for the top (bottom) quintile LTD portfolio and column 4 shows the return difference for the strong - weak LTD portfolio with corresponding t-statistics. The row 'High - Low' displays differences of portfolio returns beween the quintile with the countries with the highest individualism index and the lowest individualism index. In Panel A, I perform value-weighted sorts with local currency returns, equal-weighted sorts with USD-denominated returns, and equal-weighted sorts adjusted by the Carhart (1997) four-factor alpha. In Panel B, I classify countries according to an alternative individualism index provided by the GLOBE cultural model study and perform equal-weighted sorts with local currency returns. In Panel C, I perform equal-weighted sorts with local currency returns based on a stock's downside beta according to Ang, Chen, and Xing (2006) instead of LTD. Finally, in Panel D, I use different sample composites for my investigation: I include only non-Asian countries, only developed countries, and only data from the time period between 1997-2011, respectively. The sample covers data from common stocks in 40 markets all over the world. The overall sample period is from January 1981 to December 2011. t-statistics are computed using Newey and West (1987) adjusted standard errors. ***, **, and * indicate significance at the one, five, and ten percent level, respectively.