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International determinants of asymmetric dependence in investment returns ☆

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ABSTRACT

International investors require additional compensation, charged on top of the systematic risk premium, to hold assets displaying asymmetric dependence in returns. We document that the degree and pricing of asymmetric dependence differs substantially across the 38 markets examined. Asymmetric dependence strengthens in fast-developing equity markets. We propose policy actions aimed at improving firm competition levels through reducing restrictions for new firms to enter financial markets, which may help stabilize markets and reduce conditional risk levels of equities during downturn events.

1. Introduction

Asymmetric Dependence (AD) describes a situation where the degree of dependence between a stock and the market differs in the course of market downturns, as opposed to periods of market upturns (Patton, 2004; Ang and Chen, 2002; Longin and Solnik, 2001). Lower- (upper-) tail asymmetric dependence, a specific type of AD, refers to a stock return correlation with market returns being higher during market downturns (upturns) relative to upturns (downturns). At the firm level, the existence of AD has been observed by a number of authors.[1] Alcock and Hatherley (2017) and Ang and Xing (2006) add that AD is heavily priced in the cross section of US listed equities. To date, little is known about why AD exists, which factors drive its magnitude and pricing or how and why the level of AD differs across countries.

Abbreviations: AD, Asymmetric dependence; LTAD, Lower-tail asymmetric dependence; UTAD, Upper-tail asymmetric dependence.

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[1] See, for example, Hollstein et al. (2019), Chabi-Yo et al. (2018), Jiang et al. (2018), Oh and Patton (2017), Weigert (2016), Kelly and Jiang (2014), Ang et al. (2006), Hartmann et al. (2004), Patton (2004), Ang and Bekaert (2002), Campbell et al. (2002), Knight et al. (1995).

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An international analysis provides an ideal laboratory to examine how various country-specific fundamentals affect the magnitude of asymmetric dependence in equity returns and its relevance to investors. Using data from the 38 largest equity markets, we examine the role domestic macro factors and financial market characteristics play in explaining the cross-country variation in the prevalence and relevance of AD in equity returns. Moreover, we verify whether or not the pricing of asymmetric dependence is US-centric or an international phenomenon. We show that both the existence and pricing of AD is, indeed, an international phenomenon, observed in all markets examined. The international evidence for AD premia is striking; AD is significantly priced in all stock markets examined. Among commonly considered factors, we find that asymmetric dependence is the only factor that is consistently priced across all markets considered.

Our paper builds on the previous work of Alcock and Hatherley (2017), who identify that US investors require additional compensation, on top of systematic risk premium, for assets with returns exhibiting lower-tail asymmetric dependence, and who accept a discount for holding stocks with upper-tail asymmetric dependence. Hollstein et al. (2019) and Weigert (2016) show that international investors require compensation as a protection against tail risk and the risk of a market crash, respectively. In this paper, we argue that the entire continuum of asymmetric dependence between stock returns and market returns is relevant for investors in international markets, and that their preferences are not related to traditional unconditional risk aversion.

Instead, the premium associated with AD is consistent with disappointment-averse investors, such as those described by Skiadas (1997), who expect an additional premium as compensation for the asymmetric dependence risk on top for premium charged to cover systematic risk.[2] We observe that, globally, stock returns exhibiting LTAD (UTAD) are associated with a return premium (discount) because investors with state-dependent preferences may feel disappointed (elated) for having to hold an LTAD (UTAD) asset relative to a symmetric asset. Having access to information about the current type and degree of AD of each listed firm is clearly important for the international investor.

We document that the level of asymmetric dependence and its pricing differ substantially across countries. We find that the degree of AD strengthens in countries experiencing faster growth in their financial markets depth (measured using the MCAP to GDP ratio) and an increasing turnover. Similarly, the proportion of firms exhibiting lower-tail asymmetric dependence (LTAD) increases as financial markets grow in size and importance. Next, we document that there are relatively fewer firms exhibiting LTAD in countries with better conditions to start a business. We suggest policy makers of individual countries to consider establishing policy focused on reducing the costs and restrictions for new firms to enter the markets. This, as we document in this paper, can help reduce AD, and thus lower the conditional risk levels observed in bad times.

We further show that investors in countries with fast-growing financial markets are particularly sensitive to the AD risk. The premium attached to AD is the highest among countries with increasing MCAP/GDP and turnover. Our findings suggest that in fast-developing financial markets, investors request a higher premium for bearing AD risk.

We contribute to the literature documenting the importance of domestic fundamentals in explaining equity returns and conditional risk. Our results are consistent with the Bekaert et al. (2014)'s *'wake-up call hypothesis'* where many domestic macroeconomic fundamentals become a driving force of equity return correlations in bad times. They argue that the global financial crisis served as a wake-up call, leading local fundamentals to be more strongly reflected in factor exposures. The wake-up call hypothesis is consistent with country heterogeneous factors being priced more strongly in bad times, which can give rise to asymmetric behavior of asset returns and risk premia.

We find that the average level of lower-tail asymmetric dependence and upper-tail asymmetric dependence among equities from most markets examined is stronger than that found in the US market. This result is consistent with Carrière-Swallow and Céspedes (2013) who report that, in comparison to the U.S. and other developed countries, emerging economies suffer much more severe falls in investment and private consumption following an exogenous uncertainty shock, take significantly longer to recover, and do not experience a subsequent overshoot in activity. Furthermore, Bekaert et al. (2011) document that the level of segmentation remains significant in emerging markets and Tong and Wei (2011) show that the decline in stock prices was more severe for firms that are intrinsically more dependent on external finance for working capital. All of these arguments are helpful for our understanding of why we observe such substantial heterogeneity in the observed magnitude of AD across countries.

Our results have important implications for financial market stability. We show that a fast growth in national market capitalization relative to GDP may be associated with negative effects for the real economy, as potential abnormal losses experienced during market downturns may increase. This message resonates with Obstfeld (2012), who highlights the serious risks associated with the rapid growth of gross global financial flows and argues that it is critically important for policymakers to monitor the rapidly evolving structure of global gross assets and liabilities.

This paper is organized in the following sections. In Section 2, we describe the data and empirical methods used. Section 3 discusses our main results documenting the price of asymmetric dependence internationally, exploring the country-level factors explaining the variations in levels and prices of AD and proposing several policy actions. Section 4 concludes.

[2] For further details, please refer to Section 2 in Alcock and Hatherley (2017) that formally describes AD preferences within the context of Skiadas (1997) disappointment aversion.

Table 1
This table describes the data used from country *i*. We report the sample period, the number of distinct firms and the number of firm-month observations used in our analyses. We record data from December 31, 1985 when the market proxy (MSCI World Index) becomes available in the WRDS Database.

Data Sample Description Country *i*	Sample Period (dd/mm/yyyy)	Distinct Firms	Firm-Month Observations
Argentina	03/01/89–31/12/2020	88	6,879
Australia	02/01/87–31/12/2020	2,460	195,816
Austria	04/01/88–31/12/2020	90	8,389
Belgium	02/01/87–31/12/2020	183	20,118
Canada	31/12/85–31/12/2020	485	17,177
Chile	01/06/92–31/12/2020	197	18,327
China (Shanghai)	15/02/94–31/12/2020	1,409	120,917
China (Shenzhen)	15/02/94–31/12/2020	2,118	176,892
Denmark	02/01/87–31/12/2020	218	20,329
Egypt	06/01/97–31/12/2020	195	13,215
Finland	02/01/87–31/12/2020	186	18,849
France	02/01/87–31/12/2020	1,040	105,261
Germany	02/01/87–31/12/2020	527	34,927
Greece	01/06/92–31/12/2020	290	24,127
Hong Kong	02/01/87–31/12/2020	2,223	176,448
India	02/01/90–31/12/2020	2,284	139,676
Indonesia	31/05/95–31/12/2020	592	47,253
Ireland	31/05/95–31/12/2020	50	4,695
Italy	02/01/87–31/12/2020	489	45,375
Japan	02/01/87–31/12/2020	3,184	323,561
Korea	05/01/87–31/12/2020	954	88,556
Mexico	02/01/91–31/12/2020	146	13,698
Netherlands	02/01/87–31/12/2020	230	23,659
New Zealand	05/01/87–31/12/2020	175	16,041
Norway	02/01/87–31/12/2020	338	26,542
Pakistan	03/01/94–31/12/2020	429	37,311
Peru	16/08/94–31/12/2020	102	9,175
Philippines	03/01/89–31/12/2020	258	23,563
Poland	10/08/95–31/12/2020	860	60,163
Romania	19/05/98–31/12/2020	76	4,986
Singapore	02/01/87–31/12/2020	924	82,957
South Africa	01/06/92–31/12/2020	422	36,130
Spain	02/01/87–31/12/2020	287	26,090
Sweden	02/01/87–31/12/2020	762	57,657
Switzerland	05/01/87–31/12/2020	321	38,220
Turkey	13/02/90–31/12/2020	382	32,161
UK	02/01/87–31/12/2020	2,802	240,119
US	31/12/85–31/12/2020	3,479	492,106
Total		31,255	2,827,365

2. Data and Method

2.1. Returns

We analyze the cross-country variations in the level and price of asymmetric dependence (AD) on a sample of 38 stock exchanges. We select the largest stock exchange in each country except for China, where we analyze both the Shanghai and Shenzhen stock exchange. We include both stock exchanges from China (Shanghai and Shenzhen) and decide not to pool them together due to differing listing requirements. We have data on 31,255 individual firms from the 38 stock exchanges and 2,827,365 firm-month observations. Table 1 describes the sample period, the number of distinct firms and firm-month observations for all the financial markets considered. We collect all data for each stock exchange from when it first becomes available in WRDS Compustat Global until the end of 2020.

For each country except the US, we retrieve daily stock price information from WRDS Compustat Global Security Daily database (G_SECD). We obtain a time series of daily firm identifier (gvkey), date, close price (prccd), daily cash dividend amount (div), daily volume (cshtrd) and number of shares outstanding (cshoc). We collect annual balance sheet information from the WRDS Compustat Global Fundamentals Annual database. We collect firm identifier (gvkey), financial year (fyear), common equity (ceq) for all listed equities. Data is collected in US dollars. We select only common equity, where "TPCI - Issue Type Code" from the Compustat Global Security Daily database is equal to 0 (Common, ordinary shares).[3]

[3] US data is collected from the CRSP Security Daily database. We include only common shares (CRSP share code 10 or 11). We obtain CRSP return (ret), close price (prc), number of shares outstanding (shrout), daily volume (vol) and use permno as the main firm identifier. We use listings with the NYSE main stock exchange only (where "hexcd = 1") to avoid potential biases due to cross listings or different listing requirements. We collect end-of-year information about the firm common equity values (ceq) from the Compustat Fundamentals Annual database.

Table 2

A list of all country characteristics examined (2004–2020). The first category of country characteristics (A) the 'Doing Business Scores' published by the World Bank. We use the historical annual values of the scores computed based on the methodology used by The World Bank in March 2017. A higher value of the score means that a country has improved its practices to do business in a given category. The second category of country characteristics (B) measures financial depth and trading activity in the listed countries. Data comes from the Global Financial Development statistics issued by The World Bank. The third category (C) describes other country-level characteristics.

Country Characteristics Variable Name	Code	Description	Mean	Std	Min	Max
A) World Bank Doing Business Scores: www.doingbusiness.org						
Starting a Business	Start.Bus.	Derived based on procedures officially required, or commonly done in practice, for an entrepreneur to start up and formally operate an industrial or commercial business.	85.83	9.42	51.5	100
Getting Credit	Get.Cred.	Measures the legal rights of borrowers and lenders with respect to secured transactions through one set of indicators and the reporting of credit information through another.	70.30	14.04	18.75	100.00
Protecting Minority Investors	Prot.Inv.	A survey-based measure of the protection of minority investors from conflicts of interest through one set of indicators and shareholders' rights in corporate governance through another.	62.93	15.22	30	96.7
Paying Taxes	Pay.Tax.	The taxes and mandatory contributions that a medium-size company must pay in a given year as well as the administrative burden of paying taxes and contributions and complying with post-filing procedures.	78.45	15.22	30	96.7
Trading Across Borders	Trad. Borders	The time and cost associated with the logistical process of exporting and importing goods.	83.14	8.54	56.7	96.8
Enforcing Contracts	Enfor.Con.	The time and cost for resolving a commercial dispute through a local first-instance court and the quality of judicial processes index, evaluating whether each economy has adopted a series of good practices that promote quality and efficiency in the court system.	66.92	12.86	29	93.4
Resolving Insolvency	Resol.Ins.	The time, cost and outcome of insolvency proceedings involving domestic entities as well as the strength of the legal framework applicable to judicial liquidation and reorganization proceedings.	68.16	16.34	31.1	93.9
B) Financial Depth and Trading						
log(Market capitalization to GDP)	MCAP/ GDP	Market capitalization of listed domestic companies (% of GDP). Market capitalization is the share price times the number of shares outstanding for listed domestic companies. Data use in regressions are end of year values, in log values (due to extreme positive outliers, e.g. Hong Kong). Source: Global Financial Development Indicators, World Bank.	4.23	0.95	1.84	7.48
Turnover ratio (%)	Turnover	Turnover ratio is the value of domestic shares traded divided by their market capitalization. The value is annualized by multiplying the monthly average by 12. Source: Global Financial Development Indicators, World Bank.	77.56	71.57	1.61	480.29
C) Other Country-level Characteristics:						
Short selling practiced	Short	A dummy variable equal to 1 if short selling is practiced and zero otherwise. Source: Bris et al. (2007). For countries that are not mentioned in Bris et al. (2007), data is hand-collected based on publicly available information.	0.62	0.49	0.00	1.00
Law Code Dummy	Law_{code}	Identifies the legal origin of the company law or commercial law of each country. Each dummy variable is equal to 1 if the origin of the company law or commercial law of the country is English, French, German or Scandinavian, respectively, and zero otherwise. Source: Djankov (2010).				
Inflation	Inflation	Inflation, GDP deflator (annual %). Source: Global Financial Development Indicators, World Bank.	3.36	5.39	-5.21	50.63
log(GNI)	GNI	GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in constant 2010 U.S. dollars. In log values. Source: Global Financial Development Indicators, World Bank.	27.48	1.20	25.56	30.55
log(Population), total	Population	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates. Source: Global Financial Development Indicators, World Bank.	17.43	1.57	15.22	21.06

For all countries, except the US, we calculate total return as the sum of the capital gain and yield on dividends: $R_{it} = \frac{P_t - P_{t-1} + D_t}{P_{t-1}}$, where P_t and P_{t-1} are close prices from day t and the previous day $t-1$ and D_t is the cash amount of dividends paid out on day t. For US equities, we use the CRSP return, which already incorporates both capital gains as well as dividend income. We use the MSCI World Price Index instead of the MSCI World Net Total Return that includes dividends to compute market returns because it is available over a longer horizon. Asgharian et al. (2016) show that the correlation between returns computed from the price index and the return index is 1. Our proxy of the risk-free rate is the US one-month T-

Table 3
This table shows the mean regression coefficient and mean t-statistics (in parenthesis, in absolute values) across all countries. The stock exchange size (the number of listed companies from Table 1) is used as a weight to calculate the value-weighted average coefficient and t-statistics. This table summarizes the risk premia measured using the Ang and Xing (2006) asset-pricing procedure where equally-weighted cross-sectional OLS regressions are computed every month rolling forward. The detailed country-specific results are available in the Appendix D. The estimation procedure is described in Appendix B. The coefficients are calculated for each country individually as follows. At a given month, t, the total current annual excess return is regressed against AD, LTAD, UTAD, β, size ("Log-size"), book-to-market ratio ("BM"), the total past annual excess return ("Past Ret"), idiosyncratic risk ("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and illiquidity factor ("Illiq"). The book-to-market ratio ("BM") at time t for a given stock is computed using the last available (most recent) book equity entry. Statistical significance is determined using Newey and West (1987) adjusted t-statistics, given in parentheses, to control for overlapping data using the Newey (1994) automatic lag selection method to determine the lag length. All coefficients are reported as effective annual rates. Risk premia are estimated using all data available, a description of the data sample is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy. All returns are in US dollars.

Pricing Regressions: Summary								
	Model (1)		Model (2)		Model (3)		Model (4)	
β	−0.010	[0.347]	−0.013	[0.426]	−0.004	[0.267]		
Log-size	−0.018	[1.940]	−0.016	[1.860]	−0.016	[1.893]	−0.013	[1.738]
BM	−0.006	[0.235]	−0.005	[0.254]	−0.005	[0.218]	0.000	[0.083]
Past Ret	0.006	[0.343]	−0.011	[0.251]	0.007	[0.166]	0.008	[0.198]
Idio	−0.015	[0.043]	−0.369	[0.204]	−0.570	[0.321]	−0.609	[0.320]
Cosk	−0.077	[1.049]	0.106	[1.366]	0.101	[1.362]	0.355	[2.088]
Cokurt	0.031	[1.213]	0.037	[1.493]	0.028	[1.251]	0.026	[1.283]
Illiq	0.002	[1.776]	0.002	[1.734]	0.002	[1.754]	0.002	[1.899]
AD			−0.012	[4.446]				
LTAD					−0.010	[3.541]	−0.010	[3.593]
UTAD					−0.028	[3.487]	−0.028	[3.549]
β-							−0.028	[3.549]
β+							0.032	[0.363]
Intercept	0.357	[1.386]	0.284	[1.249]	0.324	[1.360]	0.258	[1.219]

Bill rate collected from the WRDS Fama French Factors dataset. We use the same proxy of risk-free rate in all countries examined. This approach is consistent with existing international asset-pricing studies (Karolyi et al., 2012; Amihud et al., 2015).

We follow Ince and Burt Porter (2006) and set any daily return R_{it} of firm i on day t to zero if R_{it} exceeds 200% or if $R_{it} > 100\%$ and $(1 + R_{it}) \times (1 + R_{it-1}) - 1 < 20\%$. We use this procedure to screen for data errors associated with any return above 300% that is reversed within one day. Furthermore, we exclude all daily returns with negative BM to cover for potential data errors. We apply a liquidity rule and remove stock-return time series with more than 50% of zero or missing daily returns. For each month t, only stock return time series with data available in months $t - 12$ to $t + 12$ are included in the final data set. We only consider such stock exchanges that have at least 50 listed firms and start analyzing the return time-series of such financial exchanges only after the number of firms exceeds 50.

2.2. Asymmetric Dependence of Equity Returns and its Pricing

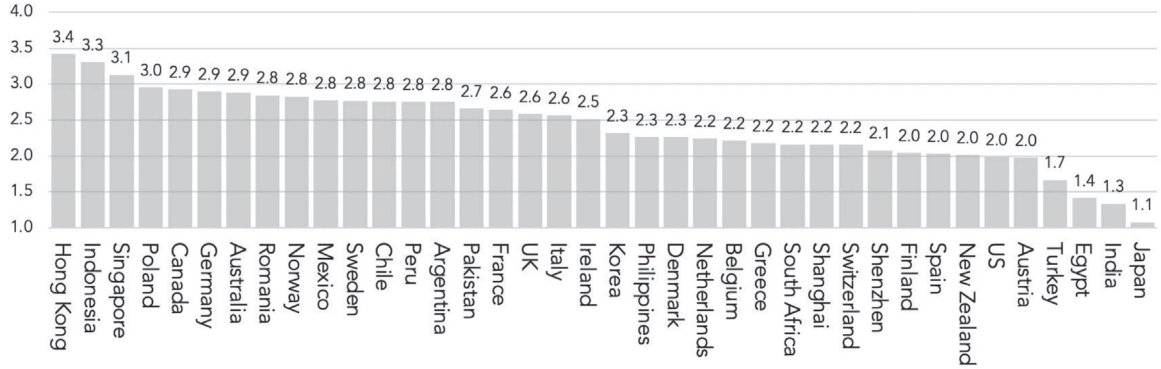
We quantify the degree of asymmetric dependence between stock returns and market returns individually for each firm in our sample using the Alcock and Hatherley (2017)'s Adjusted J-statistic (J^{Adj}). This measure of AD is orthogonal to the systematic and idiosyncratic risk. In Appendix A, we describe the construction of this measure and discuss the reasons why we choose this measure over other existing metrics of asymmetric dependence of equity returns. After we estimate the level of J^{Adj}-statistic for each firm, we separate firms into two groups exhibiting two distinct types of asymmetric dependence. Any positive value, $J^{Adj} > 0$, indicates upper-tail asymmetric dependence (UTAD), while a negative value of ($J^{Adj} < 0$) denotes lower-tail asymmetric dependence (LTAD). Lastly, we measure the proportion of firms exhibiting LTAD for each country c and end of a year t and denote it as $Prop_{ct}$.

We examine the relation between asymmetric dependence and excess returns by estimating the equally-weighted Ang and Xing (2006) cross-sectional regressions, while controlling for systematic risk, size, book-to-market ratio, momentum, idiosyncratic risk, coskewness, cokurtosis and illiquidity. We report all our asset-pricing results individually for each country in Appendix D and in summary in Table 3.

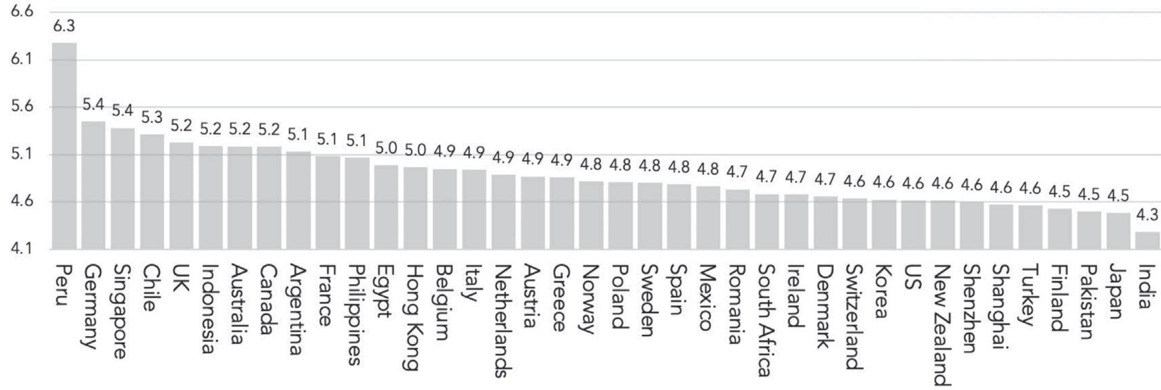
2.3. Country-level Factors

We examine the heterogeneity in the country level of AD and AD risk premia using a variety of country-specific factors. Our research is informed by existing literature, see, e.g. Ferson and Harvey (1991, 1994), that explores the effects of economic risks on common factors. Notably, Bekaert et al. (2014) attributes the observed increases in return correlations of international equity portfolios during the global financial crisis to country-specific characteristics. In our paper, we analyze which factors are specifically important for the asymmetric dependence structure of equity returns.

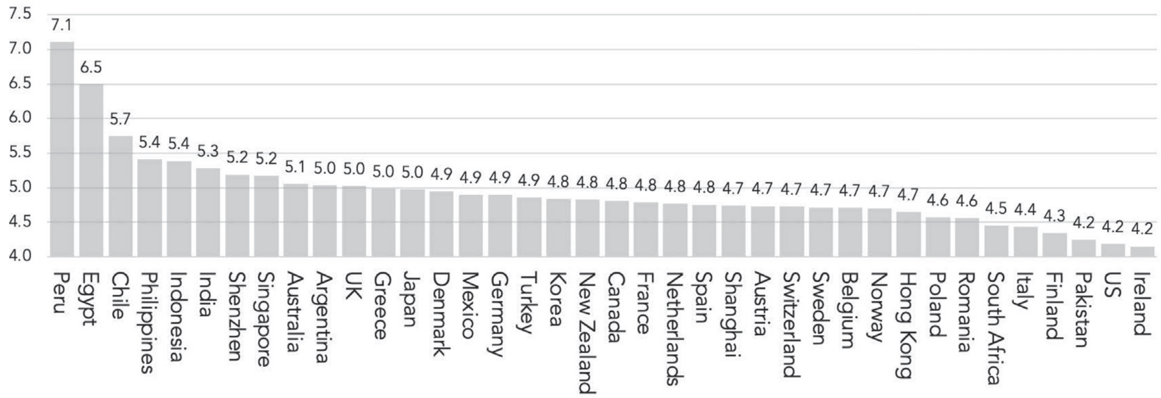
We first measure and then study the cross-country variations in the levels of asymmetric dependence and stock-return sensitivities to asymmetric dependence. We use various sources of country characteristics that describe domestic macro fun-



(a) Degree of Asymmetric Dependence (AD)



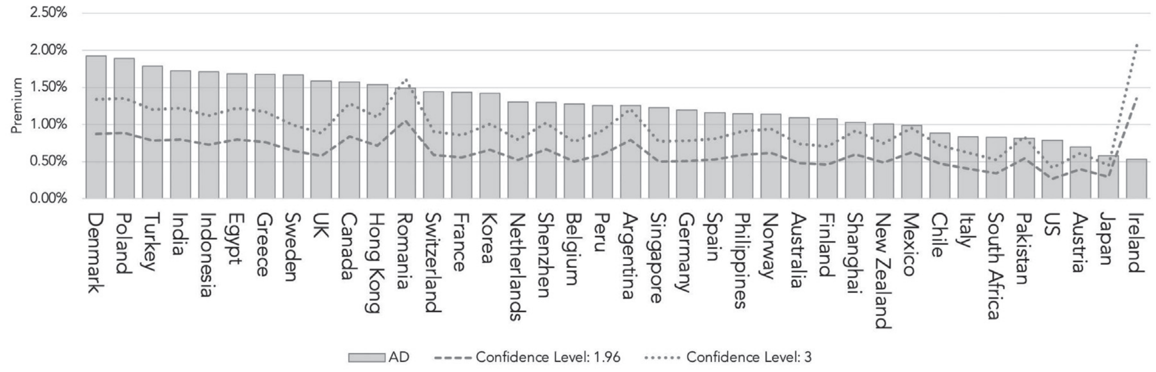
(b) Degree of Lower-Tail Asymmetric Dependence (LTAD)



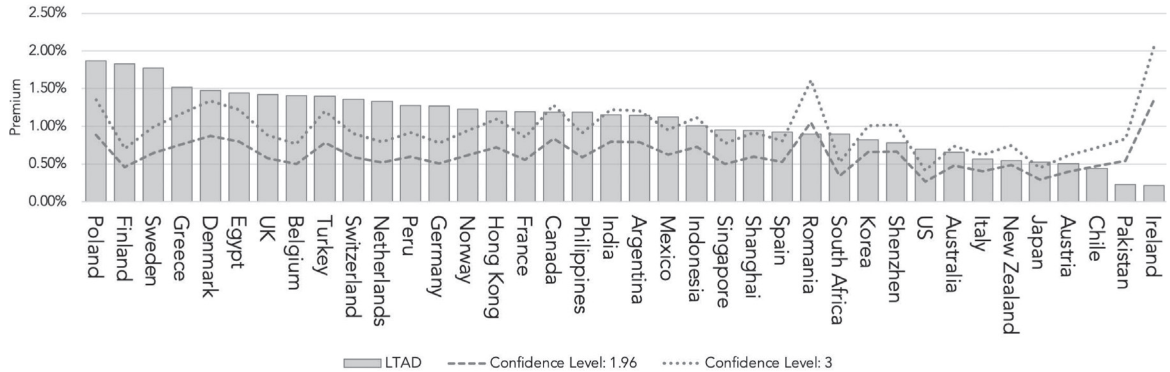
(c) Degree of Upper-Tail Asymmetric Dependence (UTAD)

Fig. 1. The Degree of Asymmetric Dependence: Country Comparison This figure shows the country levels of asymmetric dependence (1)(a), lower-tail asymmetric dependence (1)(b) and upper-tail asymmetric dependence (1)(c), respectively. The country level of asymmetric dependence corresponds to the equally-weighted average value of firm-specific asymmetric dependence across all firms listed in a given financial market. Values are Winsorized at the 1% and 99% level.

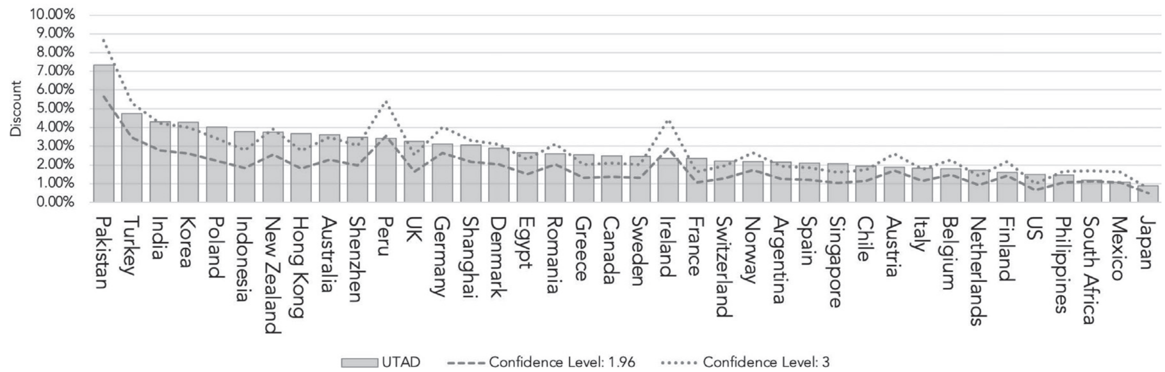
damentals, depth of financial markets, trading activity, short selling practices, and the overall business conditions. We collect country-specific information about conditions to start a new business, get credit, protect minority investors, pay taxes, trade across borders, enforce contracts or resolve insolvency from the 'Doing Business Indicators' database issued by the World Bank.



(a) Asymmetric Dependence



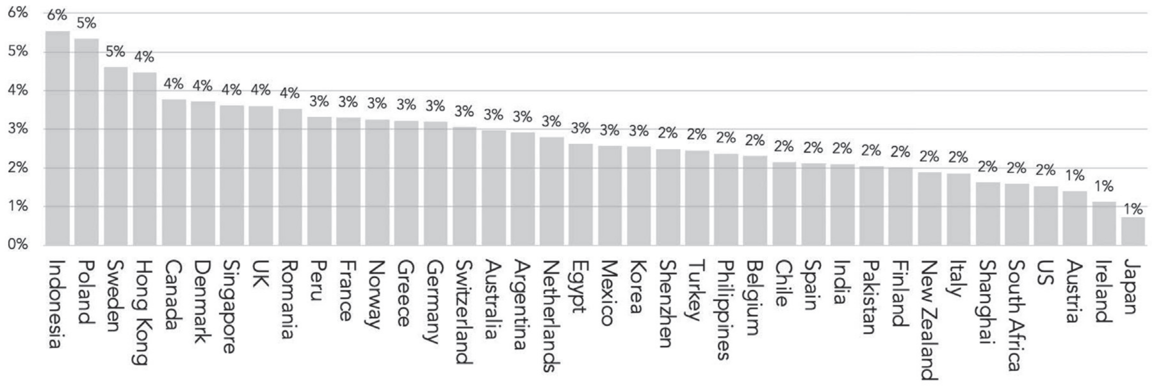
(b) Lower-Tail Asymmetric Dependence (LTAD)



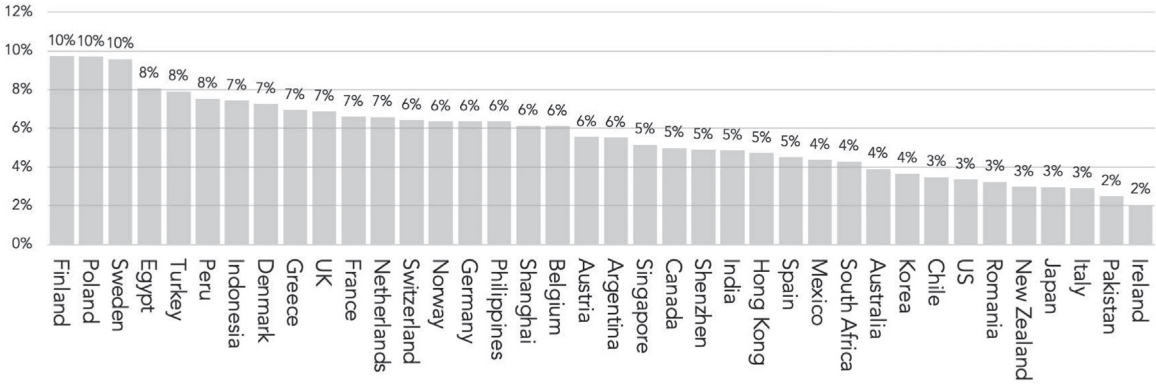
(c) Upper-Tail Asymmetric Dependence (UTAD)

Fig. 2. The Unit Price of Asymmetric Dependence: Country Comparison This figure shows the country price of asymmetric dependence (2)(a), lower-tail asymmetric dependence (2)(b) and upper-tail asymmetric dependence (2)(c), respectively. The significance of the price of asymmetric dependence (J^{Adj}) is measured using the Ang and Xing (2006) asset-pricing procedure where equally-weighted cross-sectional regressions are computed every month rolling forward. At a given month, t, the total annual excess return is regressed against AD (or LTAD and UTAD, respectively), β, size ("Log-size"), book-to-market ratio ("BM"), the average total past annual excess return ("Past Ret"), idiosyncratic risk ("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and illiquidity factor ("Illiq"). The description of data used is provided in Table 1. The dashed line represents the confidence interval associated with the t-statistic of 1.96 (5% confidence level) and the dotted line is associated with the confidence interval corresponding to the t-statistic of 3.0 (the Harvey et al. (2016) hurdle rate for t-statistic).

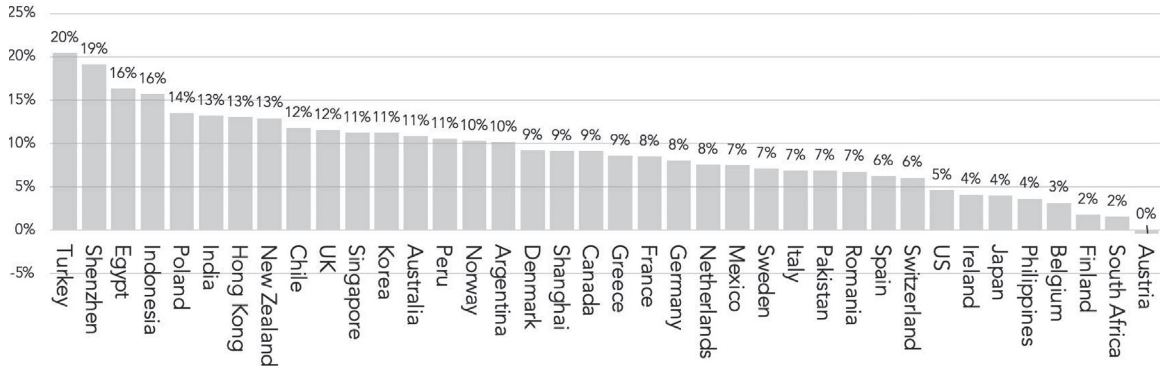
Countries differ significantly in the way they regulate the entry of new businesses. Djankov et al. (2002) show that entry appears to be regulated more heavily in countries with higher corruption and larger unofficial economies that do not typically have better quality of public or private goods. Countries with more democratic and limited governments have fewer



(a) Premium for Asymmetric Dependence (AD)



(b) Premium for Lower-Tail Asymmetric Dependence (LTAD)



(c) Discount for Upper-Tail Asymmetric Dependence (UTAD)

Fig. 3. The "Typical Price" of Asymmetric Dependence: Country Comparison This figure shows the typical price of asymmetric dependence (3)(a), lower-tail asymmetric dependence (3(b)) and upper-tail asymmetric dependence (3)(c), respectively. The typical price of AD is defined as the product of the average degree of asymmetric dependence and its corresponding estimated regression coefficient.

entry regulations. Djankov et al. (2002) argue that entry regulation benefits politicians and bureaucrats but not quality of financial markets (Djankov et al., 2002). Another factor that may affect asymmetric dependence is the ability of firms to short sell, which differs across countries. Regulators often believe that short selling restrictions can reduce the severity of market downturns (Bris et al., 2007). We explore the level of asymmetric dependence and its return premia in countries where short selling is practiced and in those where short selling is not allowed or is not practiced, to verify whether short selling restrictions have any effect on the severity of market downturns.

Table 4
This table reports panel regression estimation results for (1) the first differences in the country level of AD, ΔAD_{ct}, (2) the first differences in the country level of LTAD, $\Delta LTAD_{ct}$, (3) the first differences in the country level of UTAD, $\Delta UTAD_{ct}$, and (4) the country-level proportion of LTAD firms, $\Delta Prop_{ct}$; observed at the end of year t, which are regressed on a list of country characteristics from Table 2 measured at the end of year t. All regressors (except for Short Practiced, and Law Code dummies) are differenced. The sample is limited to years 2004–2020, because World Bank Doing Business Indicators data is not available before 2004. This table also reports the number of observations and the adjusted R-squared coefficient. The regression results are robust to the choice of the Law Code dummy variable base (i.e. Scandinavian Law Code in these regressions). Standard errors are clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Country Panel Regressions: The Degree of Asymmetric Dependence								
	ΔAD_{ct} (1)		$\Delta LTAD_{ct}$ (2)		$\Delta UTAD_{ct}$ (3)		$\Delta Prop_{ct}$ (4)	
ΔMCAP/GDP	2.022***	1.823***	0.260		0.525		0.212***	0.206***
	(0.582)	(0.381)	(0.292)		(0.498)		(0.0495)	(0.0337)
ΔStart.Bus.	−0.152**	−0.170***	−0.0211		−0.00441		−0.0125**	−0.0157***
	(0.0645)	(0.0525)	(0.0145)		(0.0395)		(0.00604)	(0.00496)
ΔGet.Cred.	−0.103*		0.0220		0.0369		−0.0105**	
	(0.0508)		(0.0222)		(0.0468)		(0.00501)	
ΔProt.Inv.	−0.00478		0.000614		−0.0347		−0.00116	
	(0.0876)		(0.0236)		(0.0458)		(0.00726)	
ΔPay.Tax.	0.0388		−0.0224		−0.0575*		0.00527	
	(0.0513)		(0.0251)		(0.0328)		(0.00448)	
ΔTrad.Borders	−0.0494		−0.00165		−0.0246		−0.00772	
	(0.0870)		(0.0228)		(0.0262)		(0.00805)	
ΔEnfor.Con.	−0.126		−0.0371		−0.185*	−0.191**	−0.0106	
	(0.113)		(0.0459)		(0.0998)	(0.0789)	(0.0100)	
ΔResol.Ins.	−0.0172		−0.0266	−0.0258***	0.000824		0.000302	
	(0.0600)		(0.0169)	(0.00887)	(0.0352)		(0.00564)	
Short	0.108	−0.273***	0.254***		0.293***		−0.00156	
	(0.100)	(0.0724)	(0.0817)		(0.0883)		(0.0111)	
Law_{FR}	0.377**		0.0977		0.218		0.0360***	0.0270***
	(0.159)		(0.111)		(0.129)		(0.0126)	(0.00709)
Law_{GE}	0.0830		−0.127		−0.112		0.0171	
	(0.154)		(0.113)		(0.119)		(0.0117)	
Law_{EN}	0.264		0.113		0.127		0.0202*	
	(0.157)		(0.108)		(0.119)		(0.0113)	
ΔInflation	−0.112***	−0.0851***	0.00959		0.0148		−0.00987***	−0.00756**
	(0.0348)	(0.0293)	(0.0292)		(0.0314)		(0.00356)	(0.00291)
ΔTurnover	1.816***	1.553***	−0.122		0.353		0.173***	0.162***
	(0.432)	(0.362)	(0.255)		(0.340)		(0.0399)	(0.0330)
ΔPopulation	−19.03		−17.14**		−23.38**		−1.041	
	(11.82)		(6.227)		(9.752)		(1.267)	
ΔGNI	5.210*		8.001***	5.900***	7.608**	5.580***	0.0341	
	(3.048)		(2.619)	(1.692)	(3.442)	(1.943)	(0.300)	
Constant	0.143	0.277***	−0.180	−0.176***	−0.186	−0.242***	0.0226	0.00672
	(0.169)	(0.0790)	(0.176)	(0.0529)	(0.201)	(0.0437)	(0.0149)	(0.00756)
Observations	265	347	265	387	265	387	265	357
R-squared	0.153	0.094	0.107	0.053	0.042	0.020	0.184	0.120

Furthermore, we also explore how domestic levels of inflation, GNI, or population growth affect AD and its pricing heterogeneities across countries. The full list of country characteristics analyzed in our study with summary statistics is included in Table 2.

2.4. Country Panel Regressions

We examine the country variations in AD level and AD pricing using country panel regressions. We regress the estimated levels of AD and AD risk premia on country-specific factors described in Table 2.[4] We estimate seven regression models in order to explain the time-varying levels of AD, LTAD, UTAD, the proportion of LTAD firms in a country, and the pricing of AD, LTAD and UTAD, observed across countries.

In seven separate panel regressions, we regress the variable of interest, X_{ct}, on a list of country-specific factors, F_{ct}, from Table 2. The country panel regression model is specified as

$$\Delta X_{ct} = \alpha_{c,0} + \alpha_c\prime \Delta F_{c,t} + \epsilon_{c,t}, \tag{1}$$

where $X_{ct} \in \{AD_{ct}, LTAD_{ct}, UTAD_{ct}, Prop_{ct}, AD\ \text{discount}_{ct}, LTAD\ \text{discount}_{ct}, UTAD\text{premium}_{ct}\}$, $\alpha_{c,0}$ is the intercept and α_c is a vector of regression coefficients. We cluster standard errors by countries.

[4] We use data from 2004 until 2015, because the Doing Business Indicators issued by the World Bank were not available before 2004. If return data is not yet available for a given stock exchange in 2004 in WRDS Compustat Global, we use the maximum available data window for this given financial market.

Table 5
This table reports panel regression estimation results for (1) the first differences of the country-specific return premium attached to AD, ΔAD Premium$_{ct}$, (2) the first differences of the country-specific return premium attached to LTAD, ΔLTAD Premium$_{ct}$, (3) the first differences of the country-specific return premium attached to UTAD, ΔUTAD Premium$_{ct}$, which are regressed on a list of country characteristics from Table 2 measured at the end of year t. The regressed values of ΔAD Premium$_{ct}$, ΔAD Premium$_{ct}$ and ΔAD Premium$_{ct}$ are in percentage points. All regressors (except for Short Practiced, and Law Code dummies) are differenced. The sample is limited to years 2004–2020, because World Bank Doing Business Indicators data is not available before 2004. This table also reports the number of observations and the adjusted R-squared coefficient. The regression results are robust to the choice of the Law Code dummy variable base (i.e. Scandinavian Law Code in these regressions). Standard errors are clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Country Panel Regressions: Pricing of Asymmetric Dependence	ΔAD Premium$_{ct}$		ΔLTAD Premium$_{ct}$		ΔUTAD Discount$_{ct}$	
	(1)		(2)		(3)	
ΔMCAP/GDP	0.976***	0.705**	0.165		2.337*	2.373***
	(0.239)	(0.304)	(0.516)		(1.170)	(0.826)
ΔStart.Bus.	−0.0648		−0.184		0.0986	
	(0.0507)		(0.193)		(0.251)	
ΔGet.Cred.	0.0241		0.0867		−0.139	
	(0.0249)		(0.0618)		(0.0902)	
ΔProt.In	0.0312		0.0805		−0.114	
	(0.0305)		(0.0608)		(0.178)	
ΔPay.Tax.	0.0104		−0.0303		0.0850	
	(0.0218)		(0.0433)		(0.204)	
ΔTrad.Borders	0.00312		0.0571		−0.0765	
	(0.0194)		(0.0517)		(0.0554)	
ΔEnfor.Con.	−0.0446		−0.00595		−0.176	
	(0.0394)		(0.0585)		(0.237)	
ΔResol.Ins.	0.0276*		0.0302		−0.0644	
	(0.0147)		(0.0344)		(0.0894)	
Short	−0.0202		−0.0704		−0.288	
	(0.0877)		(0.274)		(0.402)	
Law$_{FR}$	0.0193		−0.290		0.873	
	(0.105)		(0.321)		(0.572)	
Law$_{GE}$	−0.0867		−0.568		1.252**	
	(0.122)		(0.392)		(0.600)	
Law$_{EN}$	0.0667		−0.0856		0.675	
	(0.0772)		(0.246)		(0.532)	
ΔInflation	0.00832		0.0414	0.0526**	−0.0500	
	(0.0198)		(0.0266)	(0.0255)	(0.0445)	
ΔTurnover	0.384*	0.486***	0.349	0.551*	1.577	1.547*
	(0.194)	(0.162)	(0.374)	(0.279)	(1.191)	(0.914)
ΔPopulation	−12.79*		−25.45*		26.26	
	(7.405)		(12.74)		(24.52)	
ΔGNI	−2.203		−3.996		0.510	
	(1.791)		(3.883)		(6.191)	
Constant	0.140	−0.00778	0.553	−0.103*	−0.569	0.130
	(0.190)	(0.0287)	(0.656)	(0.0594)	(0.948)	(0.117)
Observations	265	402	265	402	265	402
R-squared	0.134	0.038	0.110	0.022	0.046	0.020

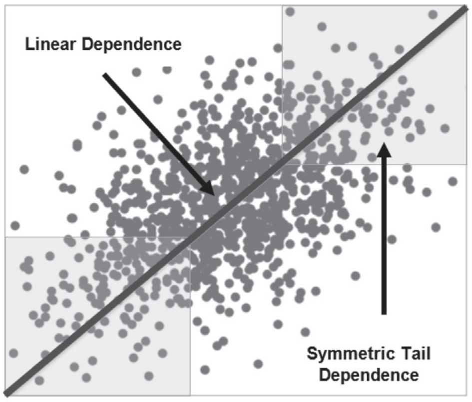
We estimate each model jointly for all countries by means of panel OLS. We apply first differencing to all our variables from Table 2, except the dummy variables describing short selling practices and law code, and X_{ct}. First differencing is applied to control for an unobserved factor simultaneously influencing both X_{ct} and F_{ct} leading to a spurious relationship between both. First differencing also helps in reducing the impact of collinearity (the Variance Inflation Factor reduced to less than 10 for all variables in the model).

We work with 14 different country characteristics, which can result in a large number of insignificant regressors that are only affecting noise in our regression model. We, therefore, start by estimating the full model that includes all factors. Then, we reduce the number of regressors, one-by-one, following Bekaert et al. (2014), by excluding the regressor with the highest p-value. We stop when all regressors have a p-value below 10%. We report results for both the full and the reduced model in Section 3.3.

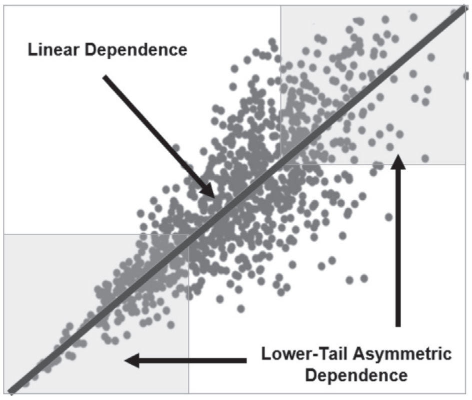
3. Results

3.1. Pricing regressions within Countries

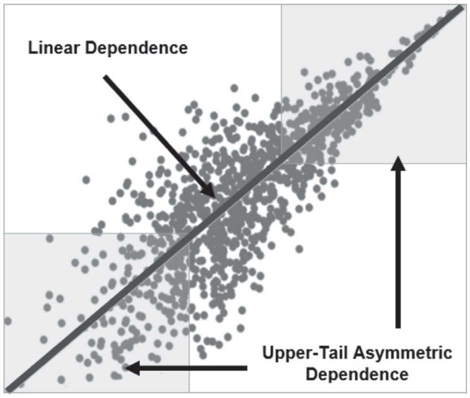
Asymmetric dependence is significantly priced in all sample countries. We use the Ang and Xing (2006)'s method and find that the coefficient associated with the degree of the firm-level asymmetric dependence is negative in all the countries considered, see Fig. 3. This result is ubiquitous and strongly consistent with the view that asymmetric dependence between



(a) Symmetric Dependence



(b) Lower-Tail Asymmetric Dependence (LTAD)



(c) Upper-Tail Asymmetric Dependence (UTAD)

Fig. 4. Types of Return Dependence Scatter plot of simulated bivariate data with different types of dependence. The dependence between stock excess returns and market excess returns may be described by a linear component (CAPM β) and a higher-order components, capturing differences in dependence across the joint return distribution. A joint distribution that displays larger dependence in one tail compared to the opposite tail is said to display asymmetric dependence. Panels (4) (a) to (c) display three possible types of return dependence, symmetric dependence, lower-tail asymmetric dependence and upper-tail asymmetric dependence.

stock returns and market returns is a general risk-based factor, rather than being an anomalous characteristic of the US market. We report value-weighted average coefficients and t-statistics in Table 3, which summarizes our main pricing results.[5] Our estimation method is described in Appendix D.

In all 38 largest financial markets, asymmetric characteristics of return correlations are relevant for international investors with state-dependent preferences (see Skiadas (1997)). The positive and significant coefficient attached to AD suggests that the higher the present AD, the higher the excess return. This further supports the Skiadas (1997) disappointment theory, where investors expect additional compensation in return for asymmetric dependence risk. We find that investors in all countries examined require an additional return premium to bear the asymmetric dependence risk.

The price of AD is not confounded by the effect of systematic or idiosyncratic risk. We use a measure of the firm-level AD that is orthogonal to firm-level CAPM β and idiosyncratic risk. We provide a simulation study to explain how the measure of AD used in this paper differs from existing measures of dependence, including conditional βs or copulae techniques used, e.g., by Oh and Patton (2017, 2016, 2013, 2012, 2009).

To the extent that investors are endowed with disappointment-averse utility function that is consistent with Skiadas (1997) preferences, the impact of AD and thus its pricing will depend on multiple market states. Indeed, a Skiadas agent is sensitive to a set of conditional preference relations (one for each event) with a disappointment-aversion parameter that increases with the severity of a market downturn (or the strength of an upturn) event.

[5] We use the number of listed equities in each stock market as weights to calculate the average regression coefficients and t-statistic from Table 3. The value-weighted average t-statistic associated with the firm-level asymmetric dependence is 4.413. In all 38 markets, the t-statistic is greater than the Harvey et al. (2016) hurdle rate of 3.0, set to account for data mining issues and noise in variables, see Model (2) from Table 3.

From the investor perspective, it is crucial to be able to distinguish between different types of AD because they have different implications for return predictions. We expect that firm stock-returns exhibiting LTAD (UTAD) are associated with a return premium (discount) because investors with state-dependent preferences, as those described by Skiadas (1997), may feel disappointed (elated) for holding a LTAD (UTAD) asset relative to a symmetric asset. To empirically determine the country-specific pricing of these two distinct types of asymmetric dependence, lower-tail asymmetric dependence (LTAD) and upper-tail asymmetric dependence (UTAD), we quantify the price of the two types of AD, LTAD and UTAD, separately, by including them as risk factors in the pricing regressions, see Model (3) from Table 3.

We find that at least one of the two factors, LTAD or UTAD, is significant in all the countries. We confirm that LTAD (UTAD) is, indeed, associated with positive (negative) and significant coefficients in all sample countries. The positive (negative) coefficient suggests that the higher the degree of LTAD (UTAD), the higher (lower) the excess return in the following month, which indicates a return premium (discount) attached to LTAD (UTAD). Our measures of asymmetric dependence are orthogonal to systematic risk (β), which means that the found prices of LTAD and UTAD are not confounded by the pricing of systematic risk.

The estimated coefficient values of 0.010 and -0.028 reported in Table 3 for Model (3) represent the average premium and discount per each unit of lower-tail and upper-tail asymmetric dependence, respectively. Given that the average factor level of LTAD and UTAD is 4.81 and 4.86,[6] the typical LTAD premium charged by investors is 4.8% and the discount for the LTAD factor is 13.9% per annum, respectively, which is not only statistically significant but also economically meaningful to all market participants.

The overall discount attached to UTAD is substantially larger than the premium charged by investors to bear LTAD risk. In all economies considered in this paper, the overall proportion of firms that exhibit UTAD is much smaller than LTAD firms. This makes the UTAD return characteristic a relatively scarce resource, which is highly demanded by investors for its hedging features. We argue that having a UTAD asset in an investment portfolio helps investors hedge against negative market shocks as return correlations of UTAD stocks are relatively lower in bad versus good times. This may explain why investors are willing to sacrifice such a large portion of their investment returns.

In terms of whether investors are concerned about upside and downside βs, we provide further clarification by adding the upside β (β^+) and downside β (β^-) into our pricing regressions. We find that international investors value LTAD and UTAD relatively more than they value upside and downside βs, see Model (4) from Table 3. We show that after controlling for LTAD and UTAD, the average global premium for downside β is only about 2.8% per annum. We do not find evidence of a discount attached to upside β. Ang and Xing (2006) document that the premium attached to downside β is about 5.6% per annum (and statistically significant) and the discount associated with upside β is insignificant. Atilgan et al. (2018) analyze the downside risk-expected return relation in a global context that spans 51 countries and fail to find evidence of a downside β discount.

A detailed description of all our pricing regression results is reported in Tables from Appendix D with Table 3 providing a value-weighted average of all regression coefficients and t-stats measured across the 38 markets examined. Our results are robust to the change of data frequency, value weighting of observations, the length of estimation windows or use local market indexes instead of the global proxy. Results from robustness tests are available upon request.

Interestingly, our measures of AD fail to predict future returns. Our findings conform to those employing other measures of downside risk including, for example, Ang and Xing (2006) who document insignificant results for downside βs in the predictive setting. Similarly, Jylhä et al. (2018) document similar results for systematic risk: stocks with high CAPM βs estimated using data from year t experience high contemporaneous returns in year t, without exhibiting high future returns (out of sample). In each of these cases, it is possible that the in-sample correlation between the risk-proxy and stock returns may not always indicate a return premium. Instead, it is feasible that risk factors follow high returns due to increases in the breadth of institutional ownership and turnover (Jylhä et al., 2018). It is possible that our in-sample pricing of AD may also be affected by these external factors.

3.2. Cross-country Heterogeneity in AD and AD Pricing

Our results reveal considerable cross-country variations in the degree of firm AD and its pricing. The main focus of this paper is to explore potential drivers of these heterogeneities observed across countries. We first report and comment on the magnitude of observed heterogeneities and then discuss the role of country-specific factors in explaining them.

Fig. 1 documents a substantial degree in heterogeneity in the level of AD observed across countries. The country mean level of AD ranges from 1.08 (Japan) to 3.43 (Hong Kong), Fig. 1. The highest degree of both LTAD and UTAD is recorded in Peru, which suggests that firms in Peru exhibit highly asymmetric tail correlations.

Moreover, we find that AD pricing also differs across countries. We test for the equality of the risk premia attached to AD that is observed across countries using the anova test and reject the null hypothesis of equal AD premia. Our findings suggest that investors care differently about the same unit level of AD experienced in different financial markets.

Heterogeneity in the AD pricing observed across countries is consistent with a lack of diversification among international investors. Existing literature offers clues on why some international investors may be poorly diversified in the international

[6] Measured as the value-weighted average degree of LTAD and UTAD from individual countries, weighted by the total number of firms listed in each country.

context. Bekaert et al. (2011) and Chambet and Gibson (2008) provide evidence suggesting that emerging markets still remain segmented and that financial integration has decreased during the financial crises of the 1990s. Furthermore, Tong and Wei (2011) show that declines in stock prices during crises are more severe for firms that are more dependent on external finance for working capital. In a similar vein, Bekaert et al. (2014) point to the heightened relevance of domestic fundamental factors observed during the global financial crisis. All these findings are inconsistent with the 'globalization' hypothesis that is built around fully integrated global financial markets and diversified investors. (See Fig. 2).

To create a measure of a return premia attached to AD that would be comparable across countries with varying factor levels of AD, we construct a measure of a 'typical' price of AD, defined as the product of the mean AD and the estimated regression coefficient associated with AD. This 'typical' AD premium ranges from a low 1% per annum in Japan to a high 7% per annum in Indonesia, see Fig. 3. Investors most sensitive to AD are those in Indonesia, Poland and Sweden, all of whom require a 'typical' return premium of more than 5% per annum for holding a stock with an average degree of AD.

The 'typical' return premium (discount) associated with LTAD (UTAD), estimated using the Ang and Chen (2002) regressions, ranges from 2% to 10% (0% to 20%), as reported in Fig. 3. The 'typical' price of LTAD (UTAD) corresponds to the size of the premium (discount) required to hold a stock with an average degree of LTAD (UTAD). These observed differences in LTAD and UTAD are both statistically significant and economically meaningful.

The observed heterogeneity in AD pricing is likely to be reflected in varying costs and options for buying downside insurance products across countries. The cost of trading equity put options could serve as another measure of investor sensitivity of AD risk. Moreover, fundamental differences in the degree of risk aversion of investors that do not diversify their portfolios worldwide can play a role in explaining the differences in country levels AD risk premia.

3.3. Drivers of Asymmetric Dependence

AD and AD pricing differs across countries. We study the sources of these country variations in the degree of firm-level asymmetric dependence and AD premia among countries. Our research is informed by existing literature (Ferson and Harvey, 1991; Ferson, 1994) that explores the effects of country-specific risks on returns and return correlations. We examine the relation between the observed degree and price of asymmetric dependence and a number of country characteristics. In particular, we analyze the role of economic risks, country-specific financial market risks, market development, short selling restrictions, the law code origin, conditions to do business and other country-specific characteristics in explaining the variations in AD among countries. Tables 4 and 5 report our panel regression results.

Financial Depth and Trading Conditions. We find that a positive change in domestic financial depth or market growth (measured by the market capitalization to GDP ratio) and turnover is associated with an increase in asymmetric dependence. The overall presence of AD strengthens because the relative proportion of firms exhibiting LTAD increases in fast-growing financial markets. Our results indicate that a fast growth of financial markets is related with and may even lead to an increase in return correlations in bad times.

One way to rationalize this result is through Rathke et al. (2020)'s findings. Rathke et al. (2020) find that foreign financial flows played an important role during the run-up to the global financial crisis. Foreign financial flows can increase the financial depth of domestic equity markets, which can lead to extremely high return correlations during bad times, which leads to higher asymmetric dependence of equity returns.

The MCAP to GDP ratio can also increase due to the change in institutional demand, which can happen, e.g., when an economy becomes a constituent of one of the MSCI indexes. Jylhä et al. (2018) document that an increase in a stock's breadth of institutional ownership or turnover is followed by a significant, but temporary, increase in conditional CAPM βs. This temporary change in equity risk may also positively affect the degree of asymmetric dependence of equity returns. We confirm this result by showing that with an increase in turnover, the overall degree of asymmetric dependence of equity returns and the proportion of LTAD firms both increase.

Our findings suggest that in countries where financial markets become larger and financial assets get more actively traded, the overall effect of asymmetric dependence on asset prices and the real economy becomes more pronounced. This is because in these fast-growing financial markets, the number of firms exhibiting LTAD increases, the financial systems becomes more fragile and the effects of negative shocks and financial crises may thus become more severe.

We also document that increasing turnover has a similar effect on the degree of AD of listed firms. Similarly to financial depth, when turnover increases at a faster rate, the proportion of firms exhibiting LTAD rises, which pushes up the overall degree of market AD. This can have destabilizing impact on the real economy.

Conditions to Do Business. Next, we document that improving conditions to start a business or get credit are associated with a lower degree of AD and a lower proportion of firms with stock returns exhibiting LTAD. We notice that business environment affecting conditions to start new businesses have an opposite effect on the proportion of LTAD firms as compared to financial market depth (i.e. the ratio of MCAP to GDP).

We explain this effect through the competition channel where the degree of competition increases when conditions to start a business improve. We report that when countries reduce the number of restrictions to open new businesses, the prevalence of LTAD firms decreases, which also lowers the overall degree of AD. Given that in all countries, LTAD is more prevalent, our findings, thus, imply that improving conditions to do business can reduce the asymmetric behavior of returns dependence among firms.

Domestic Macro Factors. We also explore how country-level macro factors influence the asymmetric features of return correlations. We consider a number of economic fundamentals measuring inflation, trading activity, population growth or domestic product.

We find that increasing inflation is associated with a decreasing degree of asymmetric dependence. In countries and during years of increasing inflation, the proportion of firms exhibiting LTAD decreases. Overall, return correlations become more symmetric when inflation increases and the dependence structure of firm-level returns and market returns gets closer to a bivariate normal distribution.

Our results can be rationalized when we think of increasing inflation as a sign of economic recovery. Typically, during economic expansions, total output increases, unemployment begins to fall and inflation rises. We document, in this paper, that economic recovery may lead to or be related with a reduction in the degree of asymmetric dependence in equity returns.

Lastly, we find evidence of domestic output growth being related with the dynamics in the degree of AD. Specifically, we find that in countries with high growth in their domestic product, both the degree of LTAD and UTAD of an average firm increase. This positive relation between domestic output and AD is most likely associated with the effect of the growth of financial markets on AD that was discussed above, which also affects the real domestic output of economies.

3.4. Policy Implications

Our findings signal an important message for regulators and policy makers. We provide evidence that a fast growth of financial markets may not always be associated with positive effects on the real economy. In fact, we find that as the financial market growth and turnover increases, the degree of asymmetric dependence as well as the proportion of LTAD firms increases. Moreover, investors become more sensitive to LTAD. This finding adds support for the recognition of excessive growth of financial markets as a potential driver of market instability.

This message speaks in favor of Lagoarde-Segot (2012) editorial comment suggesting that the deregulation and international integration of financial systems carry significant economic destabilization risks. Lagoarde-Segot (2012) notes that recent significant increases in global liquidity can destabilize emerging economies when capital inflows exert pressure on exchange rates and asset prices, which may have negative consequences on competitiveness and stability of these economies. Gimet and Lagoarde-Segot (2012) add that financial liberalization does not guarantee increased and stable net credit flows to the real sector. They suggest that rather than focusing solely on financial sector size and external liberalization, optimal financial policy should foster interbank competition in order to maintain low interest margins,[7] develop macroprudential safety system to avoid boom and bursts cycles, and help promote internal capital market development in order to increase the efficiency of the financial service industry.

We confirm the risks associated with fast growing financial markets are, indeed, related with increasing asymmetric dependence of equity returns, or an excessively high conditional risk observed in bad times. In terms of policy recommendations, we suggest that countries should focus on improving its conditions to open new businesses, which can help stabilize financial markets by reducing this excessive conditional risk. Overall, improving policy to ensure market competitiveness and reducing the number of restrictions for new firms to enter financial markets can help lower the degree of asymmetric dependence of equity returns, which will in turn have stabilizing effects on real economy during market downturns. Our results further suggest that allowing investors to short sell stocks may lead to an overall lower number of firms exhibiting LTAD and investors becoming less sensitive to both LTAD and UTAD factors.

To the extent that investment excess returns explain firm cost of capital, our results have important implications for risk-based investment strategies that determine capital allocation. Furthermore, the ubiquitous existence of AD is well known to present a potential source of risk for financially constrained investors that may not be able to secure financing during market downturns. Consequently, the externalities of AD may justify the regulatory oversight of this risk.

4. Conclusion

Our paper examines the cross section of stock returns across the world's 38 largest stock exchanges with a particular emphasis on identifying the international determinants of the variations in the degree of asymmetric dependence in investment returns. We document that changes in AD are related to the growth of financial markets relative to GDP and the conditions necessary for the establishment of a business enterprise. We find that the degree of asymmetric dependence rises in countries with increasing market capitalization to GDP. This suggests that the growth in size and importance of financial markets have negative effects that may influence the stability of these markets, as well as the economy as a whole. Moreover, investors become more sensitive to asymmetric dependence and require a higher additional return premium to bear asymmetric dependence risk in countries with a high change in market capitalization to GDP.

We propose several policy actions aimed at market stabilization that are informed by our results. We argue that improving conditions for firms to enter financial markets may prove to be beneficial in alleviating the excessive return correlations experienced during market downturns.

[7] It is important to note, however, that in a low interest-rate environment, banks may increase risk taking, as documented by Buch et al. (2014) and Ioannidou et al. (2015), which can negatively affect the overall market stability.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Measuring Asymmetric Dependence

A.1. Defining the J^{Adj} Statistic

We replicate the procedure proposed by Alcock and Hatherley (2017) to estimate the Adjusted J-statistic (J^{Adj}) for each equity in each country individually. First, for each set $\{R_{it}, R_{mt}\}_{t=1}^{T}$, we get $\widehat{R}_{it} = R_{it} - \beta R_{mt}$, where R_{it} and R_{mt} is the excess return on asset i and market, and $\beta = \mathrm{cov}(R_{it}, R_{mt})/\sigma^2_{R_{mt}}$. The first transformation implies that each data set has a zero CAPM $\beta, \beta_{\widehat{R}_{it}, R_{mt}} = 0$. Second, we standardize the data to get identical standard deviation of the CAPM regression residuals and get R^S_{mt} and $\widehat{R}^S_{it}$. Third and the final transformation step sets the $\hat{\beta}$ to 1 by letting $\widetilde{R}_{mt} = R^S_{mt}$ and $\widetilde{R}_{it} = \widehat{R}^S_{it} + R^S_{mt}$. After this transformation, all data sets have the same β and standard deviation of model residuals, which compels the J-statistic to be invariant to the linear dependence and the level of idiosyncratic risk.

The standardization of data is important when a regression model with multiple predictors is used to estimate risk premia. This step ensures that our measure of asymmetric dependence is uncorrelated with systematic and idiosyncratic risk measures included in our regression model.

The Adjusted J-statistic (J^{Adj}) adapts the J-statistic proposed by Hong et al. (2007) so that it is β and idiosyncratic risk invariant, thereby improving its utility in empirical asset-pricing studies. For asset-pricing purposes, we multiply the Alcock and Hatherley (2017)'s J^{Adj} measure to have a measure that increases when lower-tail exceedance correlations are greater than upper-tail exceedance correlations.

$$AD = -J^{Adj} = -\left[\mathrm{sgn}([\tilde{\rho}^{+} - \tilde{\rho}^{-}]\mathbf{1}\prime)T(\tilde{\rho}^{+} - \tilde{\rho}^{-})\prime\hat{\Omega}^{-1}(\tilde{\rho}^{+} - \tilde{\rho}^{-})\right], \tag{2}$$

where $\tilde{\rho}^{+} = \{\tilde{\rho}^{+}(\delta_1), \tilde{\rho}^{+}(\delta_2), \ldots, \tilde{\rho}^{+}(\delta_N)\}$ and $\tilde{\rho}^{-} = \{\tilde{\rho}^{-}(\delta_1), \tilde{\rho}^{-}(\delta_2), \ldots, \tilde{\rho}^{-}(\delta_N)\}$, $\mathbf{1}$ is $N \times 1$ vector of ones, $\hat{\Omega}$ is an estimate of the variance–covariance matrix, (Hong et al., 2007). The conditional correlations are defined as follows, for $\delta_j \in \{\delta_1, \ldots, \delta_N\}$,

$$\tilde{\rho}^{+}(\delta_j) = \mathrm{corr}\left(\widetilde{R}_{mt}, \widetilde{R}_{it} | \widetilde{R}_{mt} > \delta_j, \widetilde{R}_{it} > \delta_j\right) \tag{3}$$

$$\tilde{\rho}^{-}(\delta_j) = \mathrm{corr}\left(\widetilde{R}_{mt}, \widetilde{R}_{it} | \widetilde{R}_{mt} < -\delta_j, \widetilde{R}_{it} < -\delta_j\right). \tag{4}$$

With symmetric dependence the value of J^{Adj} will be close to zero. A significant and non-zero value of J^{Adj} provides evidence of an asymmetry between the lower and upper-tail dependence. Consistent with Alcock and Hatherley (2017), we use exceedance levels of $\delta = (0, 0.2, 0.4, 0.6, 0.8, 1)$ to estimate J^{Adj}.

A.2. Separating Lower-tail and Upper-tail Asymmetric Dependence

Consistent with Alcock and Hatherley (2017), we separate the UTAD and LTAD using indicator function $\mathbb{I}_c$, which takes a value of 1 when condition c is satisfied and zero otherwise. Any positive value ($J^{Adj} > 0$) indicates upper-tail asymmetric dependence (UTAD), while a negative value of ($J^{Adj} < 0$) denotes lower-tail asymmetric dependence (LTAD). We once again multiply J^{Adj} by minus one to make sure that we have a measure that increases in LTAD and not decreases in value.

$$LTAD = -J^{Adj}\mathbb{I}_{J^{Adj}<0} \tag{5}$$

$$UTAD = J^{Adj}\mathbb{I}_{J^{Adj}>0} \tag{6}$$

A.3. Discussion on why we use the J^{Adj}-metric

We employ this measure for the following reasons. First, we seek to determine the price and level of AD independently of systematic and idiosyncratic risk. The J^{Adj} is, by construction, orthogonal to the CAPM β and the idiosyncratic risk of stock returns. The resulting price of AD measured using the J^{Adj} statistic then corresponds to the additional return premium that investors request to bear the asymmetric dependence risk, over and above any premia that may be attached to β or idiosyncratic risk.

The J^{Adj} statistic differs from, for example, GARCH models that can only characterize the correlation structure but cannot capture higher-order dependence, or Copula functions can explain higher-order dependence but cannot achieve this independently of β and idiosyncratic risk. Weigert (2016) attempts to ameliorate the impact of this issue by conditionally combining different copulae functions, which leads to conditional β being characterized but his tail dependence measures remain compounded by the effects of CAPM β and idiosyncratic risk. Similarly, Ang and Chen (2002)'s downside and upside β cannot separate the effect of asymmetric dependence from linear dependence or idiosyncratic risk on firm excess returns.

Second, we quantify the premia attached to different types of asymmetric dependence. We distinguish between the situation when the return correlation is relatively higher in the lower tail (lower-tail asymmetric dependence) or in the upper tail (upper-tail asymmetric dependence), see Fig. 4. These two return characteristics have different implications for investors. Stock returns that exhibit lower-tail asymmetric dependence (LTAD) are likely to be associated with a return premium as investors may feel disappointed to hold assets that are highly correlated with the market when the market is down. The upper-tail asymmetric dependent (UTAD) stock returns will likely, on the other hand, be related with a return discount as investors will feel rather elated to hold assets highly correlated with the market in good times.

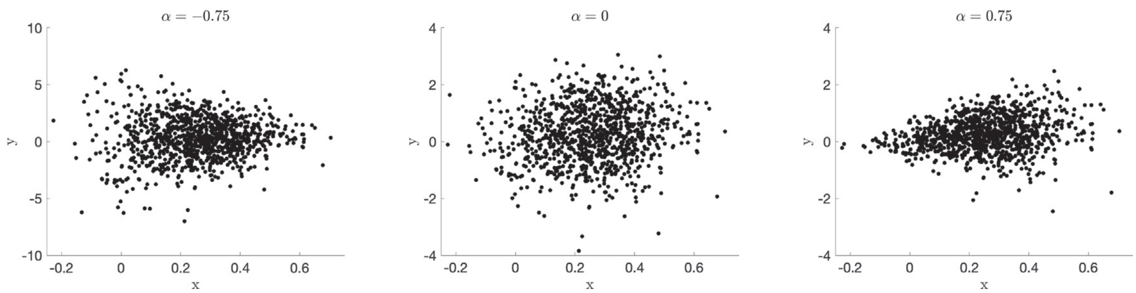
The J^{Adj} statistic is a nonparametric measure of dependence asymmetries in the data. AD (measured by J^{Adj}) differs from co-skewness, co-kurtosis or upside and downside β measures. The J^{Adj} statistic contains information about all the higher-order co-moments, whereas co-skewness or co-kurtosis correspond to the third and fourth co-moment only. The J^{Adj} measure is different from conditional βs because the J^{Adj} is a function of the differences between the lower and upper-tail correlations, where tail correlations are determined using multiple reference points. Upside and downside βs have only one reference point (typically zero or the mean value), do not measure correlation asymmetries and are not orthogonal to the CAPM β. In order to illustrate the additional informational content (or the importance) of AD, as measured by the J^{Adj}, for investors, we include co-skewness, co-kurtosis, downside and upside βs in our pricing regressions as control variables. For further details about the J^{Adj} statistic, please refer to Alcock and Hatherley (2017).

A.4. Simulation Study: Measures of Linear and Asymmetric Dependence

We simulate 100,000 pairs of data points (x, y), where $y_i = \beta x_i + \epsilon_i$, with $x_i \sim N(0.25, 0.15)$ and $\epsilon_i \sim N\big(0, (x_i + 0.25)^{\alpha}\big)$. The parameter α controls the degree of asymmetric dependence in data while β measures linear dependence. Fig. 5 displays am example of simulated pairs for three different values of α. In panel (a), $\alpha = -0.75$, which creates data exhibiting upper-tail asymmetric dependence. Panel (b) displays data points with symmetric dependence as α is set to 0. Lastly, in panel (c), $\alpha = 0.75$, which creates lower-tail asymmetric dependence between x and y. Note that the degree of linear dependence is constant and set to 1 in all three panels.

We estimate the following measures of dependence: Clayton Copula (parameter θ), Gumbel Copula (parameter θ), Gaussian Copula (correlation parameter ρ), downside β (β^-), upside β (β^+), Hong et al. (2007)'s J-statistic and Alcock and Hatherley (2017)'s J^{Adj}-statistic. We evaluate the following four scenarios:

1. **Scenario I:** Zero Asymmetric Dependence ($\alpha = 0$) & Varying Linear Dependence $\beta \in (-0.75, 0.75)$
2. **Scenario II:** Constant Linear Dependence ($\beta = 1$) & Varying Asymmetric Dependence $\alpha \in (-0.75, 0.75)$
3. **Scenario III:**Lower-Tail Asymmetric Dependence ($\alpha = -0.5$) & Varying Linear Dependence $\beta \in (-0.75, 0.75)$
4. **Scenario IV:**Upper-Tail Asymmetric Dependence ($\alpha = 0.5$) & Varying Linear Dependence $\beta \in (-0.75, 0.75)$



(a) Upper-Tail Asymmetric Dependence (UTAD) (b) Symmetric Dependence (c) Lower-Tail Asymmetric Dependence (LTAD)

Fig. 5. Example of Simulated data We simulate data with varying degrees and types of dependence. We simulate 100,000 pairs of data points (x, y), where $y_i = \beta x_i + \epsilon_i$, with $x_i \sim N(0.25, 0.15)$ and $\epsilon_i \sim N\big(0, (x_i + 0.25)^{\alpha}\big)$. The parameter α controls the degree of asymmetric dependence in data. In panel (a), setting α to -0.75 implies an upper-tail asymmetric dependence structure. Panel (b), with $\alpha = 0$, displays symmetric dependence. Lastly, panel (c) with $\alpha = 0.75$, describes a lower-tail asymmetric dependence. All three simulated pairs of data consider the same degree of linear dependence: $\beta = 1$.

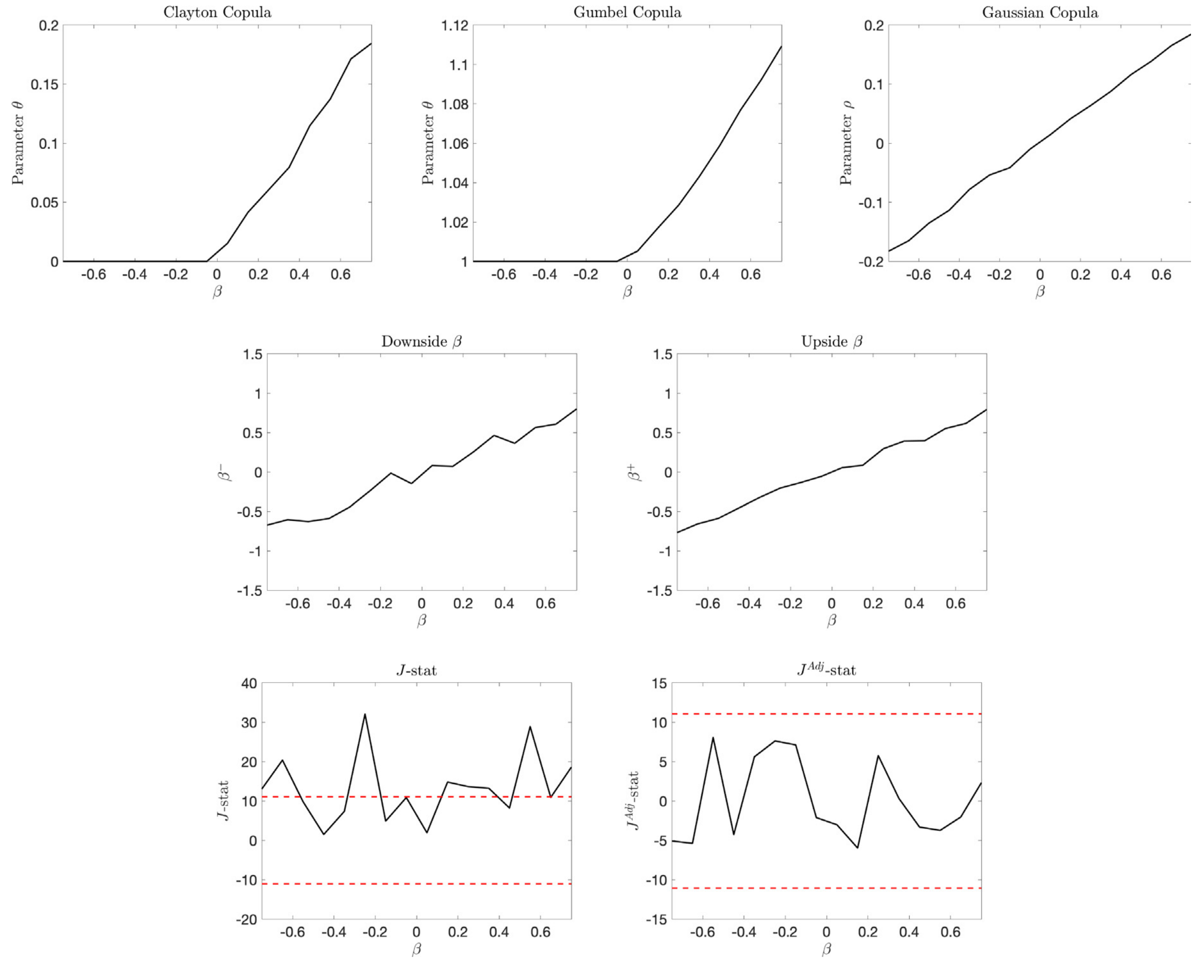


Fig. 6. Scenario I: Zero Asymmetric Dependence ($\alpha = 0$) & Varying Linear Dependence $\beta \in (-0.75, 0.75)$. We estimate the following measures of asymmetric dependence for simulated data: Clayton copula, Gumbel copula, downside and upside β, Hong et al. (2007)'s J-statistic and Alcock and Hatherley (2017)'s J^{Adj}-statistic. We simulate data with varying degrees of asymmetric dependence (α) and linear dependence (β). We simulate 100,000 pairs of data (x, y), where $y_i = \beta x_i + \epsilon_i$, with $x_i \sim N(0.25, 0.15)$ and $\epsilon_i \sim N(0, (x_i + 0.25)^{\alpha})$.

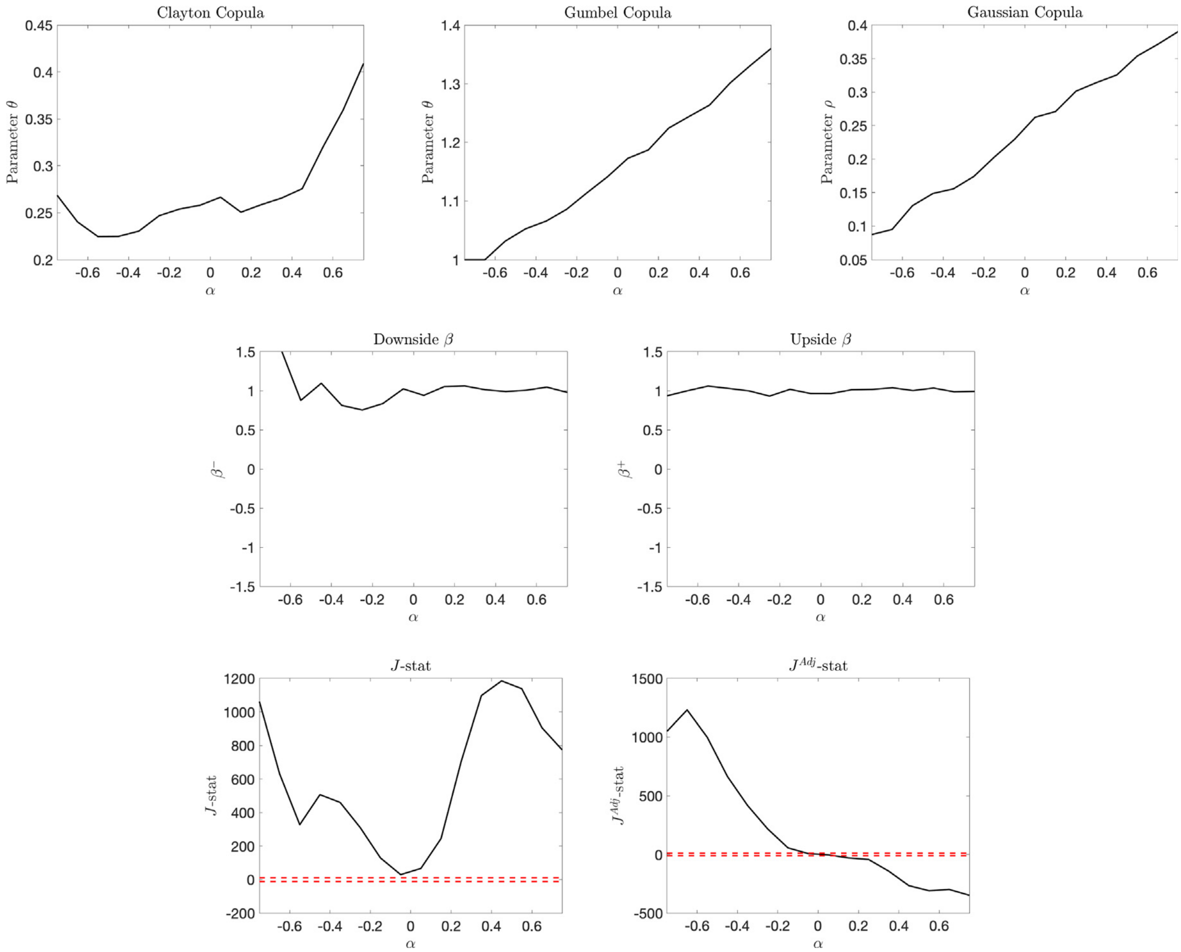


Fig. 7. Scenario II: Constant Linear Dependence ($\beta = 1$) & Varying Asymmetric Dependence $\alpha \in (-0.75, 0.75)$. We estimate the following measures of asymmetric dependence for simulated data: Clayton copula, Gumbel copula, downside and upside β, Hong et al. (2007)'s J-statistic and Alcock and Hatherley (2017)'s J^{Adj}-statistic. We simulate data with varying degrees of asymmetric dependence (α) and linear dependence (β). We simulate 100,000 pairs of data (x, y), where $y_i = \beta x_i + \epsilon_i$, with $x_i \sim N(0.25, 0.15)$ and $\epsilon_i \sim N(0, (x_i + 0.25)^{\alpha})$.

A.4.1. Simulation results

Scenario I. Both copula parameters as well as upside and downside βs fail to capture the absence of asymmetric dependence, which occurs in the simulated data when $\alpha = 0$, when the level of linear dependence, β, varies, see Fig. 6. This is because copula-based measures of dependence and conditional βs reflect the compound effects of both linear and asymmetric dependence. The Alcock and Hatherley (2017)'s J^{Adj}-statistic, on the other hand, remains insignificant for any chosen value of β and correctly identifies the absence of asymmetric dependence in the simulated data. We further show that while mostly insignificant and thus correctly evaluating the absence of asymmetric dependence, the Hong et al. (2007)'s J-statistic does in some cases becomes significant, which leads to a Type I error. (See Figs. 7 and 8).

Scenario II. The J^{Adj}-statistic is the only metric that can correctly indicate and differentiate the following types of AD: lower-tail asymmetric dependence (simulated using $\alpha < 0$), symmetric dependence ($\alpha = 0$) and lower-tail asymmetric dependence (simulated using $\alpha > 0$), see Fig. 9. The J^{Adj}-statistic decreases as α increases. The J-statistic is a u-shaped function of α and increases in its the absolute value. This is due to the fact that J-statistic cannot differentiate between LTAD and UTAD.

Scenario III. Unlike copula measure or conditional βs, the J^{Adj}-statistic accurately identifies lower-tail dependence without being affected by the varying degree of linear dependence β. The J-statistic signals a presence of AD in data but does not inform on which type of AD, i.e. LTAD or UTAD (the J-statistic is always non-positive).

Scenario IV. Lastly, with simulated data exhibiting UTAD and a varying degree of linear dependence, we show that the J^{Adj}-statistic accurately indicates UTAD (a significant and positive test value) without being affected by the varying degree of linear dependence.

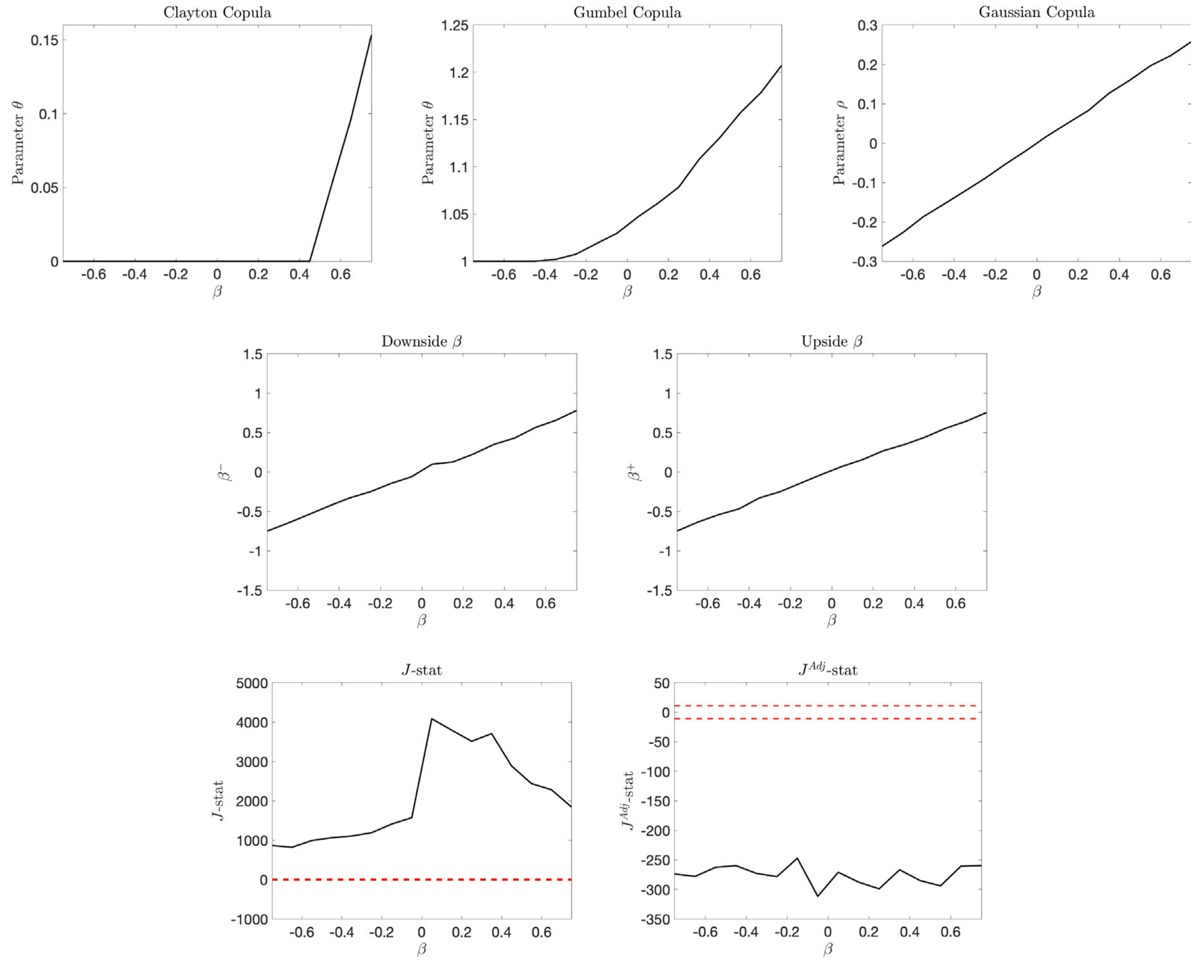


Fig. 8. Scenario III: Lower-Tail Asymmetric Dependence ($\alpha = -0.5$) & Varying Linear Dependence $\beta \in (-0.75, 0.75)$. We estimate the following measures of asymmetric dependence for simulated data: Clayton copula, Gumbel copula, downside and upside β, Hong et al. (2007)'s J-statistic and Alcock and Hatherley (2017)'s J^{Adj}-statistic. We simulate data with varying degrees of asymmetric dependence (α) and linear dependence (β). We simulate 100,000 pairs of data (x, y), where $y_i = \beta x_i + \epsilon_i$, with $x_i \sim N(0.25, 0.15)$ and $\epsilon_i \sim N\left(0, (x_i + 0.25)^{\alpha}\right)$.

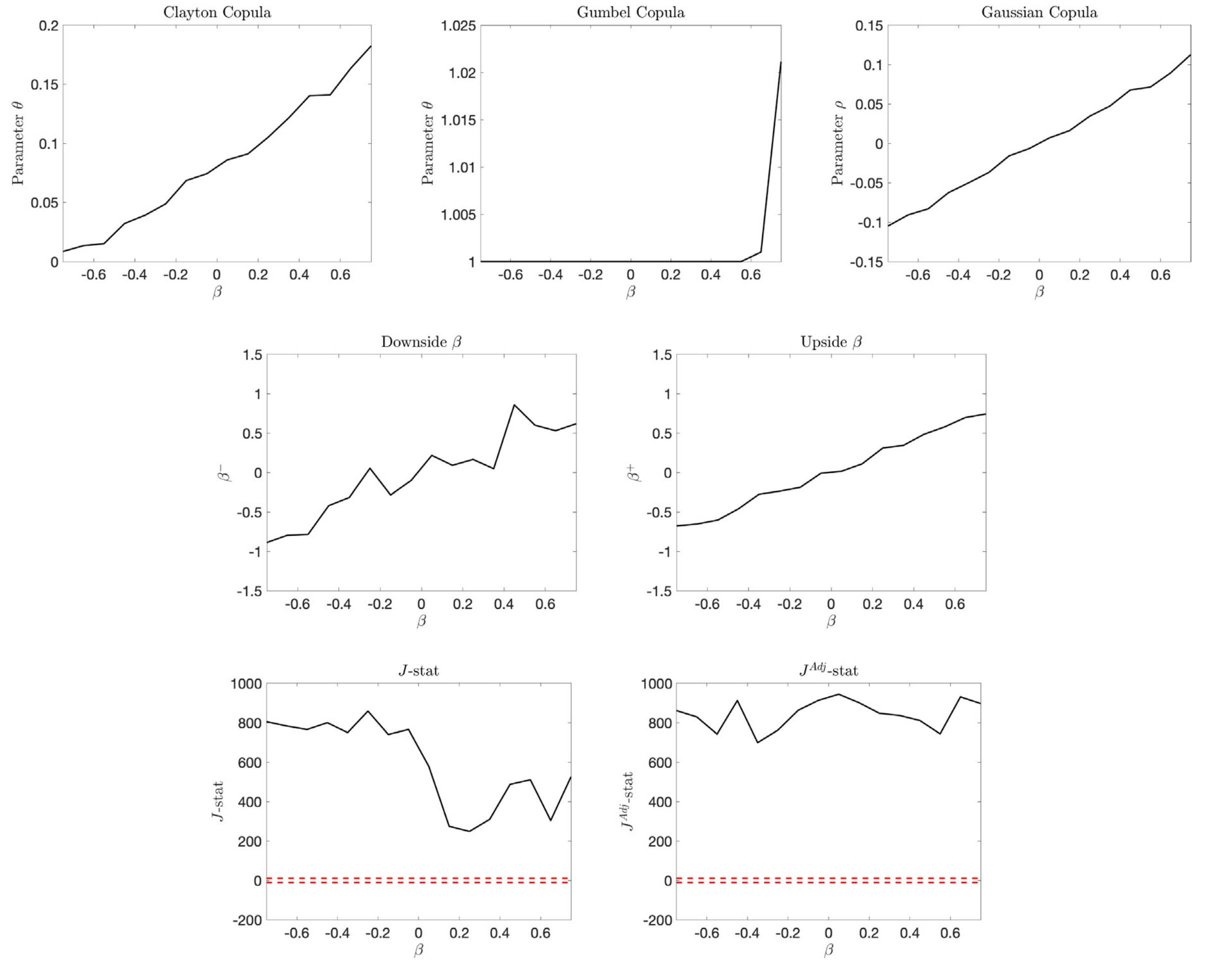


Fig. 9. Scenario IV: Upper-Tail Asymmetric Dependence ($\alpha = 0.5$) & Varying Linear Dependence $\beta \in (-0.75, 0.75)$. We estimate the following measures of asymmetric dependence for simulated data: Clayton copula, Gumbel copula, downside and upside β, Hong et al. (2007)'s J-statistic and Alcock and Hatherley (2017)'s J^{Adj}-statistic. We simulate data with varying degrees of asymmetric dependence (α) and linear dependence (β). We simulate 100,000 pairs of data (x, y), where $y_i = \beta x_i + \epsilon_i$, with $x_i \sim N(0.25, 0.15)$ and $\epsilon_i \sim N(0, (x_i + 0.25)^{\alpha})$.

Appendix B. Estimating Risk Premia

We consider and compare four main models with the following factors (regressors): Model (1) as: CAPM β, log(size), book-to-market ratio, momentum, idiosyncratic risk, coskewness, cokurtosis, and illiquidity, Model (2) as Model (1) and AD, Model (3) as Model (1) and LTAD and UTAD, and Model (4) as log(size), book-to-market ratio, momentum, idiosyncratic risk, coskewness, cokurtosis, illiquidity and downside and upside β, and LTAD and UTAD.

We run OLS regressions with equally-weighted observations. At each month t, the total current annual excess return is regressed against a subset of the following regressors: AD, CAPM β, upside and downside β, idiosyncratic risk, size, book-to-market ratio, Amihud (2002) illiquidity, coskewness, cokurtosis and the total past annual excess return. Regressors are Winsorized at the 1% and 99% level each month to control for inefficient factor estimates. We use data on daily basis to ensure sufficient number of observations for the asymmetric dependence measure. The estimated values of our risk factors may be noisy relative to estimates based on lower frequency data, the significance tests should, however, have sufficient power since we use a relatively long data history (Lewellen and Nagel, 2006).

For a given month t, we measure AD by calculating the J^{Adj}-statistic following Alcock and Hatherley (2017), using daily excess returns from the past 12 months with levels of exceedances: $\delta = \{0, 0.2, 0.4, 0.6, 0.8, 1\}$, which is also consistent with Hong et al. (2007) and Alcock and Hatherley (2017).

The control variables from our regressions are calculated as follows. In a given month, t, the CAPM β, coskewness, cokurtosis are estimated using the most recent excess daily returns. Firm size is the average log value of market value calculated over past 12 months. We use the last end-of-year value observation to compute the book-to-market ratio. The idiosyncratic risk is measured as the standard deviation of CAPM residuals estimated using daily excess returns in past 12 months. We use daily risk-free rate to obtain excess returns. The downside and upside β are defined as

$$\beta^{-} = \frac{\mathrm{cov}(R_i, R_m | R_m < 0)}{\mathrm{var}(R_m | R_m < 0)} \tag{7}$$

$$\beta^{+} = \frac{\mathrm{cov}(R_i, R_m | R_m > 0)}{\mathrm{var}(R_m | R_m > 0)}, \tag{8}$$

where R_i is the excess return on asset i and R_m is the market excess return. We use the MSCI World Index as a market benchmark and the US one-month T-Bill rate as a proxy for a risk free rate to calculate excess returns.

We estimate the risk premia for each factor using cross-sectional regressions estimated every month rolling forward using a 12 month window. We use overlapping data in our monthly rolling-window estimations and therefore use the Newey and West (1987) method to test for statistical significance and Newey (1994) for automatic lag selection. We use a short-rolling window to identify the time variation in systematic risk (Bollerslev et al., 1988; Bos and Newbold, 1984; Fabozzi and Francis, 1978; Ferson and Harvey, 1991; Ferson, 1993; Ferson and Korajczyk, 1995) and variations in asymmetric dependence risk (Alcock and Hatherley, 2017).

Appendix C. Factor Characteristics

Table 6 and 7

Table 6
This table presents mean factor values and its standard deviations (in parenetheses) of all listed firms from country *i*. At each month, *t*, we estimate for each firm from country *i*: AD, LTAD, UTAD, β, size ("Log-size"), book-to-market ratio ("BM"), the total past annual excess return ("Past Ret"), idiosyncratic risk ("Idio"), coskewness ("Cosk") and cokurtosis ("Cokurt") using the past 12 months of daily excess return data. Factor values are estimated using all data available and Winsorized at the 1%. Description of the data used is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy for all countries. All returns are in US dollars.

Factor values Country *i*	AD	LTAD	UTAD	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq
Argentina	2.822	4.816	3.708	0.741	19.383	0.846	0.002	0.027	−0.169	1.287	0.210
	(4.278)	(2.487)	(1.519)	(0.389)	(1.651)	(0.592)	(0.438)	(0.007)	(0.170)	(0.974)	(0.292)
Australia	2.910	4.781	3.532	0.592	17.924	0.836	−0.028	0.043	−0.086	0.882	2.115
	(4.211)	(2.606)	(1.362)	(0.358)	(1.953)	(0.564)	(0.446)	(0.022)	(0.132)	(0.762)	(2.953)
Austria	2.010	4.432	3.607	0.637	20.079	1.013	0.053	0.021	−0.116	1.553	0.093
	(4.311)	(2.442)	(1.641)	(0.407)	(1.680)	(0.521)	(0.281)	(0.008)	(0.186)	(1.181)	(0.144)
Belgium	2.237	4.507	3.502	0.598	19.747	1.080	0.060	0.021	−0.094	1.407	0.128
	(4.247)	(2.474)	(1.482)	(0.353)	(1.563)	(0.802)	(0.291)	(0.011)	(0.165)	(1.109)	(0.188)
Canada	2.977	4.826	3.352	0.641	17.734	0.935	0.079	0.036	−0.085	0.798	0.866
	(4.135)	(2.555)	(1.235)	(0.427)	(1.209)	(0.556)	(0.434)	(0.018)	(0.111)	(0.625)	(1.071)
Chile	2.802	4.793	3.825	0.501	19.783	0.574	0.030	0.016	−0.128	1.677	0.069
	(4.436)	(2.777)	(1.549)	(0.231)	(1.635)	(0.510)	(0.281)	(0.007)	(0.157)	(1.075)	(0.095)
Denmark	2.398	4.312	3.356	0.608	19.216	0.862	0.047	0.024	−0.098	1.278	0.347
	(3.944)	(2.328)	(1.384)	(0.339)	(1.975)	(0.594)	(0.332)	(0.011)	(0.156)	(0.993)	(0.524)
Egypt	1.556	4.581	5.146	0.113	17.887	1.027	−0.090	0.025	−0.086	0.358	0.627
	(5.088)	(2.431)	(2.226)	(0.188)	(1.550)	(0.553)	(0.329)	(0.007)	(0.147)	(0.611)	(0.786)
Finland	2.084	4.198	3.348	0.746	19.556	0.749	0.046	0.021	−0.101	1.600	0.157
	(3.941)	(2.203)	(1.408)	(0.370)	(1.582)	(0.422)	(0.316)	(0.007)	(0.163)	(1.071)	(0.219)
France	2.674	4.703	3.497	0.640	19.381	0.836	0.054	0.023	−0.100	1.366	0.243
	(4.234)	(2.555)	(1.407)	(0.384)	(1.927)	(0.488)	(0.324)	(0.009)	(0.157)	(1.058)	(0.353)
Germany	2.921	5.054	3.591	0.416	18.187	0.827	0.067	0.033	−0.043	0.603	0.965
	(4.467)	(2.712)	(1.457)	(0.328)	(1.725)	(0.485)	(0.335)	(0.016)	(0.112)	(0.593)	(1.360)
Greece	2.213	4.490	3.861	0.598	17.759	1.904	0.048	0.034	−0.066	0.908	1.371
	(4.296)	(2.326)	(1.587)	(0.434)	(1.692)	(1.372)	(0.425)	(0.013)	(0.141)	(0.803)	(1.778)
Hong Kong	3.454	4.638	2.719	0.344	19.239	1.289	−0.027	0.031	−0.079	0.651	0.219
	(3.566)	(2.516)	(0.782)	(0.301)	(1.462)	(0.992)	(0.352)	(0.012)	(0.122)	(0.665)	(0.266)
India	1.453	3.959	4.174	0.267	17.018	1.692	−0.236	0.032	−0.070	0.441	2.092
	(4.257)	(2.082)	(1.821)	(0.266)	(1.557)	(1.330)	(0.379)	(0.009)	(0.134)	(0.580)	(2.458)
Indonesia	3.394	4.815	3.158	0.296	18.674	0.883	−0.006	0.031	−0.072	0.635	0.402
	(3.895)	(2.625)	(1.048)	(0.260)	(1.676)	(0.758)	(0.349)	(0.012)	(0.127)	(0.634)	(0.561)
Ireland	2.505	4.356	3.180	0.733	20.587	0.911	0.062	0.030	−0.104	1.345	0.160
	(3.867)	(2.321)	(1.226)	(0.453)	(1.865)	(0.688)	(0.379)	(0.019)	(0.162)	(1.018)	(0.310)
Italy	2.594	4.606	3.327	0.826	19.831	0.965	0.025	0.021	−0.113	1.642	0.119
	(4.093)	(2.425)	(1.334)	(0.352)	(1.626)	(0.601)	(0.328)	(0.006)	(0.162)	(1.029)	(0.156)
Japan	1.103	4.102	4.231	0.515	21.885	1.151	−0.169	0.024	−0.142	1.111	0.013
	(4.496)	(2.150)	(1.871)	(0.292)	(1.521)	(0.615)	(0.283)	(0.008)	(0.163)	(0.899)	(0.016)
Korea	2.379	4.329	3.679	0.417	24.072	1.403	−0.191	0.027	−0.121	0.912	0.001
	(4.037)	(2.289)	(1.463)	(0.248)	(1.461)	(0.748)	(0.308)	(0.009)	(0.144)	(0.814)	(0.002)
Mexico	2.880	4.435	3.104	0.829	20.893	0.760	0.002	0.019	−0.185	2.003	0.022
	(3.775)	(2.424)	(1.160)	(0.359)	(1.333)	(0.473)	(0.289)	(0.006)	(0.178)	(1.194)	(0.024)
Netherlands	2.322	4.526	3.525	0.807	20.365	0.728	0.055	0.020	−0.116	1.611	0.086

(continued on next page)

Table 6 (*continued*)

Factor values Country i	AD	LTAD	UTAD	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq
	(4.243)	(2.488)	(1.506)	(0.383)	(1.794)	(0.400)	(0.313)	(0.009)	(0.156)	(1.072)	(0.138)
New Zealand	2.045	4.211	3.657	0.392	18.977	0.771	0.063	0.022	−0.114	1.072	0.304
	(4.126)	(2.323)	(1.659)	(0.202)	(1.490)	(0.413)	(0.306)	(0.011)	(0.152)	(0.841)	(0.493)
Norway	2.869	4.459	3.148	0.921	19.301	0.773	0.015	0.029	−0.143	1.572	0.278
	(3.807)	(2.425)	(1.150)	(0.433)	(1.555)	(0.697)	(0.381)	(0.013)	(0.174)	(1.079)	(0.391)
Pakistan	2.695	4.183	2.882	0.025	16.929	1.498	0.092	0.027	−0.064	0.216	3.108
	(3.527)	(2.230)	(1.022)	(0.192)	(1.808)	(1.098)	(0.428)	(0.009)	(0.153)	(0.574)	(4.764)
Peru	2.861	5.641	4.917	0.279	18.872	2.744	0.013	0.017	−0.127	1.037	0.168
	(5.778)	(3.696)	(2.540)	(0.219)	(1.863)	(3.489)	(0.276)	(0.008)	(0.125)	(0.839)	(0.260)
Philippines	2.284	4.668	4.230	0.236	20.611	0.861	−0.215	0.030	−0.080	0.549	0.079
	(4.580)	(2.507)	(1.776)	(0.250)	(1.894)	(0.631)	(0.302)	(0.012)	(0.138)	(0.705)	(0.110)
Poland	2.998	4.504	3.118	0.685	17.263	1.163	−0.005	0.033	−0.110	1.234	2.964
	(3.716)	(2.333)	(1.068)	(0.415)	(1.822)	(0.796)	(0.400)	(0.014)	(0.165)	(1.049)	(4.484)
Romania	2.900	4.417	3.057	0.378	17.849	1.747	0.069	0.021	−0.174	1.413	0.743
	(3.677)	(2.319)	(0.981)	(0.254)	(1.771)	(0.983)	(0.246)	(0.007)	(0.242)	(1.476)	(0.866)
Shanghai	2.228	4.253	3.579	0.306	20.598	0.439	−0.038	0.026	−0.089	0.609	0.028
	(4.005)	(2.249)	(1.426)	(0.237)	(0.872)	(0.239)	(0.300)	(0.007)	(0.137)	(0.736)	(0.021)
Shenzhen	2.187	4.265	3.795	0.325	20.405	0.356	−0.053	0.029	−0.081	0.572	0.033
	(4.132)	(2.332)	(1.540)	(0.263)	(0.723)	(0.176)	(0.330)	(0.008)	(0.138)	(0.717)	(0.022)
Singapore	3.152	4.958	3.512	0.434	18.560	1.813	0.002	0.033	−0.079	0.799	0.527
	(4.279)	(2.739)	(1.316)	(0.309)	(1.628)	(1.730)	(0.339)	(0.018)	(0.132)	(0.735)	(0.692)
South Africa	2.147	4.278	3.449	0.858	19.653	0.778	0.004	0.027	−0.104	1.451	0.302
	(4.033)	(2.289)	(1.406)	(0.339)	(1.849)	(0.515)	(0.339)	(0.011)	(0.155)	(0.949)	(0.518)
Spain	2.093	4.405	3.603	0.788	20.457	0.746	0.036	0.019	−0.097	1.608	0.066
	(4.227)	(2.369)	(1.569)	(0.420)	(1.761)	(0.440)	(0.316)	(0.008)	(0.161)	(1.073)	(0.093)
Sweden	2.832	4.478	3.225	0.849	18.940	0.627	0.033	0.029	−0.141	1.645	0.548
	(3.877)	(2.458)	(1.203)	(0.365)	(1.841)	(0.419)	(0.377)	(0.013)	(0.178)	(1.184)	(0.833)
Switzerland	2.238	4.290	3.472	0.544	20.509	0.746	0.076	0.019	−0.104	1.267	0.048
	(4.034)	(2.329)	(1.456)	(0.365)	(1.500)	(0.429)	(0.278)	(0.008)	(0.161)	(1.028)	(0.063)
Turkey	1.715	4.249	3.995	0.879	18.858	0.977	0.016	0.029	−0.134	1.707	0.468
	(4.349)	(2.281)	(1.657)	(0.314)	(1.784)	(0.580)	(0.414)	(0.009)	(0.182)	(1.088)	(0.642)
UK	2.609	4.805	3.708	0.603	19.230	0.866	0.031	0.023	−0.126	1.409	0.291
	(4.438)	(2.650)	(1.538)	(0.375)	(1.840)	(0.520)	(0.344)	(0.012)	(0.186)	(1.208)	(0.468)
US	1.982	4.267	3.386	0.905	7.090	0.568	0.077	0.021	−0.105	1.706	0.024
	(4.082)	(2.310)	(1.476)	(0.429)	(1.428)	(0.273)	(0.292)	(0.008)	(0.164)	(1.072)	(1.237)

Table 7
This table presents the range (min, max) in Panel A and the mean and median values in Panel B of correlations between each factor, measured across all countries examined. At each month, t, we use the past 12 months of daily excess return data to estimate β, β^-, β^+, size ("Log-size"), book-to-market ratio ("BM"), the total past annual excess return ("Past Ret"), idiosyncratic risk ("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and J^{Adj}. All factors are Winsorised at the 1% and 99% level at each month. A description of the data used to calculate the factor values is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy. All returns are in US dollars.

Factor Correlations

Panel A

	β^-		β^+		Log-size		BM		Past ret		Idio		Cosk		Cokurt		Illiq		AD	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
β	0.30	0.78	0.47	0.78	0.15	0.57	−0.05	0.00	−0.02	0.14	−0.01	0.12	−0.20	−0.03	0.22	0.46	−0.04	0.13	−0.10	0.10
β^-			−0.06	0.44	0.07	0.38	−0.03	0.03	−0.07	0.16	−0.01	0.09	−0.41	−0.17	0.17	0.49	−0.09	0.00	−0.05	−0.02
β^+					0.08	0.50	−0.09	0.01	0.03	0.17	−0.12	0.21	0.11	0.23	0.09	0.32	0.08	0.21	−0.09	0.04
Log-size							−0.22	0.03	0.04	0.14	−0.56	−0.03	−0.15	−0.09	0.20	0.36	−0.04	0.10	−0.16	−0.05
BM									−0.10	0.00	0.06	0.21	−0.08	0.05	−0.06	0.04	0.00	0.05	−0.01	0.19
Past ret											−0.14	0.17	−0.01	0.04	−0.03	0.08	−0.02	0.04	−0.05	0.05
Idio													−0.08	0.14	−0.23	0.05	−0.13	0.00	−0.23	−0.03
Cosk															−0.76	−0.65	0.19	0.27	−0.08	0.00
Cokurt																	−0.13	0.06	−0.05	0.05
Illiq																			0.09	0.15

Panel B

	β^-		β^+		Log-size		BM		Past ret		Idio		Cosk		Cokurt		Illiq		AD	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
β	0.63	0.59	0.61	0.62	0.29	0.33	−0.02	−0.02	0.06	0.06	0.06	0.06	−0.15	−0.13	0.37	0.36	0.01	0.03	−0.03	−0.05
β^-			0.17	0.18	0.21	0.22	−0.01	0.00	0.05	0.05	0.04	0.04	−0.39	−0.34	0.34	0.33	−0.04	−0.04	−0.03	−0.03
β^+					0.16	0.22	−0.02	−0.03	0.07	0.08	0.00	0.02	0.18	0.17	0.17	0.19	0.10	0.12	−0.03	−0.04
Log-size							−0.19	−0.14	0.10	0.10	−0.20	−0.25	−0.14	−0.13	0.31	0.29	0.09	0.06	−0.11	−0.13
BM									−0.06	−0.06	0.10	0.12	0.02	0.00	−0.02	−0.02	0.01	0.02	0.10	0.11
Past ret											0.00	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.00	0.00
Idio													0.11	0.07	−0.11	−0.10	−0.06	−0.06	−0.12	−0.10
Cosk															−0.72	−0.71	0.24	0.23	−0.04	−0.05
Cokurt																	0.04	0.01	0.02	0.03
Illiq																			0.11	0.11

Appendix D. Ang and Xing (2006) Pricing Regressions

Table 8–11

Table 8
We measure risk premia using the Ang and Xing (2006) asset-pricing procedure where equally-weighted cross-sectional regressions arecomputed every month rolling forward. At a given month, t, the total current annual excess return is regressed against β, size ("Log-size"), book-to-market ratio ("BM"), the total past annual excess return ("Past Ret"), idiosyncratic risk ("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and illiquidity factor ("Illiq"). The book-to-market ratio ("BM") at time t for a given stock is computed using the last available (most recent) book equity entry. Statistical significance is determined using Newey and West (1987) adjusted t-statistics, given in parentheses, to control for overlapping data using the Newey (1994) automatic lag selection method to determine the lag length. All coefficients are reported as effective annual rates. Risk premia are estimated using all data available, a description of the data sample is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy. All returns are in US dollars.

Model (1): Risk Premia									
Country i	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
Argentina	0.291	−0.025	−0.008	0.074	2.525	−0.137	−0.138	0.0001607	0.347
	[2.619]	[1.756]	[0.250]	[1.813]	[0.677]	[1.006]	[1.982]	[1.597]	[1.162]
Australia	0.057	−0.015	0.010	0.039	−3.325	−0.088	0.020	0.000	0.314
	[1.095]	[2.602]	[0.641]	[1.379]	[2.024]	[1.593]	[0.757]	[2.340]	[2.534]
Austria	−0.085	−0.031	0.005	0.035	3.803	−0.066	0.098	0.000	0.509
	[1.158]	[1.534]	[0.630]	[1.111]	[2.223]	[0.660]	[2.617]	[0.126]	[1.249]
Belgium	−0.054	−0.037	0.011	0.036	−0.355	−0.091	0.097	0.000	0.718
	[0.901]	[3.011]	[1.302]	[1.382]	[0.321]	[1.282]	[3.619]	[0.321]	[2.890]
Canada	0.024	−0.033	−0.004	−0.098	1.033	−0.274	0.102	0.000	0.565
	[0.379]	[2.534]	[0.406]	[1.755]	[0.476]	[2.519]	[2.170]	[2.549]	[1.931]
Chile	0.200	−0.011	0.059	0.093	−5.274	−0.280	−0.079	0.000	0.257
	[1.649]	[1.036]	[2.006]	[1.705]	[2.389]	[2.434]	[2.831]	[1.106]	[1.210]
Denmark	−0.147	−0.022	−0.031	−0.046	3.785	−0.275	0.193	0.000	0.274
	[2.582]	[1.906]	[1.117]	[0.733]	[1.523]	[3.102]	[3.715]	[1.152]	[1.136]
Egypt	−0.401	−0.017	0.027	−0.003	−0.007	0.072	0.097	0.000	0.257
	[3.251]	[1.759]	[2.504]	[0.113]	[0.004]	[0.621]	[1.966]	[0.189]	[1.505]
Finland	−0.069	−0.029	−0.024	0.019	0.180	−0.025	0.151	0.000	0.513
	[1.075]	[2.610]	[1.245]	[0.307]	[0.134]	[0.229]	[2.501]	[0.340]	[2.234]
France	−0.136	−0.010	0.011	0.033	1.601	−0.053	0.124	0.000	0.174
	[2.959]	[1.821]	[1.453]	[1.104]	[1.197]	[1.361]	[3.982]	[2.220]	[1.325]
Germany	−0.033	−0.004	0.009	0.082	−0.265	−0.011	0.082	0.000	0.076
	[0.723]	[0.573]	[0.817]	[2.044]	[0.299]	[0.138]	[1.639]	[0.043]	[0.700]
Greece	−0.039	0.002	0.030	−0.024	−1.063	−0.174	0.057	0.000	−0.044
	[0.646]	[0.212]	[2.079]	[0.582]	[0.948]	[1.585]	[1.239]	[1.186]	[0.182]
Hong Kong	0.1055	−0.034	−0.043	−0.011	0.224	0.064	−0.052	0.000	0.865
	[1.003]	[1.627]	[1.031]	[0.245]	[0.108]	[0.321]	[0.649]	[1.805]	[1.775]
India	0.012	−0.047	−0.019	−0.034	−0.361	−0.261	−0.040	0.000	0.810
	[0.269]	[3.414]	[2.852]	[1.026]	[0.278]	[2.212]	[0.565]	[0.164]	[2.756]
Indonesia	0.025	−0.031	0.014	−0.012	−0.694	−0.035	−0.032	0.000	0.664
	[0.407]	[3.760]	[1.517]	[0.368]	[0.809]	[0.547]	[1.192]	[0.377]	[3.386]
Ireland	0.367	−0.072	−0.167	−0.010	5.092	−0.160	−0.006	0.000	1.498
	[1.658]	[1.731]	[1.523]	[0.077]	[1.321]	[0.680]	[0.125]	[1.247]	[1.651]
Italy	0.044	−0.017	0.003	0.077	−5.672	−0.156	0.015	0.000	0.422
	[0.841]	[2.240]	[0.231]	[2.212]	[2.942]	[1.963]	[0.542]	[0.138]	[2.335]
Japan	−0.058	−0.007	−0.019	−0.082	5.841	0.047	−0.007	0.003	−0.037
	[1.082]	[1.684]	[1.254]	[2.146]	[2.283]	[1.202]	[0.329]	[0.760]	[0.451]
Korea	0.178	−0.004	−0.014	0.011	−5.389	0.229	−0.095	0.039	0.095
	[3.052]	[0.557]	[1.507]	[0.472]	[3.855]	[2.895]	[3.563]	[3.651]	[0.494]
Mexico	−0.135	−0.012	0.025	−0.012	0.222	−0.046	−0.005	−0.001	0.350
	[2.481]	[1.013]	[1.759]	[0.176]	[0.125]	[0.406]	[0.195]	[1.480]	[1.259]
Netherlands	−0.191	0.001	0.002	0.014	7.752	−0.227	0.154	0.001	−0.176
	[3.698]	[0.184]	[0.149]	[0.421]	[3.366]	[2.965]	[4.070]	[2.886]	[1.028]
New Zealand	−0.399	−0.008	0.030	0.080	7.688	−0.187	0.162	0.000	0.061
	[2.915]	[0.720]	[0.806]	[1.771]	[2.004]	[2.035]	[3.143]	[0.071]	[0.267]
Norway	−0.102	−0.027	−0.012	0.003	2.121	−0.286	0.198	0.000	0.335
	[2.442]	[2.165]	[0.468]	[0.034]	[1.357]	[2.261]	[2.823]	[2.112]	[1.525]
Pakistan	0.058	−0.028	0.013	−0.006	−1.989	−0.003	0.006	0.000	0.654
	[0.510]	[3.675]	[1.648]	[0.148]	[1.080]	[0.040]	[0.149]	[0.012]	[3.435]
Peru	0.031	−0.019	−0.001	0.180	−4.033	−0.115	0.013	0.000	0.412
	[0.354]	[2.834]	[0.634]	[2.845]	[2.831]	[1.213]	[0.373]	[1.644]	[2.928]
Philippines	0.225	−0.003	0.021	0.004	−0.750	−0.145	−0.105	0.000	−0.077
	[2.146]	[0.495]	[1.667]	[0.178]	[0.636]	[1.225]	[2.116]	[0.060]	[0.574]
Poland	0.055	−0.018	−0.008	−0.003	0.586	−0.167	0.073	0.000	0.326
	[0.686]	[1.478]	[0.701]	[0.054]	[0.276]	[1.670]	[1.425]	[2.434]	[1.220]

Table 8 (*continued*)

Model (1): Risk Premia Country *i*	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
Romania	0.088	0.011	0.018	0.211	0.382	−0.140	0.005	0.000	−0.189
	[0.794]	[1.621]	[1.962]	[3.552]	[0.141]	[0.912]	[0.085]	[2.149]	[1.165]
Shanghai	0.042	−0.037	0.015	−0.123	−8.978	−0.145	0.026	0.002	0.959
	[0.673]	[1.372]	[0.717]	[2.222]	[2.893]	[1.675]	[0.759]	[2.673]	[1.513]
Shenzhen	−0.053	−0.006	0.003	−0.093	−5.963	−0.051	0.039	0.002	0.256
	[0.686]	[0.253]	[0.102]	[3.199]	[3.595]	[0.718]	[1.264]	[2.896]	[0.462]
Singapore	0.155	−0.010	0.004	0.018	−6.215	0.005	−0.069	0.000	0.420
	[2.270]	[1.328]	[0.488]	[0.438]	[2.836]	[0.105]	[1.541]	[0.254]	[1.875]
South Africa	−0.117	−0.013	0.020	0.112	2.224	−0.062	0.121	0.000	0.182
	[2.565]	[1.396]	[0.808]	[2.588]	[1.195]	[0.681]	[3.208]	[1.403]	[0.872]
Spain	−0.107	−0.010	0.041	0.045	5.569	0.083	0.134	0.000	0.106
	[1.976]	[1.159]	[1.884]	[1.358]	[2.617]	[1.107]	[3.578]	[0.348]	[0.555]
Sweden	−0.075	−0.036	−0.022	−0.038	2.555	−0.136	0.205	0.000	0.544
	[1.546]	[3.593]	[1.972]	[0.863]	[2.027]	[1.687]	[3.788]	[1.321]	[2.864]
Switzerland	−0.150	−0.033	−0.025	0.058	1.398	−0.193	0.139	0.000	0.686
	[2.297]	[3.848]	[2.345]	[1.704]	[0.858]	[1.952]	[3.721]	[1.827]	[3.651]
Turkey	0.003	−0.006	0.009	1.583	−2.043	0.036	−0.089	−1.79	2.033
	[0.052]	[0.796]	[1.023]	[0.785]	[1.020]	[0.311]	[1.956]	[1.000]	[0.958]
UK	−0.095	−0.007	−0.047	0.019	3.974	−0.118	0.080	0.001	0.108
	[1.822]	[1.129]	[1.666]	[0.714]	[2.315]	[1.845]	[3.986]	[1.346]	[0.811]
US	−0.039	−0.013	0.020	−0.013	2.371	−0.127	0.062	0.000	0.060
	[1.003]	[3.255]	[1.349]	[0.503]	[2.228]	[3.151]	[3.736]	[4.260]	[1.599]

Table 9
We measure risk premia using the Ang and Xing (2006) asset pricing procedure where equally-weighted OLS cross-sectional regressions arecomputed every month rolling forward. At a given month, *t*, thetotal current annual excess return is regressed againstAD, β, size ("Log-size"), book-to-market ratio ("BM"), the past total annual excess return12-monthly excess return ("Past Ret"), idiosyncratic risk("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and Amihud (2002) illiquidity factor ("Illiq"). Statistical significance is determined using Newey and West (1987)adjusted t-statistics, given in parentheses, to control foroverlapping data using the Newey (1994) automatic lagselection method to determine the lag length. All coefficients are reported as effective annualrates. Risk premia are estimated using all data available, a description of the data sample is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy. All returns are in US dollars.

Model (2): Risk Premia - The Price of Asymmetric Dependence Country *i*	AD	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
Argentina	0.013	0.250	−0.021	−0.008	0.084	3.136	0.101	−0.099	0.000	0.241
	[3.118]	[2.381]	[1.338]	[0.278]	[1.411]	[0.906]	[0.740]	[1.623]	[1.639]	[0.761]
Australia	0.011	0.047	−0.015	0.007	0.026	−3.545	0.055	0.036	0.000	0.309
	[4.458]	[0.899]	[2.651]	[0.426]	[0.988]	[2.126]	[0.980]	[1.350]	[2.357]	[2.545]
Austria	0.007	−0.075	−0.030	0.007	0.029	3.705	0.023	0.093	0.000	0.484
	[3.428]	[1.008]	[1.444]	[0.765]	[1.054]	[2.307]	[0.234]	[2.493]	[0.331]	[1.161]
Belgium	0.013	−0.042	−0.036	0.010	0.026	−0.556	0.109	0.097	0.000	0.685
	[4.708]	[0.737]	[3.159]	[1.231]	[0.846]	[0.515]	[1.822]	[4.131]	[0.245]	[2.996]
Canada	0.016	−0.010	−0.032	−0.003	−0.101	0.806	0.042	0.144	0.000	0.526
	[3.679]	[0.160]	[2.679]	[0.269]	[1.918]	[0.378]	[0.461]	[2.955]	[2.511]	[1.990]
Chile	0.009	0.168	−0.012	0.054	0.079	−4.859	−0.189	−0.059	0.000	0.268
	[3.690]	[1.366]	[1.124]	[1.868]	[1.486]	[2.329]	[1.688]	[2.325]	[0.706]	[1.235]
Denmark	0.019	−0.084	−0.015	−0.025	−0.075	0.923	0.030	0.113	0.000	0.191
	[4.316]	[1.329]	[1.582]	[0.941]	[1.104]	[0.368]	[0.415]	[2.634]	[0.923]	[0.840]
Egypt	0.017	−0.340	−0.014	0.018	−0.007	−0.691	0.228	0.097	0.000	0.218
	[4.152]	[3.244]	[1.647]	[1.862]	[0.243]	[0.322]	[1.776]	[2.252]	[0.303]	[1.445]
Finland	0.011	−0.060	−0.027	−0.031	0.013	−0.385	0.144	0.144	0.000	0.452
	[4.580]	[1.007]	[2.607]	[1.659]	[0.224]	[0.302]	[1.196]	[2.888]	[0.408]	[2.165]
France	0.014	−0.110	−0.010	0.009	0.045	0.555	0.163	0.110	0.000	0.175
	[5.027]	[2.573]	[1.782]	[1.249]	[1.609]	[0.502]	[3.722]	[4.121]	[1.868]	[1.355]
Germany	0.012	−0.024	0.002	0.007	0.076	−0.600	0.148	0.072	0.000	−0.057
	[4.392]	[0.540]	[0.339]	[0.636]	[2.164]	[0.783]	[1.749]	[1.657]	[0.716]	[0.450]
Greece	0.017	−0.048	0.006	0.031	−0.008	−1.306	0.053	0.073	0.000	−0.145
	[4.299]	[0.867]	[0.580]	[2.043]	[0.200]	[1.324]	[0.521]	[1.586]	[1.623]	[0.618]
Hong Kong	0.015	0.077	−0.0246	−0.043	−0.027	0.390	0.327	−0.034	0.000	0.672
	[4.190]	[0.714]	[1.383]	[1.109]	[0.506]	[0.179]	[1.362]	[0.438]	[1.607]	[1.548]
India	0.017	−0.017	−0.045	−0.018	−0.011	−1.696	−0.016	−0.040	0.000	0.810
	[4.226]	[0.352]	[3.723]	[3.019]	[0.286]	[1.432]	[0.142]	[0.495]	[0.396]	[3.184]
Indonesia	0.017	0.007	−0.027	0.008	−0.025	−1.033	0.110	−0.010	0.000	0.552
	[4.585]	[0.114]	[3.598]	[1.126]	[0.661]	[1.085]	[1.475]	[0.381]	[0.779]	[3.081]
Ireland	0.005	0.434	−0.063	−0.168	−0.041	2.288	−0.046	−0.039	4.80E-04	1.390

(continued on next page)

Table 9 (*continued*)

Model (2): Risk Premia - The Price of Asymmetric Dependence										
Country i	AD	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
	[0.774]	[1.806]	[1.747]	[1.572]	[0.316]	[0.527]	[0.266]	[0.649]	[1.296]	[1.683]
Italy	0.008	0.058	−0.017	0.002	0.077	−5.765	−0.014	0.011	0.000	0.404
	[4.180]	[1.056]	[2.215]	[0.170]	[2.486]	[3.067]	[0.168]	[0.444]	[0.253]	[2.266]
Japan	0.006	−0.071	−0.006	−0.018	−0.068	5.459	0.122	0.002	0.004	−0.035
	[3.491]	[1.349]	[1.627]	[1.195]	[1.925]	[2.201]	[2.653]	[0.122]	[0.995]	[0.423]
Korea	0.014	0.147	0.000	−0.013	0.026	−5.886	0.429	−0.071	0.040	0.002
	[4.236]	[2.662]	[0.033]	[1.527]	[1.099]	[3.962]	[3.587]	[3.292]	[3.693]	[0.013]
Mexico	0.010	−0.154	−0.009	0.021	−0.015	0.749	0.170	0.004	−0.001	0.287
	[3.109]	[2.527]	[0.794]	[1.738]	[0.257]	[0.374]	[1.191]	[0.154]	[1.447]	[1.106]
Netherlands	0.013	−0.144	0.003	−0.002	0.020	5.943	−0.014	0.133	0.001	−0.209
	[4.909]	[3.052]	[0.422]	[0.137]	[0.594]	[2.964]	[0.231]	[4.062]	[2.725]	[1.203]
New Zealand	0.010	−0.396	−0.007	0.031	0.069	6.914	−0.059	0.168	0.000	0.035
	[4.063]	[3.009]	[0.559]	[0.823]	[1.600]	[1.817]	[0.668]	[3.292]	[0.073]	[0.147]
Norway	0.011	−0.075	−0.026	−0.004	−0.002	0.928	−0.068	0.164	0.000	0.344
	[3.621]	[1.817]	[2.238]	[0.131]	[0.028]	[0.688]	[0.840]	[3.302]	[1.934]	[1.658]
Pakistan	0.008	0.049	−0.029	0.012	−0.010	−2.353	0.110	0.011	0.000	0.675
	[2.938]	[0.434]	[3.743]	[1.521]	[0.232]	[1.256]	[1.307]	[0.271]	[0.022]	[3.497]
Peru	0.013	0.021	−0.016	0.000	0.158	−4.083	−0.018	0.025	0.000	0.320
	[4.089]	[0.236]	[2.221]	[0.045]	[2.825]	[2.959]	[0.231]	[0.745]	[1.276]	[2.175]
Philippines	0.011	0.194	−0.002	0.013	−0.014	−0.842	0.006	−0.087	0.000	−0.096
	[3.790]	[1.885]	[0.346]	[1.406]	[0.629]	[0.863]	[0.060]	[1.851]	[0.198]	[0.650]
Poland	0.019	0.049	−0.017	−0.006	0.000	0.184	0.083	0.091	0.000	0.275
	[4.194]	[0.667]	[1.434]	[0.474]	[0.008]	[0.087]	[0.886]	[1.804]	[2.252]	[1.090]
Romania	0.015	0.099	0.015	0.011	0.198	1.180	−0.022	0.005	0.000	−0.289
	[2.767]	[0.924]	[1.902]	[1.233]	[3.235]	[0.450]	[0.160]	[0.089]	[2.114]	[1.655]
Shanghai	0.010	0.052	−0.032	0.021	−0.074	−7.869	0.075	0.023	0.002	0.836
	[3.348]	[0.850]	[1.375]	[1.053]	[2.199]	[3.011]	[1.071]	[0.763]	[2.643]	[1.517]
Shenzhen	0.013	−0.024	−0.003	0.011	−0.075	−5.603	0.123	0.032	0.002	0.147
	[3.605]	[0.329]	[0.110]	[0.338]	[3.058]	[3.659]	[1.591]	[1.163]	[2.985]	[0.285]
Singapore	0.012	0.118	−0.011	0.004	0.034	−5.731	0.188	−0.043	0.000	0.395
	[4.783]	[1.890]	[1.275]	[0.395]	[1.027]	[2.798]	[3.025]	[0.973]	[0.112]	[1.744]
South Africa	0.008	−0.115	−0.014	0.019	0.110	1.689	0.089	0.123	0.000	0.207
	[4.723]	[2.441]	[1.429]	[0.737]	[2.464]	[0.923]	[1.233]	[3.732]	[1.251]	[0.931]
Spain	0.012	−0.088	−0.007	0.036	0.046	4.657	0.236	0.125	0.000	0.035
	[4.310]	[1.704]	[0.846]	[1.888]	[1.394]	[2.492]	[2.743]	[3.873]	[0.304]	[0.191]
Sweden	0.017	−0.050	−0.030	−0.018	−0.033	1.715	0.113	0.184	0.000	0.423
	[5.040]	[1.152]	[3.314]	[1.704]	[0.787]	[1.485]	[1.414]	[3.934]	[1.305]	[2.409]
Switzerland	0.014	−0.110	−0.031	−0.018	0.061	0.542	0.044	0.133	0.000	0.636
	[4.770]	[1.793]	[3.825]	[1.942]	[1.876]	[0.349]	[0.572]	[3.856]	[1.807]	[3.625]
Turkey	0.018	0.010	−0.007	0.013	−0.264	−2.753	0.259	−0.068	−1.58E + 00	0.134
	[4.464]	[0.175]	[0.959]	[1.533]	[0.163]	[1.498]	[2.011]	[1.711]	[1.000]	[0.081]
UK	0.016	−0.094	−0.005	−0.047	0.019	2.863	0.108	0.089	0.001	0.062
	[5.634]	[1.968]	[0.968]	[1.792]	[0.613]	[2.069]	[1.976]	[4.501]	[1.485]	[0.525]
US	0.008	−0.038	−0.013	0.018	−0.004	2.318	0.006	0.068	0.000	0.047
	[5.702]	[0.998]	[3.243]	[1.268]	[0.217]	[2.190]	[0.172]	[4.037]	[4.124]	[1.300]

Table 10

We measure risk premia using the Ang and Xing (2006) asset pricing procedure where equally-weighted cross-sectional regressions arecomputed every month rolling forward. At a given month, t, thetotal current annual excess return is regressed againstLTAD, UTAD, β, size ("Log-size"), book-to-market ratio ("BM"), the total past annual excess return ("Past Ret"), idiosyncratic risk("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and Amihud (2002) illiquidity factor ("Illiq"). Statistical significance is determined using Newey and West (1987)adjusted t-statistics, given in parentheses, to control foroverlapping data using the Newey (1994) automatic lagselection method to determine the lag length. All coefficients are reported as effective annualrates. Risk premia are estimated using all data available, a description of the data sample is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy. All returns are in US dollars.

Model (3): Risk Premia - The Price of Lower-tail and Upper-tail Asymmetric Dependence											
Country i	LTAD	UTAD	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
Argentina	0.011	−0.022	0.254	−0.018	−0.003	0.077	2.665	0.106	−0.101	0.000	0.201
	[2.525]	[3.333]	[2.469]	[1.189]	[0.110]	[1.717]	[0.698]	[0.813]	[1.638]	[1.788]	[0.664]
Australia	0.007	−0.036	0.057	−0.015	0.010	0.041	−3.670	0.048	0.023	0.000	0.332
	[3.423]	[3.115]	[1.064]	[2.623]	[0.656]	[1.418]	[2.211]	[0.891]	[0.895]	[2.357]	[2.610]
Austria	0.005	−0.019	−0.058	−0.031	0.004	0.032	3.155	−0.005	0.079	0.000	0.525
	[1.841]	[2.176]	[0.800]	[1.460]	[0.467]	[1.063]	[2.021]	[0.051]	[2.196]	[0.216]	[1.236]
Belgium	0.014	−0.018	−0.037	−0.034	0.010	0.045	−0.657	0.111	0.090	0.000	0.652
	[3.861]	[2.370]	[0.648]	[3.101]	[1.300]	[1.646]	[0.620]	[1.855]	[4.031]	[0.326]	[2.923]
Canada	0.012	−0.025	−0.015	−0.034	−0.006	−0.093	0.778	0.020	0.146	0.000	0.580

Table 10 (*continued*)

Model (3): Risk Premia - The Price of Lower-tail and Upper-tail Asymmetric Dependence											
Country *i*	LTAD	UTAD	β	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
	[2.288]	[3.530]	[0.248]	[2.733]	[0.563]	[1.679]	[0.354]	[0.234]	[3.044]	[2.507]	[2.125]
Chile	0.004	−0.019	0.189	−0.012	0.054	0.086	−4.976	−0.197	−0.073	0.000	0.283
	[1.496]	[3.334]	[1.447]	[1.165]	[1.814]	[1.677]	[2.470]	[1.800]	[2.500]	[0.765]	[1.339]
Denmark	0.015	−0.029	−0.060	−0.015	−0.023	−0.031	0.518	0.001	0.091	0.000	0.212
	[3.447]	[2.804]	[0.865]	[1.549]	[0.826]	[0.500]	[0.199]	[0.014]	[2.006]	[0.806]	[0.896]
Egypt	0.014	−0.026	−0.327	−0.014	0.017	0.003	−1.037	0.228	0.094	0.000	0.236
	[3.563]	[3.458]	[3.152]	[1.593]	[1.825]	[0.127]	[0.504]	[1.796]	[2.137]	[0.195]	[1.518]
Finland	0.018	−0.016	−0.061	−0.027	−0.027	0.029	−0.346	0.149	0.144	0.000	0.442
	[4.090]	[2.202]	[1.053]	[2.581]	[1.469]	[0.499]	[0.289]	[1.225]	[2.889]	[0.277]	[2.079]
France	0.012	−0.023	−0.097	−0.010	0.009	0.048	0.084	0.156	0.100	0.000	0.184
	[4.569]	[4.285]	[2.316]	[1.675]	[1.196]	[1.599]	[0.073]	[3.646]	[3.997]	[1.908]	[1.355]
Germany	0.013	−0.031	−0.032	0.003	0.008	0.081	−0.477	0.159	0.075	0.000	−0.081
	[3.802]	[2.318]	[0.739]	[0.508]	[0.771]	[2.359]	[0.595]	[1.808]	[1.697]	[0.665]	[0.641]
Greece	0.015	−0.025	−0.054	0.005	0.030	−0.025	−1.473	0.033	0.077	0.000	−0.102
	[3.796]	[3.767]	[1.001]	[0.443]	[2.125]	[0.651]	[1.535]	[0.338]	[1.778]	[1.652]	[0.470]
Hong Kong	0.012	−0.037	0.084	−0.026	−0.045	−0.010	−0.077	0.312	−0.042	0.000	0.728
	[2.708]	[4.011]	[0.813]	[1.435]	[1.124]	[0.231]	[0.038]	[1.402]	[0.591]	[1.790]	[1.633]
India	0.012	−0.043	−0.004	−0.046	−0.018	−0.014	−2.035	−0.033	−0.054	0.000	0.853
	[3.384]	[3.053]	[0.073]	[3.767]	[2.997]	[0.348]	[1.603]	[0.278]	[0.631]	[0.496]	[3.244]
Indonesia	0.010	−0.038	0.027	−0.028	0.010	−0.005	−1.353	0.086	−0.032	0.000	0.627
	[3.315]	[4.060]	[0.425]	[3.630]	[1.195]	[0.166]	[1.431]	[1.142]	[1.140]	[0.667]	[3.264]
Ireland	0.002	−0.024	0.437	−0.062	−0.168	0.020	3.230	−0.078	−0.042	4.85E-04	1.337
	[0.275]	[1.594]	[1.788]	[1.745]	[1.556]	[0.167]	[0.774]	[0.413]	[0.781]	[1.282]	[1.668]
Italy	0.006	−0.018	0.064	−0.016	0.002	0.084	−5.962	−0.014	0.001	0.000	0.403
	[3.254]	[3.125]	[1.209]	[2.073]	[0.218]	[2.501]	[3.099]	[0.175]	[0.059]	[0.026]	[2.230]
Japan	0.005	−0.009	−0.074	−0.008	−0.021	−0.080	5.346	0.126	0.002	0.003	0.003
	[2.844]	[3.228]	[1.414]	[1.994]	[1.327]	[2.086]	[2.162]	[2.659]	[0.105]	[0.910]	[0.037]
Korea	0.008	−0.043	0.165	−0.005	−0.010	0.009	−5.835	0.402	−0.086	0.037	0.137
	[2.912]	[3.221]	[3.125]	[0.777]	[1.029]	[0.354]	[4.333]	[3.796]	[3.729]	[3.851]	[0.802]
Mexico	0.011	−0.011	−0.137	−0.006	0.022	−0.013	−0.303	0.177	−0.010	−0.002	0.253
	[2.325]	[1.998]	[2.483]	[0.565]	[1.778]	[0.198]	[0.157]	[1.182]	[0.402]	[1.463]	[0.990]
Netherlands	0.013	−0.017	−0.123	0.003	0.002	0.019	5.549	−0.029	0.120	0.001	−0.195
	[4.563]	[3.680]	[2.466]	[0.349]	[0.143]	[0.596]	[2.786]	[0.448]	[3.917]	[2.704]	[1.148]
New Zealand	0.005	−0.038	−0.337	−0.007	0.029	0.087	7.161	−0.061	0.143	0.000	0.046
	[2.155]	[2.885]	[2.649]	[0.537]	[0.796]	[1.879]	[1.839]	[0.713]	[3.007]	[0.002]	[0.177]
Norway	0.012	−0.022	−0.083	−0.022	−0.005	0.008	0.788	−0.034	0.156	0.000	0.290
	[3.136]	[2.488]	[2.110]	[1.986]	[0.175]	[0.095]	[0.635]	[0.470]	[3.137]	[1.872]	[1.418]
Pakistan	0.002	−0.073	0.061	−0.030	0.011	−0.003	−2.828	0.102	0.000	0.000	0.735
	[0.775]	[2.546]	[0.554]	[3.739]	[1.495]	[0.074]	[1.490]	[1.249]	[0.008]	[0.070]	[3.471]
Peru	0.013	−0.034	0.028	−0.019	0.000	0.165	−3.971	−0.029	0.025	0.000	0.369
	[3.703]	[1.901]	[0.326]	[2.429]	[0.004]	[2.906]	[2.835]	[0.355]	[0.680]	[0.911]	[2.370]
Philippines	0.012	−0.015	0.205	−0.002	0.014	0.009	−1.006	0.029	−0.090	0.000	−0.089
	[3.188]	[2.565]	[1.809]	[0.347]	[1.423]	[0.344]	[0.934]	[0.314]	[1.820]	[0.358]	[0.567]
Poland	0.019	−0.040	0.043	−0.016	−0.006	0.005	−0.110	0.084	0.087	0.000	0.259
	[3.873]	[3.531]	[0.586]	[1.232]	[0.417]	[0.103]	[0.050]	[0.897]	[1.722]	[2.204]	[0.925]
Romania	0.009	−0.026	0.119	0.014	0.011	0.204	0.763	−0.001	−0.013	0.000	−0.252
	[1.762]	[2.484]	[1.155]	[1.992]	[1.345]	[3.402]	[0.270]	[0.007]	[0.285]	[2.196]	[1.462]
Shanghai	0.009	−0.031	0.080	−0.034	0.021	−0.119	−7.686	0.040	0.008	0.002	0.856
	[1.836]	[2.768]	[1.240]	[1.377]	[1.099]	[2.135]	[3.221]	[0.593]	[0.272]	[2.667]	[1.542]
Shenzhen	0.008	−0.035	0.012	−0.002	0.007	−0.087	−5.817	0.117	0.014	0.002	0.178
	[2.234]	[3.271]	[0.168]	[0.082]	[0.223]	[3.136]	[3.673]	[1.488]	[0.511]	[3.000]	[0.339]
Singapore	0.010	−0.021	0.120	−0.009	0.004	0.026	−6.056	0.181	−0.055	0.000	0.385
	[3.719]	[3.847]	[1.885]	[1.186]	[0.401]	[0.619]	[2.820]	[2.960]	[1.157]	[0.187]	[1.746]
South Africa	0.009	−0.012	−0.113	−0.011	0.017	0.117	1.455	0.090	0.112	0.000	0.145
	[4.019]	[2.123]	[2.378]	[1.143]	[0.709]	[2.698]	[0.809]	[1.255]	[3.942]	[1.422]	[0.665]
Spain	0.009	−0.021	−0.071	−0.007	0.040	0.051	4.093	0.226	0.114	0.000	0.057
	[3.409]	[3.390]	[1.402]	[0.890]	[2.058]	[1.528]	[2.168]	[2.687]	[3.616]	[0.390]	[0.316]
Sweden	0.018	−0.024	−0.049	−0.028	−0.016	−0.034	1.560	0.120	0.182	0.000	0.375
	[4.890]	[3.665]	[1.120]	[3.123]	[1.583]	[0.768]	[1.366]	[1.459]	[3.837]	[1.438]	[2.125]
Switzerland	0.014	−0.022	−0.103	−0.030	−0.016	0.066	0.400	0.045	0.124	0.000	0.606
	[4.278]	[3.379]	[1.671]	[3.764]	[1.723]	[1.947]	[0.263]	[0.567]	[3.708]	[1.833]	[3.568]
Turkey	0.014	−0.047	0.021	−0.006	0.014	1.227	−3.254	0.264	−0.079	−2.92E + 00	1.686
	[2.272]	[2.679]	[0.347]	[0.729]	[1.488]	[0.743]	[1.486]	[1.904]	[1.751]	[1.000]	[0.962]
UK	0.014	−0.033	−0.074	−0.005	−0.042	0.031	2.469	0.117	0.077	0.001	0.070
	[4.995]	[3.863]	[1.542]	[0.890]	[1.686]	[1.124]	[1.842]	[2.354]	[3.943]	[1.576]	[0.559]
US	0.007	−0.015	−0.042	−0.013	0.019	−0.008	2.360	0.009	0.067	0.000	0.053
	[5.305]	[4.438]	[1.090]	[3.266]	[1.335]	[0.336]	[2.220]	[0.263]	[3.948]	[4.119]	[1.431]

Table 11
We measure risk premia using the Ang and Xing (2006) asset pricing procedure where equally-weighted cross-sectional regressions arecomputed every month rolling forward. At a given month, t, thetotal current annual excess return is regressed againstLTAD, UTAD, β^{-}, β^{+}, size ("Log-size"), book-to-market ratio ("BM"), the total past annual excess return ("Past Ret"), idiosyncratic risk("Idio"), coskewness ("Cosk"), cokurtosis ("Cokurt") and Amihud (2002) illiquidity factor ("Illiq"). Statistical significance is determined using Newey and West (1987)adjusted t-statistics, given in parentheses, to control foroverlapping data using the Newey (1994) automatic lagselection method to determine the lag length. All coefficients are reported as effective annualrates. Risk premia are estimated using all data available, a description of the data sample is provided in Table 1. MSCI World index and the US 1-month T-Bill rate are used as a market and risk free rate proxy. All returns are in US dollars.

Model (4): Controlling for β^{-} and β^{+}												
Country i	LTAD	UTAD	β^{-}	β^{+}	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
Argentina	0.013	−0.017	0.096	0.049	−0.010	0.011	0.095	5.587	−0.083	−0.085	0.000	−0.008
	[2.819]	[2.868]	[1.486]	[0.764]	[0.711]	[0.321]	[2.289]	[1.208]	[0.325]	[1.013]	[1.694]	[0.027]
Australia	0.008	−0.035	0.001	−0.017	−0.015	0.015	0.037	−2.170	0.196	0.076	0.000	0.306
	[4.010]	[3.167]	[0.019]	[0.840]	[2.676]	[0.971]	[1.181]	[1.465]	[1.772]	[3.107]	[2.500]	[2.496]
Austria	0.006	−0.027	0.042	−0.102	−0.027	0.003	0.024	2.723	0.244	0.088	0.000	0.466
	[2.123]	[1.952]	[0.750]	[1.862]	[1.578]	[0.328]	[0.692]	[2.253]	[1.456]	[2.330]	[0.117]	[1.381]
Belgium	0.014	−0.018	−0.074	−0.041	−0.031	0.011	0.042	−0.141	0.110	0.123	0.000	0.579
	[3.735]	[2.262]	[1.904]	[1.107]	[3.187]	[1.254]	[1.398]	[0.117]	[0.967]	[3.324]	[0.238]	[3.040]
Canada	0.010	−0.023	−0.112	0.100	−0.043	−0.005	−0.088	0.626	−0.298	0.107	0.000	0.754
	[2.259]	[3.296]	[1.797]	[1.771]	[3.345]	[0.578]	[1.456]	[0.274]	[1.026]	[1.570]	[2.176]	[2.702]
Chile	0.007	−0.020	0.274	−0.207	0.003	0.063	0.082	−4.473	0.474	−0.013	0.001	0.010
	[2.664]	[3.970]	[2.186]	[2.852]	[0.425]	[1.775]	[1.604]	[2.101]	[2.572]	[0.565]	[2.145]	[0.066]
Denmark	0.015	−0.028	0.012	−0.106	−0.017	−0.026	−0.036	0.858	0.300	0.119	0.000	0.272
	[3.580]	[3.117]	[0.294]	[1.852]	[1.789]	[0.932]	[0.570]	[0.366]	[1.556]	[2.953]	[0.605]	[1.172]
Egypt	0.013	−0.029	−0.136	−0.081	−0.011	0.010	0.025	−3.303	0.085	0.073	0.000	0.231
	[3.491]	[3.633]	[1.947]	[1.121]	[1.126]	[1.181]	[0.894]	[1.661]	[0.289]	[1.377]	[0.889]	[1.251]
Finland	0.016	−0.018	−0.075	0.017	−0.027	−0.024	0.026	−0.278	−0.052	0.131	0.000	0.433
	[4.017]	[2.362]	[1.437]	[0.463]	[2.602]	[1.315]	[0.404]	[0.262]	[0.362]	[2.837]	[0.358]	[2.172]
France	0.010	−0.024	−0.098	0.010	−0.007	0.009	0.049	0.718	−0.026	0.108	0.000	0.096
	[4.423]	[4.346]	[2.801]	[0.406]	[1.356]	[1.173]	[1.617]	[0.651]	[0.228]	[3.873]	[1.975]	[0.796]
Germany	0.012	−0.028	−0.038	−0.021	0.004	0.009	0.073	−0.827	0.114	0.076	0.000	−0.099
	[3.837]	[2.622]	[1.673]	[0.832]	[0.772]	[0.745]	[2.346]	[0.855]	[0.901]	[1.937]	[1.668]	[0.844]
Greece	0.016	−0.026	0.044	−0.025	0.003	0.027	−0.011	−2.228	0.323	0.014	0.000	−0.041
	[3.446]	[3.640]	[1.179]	[0.883]	[0.243]	[1.961]	[0.272]	[1.987]	[1.910]	[0.337]	[1.516]	[0.184]
Hong Kong	0.012	−0.044	0.221	−0.010	0.004	0.004	0.002	−2.032	1.223	−0.230	0.000	0.140
	[2.524]	[4.200]	[2.009]	[0.251]	[0.306]	[0.277]	[0.059]	[1.071]	[2.561]	[1.381]	[2.223]	[0.662]
India	0.012	−0.041	0.045	−0.037	−0.046	−0.019	−0.030	−2.228	0.378	−0.019	0.000	0.836
	[3.573]	[3.127]	[1.857]	[1.811]	[3.782]	[3.359]	[1.035]	[1.570]	[2.273]	[0.342]	[0.416]	[3.274]
Indonesia	0.011	−0.036	0.107	−0.044	−0.028	0.010	−0.003	−1.543	0.443	−0.044	0.000	0.620
	[3.377]	[4.114]	[2.314]	[1.607]	[3.451]	[1.253]	[0.101]	[1.718]	[2.592]	[1.610]	[0.659]	[3.172]
Ireland	0.011	−0.015	−0.105	0.280	−0.063	−0.163	0.001	5.325	−0.448	−0.025	0.001	1.290
	[1.153]	[1.628]	[0.986]	[1.141]	[1.862]	[1.577]	[0.008]	[1.208]	[0.611]	[0.323]	[1.399]	[1.691]
Italy	0.007	−0.017	0.010	−0.004	−0.012	0.001	0.088	−5.102	0.082	0.015	0.000	0.343
	[3.377]	[3.027]	[0.296]	[0.098]	[1.790]	[0.125]	[2.321]	[2.575]	[0.454]	[0.526]	[0.530]	[2.092]
Japan	0.005	−0.009	−0.043	0.015	−0.011	−0.023	−0.088	5.032	0.192	−0.019	0.004	0.048
	[3.020]	[3.197]	[1.069]	[0.515]	[2.409]	[1.548]	[2.142]	[2.195]	[2.279]	[1.405]	[1.268]	[0.531]
Korea	0.010	−0.038	0.116	0.060	−0.003	−0.005	0.008	−6.207	0.593	−0.096	0.034	0.088
	[3.094]	[3.147]	[3.305]	[1.815]	[0.445]	[0.549]	[0.305]	[4.426]	[3.275]	[3.081]	[3.695]	[0.469]
Mexico	0.010	−0.012	−0.092	−0.050	−0.011	0.017	−0.004	−1.212	0.295	0.037	−0.002	0.361
	[2.324]	[1.894]	[1.051]	[0.940]	[1.124]	[1.732]	[0.059]	[0.526]	[1.188]	[1.264]	[1.548]	[1.492]
Netherlands	0.011	−0.017	−0.081	−0.053	0.005	0.000	0.036	6.420	−0.031	0.131	0.001	−0.232
	[4.364]	[3.583]	[2.104]	[1.408]	[0.596]	[0.025]	[0.930]	[3.017]	[0.229]	[3.487]	[2.665]	[1.322]
New Zealand	0.004	−0.036	0.009	−0.235	−0.002	0.013	0.107	3.964	0.596	0.160	0.000	−0.031
	[1.883]	[2.893]	[0.131]	[2.871]	[0.230]	[0.439]	[2.278]	[1.359]	[2.202]	[2.959]	[0.413]	[0.170]
Norway	0.012	−0.020	−0.058	0.007	−0.022	0.006	−0.002	0.439	−0.072	0.123	0.000	0.296
	[3.020]	[2.490]	[1.592]	[0.183]	[2.105]	[0.183]	[0.019]	[0.359]	[0.450]	[2.782]	[1.571]	[1.512]
Pakistan	0.003	−0.078	0.176	−0.006	−0.025	0.012	0.000	−3.251	0.554	−0.034	0.000	0.668
	[0.901]	[2.576]	[2.258]	[0.106]	[3.824]	[1.740]	[0.005]	[1.639]	[2.526]	[0.867]	[0.419]	[3.543]
Peru	0.014	−0.052	0.078	−0.154	−0.017	0.000	0.167	−3.320	0.149	0.062	0.000	0.324
	[3.991]	[1.474]	[0.956]	[2.020]	[2.318]	[0.157]	[2.651]	[2.205]	[0.958]	[2.330]	[0.780]	[2.293]
Philippines	0.012	−0.015	0.159	0.004	0.005	0.018	0.022	−0.327	0.331	−0.097	0.000	−0.249
	[3.620]	[2.979]	[2.059]	[0.083]	[0.944]	[1.601]	[0.937]	[0.474]	[1.608]	[1.906]	[0.023]	[2.079]
Poland	0.019	−0.043	0.089	−0.035	−0.014	−0.005	0.009	−0.192	0.670	0.114	0.000	0.235
	[3.844]	[3.656]	[1.921]	[0.561]	[1.198]	[0.392]	[0.219]	[0.073]	[2.921]	[1.915]	[2.185]	[0.926]
Romania	0.009	−0.024	0.152	−0.052	0.018	0.018	0.201	−1.597	0.494	−0.051	0.000	−0.258
	[1.837]	[2.316]	[1.303]	[0.647]	[2.219]	[1.851]	[3.355]	[0.673]	[1.213]	[0.923]	[2.457]	[1.632]
Shanghai	0.012	−0.029	0.189	−0.184	−0.022	0.028	−0.116	−6.993	0.733	0.052	0.002	0.605
	[2.425]	[2.749]	[2.719]	[2.476]	[1.093]	[1.456]	[2.277]	[3.112]	[3.476]	[1.173]	[2.712]	[1.368]
Shenzhen	0.009	−0.033	0.079	−0.070	−0.003	0.013	−0.088	−5.417	0.468	0.024	0.002	0.205
	[2.431]	[3.604]	[1.732]	[2.306]	[0.163]	[0.417]	[3.395]	[3.624]	[2.384]	[0.722]	[3.140]	[0.444]
Singapore	0.011	−0.017	0.030	0.007	−0.008	0.003	0.011	−4.532	0.321	0.004	0.000	0.304

Table 11 (*continued*)

Model (4): Controlling for β^- and β^+												
Country i	LTAD	UTAD	β^-	β^+	Log-size	BM	Past ret	Idio	Cosk	Cokurt	Illiq	Intercept
	[3.992]	[3.680]	[0.987]	[0.215]	[0.982]	[0.432]	[0.261]	[2.818]	[1.680]	[0.126]	[0.614]	[1.457]
South Africa	0.007	−0.012	−0.114	0.023	−0.011	0.013	0.107	0.602	−0.056	0.091	0.001	0.151
	[3.734]	[2.134]	[2.329]	[0.451]	[1.084]	[0.604]	[2.481]	[0.307]	[0.358]	[2.767]	[1.679]	[0.635]
Spain	0.009	−0.021	−0.100	0.006	−0.006	0.038	0.048	4.692	0.170	0.102	0.000	0.044
	[3.299]	[3.482]	[2.207]	[0.135]	[0.896]	[1.982]	[1.418]	[2.161]	[0.986]	[3.001]	[0.325]	[0.270]
Sweden	0.018	−0.024	−0.055	−0.050	−0.023	−0.018	−0.024	2.344	0.175	0.218	0.000	0.280
	[4.714]	[4.001]	[1.658]	[1.736]	[2.530]	[1.863]	[0.551]	[1.841]	[1.243]	[4.054]	[1.796]	[1.518]
Switzerland	0.012	−0.023	−0.125	−0.063	−0.030	−0.014	0.069	1.598	0.064	0.152	0.000	0.588
	[4.190]	[3.627]	[2.380]	[2.074]	[3.805]	[1.346]	[1.922]	[1.042]	[0.516]	[3.939]	[1.665]	[3.554]
Turkey	0.015	−0.050	0.241	−0.146	−0.002	0.016	1.302	−4.587	1.029	−0.055	−0.766	1.740
	[2.541]	[2.849]	[2.671]	[2.178]	[0.309]	[1.679]	[0.877]	[2.352]	[3.043]	[1.206]	[1.000]	[1.097]
UK	0.015	−0.031	−0.010	−0.064	−0.004	−0.035	0.033	2.319	0.345	0.075	0.001	0.057
	[4.563]	[3.859]	[0.414]	[2.584]	[0.979]	[1.526]	[1.152]	[1.802]	[4.044]	[2.903]	[1.729]	[0.559]
US	0.007	−0.015	−0.006	−0.040	−0.012	0.019	−0.006	1.862	0.134	0.081	0.000	0.036
	[5.197]	[4.691]	[0.238]	[1.955]	[3.222]	[1.329]	[0.240]	[2.183]	[1.875]	[4.532]	[4.191]	[1.004]

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