

RESEARCH

Assessing the Relative Magnitude of Premiums

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We examine the magnitude of the expected size, value, and profitability premiums relative to each other and across regions using monthly premiums from 1927 to 2020. We do not find reliable differences in expected premiums, individually or jointly, across the US, developed ex US, and emerging markets. We also do not find reliable differences across premiums within a region. As a result, we believe that investors should be cautious about favoring one premium over another or one region over another based on the magnitude of the expected premiums.

The existence of the size, value, and profitability premiums has been documented using decades of data around the world.¹ When studying the empirical evidence globally, a natural question to ask is: what can we say about the magnitude of the expected premiums relative to each other and across regions? For example, is the expected profitability premium larger or smaller than the expected value premium? Should we expect the size premium in emerging markets to be greater than the size premium in other regions?

While valuation theory says we should expect these premiums to be positive in every region, it does not provide clear predictions on their magnitude. To answer these questions, we conduct two sets of tests on the average size, value, and profitability premiums: one across regions and the other across premiums. The statistical tests used are inspired, in part, by Fama and French (2020), which tests the magnitude of the value premium across time.

Exhibit 1 presents the summary statistics of the premiums used in this study since the first full year available through December 2020. All the premiums were positive on average in the US, developed ex US, and emerging markets, confirming the pervasiveness of the premiums. In addition, all the t-statistics are greater than 2, indicating the average premiums are reliably positive.

EXHIBIT 1: Summary Statistics of Monthly Size, Value, and Profitability Premiums by Region, Through December 2020

Region	Size	Value	Profitability
US	1927-2020	1927-2020	1964-2020
Average (%)	0.25	0.31	0.22
Standard Deviation	3.13	4.05	2.51
t-Statistic	2.73	2.56	2.31
Developed ex US	1970-2020	1975-2020	1991-2020
Average (%)	0.38	0.32	0.26
Standard Deviation	2.32	2.60	1.86
t-Statistic	4.05	2.93	2.69
Emerging Markets	1989-2020	1989-2020	1992-2020
Average (%)	0.21	0.34	0.24
Standard Deviation	1.96	2.84	2.13
t-Statistic	2.10	2.36	2.08

Please see Appendix for the definition of each premium.

TESTS ACROSS REGIONS

In **Exhibit 2**, we test whether we can reliably differentiate the magnitude of each premium across regions using the longest periods possible. We first run two-sample t-tests for each premium and each region pair to examine whether the expected premium has the same magnitude between the two regions. For example, we test whether the expected size premium in the US is the same as the expected size premium in developed ex US markets. The average monthly difference in the size premium across the two regions is -0.13% with a t-statistic of -0.87. Hence, we cannot reject the hypothesis that the expected size premium is the same for the US market and developed ex US markets. Overall, the differences in average monthly premiums are small, and their t-statistics are below 2 in absolute value across the board, indicating that none of the differences in average premiums are robust. In other words, we cannot reject the hypothesis that expected premiums are the same between any two regions. In addition,

we run F-tests to see whether the individual premiums are the same across all three regions. The hypotheses are again not rejected, as shown by the small F-statistics and large p-values² in the bottom panel of Exhibit 2.

EXHIBIT 2: Summary of t-Tests and F-Tests for Monthly Return Differences in Size, Value, and Profitability Premiums Across Regions

Region	Size	Value	Profitability
US vs Developed ex US			
Average Difference (%)	-0.13	-0.02	-0.04
t-Statistic	-0.87	-0.08	-0.28
US vs Emerging Markets			
Average Difference (%)	0.04	-0.03	-0.02
t-Statistic	0.26	-0.15	-0.11
Developed ex US vs Emerging Markets			
Average Difference (%)	0.17	-0.02	0.03
t-Statistic	1.18	-0.10	0.18
All 3 Regions			
F-Statistic	0.58	0.01	0.04
p-Value	56%	99%	96%

Please see Appendix for the definition of each premium. Longest periods for each premium in each region are used in the tests.

Next, we consider all three premiums together and test whether the premiums in one region are jointly equal to the corresponding premiums in another region. **Exhibit 3** shows the results of two-sample Hotelling T² tests³ for comparison between each region pair as well as an F-test⁴ for comparison across all three regions. All the F-statistics are relatively small and the p-values are large, so we cannot reject the hypothesis that the expected size, value, and profitability premiums are jointly the same across the US, developed ex US, and emerging markets.

EXHIBIT 3: Summary of Hotelling T² Tests for Differences in Size, Value, and Profitability Premiums Jointly Across Regions

	US vs Developed ex US	US vs EM	Developed ex US vs EM	All 3 Regions
F-Statistic	0.22	0.41	0.06	0.28
p-Value	88%	75%	98%	95%

Please see Appendix for the definition of each premium. Longest common periods of premiums within each region are used in the tests.

TESTS ACROSS PREMIUMS

In this section, we examine the differences in expected magnitude across premiums using regional as well as global premiums over the longest periods possible, where the global premiums are calculated as the weighted averages of regional premiums based on historical regional weights. **Exhibit 4** summarizes the tests for each pair of premiums—size vs. value, value vs. profitability, and size vs. profitability—within each region and all regions combined. As indicated by the low t-statistics across all tests, there is little evidence suggesting that we should expect one premium to be reliably larger or smaller than another in any region.

EXHIBIT 4: Summary of t-Tests for Monthly Return Differences Across Size, Value, and Profitability Premiums

Region	Size vs Value	Size vs Prof	Value vs Prof
US			
Average Difference (%)	-0.05	0.03	0.09
t-Statistic	-0.36	0.23	0.51
Developed ex US			
Average Difference (%)	0.05	0.11	0.06
t-Statistic	0.38	0.80	0.38
Emerging Markets			
Average Difference (%)	-0.13	-0.03	0.10
t-Statistic	-0.75	-0.18	0.56
Global			
Average Difference (%)	0.02	0.02	-0.00
t-Statistic	0.19	0.15	-0.03

Please see Appendix for the definition of each premium. Longest periods for each premium in each region are used in the tests.

The lack of a reliable performance difference between any two premiums is further confirmed by the F-tests shown in **Exhibit 5**, which test the equality of expected magnitude across all three premiums jointly. With the small F-statistics and the large p-values, we again fail to reject the hypothesis that the expected size, value, and profitability premiums have the same magnitude in each region and globally.

EXHIBIT 5: Summary of F-Tests for Differences Jointly Across Size, Value, and Profitability Premiums

All Three Premiums	US	Developed ex US	EM	Global
F-Statistic	0.15	0.28	0.33	0.28
p-Value	86%	76%	72%	95%

Please see Appendix for the definition of each premium. Longest periods for each premium in each region are used in the tests.

INVESTMENT IMPLICATIONS

What can we conclude from this study? We do not find that the expected premiums are reliably different relative to each other or across the US, developed ex US, and emerging markets. In other words, the evidence does not support favoring one premium over another or one region over another based on the magnitude of the expected premiums. On the other hand, our results reinforce the predictions of valuation theory: the size, value, and profitability premiums are reliably positive across markets, and investors can target these premiums systematically in the pursuit of higher expected returns.

1. See, for example, Fama and French (1992, 1993, 2006, 2015, and 2017), Robert Novy-Marx (2013), O’Reilly and Rizova (2013), Rizova and Saito (2019).
 2. In hypothesis testing, a p-value below 5% is typically considered strong evidence against the null hypothesis.
 3. The two-sample Hotelling T² test is a multivariate extension of the two-sample t-test.
 4. The F-test for 3 regions is a multiple-group generalization of the Hotelling T² test.

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APPENDIX

Size premium is calculated as the return difference between a small cap index and a large cap index. The following indices are used in this study.

- US: small caps represented by the Dimensional US Small Cap Index from 06/1927 to 12/2020 and the Fama/French US Small Cap Index from 01/1927 to 05/1927. Large caps represented by the Fama/French US Large Cap Index.
- Developed ex US: small caps represented by the Dimensional International Small Cap Index. Large caps represented by the Fama/French Developed ex US Large Cap Index from 07/1990 to 12/2020, the Fama/French International Index from 01/1975 to 06/1990, and the MSCI World ex USA Index from 01/1970 to 12/1974.
- Emerging Markets: small caps represented by the Dimensional Emerging Markets Small Cap Index. Large Caps represented by the Fama/French Emerging Markets Large Cap Index from 07/1989 to 12/2020 and the Fama/French Emerging Markets Index from 01/1989 to 06/1989.
- Global: small caps represented by the weighted average of US, developed ex US, and emerging markets small caps as defined above from 01/1975 to 12/2020 based on historical regional weights (emerging markets included starting in 01/1989), and the Dimensional Global Small Index from 01/1970 to 12/1974. Large caps represented by the weighted average of US, developed ex US, and emerging markets large caps as defined above from 01/1975 to 12/2020 based on historical regional weights (emerging markets included starting in 01/1989) and the MSCI World Index from 01/1970 to 12/1974.

Value premium is calculated as the return difference between the Fama/French Value Index and the Fama/French Growth Index in each region. Global value premium is calculated as the weighted average of the regional value premiums from 01/1975 to 12/2020 based on historical regional weights (emerging markets included starting in 01/1989).

Profitability premium is calculated as the return difference between the Fama/French High Profitability Index and the Fama/French Low Profitability Index in each region. Global profitability premium is calculated as the weighted average of the regional profitability premiums from 01/1991 to 12/2020 based on historical regional weights (emerging markets included starting in 01/1992).

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Dimensional US Small Cap Index was created by Dimensional in March 2007 and is compiled by Dimensional. It represents a market capitalization-weighted index of securities of the smallest US companies whose market capitalization falls in the lowest 8% of the total market capitalization of the eligible market. The eligible market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: non-US companies, REITs, UITs, and investment companies. From January 1975 to the present, the index excludes companies with the lowest profitability and highest relative price within the small cap universe. The index also excludes those companies with the highest asset growth within the small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. Source: CRSP and Compustat. The index monthly returns are computed as the simple average of the monthly returns of 12 subindices, each one reconstituted once a year at the end of a different month of the year. The calculation methodology for the Dimensional US Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

Fama/French US Small Cap Research Index:

July 1926-present: Fama/French US Small Cap Research Index. Courtesy of Fama/French from CRSP and Compustat securities data. Includes NYSE securities (plus AMEX equivalents since July 1962 and NASDAQ equivalents since 1973) in the lower 50% market equity range of NYSE firms; rebalanced annually in June.

Fama/French US Large Cap Research Index:

July 1926-present: Fama/French US Large Cap Research Index. Courtesy of Fama/French from CRSP and Compustat securities data. Includes NYSE securities (plus AMEX equivalents since July 1962 and NASDAQ equivalents since 1973) in the upper 50% market equity range of NYSE firms; rebalanced annually in June.

Dimensional International Small Cap Index was created by Dimensional in April 2008 and is compiled by Dimensional. July 1981–December 1989: It Includes non-US developed securities in the bottom 10% of market capitalization in each eligible country. All securities are market capitalization weighted. Each country is capped at 50%. Rebalanced semiannually. January 1990–present: Market capitalization-weighted index of small company securities in the eligible markets, excluding those with the lowest profitability and highest relative price within their country's small cap universe. The index also excludes those companies with the highest asset growth within their country's small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four subindices, each one reconstituted once a year at the end of a different quarter of the year. Prior to July 1981, the index is 50% UK and 50% Japan. The calculation methodology for the Dimensional International Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

Fama/French Developed ex US Large Cap Index:

July 1990–present: Courtesy of Fama/French from Bloomberg data. Market cap weighted index of companies comprising the largest 90% of developed ex US market cap; rebalanced annually in June.

Fama/French International Market Index: January 1975–present: Fama/French International Market Index. Source: Ken French website. Simulated from MSCI and Bloomberg data.

Dimensional Emerging Markets Small Index was created by Dimensional in April 2008 and is compiled by Dimensional. January 1989–December 1989: Fama/French Emerging Markets Small Cap Index. January 1990–present: Dimensional Emerging Markets Small Cap Index composition: Market capitalization-weighted index of small company securities in the eligible markets, excluding those with the lowest profitability and highest relative price within their country's small cap universe. The index also excludes those companies

with the highest asset growth within their country's small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four subindices, each one reconstituted once a year at the end of a different quarter of the year. Source: Bloomberg. The calculation methodology for the Dimensional Emerging Markets Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

Fama/French Emerging Markets Large Cap Index:

July 1989–present: Fama/French Emerging Markets Index. Courtesy of Fama/French from Bloomberg and IFC securities data. Float-adjusted market cap weighted index of companies comprising the largest 90% of float-adjusted market cap in each emerging market; rebalanced annually in June. Fama/French and multifactor data provided by Fama/French.

Fama/French Emerging Markets Index: January 1989–present: Fama/French Emerging Markets Index. Courtesy of Fama/French from Bloomberg and IFC securities data. Companies weighted by float-adjusted market cap. Fama/French and multifactor data provided by Fama/French.

Dimensional Global Small Index was created by Dimensional in April 2008 and is compiled by Dimensional. January 1970–June 1981: 50% Dimensional US Small Cap Index, 50% Dimensional International Small Cap Index. July 1981–December 1989: Dimensional US Small Cap Index and Dimensional International Small Cap Index combined using Small Portfolio Weights. January 1990–present: Dimensional Global Small Index: Market capitalization-weighted index of small company securities in the eligible markets, excluding those with the lowest profitability and highest relative price within their country's small cap universe. The index also excludes those companies with the highest asset growth within their country's small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four subindices, each one reconstituted once a year at the end of each quarter of the year. Maximum index weight of any one company is capped at 5%. Countries currently included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, and United States. Exclusions: REITs and Investment Companies. Source: Bloomberg. The calculation methodology for the Dimensional Global Small Index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index.

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