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Skewness preferences and gambling cultures

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ABSTRACT

We examine the relationship between cultural attitudes towards gambling and investor preferences for skewness across 45 countries. Our results show that countries with higher gambling losses per adult, countries with legalized online gambling, and countries with the most Catholics relative to Protestants tend to display the most significant (negative) return premiums associated with return skewness. We do not find that other macroeconomic characteristics, such as economic development, GDP per capita, or per capita consumption explain the presence of skewness premiums.

1. Introduction

Using prospect theory, Barberis and Huang (2008) show that when some investors overweight the tails of return distributions—or subjectively assign a higher probability to objectively low probability events—the resulting excess demand for positively skewed assets leads to lower expected returns than those predicted by the standard expected utility model. This prediction is supported by numerous empirical studies. One interpretation of prospect theory and the supporting empirical evidence is that some investors exhibit preferences for skewness. For instance, Mitton and Vorkink (2007) show that some retail investors intentionally underdiversify their portfolios in order to attain higher positive skewness at the expense of mean-variance efficiency. Additionally, Zhang (2005), Kumar (2009), Boyer et al. (2010), Bali et al. (2011) document preferences for lottery-like return distributions for certain investor demographics. This preference for skewness can lead to excess demand and subsequent underperformance for securities with lottery-like features.

In this study, we first contribute to the literature by determining whether the return premium associated with skewness exists in foreign markets. To the extent that skewness preferences vary across countries, our second objective is to test whether the cross-country variation in the return premiums associated with skewness is affected by a country's attitude toward gambling. On one hand, favorable gambling attitudes in a particular country might directly affect investors' preferences for lottery-like stocks (Kumar (2009)). On the other hand, Cookson (2015) finds that financial gambles may substitute for other types of gambling, which might lead to less demand for those assets with the most positive skewness. Determining whether favorable gambling attitudes and skewness premiums are complements or substitutes becomes an empirical question, which we seek to answer below.

Our tests fit nicely in the literature that discusses various explanations for skewness premiums. Kumar (2009) shows that preferences for lottery-like stocks are related to socio-economic characteristics of investors, such as lottery ticket purchases, religious affiliation (Catholic), and income. These types of characteristics are likely to vary greatly across countries, which allows for more powerful statistical tests. To examine how return premiums might vary across country, we use a Fama and Macbeth (1973) approach

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and regress next-month returns on a variety of control variables and the variable of interest, idiosyncratic skewness. We find that 31 of the 45 countries have a negative coefficient on idiosyncratic skewness. Of the 31 negative coefficients, only 10 are statistically significant at the 0.05 level. Thus, about a quarter of our sample exhibits a strong negative relationship between lottery-like stocks and future returns. Finding that only 10 countries exhibit significant skewness premiums not only supports the idea that gambling preferences extend beyond the United States, but it also highlights the fact that there might be cultural factors that influence these differences across countries.

To explore what might be driving the cross-country differences in skewness preferences, we examine the association between several proxies for attitudes toward gambling and skewness premiums. We first examine countries that have the most gambling losses per adult. We compare the top 10 countries ranked on gambling losses with those not in the top 10 and find statistically different coefficients between the two groups. Top 10 countries have a coefficient on idiosyncratic skewness of -0.1105 with a *t*-statistic of -2.46. In economic terms, a one-unit increase in idiosyncratic skewness represents a reduction in next-month returns of 11 basis points, suggesting that the results are not only statistically significant but also economically meaningful. In contrast, we find that countries not in the top 10 with respect to gambling losses per adult have a positive coefficient of 0.1053 with a *t*-statistic of 2.71. Furthermore, a test of the difference between these two coefficients (difference = -0.2158, z-statistic = -3.63) supports the idea that cultural attitudes toward gambling are driving the differences between the varying return premiums.

We find similar results when examining whether a country allows (legal) online gambling (difference = -0.396, z-statistic = -2.32) as well as countries ranked in the top 10 based on the ratio of Catholics to Protestants (difference = -0.222, z-statistic = -3.36), which supports the findings of Kumar et al. (2011).[1] To examine the robustness of our results, we also examine other proxies for lottery-like stocks, including the maximum return variable from Bali et al. (2011) and find similar results to those reported. Our tests are closest to those in Kumar (2009) who finds that the return premium associated with lottery-like securities is strongest in U.S. regions that have more favorable gambling attitudes. Our results suggest that these results hold in an international context.

While our results support the idea that favorable gambling attitudes and skewness premiums are indeed complements, it is possible that our findings are simply driven by the development of the country and not by preferences for gambling. While some studies have shown that wealthier individuals gamble more, others have found the opposite (see Clotfelter et al. (1999) and Kearney (2005)). Therefore, we next test whether skewness premiums are driven by differences in development. We examine the difference between G7 and non-G7 countries, G10 and non-G10 countries as well as countries ranked on GDP per capita, income per capita, and consumption per capita. Our analysis suggests that macroeconomic characteristics do not explain the presence of skewness preferences in financial markets. When combined with our earlier results, our findings indicate that while gambling cultures matter when explaining skewness premiums, macroeconomic conditions do not.

The results of our study contribute to the literature in two important ways. First, consistent with an emerging body of evidence, we find support for the claim that preferences for skewness adversely affect expected returns for stocks in some international financial markets. Second, and perhaps more importantly, we identify which country-specific factors appear to drive these preferences. Consistent with our expectation, we find that countries with more favorable attitudes towards gambling are more likely to have significant negative premiums associated with lottery-type stocks. Further, the development of the country, specifically, countries with diffing GDP per capita, income per capita, and consumption per capita does not necessarily drive the preferences for lottery-like stocks.

2. Related literature and hypothesis development

Kahneman and Tversky's (1979) prospect theory hypothesizes that, when making decisions, individuals often depart from expected utility maximization as traditionally understood. Kahneman and Tversky (1992)'s cumulative prospect theory further suggests that individuals value extreme outcomes differently than moderate outcomes. Applying cumulative prospect theory to security pricing, Barberis and Huang (2008) argue that investors will weigh the tails of the return distribution more heavily, and, in so doing, will exhibit a preference for positive skewness. This preference can result in higher prices and lower expected returns than traditional pricing models estimate for stocks with high positive skewness.

Confirming Barberis and Huang's theoretical predictions, several empirical studies reveal that some investors overpay for positive return skewness. Mitton and Vorkink (2007) find that retail investors intentionally under-diversify their portfolios in order to achieve higher skewness. Kumar (2009) finds that stocks which resemble lotteries typically underperform, suggesting that these stocks command higher prices. Boyer et al. (2010) examine the relationship between idiosyncratic skewness and expected returns, and arrive at similar conclusions. Bali et al. (2011) find that stocks with the largest maximum daily returns during the previous month subsequently underperform by a significant margin; this evidence is, again, consistent with the assertion that investor demand for positive skewness is strong enough to create price premiums for lottery-like stocks.[2]

The preceding studies establish the conceptual framework and provide a methodological solution for the first hypothesis we test in this paper. However, we recognize an important limitation in our study. Boyer et al. (2010) attempt to identify a return premium

[1] A particular country must have a combined percentage of Catholics and Protestants that is greater than 50% of the total population to be included in our analysis.

[2] Boyer and Vorkink (2013) find skewness premiums when examining the relationship between *ex ante* skewness in option prices and next-week equity option returns. Further, Green and Hwang (2012) show that initial public offerings with higher expected skewness have larger first-day returns, suggesting that skewness preferences lead to greater demand once securities become tradeable.

associated with expected idiosyncratic skewness, which is used because idiosyncratic skewness is not very persistent in their sample. Unfortunately, some of the characteristics required to estimate international stocks' expected idiosyncratic skewness are unavailable. We are left to use the historical idiosyncratic skewness but find that our estimates are quite persistent. For instance, the univariate correlation between this month's idiosyncratic skewness and last month's idiosyncratic skewness is nearly 0.80. The analogous correlation coefficient for Boyer, Mitton, and Vorkink's measure is 0.64. Previously, tests for skewness premiums have exclusively used data from the U.S. equity market. So while we do not have the data necessary to estimate expected idiosyncratic skewness, we are confident that there is sufficient persistence in historical skewness in countries outside of the U.S. to allay concerns. Moreover, one objective of our empirical analysis is to first provide out-of-sample tests using data from equity markets across the world. We formally state our first null hypothesis as follows.

H1. *Within each international stock market, stocks with the highest idiosyncratic skewness will neither underperform nor outperform other stocks.*

Our first hypothesis contributes to the existing literature by providing out-of-sample tests of skewness premiums using global data. We expect to see that highly skewed stocks in each of the 45 international markets have lower returns compared to other stocks in the same country. Additionally, we examine which country-specific factors will affect the level of skewness premiums. A variety of other factors, such as cultural standards, demographics, and economic development, which have been identified in prior research might also influence the magnitude of the skewness premium. Using a variety of data sources, Kumar (2009) demonstrates that regional attitudes towards gambling affect investors' preferences for lottery-like stocks. For example, an examination of brokerage trading records reveals that investors living in zip codes characterized by low income and a high Catholic-to-Protestant Ratio—traits strongly associated with a propensity to gamble—purchase more lottery-like stocks. Kumar et al. (2011) also find that employees are more likely to participate in stock option compensation plans in regions where attitudes are more favorable towards gambling. They further document that the negative return premium for lottery-like stocks is greater for firms incorporated in regions with a more pronounced inclination to gamble.

Extending research on the skewness premium to international markets enables us to assess possible biases at the country level. This is an improvement over previous tests based only on U.S. data. The friction which deters a Detroit-based investor from speculating in a San Francisco-based technology stock is low. In other words, the regional home bias in stock investing (in this example, home bias in the industrial Midwest of the United States) is unlikely to be strong, and one would not expect a hyper-local gambling propensity to markedly influence the prices of stocks that are geographically close. However, for retail investors, the resistance to investing in non-U.S. stocks is very high, resulting in a nearly complete home country bias. Generalizing, the prevailing national attitude toward gambling in a given country may have a substantial impact on lottery-like stocks issued by companies domiciled in that country. Accordingly, we test whether skewness premiums in countries other than the United States are affected by the country's general attitude towards gambling. We formally state our null hypothesis as follows.

H2. *Skewness return premiums are independent of a country's general attitude toward gambling.*

To the extent that return premiums are related to a particular country's gambling propensity, these findings would provide support to those in Kumar (2009) and Kumar et al. (2011). Tests of both of our formally stated hypotheses are reported below.

3. Data description

The research related to the first hypothesis covers the sample period from 1980 to 2013. We gather daily stock returns for securities in 45 countries from DataStream and firm-specific financial information from Worldscope. We include countries in our analysis that have data for our entire sample period. We estimate a local CAPM beta for each stock with respect to the local market return, which is computed using the capitalization-weighted returns for all listed stocks in a particular country. We use the residuals from the CAPM regression to estimate the idiosyncratic volatility of each stock. In estimating beta and idiosyncratic volatility, we use daily stock returns for each stock in each month for a rolling six-month window. We calculate the book-to-market ratio for a given month using the book value of equity from the previous fiscal year and the end-of-month market value of equity. Following prior research (Kumar (2009) and Boyer et al. (2010)), we use idiosyncratic skewness (*IdioSkew)* as the variable of interest, where idiosyncratic skewness is calculated in the following way.

$$IdioSkew = \frac{T}{(T-1)(T-2)}\left(\frac{\left\{\sum_{t=1}^{T}(R_t-\overline{R})^3\right\}}{\sigma^3}\right) \quad (1)$$

Here, *IdioSkew* is estimated as the scaled third moment of the return distribution, where *R* is the residual return obtained from the CAPM regression in each country. We note that other security-level characteristics might be important in our analysis. However, data limitations prevent us from including more than the variables described above.

Table 1 reports summary statistics for each country as well as averages for the entire sample. The number of securities per country ranges from 69 to almost 5,000, with an average of 960. The average market capitalization (*Size*) of a firm in our sample is $1.006 billion. The average book-to-market ratio (*B/M*) is 0.392. The average idiosyncratic volatility (*IdioVolt*) is 0.101 but is highly driven by unusually high idiosyncratic volatility in Chile. Idiosyncratic skewness (*IdioSkew*) is lowest in Morocco at 0.195 and highest in

Table 1
Summary statistics

	No. stocks	No. Obs	Size	B/M	Momentum	IDIOVOLT	IDIOSKEW
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Australia	2,812	287,730	579.68	0.169	0.171	0.062	0.513
Austria	196	27,245	675.53	0.572	0.066	0.029	0.271
Belgium	263	39,217	1,247.88	0.399	0.082	0.028	0.285
Brazil	570	54,947	1,310.08	0.993	0.339	0.067	0.479
Canada	4,618	427,818	584.59	0.199	0.476	0.109	0.631
Chile	254	33,091	833.56	0.315	17.267	2.558	0.233
China	1,658	64,000	1,068.96	0.396	0.745	0.169	0.655
Colombia	73	6,472	1,895.83	0.577	0.316	0.040	0.222
CzechRep.	86	7,129	813.68	0.581	0.046	0.027	0.352
Denmark	403	56,852	525.72	0.467	0.069	0.033	0.251
Egypt	135	12,638	564.41	0.335	0.138	0.030	0.545
Finland	203	30,111	1,236.92	0.276	0.085	0.030	0.345
France	1,595	201,529	1,595.34	0.378	0.107	0.038	0.446
Germany	1,494	205,310	1,370.77	0.354	0.099	0.032	0.561
Greece	444	61,778	367.36	0.393	0.062	0.033	0.489
HongKong	1,298	182,491	1,000.32	0.275	0.130	0.050	0.756
Hungary	69	7,397	589.21	0.321	0.191	0.069	0.529
India	2,679	241,890	484.51	0.356	0.149	0.039	0.723
Indonesia	513	59,191	471.22	0.448	0.221	0.059	0.656
Ireland	168	22,154	1,050.24	0.309	0.109	0.035	0.441
Israel	621	61,587	347.92	0.363	0.128	0.044	0.455
Italy	523	74,721	1,787.04	0.511	0.034	0.022	0.567
Japan	4,988	948,433	1,168.52	0.353	0.055	0.028	0.467
SouthKorea	2,141	225,337	471.62	0.443	0.146	0.036	0.628
Luxembourg	89	9,110	1,911.10	0.591	0.088	0.032	0.321
Malaysia	1,274	159,754	282.18	0.310	0.128	0.044	0.793
Mexico	196	22,232	1,924.64	0.443	0.094	0.036	0.309
Morrocco	79	7,631	826.47	0.224	0.073	0.024	0.195
Netherlands	392	57,396	1,957.60	0.300	0.079	0.024	0.410
NewZealand	237	26,538	295.85	0.173	0.146	0.055	0.332
Norway	447	47,028	704.03	0.493	0.099	0.042	0.412
Peru	176	15,037	374.64	0.957	0.409	0.068	0.257
Philippines	283	37,195	355.42	0.534	0.183	0.066	0.619
Poland	546	42,284	390.11	0.258	0.106	0.035	0.587
Portugal	144	18,275	840.75	0.509	0.100	0.046	0.447
Russia	516	25,280	3,237.67	0.386	0.365	0.086	0.670
Singapore	856	108,125	524.28	0.219	0.160	0.049	0.591
SouthAfrica	851	72,937	751.30	0.273	0.250	0.076	0.478
Spain	281	40,756	2,871.55	0.363	0.049	0.023	0.483
Sweden	772	84,302	886.67	0.296	0.120	0.042	0.528
Switzerland	432	70,470	2,628.67	0.495	0.072	0.026	0.324
Taiwan	1,892	207,115	478.38	0.234	0.056	0.027	0.484
Thailand	699	83,603	321.52	0.331	0.121	0.040	0.641
Turkey	391	47,394	553.96	0.260	0.130	0.028	0.920
UK	4,836	577,930	1,134.48	0.207	0.057	0.025	0.582
AVERAGE	960	113,321	1,006.49	0.392	0.536	0.101	0.486

The table reports statistics that describe the sample. For each of the 45 countries, we report the number of unique stocks, the number of stock-month observations, the CAPM Beta, the market capitalization (Size), the book-to-market ratio (B/M), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness for a particular stock during a particular month (IdioSkew). Both the beta and IdioVolt are obtained using daily returns over a six-month rolling window. Betas are calculated with the market return being the value-weighted market return for the stocks in a particular country. Idiovolt is calculated as the standard deviation of residual returns, where residual returns are the residuals from the daily CAPM regressions.

Turkey at 0.920, with a sample average of 0.486. Finding positive skewness for individual stocks on average is consistent with the findings in the U.S. data (see Harvey and Siddique (1999 and 2000) and Chen et al. (2001)).

To test the second hypothesis, we collect data from a variety of sources. From H2 Gambling Capital, a London-based consultancy, we obtain data from the 10 countries with the greatest gambling losses per adult.[3] We create an indicator variable to identify the countries that allow online gambling using data from a number of sources that we cross-checked for accuracy. From various census data, we obtain the numbers of Catholics and Protestants in each country in order to estimate the Catholic-to-Protestant (*CP Ratio)*

[3] Although we would prefer to have gambling losses per adult for every country in our sample, only the top 10 countries are publicly reported. This data does not vary through time and is reported for the year 2010.

Table 2
Fama-MacBeth regression coefficients by country

	Intercept	Beta	Ln(Size)	B/M	Momentum	IDIOVOLT	IDIOSKEW
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Australia	2.429***	-0.072	-0.329***	0.270***	1.129***	0.0163	-0.130**
Austria	1.274**	-0.091	-0.115	0.0203	1.761**	0.012	-0.542
Belgium	2.793***	0.502	-0.341***	0.041***	2.557***	-0.344***	-0.012
Brazil	4.746***	-0.446***	-0.580***	0.103***	3.949***	-0.092	0.423**
Canada	0.822	-0.134	-0.449***	1.037*	1.246	0.237*	-0.819**
Chile	2.520***	-0.005	-0.222**	0.103*	1.719**	-0.174***	0.014
China	1.276	0.787	-0.792**	0.598***	-1.267	0.324	0.252
Colombia	3.940**	0.234	-0.444	0.088	0.210	-0.192	0.216
CzechRep.	2.308**	-0.616	-0.033	0.179**	1.481	-0.824***	0.261
Denmark	1.359**	0.220	-0.175**	0.057***	2.648***	-0.052	-0.070
Egypt	10.413***	-2.846	-1.217***	-0.051	1.643	-0.345	-0.439**
Finland	20.061	-6.085	-1.878	-1.997	2.087***	0.121	-0.146
France	1.507***	0.024	-0.170***	0.082***	1.529***	0.037	-0.145**
Germany	1.295***	-0.242	-0.085**	0.039***	0.848***	0.021	-0.074**
Greece	3.293**	-0.252	-0.415**	0.095***	0.835	-0.000	-0.129
HongKong	2.593**	-0.117	-0.371***	0.332***	1.906***	0.109	-0.239***
Hungary	1.598	-0.364	-0.167	0.157	1.262	0.057	-1.207***
India	2.417*	-0.192	-0.265*	0.078***	1.222***	0.098	-0.125
Indonesia	3.103**	0.053	-0.548***	0.324***	0.655	0.047	-0.110
Ireland	2.579**	0.214	-0.301*	0.011	0.362	-0.136	0.041
Israel	5.298*	2.786	-0.972**	0.043	5.540**	-0.368	-0.525
Italy	1.563**	0.127	-0.099	0.034***	1.656***	-0.238**	-0.179***
Japan	2.814***	0.280	-0.290***	0.049***	0.527	-0.245***	-0.038
SouthKorea	2.897**	0.658	-0.869***	0.209***	6.271***	0.265	0.088
Luxembourg	1.548	-1.307	-0.049	0.040**	1.394	0.043	-0.340
Malaysia	1.369	0.047	-0.173	0.146***	0.720	-0.109*	-0.190***
Mexico	-0.098	-0.280	0.136*	0.151***	0.569	-0.053	0.115
Morocco	1.919	0.381	-0.127	0.027	4.203	-0.528	-0.077
Netherlands	3.110	-0.906**	-0.094	0.048***	5.077*	-0.053	-0.077
NewZealand	6.944*	1.494	-1.148	-0.813	10.664*	-1.142	-1.123
Norway	2.243***	-0.103	-0.244**	0.023*	2.200***	-0.014	-0.108
Peru	3.074**	0.310	-0.349***	0.049	0.280	-0.030	0.392**
Philippines	1.376	-0.527**	0.122	0.296	-3.916**	0.234***	-0.418
Poland	4.106**	-0.723	-0.459**	0.223***	2.834***	-0.343**	-0.268
Portugal	0.814	0.185	-0.184**	0.148***	0.515	0.078	0.052
Russia	-59.138	0.946	6.933	-0.373	-8.549	4.032	-0.651
Singapore	1.654**	0.094	-0.236**	0.311***	1.340***	-0.113	0.068
SouthAfrica	2.320***	0.151	-0.450***	0.224***	0.963**	0.056	-0.052
Spain	0.372	-2.804*	0.779	-0.049	-1.657	0.155	-0.033
Sweden	2.021***	-0.100	-0.212**	0.153***	1.797***	-0.078	-0.287***
Switzerland	0.037	0.882*	-0.283	0.083	-1.808	0.557	0.287
Taiwan	2.509**	0.652	-0.626*	0.207	1.462**	-0.032	0.163
Thailand	3.015***	0.253	-0.515***	0.171***	1.681***	-0.122**	-0.039
Turkey	1.901	0.996	-0.358*	0.254***	0.498	0.154	-0.627
UK	1.746***	0.101	-0.238***	0.121***	1.863***	-0.004	0.0302

The table reports the regression results from estimating the following equation.

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c}$$

The dependent variable is the return for stock i in month $t+1$, in country c. The independent variables, which are measured in month t, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). The regressions are estimated using a Fama and Macbeth, 1973approach. We denote statistical significance using asterisks based on Newey and West (1987) standard errors. *, ** and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

ratio. Finally, we obtain pertinent macroeconomic characteristics for each country from the World Bank. We obtain GDP per capita, income per capita, and consumption per capita from The World Bank. Definitions of how they calculate their variables can be found at data.worldbank.org.

4. Empirical results

4.1. The return premium associated with idiosyncratic skewness

We begin our analysis by examining the return premium associated with idiosyncratic skewness across the 45 countries in our sample. Given the varying cultural beliefs and attitudes toward gambling, we expect the significance and magnitude of the return premium to vary across country. Table 2 reports regression results from estimating the following equation country by country.

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c} \quad (2)$$

The dependent variable is the return for stock i in month $t+1$ in country c. The independent variables, which are measured in month t, include CAPM betas (*Beta*), the natural log of market capitalization (*Ln(Size)*), the book-to-market ratio (*B/M*), the past six-month return (*Momentum*), the idiosyncratic volatility (*IdioVolt*), and idiosyncratic skewness during a particular month (*IdioSkew*). We use a Fama and Macbeth (1973) approach to estimate regression coefficients by month while applying a Newey and West (1987) adjustment to standard errors.

Our main variable of interest is *IdioSkew*, which Kumar (2009) and Boyer et al. (2010) argue measures an important lottery characteristic. Using data from U.S. financial markets, these studies use various estimates of idiosyncratic skewness to capture lottery preferences and observe a significant negative relation between skewness and next-month returns, indicating that stocks with the greatest skewness in a particular month substantially underperform in the next month. This result is consistent with Barberis and Huang's (2008) theory that many investors' preferences for skewness engender price premiums leading to significant underperformance. A statistically significant negative coefficient on *IdioSkew* indicates that the lottery premium is negative.

Although the average coefficient on *IdioSkew* is -0.118, only 9 of the 45 countries exhibit coefficients that are significantly negative at the 5 percent level. In fact, idiosyncratic skewness in Brazil and Peru seems to have the opposite effect. The estimates for *IdioSkew* are 0.423 and .392 respectively, both of which are statistically significant at the 0.05 level. Of the 45 countries in our sample, 31 have negative estimates but only 9 of those are statistically different from zero. Our findings provide weak international support for the conclusions reached in prior research that discusses the significance of skewness preferences. Perhaps what is more important to our analysis is to identify country-specific factors that explain the presence of skewness premiums. Thus, the next step in our analysis is to try and put these differences in context by grouping countries based on other measures of gambling preferences and other macroeconomic characteristics.

A few other observations are in order before we leave Table 2. Column [3] shows that 29 of the 45 countries produce negative and significant coefficients on *Ln(Size)*. When examining the coefficients for *B/M*, we find that 30 countries produce positive and significant estimates, and only one country produces a negative coefficient. Of the 45 countries, 24 provide a momentum return premium, while only one country produces a negative and significant estimate for our measure of momentum. Seven countries provide negative coefficients on *IdioVolt*; one country, the Philippines, has a positive and significant estimate on *IdioVolt*. These results put the return premium associated with *IdioSkew* in context. It is reasonably strong relative to the other variables that have been shown to affect the predictability of monthly stock returns.

4.2. Cross-Country Gambling Attitudes and the Idiosyncratic skewness Premium

In this section, we begin to investigate country-specific factors that might influence the return premium associated with idiosyncratic skewness. In particular, we examine several proxies for attitudes toward gambling across countries, starting with gambling losses per adult. We can relate each country's skewness premium, estimated using equation [2], to the country's attitude toward gambling in the cross-section.

Table 3 identifies and presents data on the countries with the highest gambling loss per adult.[4] The top 10 countries by this measure are Australia, Singapore, Ireland, Canada, Finland, Italy, Hong Kong, Norway, Greece, and Spain. After grouping these 10 countries together, Table 3 reports the results from estimating Equation (2). We also report the coefficients for the grouping of securities within countries that are not ranked in the top 10 based on gambling losses per adult. Because there is a lot of variation between countries for the variables we measure, we estimate each specification with country fixed effects. Column [1] reports results for the countries with the top 10 gambling losses while Column [2] reports results for those countries not in the top 10. Consistent with other studies, we that market cap is negatively related to next-month returns while book-to-market ratios are positively related to next-month returns. These results hold across both subsamples. Consistent with our expectations, we find that attitudes toward gambling are associated with skewness premiums. In particular, we find that countries in the top 10 for gambling losses have a negative and significant coefficient on *IdioSkew* (-0.1105, t-stat = -2.46) while countries not in the top 10 have a positive and significant estimate on *IdioSkew*. In economic terms, a one-unit increase in idiosyncratic skewness in stocks from countries ranked in the top 10 based on gambling losses represents a reduction in next-month returns of 11 basis points. Given that the estimate on *IdioSkew* in column [1] is negative and significant and the estimate in column [2] is positive and significant, it is not surprising that the difference between these estimates is statistically significant. A test of the difference between these two coefficients (difference = -0.2158, z-statistic = -3.63) supports the idea that cultural attitudes toward gambling are driving the differences between the varying return premiums. The interpretation of our tests again implies that, to the extent that gambling losses per adult properly capture gambling attitudes in a particular country, countries with more favorable gambling cultures exhibit preferences for skewness found in Kumar (2009) and Boyer et al. (2010).

As means of robustness, we conduct a series of analysis where we include all observations from all of the countries in our analysis. We then identify top 10 gambling loss countries with an indicator variable (*HighGambLoss*) and interact this indicator variable with *IdioSkew*. If the interaction variable produces a negative and significant coefficients, then we will be able to infer that skewness

[4] We note that we only have the rankings for the top 10 countries based on gambling losses. These rankings were provided free of charge. Additional data that included the rankings of all countries in our sample was not available to the public.

Table 3
Fama-MacBeth regression results by gambling loss per adult

	Top 10 gambling losses	Non-top 10	All observations		
	[1]	[2]	[3]	[4]	[5]
Intercept	2.4396***	2.2001***	2.2564***	2.2587***	2.2534***
	(4.55)	(5.04)	(5.27)	(5.36)	(5.35)
Beta	-0.0141	0.0031	-0.0062	-0.0001	-0.0009
	(-0.10)	(0.04)	(-0.08)	(-0.01)	(-0.01)
Ln(Size)	-0.3425***	-0.3422***	-0.3415***	-0.3435***	-0.3438***
	(-5.84)	(-5.08)	(-5.65)	(-5.69)	(-5.69)
B/M	0.1225***	0.1429***	0.1406***	0.1399***	0.1399***
	(6.69)	(4.85)	(5.31)	(5.30)	(5.30)
Momentum	1.1709***	0.3040	0.3613	0.3534	0.3613
	(3.32)	(0.63)	(0.85)	(0.83)	(0.85)
Idiovolt	0.0552	0.1068**	0.0965**	0.0973**	0.0960**
	(1.25)	(2.31)	(2.35)	(2.36)	(2.33)
Idioskew	-0.1105**	0.1053***	0.0878**	0.0857**	0.1050***
	(-2.46)	(2.71)	(2.44)	(2.39)	(3.00)
Highgambloss				0.0489	0.1106
				(0.26)	(0.60)
Idioskew × Highgambloss					-0.1414**
					(-2.50)

The table reports Fama and Macbeth (1973) regression results with t-statstics from Newey and West (1987) adjusted standard errors for countries ranked on "Gambling Losses Per Adult". The formal equation that is estimated is given below:

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c}$$

The dependent variable is the return for stock *i* in month *t+1*, in country *c*. The independent variables, which are measured in month *t*, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). Columns [1] and [2] report the results when we estimate the above equation for those countries ranked in the top 10 in Gambling Losses while columns [3] and [4] show the results for those countries not ranked in the top 10 in Gambling Losses. Country fixed effects are included in each specification but not reported. *, ** and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

premiums are driven by countries with high levels of gambling losses. Columns [3] and [4] show the results before including the interaction estimate. Consistent with the inferences we draw from columns [1] and [2], we find that the interaction variable is -0.1414 (t-statistic = -2.50) in column [5]. These results suggest that, relative to the non-top 10 countries, countries with high gambling losses per adult generally have the most negative return premium associated with idiosyncratic skewness. Interestingly, we note that the positive estimate on *IdioSkew* indicates that there is positive return premium associated with idiosyncratic skewness in non-top 10 countries. Of course, a similar result is found in column [2]. Further, the positive coefficients on *IdioSkew* in columns [3] and [4] suggest that conditioning on countries with gambling losses per adult is important when identifying the skewness premium. With respect to the control variables, we again find significant size and value effects as the coefficients on *Size* and *B/M* are negative and positive, respectively. We also note that for the entire sample (columns [3] through [5]), the estimate for *IdioVolt* is positive and significant.

We recognize that while gambling losses per adult seem to capture a country's attitude towards gambling, it is not a perfect proxy. Therefore, we use several other measures of gambling attitudes within countries for robustness. For instance, Table 4 replicates our analysis in Table 3, but instead of grouping countries based on gambling losses, we group countries based on the legal allowance of online gambling. We note that 15 of the 45 countries in our sample have legal online gambling. Consistent with our previous findings, the countries that allow online gambling (column [1]) have a coefficient on *IdioSkew* that is negative and significant (estimate = -0.2989, *t*-statistic = -1.78). The countries that do not allow online gambling (column [2]) have a positive and significant coefficient (estimate = 0.0975, *t*-statistic = 3.13). We also note that the coefficients on the other control variables are similar to the corresponding coefficients in the previous table. Further, the economic magnitude of the coefficient in column [1] is stronger than the magnitude of the corresponding coefficient in Table 3. We again note that the difference between estimates is statistically significant (difference = -0.396, z-statistic = -2.32).[5]

As before, we estimate Equation (2) for all observations in all countries and include an indicator variable capturing whether or not a particular country has legal online gambling (*LegalOnline*) as well as an interaction variable between the indicator variable and *IdioSkew*. Column [5] presents the results from this full specification. Consistent with our findings in the previous table, we again find a negative and significant interaction estimate. The sign and magnitude of the other independent variables are similar to the corresponding coefficients in Table 3. Again, the negative coefficient on the interaction between *LegalOnline* and *IdioSkew* is consistent with the idea that any negative return premium that exists in international markets is driven by stocks in countries with a more

[5] The countries that allow online gambling are Australia, Belgium, Canada, France, Germany, Hungary, Ireland, Italy, New Zealand, Philippines, Poland, Russia, Singapore, Spain, and Switzerland.

Table 4
Fama-MacBeth regression results by countries with legal online gambling

	Legal online gambling	Illegal online gambling	All observations		
	[1]	[2]	[3]	[4]	[5]
Intercept	1.3838*	1.9743***	2.2564***	2.2561***	2.2424***
	(1.75)	(4.45)	(5.27)	(5.41)	(5.36)
Beta	-0.1485	-0.1143	-0.0062	0.0124	0.0115
	(-0.72)	(-1.07)	(-0.08)	(0.17)	(0.15)
Ln(Size)	-0.2938***	-0.2408***	-0.3415***	-0.3427***	-0.3432***
	(-4.09)	(-4.51)	(-5.65)	(-5.78)	(-5.82)
B/M	0.2259***	0.1050***	0.1406***	0.1421***	0.1419***
	(2.75)	(8.63)	(5.31)	(5.34)	(5.34)
Momentum	1.2642***	0.3348	0.3613	0.3769	0.3812
	(2.62)	(0.98)	(0.85)	(0.88)	(0.90)
Idiovolt	0.2404**	0.0636	0.0965**	0.0945**	0.0948**
	(2.04)	(1.02)	(2.35)	(2.27)	(2.28)
Idioskew	-0.2989*	0.0975***	0.0878**	0.0764**	0.1003**
	(-1.78)	(3.13)	(2.44)	(2.12)	(2.41)
Legalonline				0.0323	0.0889
				(0.16)	(0.46)
Idioskew × Legalonline					-0.0990*
					(-1.74)

The table reports Fama and Macbeth (1973) regression results with t-statstics from Newey and West (1987) adjusted standard errors for countries ranked on "Online Gambling". The formal equation that is estimated is given below:

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c}$$

The dependent variable is the return for stock i in month $t+1$, in country c. The independent variables, which are measured in month t, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). Columns [1] and [2] report the results when we estimate the above equation for those countries with legalized online gambling while columns [3] and [4] show the results for those countries without legalized online gambling. Country fixed effects are included in each specification but not reported. *, ** and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

favorable attitude towards gambling.

As a final indicator of gambling culture within countries, we follow Kumar et al. (2011) and use the ratio of Catholics to Protestants in a given country to proxy for gambling preferences. They assume that a higher proportion of Catholics relative to Protestants is associated generally with more favorable attitudes towards gambling. While Protestant teachings are generally against gambling, Catholics are generally more accepting of gambling. We use the definition of the *CP Ratio* as in Kumar et al. (2011), but in order to be ranked in the top 10, a particular country must have a combined percentage of Catholics and Protestants that is greater than 50% of the total population.[6] For example, Morocco has the highest *CP Ratio* and Israel has the 3rd highest ratio. However, these countries have a combined percentage of Catholics plus Protestants that is much lower than the 50% threshold and therefore, are not ranked in the top 10 based on the *CP Ratio*. We refrain from examining other religious definitions and focus on the *CP ratio* because it has been used in previous research and has a clearer interpretation with respect to gambling. We also want to avoid making judgments on the relative severity of gambling across different religious beliefs.

The countries with the highest *CP Ratio* that are above the threshold include Poland, Spain, Portugal, Luxembourg, Italy, Belgium, France, Ireland, Austria, and Mexico. Table 5 displays the results from estimating Equation (2) for the sample of securities in countries ranked in the top 10 and for the sample of securities in countries not ranked in the top 10 (based on the *CP Ratio*). Focusing our discussion on column [1], we find that while market cap produces a negative estimate and both book-to-market ratios and momentum produce positive estimates, the coefficient on *IdioSkew* is negative and statistically different from zero (estimate = -0.1195, *t*-statistic = -2.21). In economic terms, every one-unit increase in idiosyncratic skewness is associated with an almost 12 basis point reduction in next-month returns. These findings are again not only statistically significant, but they are also economically meaningful and comparable to our results using gambling losses per adult (Table 3). Column [2] shows that the coefficient on IdioSkew is positive and significant (estimate = 0.1029, *t*-statistic = 2.71). As before, we conduct a z-test and find that the difference between the coefficients on *IdioSkew* is reliably different from zero (difference = -0.222, z-statistic = -3.36). As before, we also conduct tests that include all observations from all countries in columns [3] through [5]. We include an indicator variable capturing countries in the Top 10 based on the *CP Ratio* as well as the interaction between *IdioSkew* and this indicator variable. Consistent with findings in the previous two tables, the interaction variable produces a negative and significant coefficient (estimate = -0.1037, t-statistic = -2.00)

The results in Tables 3 through 5 consistently indicate that, regardless of how we proxy for cultural attitudes toward gambling,

[6] The number of countries that are excluded from the analysis is 18. These countries include China, Czech Republic, Egypt, Greece, Hong Kong, India, Indonesia, Israel, Japan, South Korea, Malaysia, Morocco, Netherlands, New Zealand, Russia, Singapore, Thailand, and Turkey.

Table 5
Fama-MacBeth regression results by countries with the highest catholic-protestant ratio

	Top 10 CP ratio	Non-top 10	All observations		
	[1]	[2]	[3]	[4]	[5]
Intercept	1.5181***	2.2560***	2.2564***	2.2466***	2.2376***
	(3.16)	(5.10)	(5.27)	(5.21)	(5.19)
Beta	-0.0450	0.0067	-0.0062	-0.0015	-0.0033
	(-0.43)	(0.08)	(-0.08)	(-0.02)	(-0.04)
Ln(Size)	-0.1621***	-0.3552***	-0.3415***	-0.3406***	-0.3398***
	(-3.51)	(-5.45)	(-5.65)	(-5.65)	(-5.64)
B/M	0.0616***	0.1526***	0.1406***	0.1403***	0.1404***
	(6.72)	(5.09)	(5.31)	(5.32)	(5.31)
Momentum	1.6985***	0.2389	0.3613	0.3230	0.3241
	(4.80)	(0.52)	(0.85)	(0.76)	(0.76)
Idiovolt	0.1024*	0.1062**	0.0965**	0.0980**	0.0993**
	(1.70)	(2.43)	(2.35)	(2.41)	(2.45)
Idioskew	-0.1195**	0.1029***	0.0878**	0.0886**	0.0948***
	(-2.21)	(2.71)	(2.44)	(2.47)	(2.63)
HighCPRatio				0.0031	0.0508
				(0.02)	(0.25)
Idioskew × HighCPRatio					-0.1037**
					(-2.00)

The table reports Fama and Macbeth (1973) regression results with t-statstics from Newey and West (1987) adjusted standard errors for countries ranked on "Catholic-Protestant Ratio". The formal equation that is estimated is given below:

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c}$$

The dependent variable is the return for stock i in month $t+1$, in country c. The independent variables, which are measured in month t, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). Columns [1] and [2] report the results when we estimate the above equation for those countries with legalized online gambling while columns [3] and [4] show the results for those countries without legalized online gambling. Country fixed effects are included in each specification but not reported. *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

similar conclusions can be drawn. Namely, countries with more favorable attitudes toward gambling have investors who prefer lottery-like stocks, which results in negative return premiums in stocks with high idiosyncratic skewness. These results provide an important contribution to the literature that has found this effect in U.S. markets (Kumar (2009), Boyer et al. (2010), and Kumar et al. (2011)).

4.3. Macroeconomic Characteristics and Lottery Return Premiums

It is possible that our findings are based on the macroeconomic conditions in a particular country and that our proxies for gambling attitudes are simply capturing the differences between the wealthiest or most developed countries and the least developed countries. Therefore, we next condition the skewness return premium on different macroeconomic characteristics. Columns [1] and [2] of Table 6 present the results for the G7 countries (excluding the United States). These countries, which are considered the wealthiest countries in terms of net wealth, include: Australia, France, Germany, Italy, Japan, and the U.K. The 2013 Credit Suisse Global Wealth Databook reports that the G7 countries make up more than 60% of the world's wealth. Column [1] shows that when we estimate Equation (2) for this group of countries, we do not find a reliable estimate for *IdioSkew* (estimate = -0.0475, *t*-statistic = -0.45). Similar results are found in column [2] when we estimate Equation (2) for the group of countries not listed in the G7. At the bottom of these columns, we report the difference between the *IdioSkew* coefficients, which is not significantly different from zero (difference = -0.0714, z-statistic = -0.62).

Columns [3] and [4] show the results when we condition our analysis on membership in the G10 (except the U.S.). Membership in the G10 is based on a country's willingness to participate in the General Arrangements to Borrow (GAB). The GAB allows the International Monetary Fund to borrow from these countries' central banks and may signal an important level of economic development. When examining the results in the latter two columns, we do not find that the return premium associated with idiosyncratic skewness is explained by G10 membership. First, the coefficients on *IdioSkew* (in either column) are not reliably different from zero. Second, the difference between coefficients (at the bottom of columns [3] and [4]) is not statistically significant (difference = -0.0473, z-statistic = -0.45). Combined with findings in the previous two columns, it seems that membership in the G7 or the G10 is not a good predictor of which countries will or will not exhibit skewness preferences.

The results thus far indicate that broad differences in development do not drive the significant return premiums associated with idiosyncratic skewness. To pursue the analysis further, we next examine several other country-specific macroeconomic variables. Table 7 reports the results for these specific macroeconomic variables.

In Table 7, we rank countries based on GDP per capita, income per capita, and consumption per capita. Coefficients and

Table 6
Fama-MacBeth regression results by G7 countries and G10 countries

	G7 countries	Non-G7 countries	G10 countries	Non-G10 countries
	[1]	[2]	[3]	[4]
Intercept	1.4801**	1.8967***	1.2098*	2.1250***
	(2.27)	(3.84)	(1.77)	(4.17)
Beta	-0.2179	0.0083	-0.1581	-0.0573
	(-0.97)	(0.07)	(-0.72)	(-0.48)
Ln(Size)	-0.2388***	-0.2890***	-0.2168***	-0.3154***
	(-3.63)	(-4.83)	(-3.22)	(-4.74)
B/M	0.1450**	0.1304***	0.1397***	0.1322**
	(2.54)	(8.15)	(2.69)	(8.63)
Momentum	0.6187	0.7388**	0.6455	0.6930**
	(1.10)	(2.16)	(1.29)	(2.02)
Idiovolt	0.1611*	0.1234*	0.2475**	0.1135*
	(1.83)	(1.89)	(2.02)	(1.89)
Idioskew	-0.0475	0.0239	-0.0444	0.0029
	(-0.45)	(0.51)	(-0.48)	(0.06)
Diff idioskew	-0.0714		-0.0473	
	(-0.62)		(-0.45)	

The table reports Fama and Macbeth (1973) regression results with t-statstics from Newey and West (1987) adjusted standard errors for countries ranked on "G7 or G10 membership". The formal equation that is estimated is given below:

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c}$$

The dependent variable is the return for stock i in month $t+1$, in country c. The independent variables, which are measured in month t, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). Columns [1] and [2] report the results for G7 and non-G7 countries while columns [3] and [4] show the results for G10 and non-G10 countries, respectively. Diff IdioSkew tests the difference between the regression coefficients for IdioSkew between the respective models. Country fixed effects are included in each specification but not reported. *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

Table 7
Fama-MacBeth regression results by various macroeconomic characteristics

	GDP per capita		Income per capita		Consumption per capita	
	Top 10	Non-top 10	Top 10	Non-top 10	Top 10	Non-top 10
	[1]	[2]	[3]	[4]	[5]	[6]
Intercept	1.8610***	2.4489***	1.6272***	2.4479***	1.0904	2.0798***
	(4.40)	(5.22)	(3.94)	(5.13)	(1.50)	(4.34)
Beta	0.2062	0.0316	0.1524	0.0458	-0.0817	-0.0884
	(0.85)	(0.49)	(0.73)	(0.68)	(-0.32)	(-0.85)
Ln(Size)	-0.2320***	-0.3914***	-0.2059***	-0.3987***	-0.2162***	-0.2818***
	(-4.12)	(-5.64)	(-3.88)	(-5.65)	(-2.78)	(-5.18)
B/M	0.0438***	0.1809***	0.0500***	0.1880***	0.1499***	0.1273***
	(2.67)	(5.07)	(3.84)	(4.97)	(2.66)	(8.84)
Momentum	1.1000**	0.9731**	1.1629***	0.9198*	0.4821	0.9594***
	(2.35)	(2.00)	(2.59)	(1.87)	(0.86)	(2.75)
Idiovolt	0.0600	0.0453	0.1150	0.0434	0.2684**	0.0572
	(0.58)	(1.09)	(1.28)	(1.04)	(2.46)	(0.95)
Idioskew	0.0097	0.0434	-0.0388	0.0561	-0.0331	-0.0321
	(0.25)	(1.13)	(-0.89)	(1.45)	(-0.34)	(-0.87)
Diff idioskew	-0.0337		-0.0949		-0.0010	
	(-0.62)		(-1.63)		(-0.01)	

The table reports Fama and Macbeth (1973) regression results with t-statstics from Newey and West (1987) adjusted standard errors for countries ranked on various macroeconomic indicators. The formal equation that is estimated is given below:

$$Ret_{i,t+1,c} = \alpha + \beta_1 Beta_{i,t,c} + \beta_2 Ln(Size_{i,t,c}) + \beta_3 B/M_{i,t,c} + \beta_4 Momentum_{i,t,c} + \beta_5 IdioVolt_{i,t,c} + \beta_6 IdioSkew_{i,t,c} + \varepsilon_{i,t+1,c}$$

The dependent variable is the return for stock i in month $t+1$, in country c. The independent variables, which are measured in month t, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). Columns [1] and [2] show the results for countries ranked and not ranked in the top 10 based on GDP per capita. Columns [3] and [4] show the results for countries ranked and not ranked in the top 10 based on Income per capita. Columns [5] and [6] show the results for countries ranked and not ranked in the top 10 based on Consumption per capita. Diff IdioSkew tests the difference between the regression coefficients for IdioSkew between the respective models. Country fixed effects are included in each specification but not reported. *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

corresponding *t*-statistics obtained from estimating Equation (2) for these subsamples of stocks are reported in columns [1] through [6]. Uniformly, we do not find reliable coefficients on *IdioSkew* in any of the columns. Moreover, the differences between these subsamples are not significant. Thus, the analysis in Table 7 supports our conclusions from the previous table and suggests that differences in macroeconomic characteristics, such as per capita GDP, per capita income, and per capita consumption, do not explain the presence of skewness preferences in financial markets. We note that, in unreported tests, we replicate the analysis in column [5] of Tables 3 through 5 and include all observations from all countries with indicator variables capturing the most developed countries. We note that the interaction between indicators capturing economic development and *IdioSkew* does not produce a reliably negative coefficient in any of these robustness tests. When combined with our earlier results, our findings suggest that while gambling cultures matter when explaining skewness premiums, macroeconomic conditions, and development do not.

4.4. Robustness

In this subsection, we conduct a series of robustness tests. It is possible that the conclusions we draw from our analysis, thus far, is misguided simply because of the variation in a number of macroeconomic and societal characteristics across countries. To account for this possibility, we replicate our tests using U.S. data. In particular, we obtain data on whether or not state laws allow for a state lottery, commercial gambling, and sports betting. We also obtain the ratio of Catholics-to-Protestants. We then create an indicator variable (HighGamb) that captures states that have laws allowing for these various types of gambling as well as states ranked in the top 10 based on Catholics-to-Protestant ratio (as in Kumar (2009)). We then replicate our initial set of tests using a sample of firms that are most likely to have strong home bias. For instance, Coval and Moskowitz (1999) show that smaller stocks with higher leverage are likely to attract investment by local investors. We sort the universe of (the intersection of) firms from CRSP and Compustat into quintiles based on market capitalization and debt-to-equity ratios. We then denote firms that are in the lowest market cap quintile and the highest debt-to-equity quintile as firms that have strong home bias. In particular, we estimate the following equation using our sample of U.S. stocks.

$$Ret_{i,t+1} = \alpha + \beta_1 Beta_{i,t} + \beta_2 Ln(Size_{i,t}) + \beta_3 B/M_{i,t} + \beta_4 Momentum_{i,t} + \beta_5 IdioVolt_{i,t} + \beta_6 IdioSkew_{i,t} + \beta_7 HighGamb_{i,t} + \beta_8 IdioSkew_{i,t} \times HighGamb_{i,t} + \varepsilon_{i,t+1} \quad (3)$$

Table 8
Fama-MacBeth regression results using U.S. Data for Firms with "Strong Home Bias"

	[1]	[2]	[3]
Intercept	0.0134**	0.0122**	0.0120**
	(2.36)	(2.18)	(2.15)
Beta	-0.0002	-0.0001	-0.0001
	(-0.31)	(-0.13)	(-0.13)
Ln(Size)	-0.0013***	-0.0012***	-0.0012***
	(-3.00)	(-2.84)	(-2.83)
B/M	0.0615***	0.0660***	0.0660***
	(10.13)	(10.88)	(10.88)
Momentum	-0.0157***	-0.0161***	-0.0161***
	(-5.54)	(-5.69)	(-5.70)
Idiovolt	0.01873***	0.1856***	0.1865***
	(2.82)	(2.79)	(2.80)
Idioskew	-0.0007**	-0.0006*	-0.0005
	(-2.13)	(-1.83)	(-1.49)
Highgamb		0.0008	0.0022*
		(0.70)	(1.94)
Idioskew × Highgamb			-0.0033**
			(-1.98)

The table reports Fama and Macbeth (1973) regression results with t-statistics from Newey and West (1987) adjusted standard errors from estimating the following equation.

$$Ret_{i,t+1} = \alpha + \beta_1 Beta_{i,t} + \beta_2 Ln(Size_{i,t}) + \beta_3 B/M_{i,t} + \beta_4 Momentum_{i,t} + \beta_5 IdioVolt_{i,t} + \beta_6 IdioSkew_{i,t} + \beta_7 HighGamb_{i,t} + \beta_8 IdioSkew_{i,t} \times HighGamb_{i,t} + \varepsilon_{i,t+1}$$

The dependent variable is the return for stock *i* in month *t*+1. The independent variables, which are measured in month *t*, include CAPM betas (Beta), the natural log of market capitalization (Ln(Size)), the book-to-market ratio (B/M), the past six-month return (Momentum), the idiosyncratic volatility (IdioVolt), and the idiosyncratic skewness during a particular month (IdioSkew). HighGamb is an indicator variable equal to unity if a state is in the top 10 in the Catholic-to-Protestant ratio, has a state lottery, has legalized commercial gambling, and allows for sports betting–zero otherwise. To be included in the sample, firms has have strong home bias – or be small-cap stocks with high leverage. The table shows the results when including both on small cap firms (in the lowest quintile) and firms with the highest D/E ratio (in the highest quintile). *, ** and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels.

The dependent variable is the return for stock *i* in month $t+1$. The independent variables have been defined previous but in Equation (3), we estimate these variables using our sample of U.S. stocks. The results are reported in Table 8. As before t-statistics that are obtained from Newey-West standard errors are reported below each coefficient. The variable of interest, of course, is the interaction between HighGamb and IdioSkew. Consistency with our initial set of tests is found if the interaction variable produces a negative coefficient, which suggests that in states with more favorable attitudes towards gambling, firms with home bias that are headquartered in these states and also have more positive skewness in their return distribution will exhibit more negative stock returns. Consistent with this idea, we find that indeed the interaction estimate is negative and significant (estimate = -0.0033, t-statistic = -1.98). These results confirm the findings in Kumar (2009) that also show that the skewness return premium is strongest in U.S. regions with the most favorable gambling attitudes and suggest that the methods we use in an international setting also hold for U.S. firms.

We also conduct and discuss the findings from a set of additional, unreported tests that provide some robustness for the conclusions that we have drawn thus far. In a number of unreported tests, we conduct our analysis using the maximum daily stock return during a particular month (*MaxRet*) instead of idiosyncratic skewness. Bali et al. (2011) show that *MaxRet* has important explanatory power with respect to next-month returns. This variable might also capture preferences for lottery-type stocks. Of the 45 countries, we find that 25 of the countries have a significant negative coefficient on the variable *MaxRet*. Further, of the 15 countries that allow online gambling, 13 countries have significant negative estimates for *MaxRet*. We also find that countries with high gambling losses per adult and countries with the highest *CP Ratio* typically have the most negative coefficients on *MaxRet*. With respect to Tables 3 through 7, these results are not simply a function of more developed economies or other macroeconomic characteristics. The results from these unreported robustness tests support the conclusions that we are able to draw in this study and suggest that lottery preferences, whether measured by idiosyncratic skewness or maximum daily returns, are generally explained by the cultural attitudes towards gambling within each country.

In addition to using the *MaxRet* as the independent variable of interest in an international setting, we also replicate Table 8 but include *MaxRet* instead of *IdioSkew* as our variable of interest. Results from these unreported tests show that the interaction between *HighGamb* and *MaxRet* also produces a negative and significant coefficient (estimate = -0.0429, t-statistic = -1.80). Again, these results provide us with greater confidence that our results are not simply an artifact of either the observed variation in macroeconomic and societial differences across countries or the use of idiosyncratic skewness as the variable of interest. Instead our findings are robust to using U.S. data and daily maximum returns.

5. Conclusion

A growing body of research on the U.S. market has examined the role that skewness preferences play in affecting asset prices (Mitton and Vorkink (2007), Barberis and Huang (2008), Kumar (2009), Boyer et al. (2010), Bali et al. (2011), Kumar et al. (2011), Green and Hwang (2012), Boyer and Vorkink (2013)). We explore the relationship between idiosyncratic skewness and expected returns for a large sample of securities from 45 different countries. We find evidence that is consistent with the theory that lottery preferences lead to subsequent underperformance: 31 of the 45 countries exhibit negative lottery return premiums, with 10 (9) of those being statistically significant at the 0.10 (0.05) level.

What is more interesting is that cultures with more favorable attitudes towards gambling are more likely to have significant return premiums associated with idiosyncratic skewness. Countries with the most gambling losses per adult, legalized online gambling, and the highest proportion of the Catholics to Protestants tend to have the most significant skewness return premiums. We also document that more developed economies and countries with the highest per capita GDP, income, and consumption do not exhibit this relation.

Our results provide out-of-sample evidence for the presence of skewness preferences and corresponding return premiums. Further, our conclusion that a more receptive culture towards gambling leads to more significant return premiums extends the results in Kumar (2009) and Kumar et al. (2011). In a broader context, our study, combined with this growing body of literature, seems to suggest that traditional asset pricing theory, which relies on assumptions of mean-variance efficiency, might produce biased results to the extent that skewness preferences are not considered.

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