

Diversification Benefits of European Small-Cap Stocks After the Global Financial Crisis and Brexit

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A Thesis

in The John Molson School of Business

Presented in Partial Fulfillment of the Requirements

For the Degree of Master of Science in Finance at

Concordia University

Montreal, Quebec, Canada

February, 2019

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CONCORDIA UNIVERSITY
School of Graduate Studies

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Entitled: Diversification Benefits of European Small-cap Stocks
after the Global Financial Crisis and Brexit

and submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN FINANCE

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ABSTRACT

Diversification Benefits of European Small-caps Stocks

After the Global Financial Crisis and Brexit

Nguyen Tien Dat

In this paper we investigate the diversification gains obtained from investing in European small-cap stocks, focusing on the periods since the Global Financial Crisis and Brexit. We find mixed evidence to support the assertion that European small-caps provide diversification benefits to a benchmark portfolio of large US stocks. The benefits are further reduced when benchmark assets include both a US large-cap portfolio as well as a portfolio of European large-cap stocks. After Brexit, US investors achieve diversification benefits from investments in European large-cap stocks. However, after Brexit, small-cap stocks from only one country in the EU are shown to provide further diversification gains.

ACKNOWLEDGEMENT

I would like to thank my supervisor, Dr. Lorne Switzer, for his patience, encouragement and assistance throughout my thesis. His suggestions during the planning and development of this thesis are invaluable and constructive.

Then, I want to thank my committee members for their patience and guidance: Dr. Alan Hochstein and Dr. David Newton. I would also like to extend my thanks to Dr. David Newton for his suggestions and help with using the SAS system.

Finally, I wish to thank my parents and all my classmates for their support and encouragement throughout my study.

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1. Introduction

Since the advent of Modern Portfolio Theory (Markowitz, 1952), fund managers and investors alike have sought to diversify and minimize risks by allocating their portfolios into different asset classes. By spreading their investments into different assets with different risk profiles, they are able to diversify away some of the idiosyncratic risk of each asset and enjoy a lower overall portfolio risk

One of the ways to diversify risk for a US investor is to invest internationally. Europe is a popular destination for US investors who want to increase their stakes in the international market due to the cross-cultural and investment environment similarities between regions. Indeed, many academic studies that look into diversification into some European stocks (Driessen and Laeven, 2007; Eun, Huang, and Lai, 2008a, 2008b; Gilmore and McManus, 2002; Otten and Bams, 2002; Switzer and Fan, 2007) show that European small-cap stocks may provide diversification benefits when added to a portfolio of US stocks.

However, these studies ignore the impact of fundamental structural changes and shocks that could fundamentally change the risk profile of the asset classes examined. Over the past decade (2008-2018), Europe has experienced two major structural shocks: the global financial crisis and Brexit. The latter threatens the existence of European Union itself as the withdrawal of United Kingdom could trigger a chain reaction and lead to the dissolution of the European Union.

In light of these events, in this paper we propose to re-examine the diversification benefits of European small-cap stocks using the recent stock market data that extend to December 2018. We find that while some European small-cap indexes could add diversification benefits to a US large-cap portfolio before the global financial crisis, these benefits diminish over time. After Brexit, diversification benefits from European large cap stocks can be shown. However, small-cap stocks from only one country in the EU are not spanned by a composite large-cap benchmark that is reflective of large-cap investors in both the US and Europe. The remainder of the paper is organized as follows. In the next section we provide a brief review of the literature and provide

some historical background for the hypotheses to be tested. In section 3 we discuss the methodology and data used in the analyses. The empirical results are shown in section 4. The paper concludes with a summary in section 5.

2. Literature Review and Hypothesis

2.1 Literature Review

2.1.1. Diversification Benefits of European Small-Caps

Issues surrounding the benefits of international diversification have been of considerable interest to academics and practitioners for several decades. Due to differences in economic, cultural, social and governmental risks, it is a common presumption that there should be a low correlation between returns of the US vs, European stock markets (Gilmore and McManus (2002)). Hence, from the perspective of modern portfolio theory, there should be significant diversification benefits to be realized for US investors who invest internationally into European markets.

A number of studies have looked at diversification benefits for small-caps both within Europe, and internationally. Otten and Bams (2002) show that European mutual funds that invest in small-caps stock do add value when adjusted for risk. They suggest that this out-performance is significant and persistent over time. Petrella (2005) uses mean variance spanning tests using monthly data to test the properties of small-caps European stocks as a separate asset class. Using a four-year sample (1998-2002) he shows that Euro small-cap stock are truly autonomous asset classes, with robust results to alternative benchmarks that include euro large-cap stocks, international asset classes and US small-cap stocks.

Subsequent studies document diversification benefits from investing in international small-caps from an US investor perspective. Eun, Huang, and Lai (2008) find that large-cap international stocks tends to co-move with market indices, which cancels out any diversification benefit from investing internationally. They also demonstrate that stocks of small locally oriented companies

do not exhibit this behavior. Diversification benefits into small-caps are demonstrated, even with market frictions taken into account.

Switzer and Fan (2007) apply the spanning tests on portfolios of small-caps stocks of G7 countries and find that some of these portfolios can behave as separate asset classes and have diversification benefits.

However, these observations might have neglected certain characteristics of small-caps stock such as that they display negative co-skewness with other indices during bear markets (Guidolin and Nicodano (2009)). These risks of small-cap stock during bear markets are coined “variance risk” and they might have an effect on the expected return as is shown in Acharya and Pedersen (2005) and they command a risk premium on average of 3.60 percent per year (Harvey and Siddique (2000)). An investor may dislike small-cap stocks because they fail to provide liquidity when it is needed the most, i.e. when the market is bearish. Guidolin and Nicodano (2009) show that optimal weights are dependent on the observability of the state of the market: the optimal weight of European small-caps when the state is unobservable is always less than 50%, compared to close to 90% when the states are myopically predictable.

Indeed, as bear markets may extend for a long period of time, we can find high extreme negative returns across countries as is shown in Longin and Solnik, (2001) and Campbell, Koedijk, and Kofman, (2002). Longin and Solnik, (2001) find that during the period from 1959 to 1996, the correlations of large positive returns decrease and converge to zero but those of large negative returns increase with the threshold level. Similarly, Ang and Chen (2002) confirm this correlation asymmetry between individual US stocks and the aggregate US market, with correlation conditional on a downside market differing from that implied by a normal distribution by 11.6%. This asymmetry is exaggerated for small-cap stocks, value-stocks and past loser stocks, with the null hypothesis for multivariate normal distributions rejected at daily, weekly and monthly intervals.

There is also considerable evidence that shows that benefits can change considerably over time as the long-term correlation of equity markets experiences major shifts. Goetzmann, Li, and

Rouwenhorst (2001) study the correlation structure of major equity markets over 150 years and decompose diversification benefits to two components: variation in the opportunity set and variation in the correlation matrix. They find that the diversification benefits are linked with the level of economic integration of world markets.

Yarovaya and Lau, (2016) analyze the co-movements of international portfolios from an UK investor perspective and find that diversification benefits are absent around crisis periods and that negative market shocks cause higher dependency among different markets.

In a more recent study, Switzer and Tahaoglu (2015) find that most small-cap indices across countries are spanned by a benchmark portfolio that includes the corresponding national large-cap index. That is, a portfolio that holds both US stocks and large-cap stocks of a country does not receive diversification benefits from the inclusion of small-cap stocks of that country.

As market states can have such a large impact on the return characteristics and diversification opportunities for small-cap portfolio, a brief look at the economic and political climate of Europe during the previous decade could shed light into the recent contradictory findings on diversification benefits of European small-caps.

2.1.2. The Economy of European Union in the Past Decade (2008-2018)

Over the past decade, the European Union has suffered from multiple crises, some of them originating within Europe and some that are external. One could assert that the risks involved in investing in the Europe have increased as the political and economic certainty of the European Union are called into question. To the extent that markets capture these uncertainties, this could be reflected in the empirical analyses of this paper.

Global Financial Crisis

From the beginning of 2007, the economies of a number of countries in the Eurozone began to show signs of malaise, if not contraction. What began as an economic slowdown, developed into a Global Financial crisis of 2007-08 triggered with the peak of the subprime mortgage crisis bubble

on February 2007.¹ The financial crisis had a devastating effect on European banks, who are faced with slow recovery due to a lack of a harmonized and on time bailout by the European Union. The European Union ultimately provided funding amounting to 1.6 trillion euros to bailout its failing bank, out of the 5 trillion euro approved. The majority of this aid is concentrated in 9 countries: United Kingdom, Germany, Denmark, Spain, Ireland, France, Belgium, Netherlands and Greece.²

In the aftermath of the crisis, as discussed in Lee, Wang, and Switzer (2019), despite the recovery of a number of European markets, several European countries remained the focus of ongoing instability, with major bank failures, and recapitalizations, overlapping with the European debt crisis. Lee Wang and Switzer (2019) demonstrate that in countries that were the focus of protracted financial instability the behavior of investors in terms of portfolio flows to equity funds was not consistent with that of investors in their healthier counterparts.

During the period of the global financial crisis, small and medium-sized enterprises (SMEs) in Europe found themselves to be especially vulnerable to financial risks as they struggled to find credit supply or renew their long-term debt. This can cause a major variation in their debt structure as well as financial hardship (Vermoesen, Deloof, and Laveren, 2013). After the global financial crisis, European businesses were soon confronted with a new crisis: Brexit.

Brexit

Brexit is a portmanteau term that represents the withdrawal of United Kingdom from the European Union on March 29th, 2019. The timeline for Brexit begins on January 23rd 2013 with the interview of Prime Minister David Cameron with Bloomberg, where he proposed an in-out referendum on the question of the UK's continuing as a member of European Union (Walker, 2019). The result is well-known: on June 23rd 2016, the UK held its referendum, and with a 72.21% turnout and

¹ Amadeo, Kimberly. "[Here's How They Missed the Early Clues of the Financial Crisis](#)". *The Balance*. Retrieved 2018-12-25.

² EU bank bailout breakdown – how 1.6 trillion euros were allocated. (2013, September 30). Retrieved January 31, 2019, from <https://blogs.thomsonreuters.com/answerson/eu-bank-bailout-trillion-euros-allocated-graphic/>

51.89% of voters cast their ballots in favor of leaving the EU. Since then, the process of Brexit has been mired with uncertainty, including calls for further renegotiations with the EU.³

Several recent studies have suggested that Brexit will harm the UK economy (Breinlich, Dhingra, Sampson, and Van (2016); Busch and Matthes (2016); Dhingra, Ottaviano, Sampson, and Reenen, (2016); Sampson (2017); UK Treasury (2016), with projected declines in per-capita GDP ranging from 1% to 10%.

It has been suggested that the withdrawal of the United Kingdom will strengthen the protectionist bloc led by Germany, which may lead to the restructured European Parliament to increase the regulatory burdens of member states, as well as to increase member-state contributions, tax harmonizations as well as to increase taxes that would harm investors, such as a financial transaction tax (see e.g. Patel and Reh (2016)).

With the withdrawal of United Kingdom from the European Union on March 29, 2019 the risks of an adverse reconfigured arrangement (no-deal/suboptimal alternative trade configuration) between the UK and the EU are high. Some financial commentators have suggested that while UK stocks and the British pounds suffer from discounts from the risk of the no-deal Brexit, there exist risks as well as opportunities in investing in the UK market as well as the British pounds in this environment.⁴

2.1.3. The Gap in Existing Literature

While a few recent studies have explored the effects of the post-financial crisis period in terms of portfolio flows of European investors, their impact for US and foreign investors in terms of risk, returns, and diversification opportunities remains to be explored. This paper aims to fill in the extant gap by reexamining the question of international diversification into European small-cap equities using a dataset encompasses two major events that have affected the Eurozone: the global

³ This would include a proposal of the British Labour party to keep close economic ties with the bloc even after Britain leaves the EU. The governing Conservative Party has rejected this option, to date, however See <https://www.wsj.com/articles/as-brexits-clock-ticks-down-may-plays-for-time-11549987738>

⁴ See e.g. Crowe, P. (2019, January 15). Future Returns: What Brexit Means for Investors. Retrieved February 20, 2019, from <https://www.barrons.com/articles/future-returns-what-brexits-means-for-investors-01547567863>

financial crisis and Brexit. These results can serve as a further robustness test for studies that have identified significant diversification gains from small-caps European stocks in the past.

2.2. Hypothesis

Hypothesis 1: The correlations between the S&P500 and European small-cap indices will increase after the global financial crisis but it will not increase further after Brexit.

As investor perception of market performances after the global financial crisis turns bearish, we expect the correlation European small-cap stock indices and the US stock index to increase and reach an all-time high after the global financial crisis. However, we also hypothesize that this correlation increase will not be sustained further after Brexit as after the market correction during the global financial crisis, the European markets and the US are already highly correlated. With this in mind, and any major risk such as the potential dissolution of the European Union would have already been priced into the market by investors. Consequently, the announcement of Brexit should not significantly increase of the risk of investing in European small-cap indices and subsequently should not increase the co-movement between the European small-cap markets and the US market.

Hypothesis 2: The diversification benefit of small-caps European stocks will decrease after the Global Financial Crisis and it will decrease even further after Brexit.

With the new political and economic risks introduced by the global financial crisis and Brexit into Europe, we hypothesize that the diversification benefits of small-cap European stocks found in previous studies would be diminished. This is a consequence of the negative co-skewness exhibited by small-cap stocks during periods of bear markets and that the amplification of their co-movements with each other and with the general market during such periods. Consequently, we would expect diversification gains from investing in European small-cap stocks to decrease after the Global Financial Crisis and to decrease even further after the announcement of Brexit.

4. Data and Methodology

4.1. Data Description

4.1.1. Economic, Social and Governance Indicators for Countries in the Sample

Table 1 provides a number of economic, social and corporate governance indicators for the 14 European countries in our sample as well as the United States at the end of 2018. There is considerable variability in terms of these indicators across countries within the European Union, Ireland has the highest GDP per capita at \$69,330.69 and Greece has the lowest at \$17,975.87. In terms of unemployment, there is a wide variation in our sample, with the highest being Greece at 21.07% and the lowest being Germany at 3.72%. The country with the lowest level of income inequality in our sample is Finland with a GINI coefficient of just 27.1. The United Kingdom ranks highly in terms of corporate ethics and corporate governance, based on World Bank rankings. On the other hand, Spain, Italy, Portugal, and Greece have low ratings in terms of both ethics and governance. France also rates poorly in terms of corporate ethics.

[Insert Table 1 Here]

4.1.2. Data Description and Descriptive Statistics

The return series used for the sample are obtained from Morning Star Direct and are constructed and maintained by Standard and Poor (S&P). The S&P total return index database provides stock market data adjusted for split, mergers, buy back as well as dividends and is normalized into US Dollars. The monthly return data obtained spans the period from January 1st 1994 to December 31st 2018. Our tests are run over three sample periods. The first period is the period leading up to and including the global financial crisis from January 1994 to March 2009. The second period is the interim period after the global financial crisis and before Brexit from April 2009 to January 2013. The last period is the post-Brexit period from February 2013 to December 2018.

Because our study involves Brexit which is an event that pertains directly to member states of the European Unions, we restrict our sample to European countries which are member of the European Union throughout our period of analysis. There are 14 countries in total that meet these criteria and that have data available from S&P.⁵ The methodology used to classify stocks into large-caps and small-caps follows the guidelines is documented by S&P for global BMI and IFCI.⁶ Stocks are ranked based on their free float-adjusted market capitalization with the first 70% total market capitalization allocated to large-cap, the next 15% allocated to mid-cap and the final 15% allocated to small-cap stocks.

Figure 1 shows the Total Return series for the indices examined for the complete sample period, Jan. 1996- Dec. 2018. Greece is the worst performing country in the sample, and diverges considerably from the other countries particularly after November 2009. With a few exceptions, most indices of the sample recover from a market wide trough experienced in February 2009.

[Insert Figure 1 Here]

Descriptive statistics of these return data series is summarized below.

[Insert Table 2 Here]

For our small-cap indices complete sample, the S&P Small-Cap total return for Denmark provide the highest mean and median returns at 1.23718 and 1.56057 respectively. The small-cap index of Greece provides the lowest mean and median return is at just 0.34566 and 0.41595 respectively. In terms of volatility, all indices experienced wide swing in returns ranging from -35.645% to 33.8426%. Greece has the highest standard deviation at 10.0207% and the United Kingdom has the smallest standard deviation at 4.17171%. All return series are negatively skewed, indicating extreme negative return compared to expected by normal distribution. Interestingly, the standard deviation of UK series is actually at its lowest level during the post-Brexit period at just 3.68302%.

⁵ A few countries that joined the EU in 2015 are also included in the sample.

⁶ S&P global bmi S&P/ifci methodology - Google Search. (n.d.). Retrieved February 21, 2019, from <https://us.spindices.com/documents/methodologies/methodology-sp-global-bmi-sp-ifci-indices.pdf>

4.2. Methodology

4.2.1. Mean Variance Spanning Test

The standard mean variance spanning was developed by Huberman and Kandel (1987). This likelihood ratio test is used to determine if the minimum-variance frontier of N test assets span that of K benchmark assets. That is, if N test assets expand the minimum-variance frontier if added to the portfolio of K benchmark assets.

The multivariate test is a regression of the test assets on benchmark assets

$$r = \alpha + \beta R + E$$

where

r is a $T \times N$ vector of the returns of the test assets

R is a $T \times K$ matrix of the returns of the K benchmark assets

α is the estimated intercept of the regression for benchmark asset

β is coefficient vector of benchmark assets

E is a $T \times N$ vector of the error terms ε_t

The null hypothesis for the spanning test is:

$$H_0: \alpha = 0; \Sigma\beta = 1$$

We consider that the test asset does not add to the benchmark asset if the intercept of the regression is not statistically different from zero and the test asset can be represented as a linear combination of all benchmark assets.

4.2.2. Research Methodology

To test the diversification benefit of the test asset, we will run a regression of the test asset on benchmark assets. If the spanning test for the test asset the null hypothesis, meaning that there is diversification benefit to be gained from the small-cap index, then the index is added to the benchmark portfolio.

The order with which the spanning test is run is based on the stock market capitalization of the originating country. For our starting benchmark portfolio, we will use the S&P 500 index. Then we will run the spanning test with all the European large-cap indices to determine if the S&P 500 with all the large-cap indices is a separate benchmark.

From then, we will first run the spanning test for our full sample to test for diversification benefit across the whole sample up until December 31st 2018 with all the European small-cap indices and the Russell 2000 small-cap US index.

Then we will run our spanning test on split samples for three periods. The first period is the period leading up to and including the global financial crisis from January 1994 to March 2009. The second period is the interim period after the global financial crisis and before Brexit from April 2009 to January 2013. The last period is the post-Brexit period from February 2013 to December 2018. The spanning results of these three sub samples will be compared to verify if diversification benefits still remain after the crisis.

4. Empirical Results

4.1. Pearson Correlation Statistics

Table 3 shows the Pearson Correlation Statistics table for the whole sample and sub samples. Panel A shows us the results for the complete sample, panel B shows us the results for the period leading up to and including the global financial crisis, panel C shows us the results for the interim period after the global financial crisis and before Brexit and panel D shows us the results for the post-Brexit period.

As we can see from the table, the correlation between US and European small-caps remains high throughout our sample. The European small-caps are more highly correlated among each other than they are with the US, with some as high as 0.90966 (Netherlands vs France) or 0.88859 (Netherlands vs Germany). All correlations among the European small-cap indices are over 0.5.

Correlation between the US and European small-caps are also high, with the highest being 0.72409 (US vs Netherlands) and the lowest being 0.4701 (US vs Greece).

Through time, we can clearly see a distinct increase in correlations between the US index and European small-caps indices as well as among European small-cap indices. These correlations reach their highest levels during the interim period after the global financial crisis but before Brexit due to the bear market from the global financial crisis. This confirms our hypothesis that European small-cap stocks are highly correlated with the market during periods of bear markets.

However, we can also see that the correlations level off and even decrease after the interim period after the Brexit event. Given that the correlations among the European small-caps and with the S&P 500 were already high before Brexit, it is no surprise that correlations decrease as such large risk as the dissolution of the European Union would have been priced in after the market correction from the global financial crisis. In other words, Brexit risk is too small compared to the risks imposed by the global financial crisis, making the impact of Brexit after the interim period on the correlations negligible.

[Insert Table 3 Here]

The result from the Pearson Correlation Statistics is in line with what we expect from first hypothesis. The correlations of small-cap European indices with the US market and among themselves increase after the bear market of 2008-2009 but these correlations do not increase further after Brexit as the risk of Brexit is pale in comparison to the risk of the global financial crisis. The market has thus already priced in the Brexit risk during the interim period and hence we do not see a dramatic increase in asset correlations after Brexit.

4.2. Spanning Test for European Large-cap Indices

To determine the appropriate benchmark for our small-cap European indices spanning tests, we first run the spanning test with the S&P 500 against 14 other European large-cap indices to determine if the S&P 500 and the 14 European large-cap indices provide a valid alternative “large cap” benchmark apart from the S&P 500. The results from this spanning test are displayed in Table

4. As we can see from this table, adding European large-caps to a US portfolio will have a positive impact on diversification, this result is robust throughout all periods. The S&P 500 and all the European large-cap indices will thus be treated as an alternative large-cap benchmark for our small-cap European indices spanning tests from this point onwards.⁷

[Insert Table 4 Here]

4.3. Spanning Test for European Small-Cap Indices with the Complete Sample

Table 5 displays the spanning test result for the complete sample using the S&P 500 as the benchmark asset as well as our composite large-cap benchmark. For the S&P 500 benchmark, there are 8 countries with small-cap index that adds diversification benefit to our benchmark. They include the United Kingdom, France, Sweden, Belgium, Denmark, Ireland, Portugal and Greece.

[Insert Table 5 Here]

When we use the composite benchmark, the number of small-cap indices that reject the null hypothesis for the spanning test decreased to just 3. These are the small-cap indices of United Kingdom, Netherlands and Spain. This result confirms the findings of Switzer and Tahaoglu (2015), that a European small-cap index does not usually span a benchmark that has already included the large-cap index of that country.

The Russell 2000 US small-cap index does not provide diversification benefits based on either the S&P 500 benchmark or our composite large-cap benchmark for the complete sample period. This shows that US large-cap investors do not gain from diversifying into US small-cap stocks during the extended (complete) sample period studied.

⁷ From this point onwards, we will use LB to denote the composite benchmark that includes the S&P 500 and all European large-cap indices.

4.4. Spanning Test for European Small-cap Indices with Period Split

Table 6 provides the spanning test results using the S&P 500 as well as our composite large-cap benchmark as the benchmark asset for alternative sub-periods.

[Insert Table 6 Here]

For the first period leading to and including the global financial crisis, there are five (six) small-cap indices that are not spanned by the S&P 500 (large-cap composite) benchmark. The small-cap indices of United Kingdom, Austria and Ireland show consistent diversification benefits using both benchmarks.

For the second period after the global financial crisis and before Brexit, there are three small-cap indices that add diversification benefits using the S&P benchmark; only one index is not spanned by the large-cap composite benchmark, the small cap index for the United Kingdom. The Russell 2000 small-cap US index adds diversification benefits based on the S&P 500 benchmark but not using our large-cap composite benchmark. In other words, small-cap US stocks do not span a portfolio that includes both US and European large cap stocks.

For the final period after Brexit, there are no diversification benefits provided by small cap indices of any EU member, using the S&P 500 benchmark. However, that does not mean that US large cap investors should shun Europe completely. Indeed, EU large caps do add benefits to large cap investors as was shown in Table 4.

Our result is in line with what is expected in the aforementioned second hypothesis: With the new crisis of Brexit, small and medium size enterprises will be particularly vulnerable to financial risks that will detract from the diversification benefits from investing into the European small-cap markets from an US investor perspective. After Brexit, only the Swedish small-cap index remains is shown to provide diversification benefits based on a composite portfolio that includes both US and European large cap stocks. It is interesting to note that the Swedish economy rates highly across its peers on three rankings: corporate ethics, corporate governance, and income inequality.

5. Summary and Conclusions

Several previous studies have documented significant diversification benefits for adding small-cap European stocks to the portfolios of US investors. Using the spanning test developed by Huberman and Kandel (1987), we show that over the previous decade, the diversification benefits of small-cap European stocks from a US investor perspective have gradually diminished over time.

Indeed, since Brexit these diversification benefits almost disappear entirely. This may be in part due to the negative co-skewness tendency that small-cap stocks exhibit during prolonged bear market periods followed by periods of continued economic and political uncertainty.

The results from this research have various implications for fund managers as well as investors who have invested in or are looking into diversifying in European small-cap stocks. With the rising political and economic risk in Europe, it is interesting to note that large-cap European stocks are shown to provide diversification benefits for US investors after Brexit. However, strategic exposure to European small-cap firms may be questionable. One could argue that this is due to the higher exposure of small-cap firms to business and financial risks due to Brexit. After Brexit, across all European Union markets, only the Swedish small-cap index is shown to provide diversification benefits based on a composite portfolio that includes both US and European large cap stocks. It is interesting to note that the Swedish economy rates highly across its peers on three rankings: corporate ethics, corporate governance, and income inequality. Whether these factors mitigate business and financial risk of firms exposed to Brexit remains a topic for future research.

Further improvement into this research can focus on decomposing the risk factor for a US portfolio and use the spanning test for diversification benefits for each risk factor. We can also expand our research into other small-cap indices in emerging markets such as South America, Asia and Africa.

Appendix

Appendix I – Variable Description

Appendix I - Variable Description

Appendix I contains all the variables used in the spanning test and their descriptions

Variable	Description
LB	Shorthand notation for S_PCOMP and all large cap indices
S_PCOMP	S&P 500 US Total Return
RUS2000	Russell 2000 US Small Cap Total Return
S_PSAST	S&P Austria Small Cap Total Return
S_PSBEL	S&P Belgium Small Cap Total Return
S_PSDEN	S&P Denmark Small Cap Total Return
S_PSFIN	S&P Finland Small Cap Total Return
S_PSFRA	S&P France Small Cap Total Return
S_PSGER	S&P Germany Small Cap Total Return
S_PSGRC	S&P Greece Small Cap Total Return
S_PSIRE	S&P Ireland Small Cap Total Return
S_PSITA	S&P Italy Small Cap Total Return
S_PSNET	S&P Netherlands Small Cap Total Return
S_PSSPA	S&P Spain Small Cap Total Return
S_PSPOR	S&P Portugal Small Cap Total Return
S_PSSWE	S&P Sweden Small Cap Total Return
S_PSGBR	S&P United Kingdom Small Cap Total Return
S_PLAST	S&P Austria Large Cap Total Return
S_PLBEL	S&P Belgium Large Cap Total Return
S_PLDEN	S&P Denmark Large Cap Total Return
S_PLFIN	S&P Finland Large Cap Total Return
S_PLFRA	S&P France Large Cap Total Return
S_PLGER	S&P Germany Large Cap Total Return
S_PLGRC	S&P Greece Large Cap Total Return
S_PLIRE	S&P Ireland Large Cap Total Return
S_PLITA	S&P Italy Large Cap Total Return
S_PLNET	S&P Netherlands Large Cap Total Return
S_PLSPA	S&P Spain Large Cap Total Return
S_PLPOR	S&P Portugal Large Cap Total Return
S_PLSWE	S&P Sweden Large Cap Total Return
S_PLGBR	S&P United Kingdom Large Cap Total Return

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Figure 1 - Absolute index return of S&P 500 and European small cap indices from 1994 to 2018

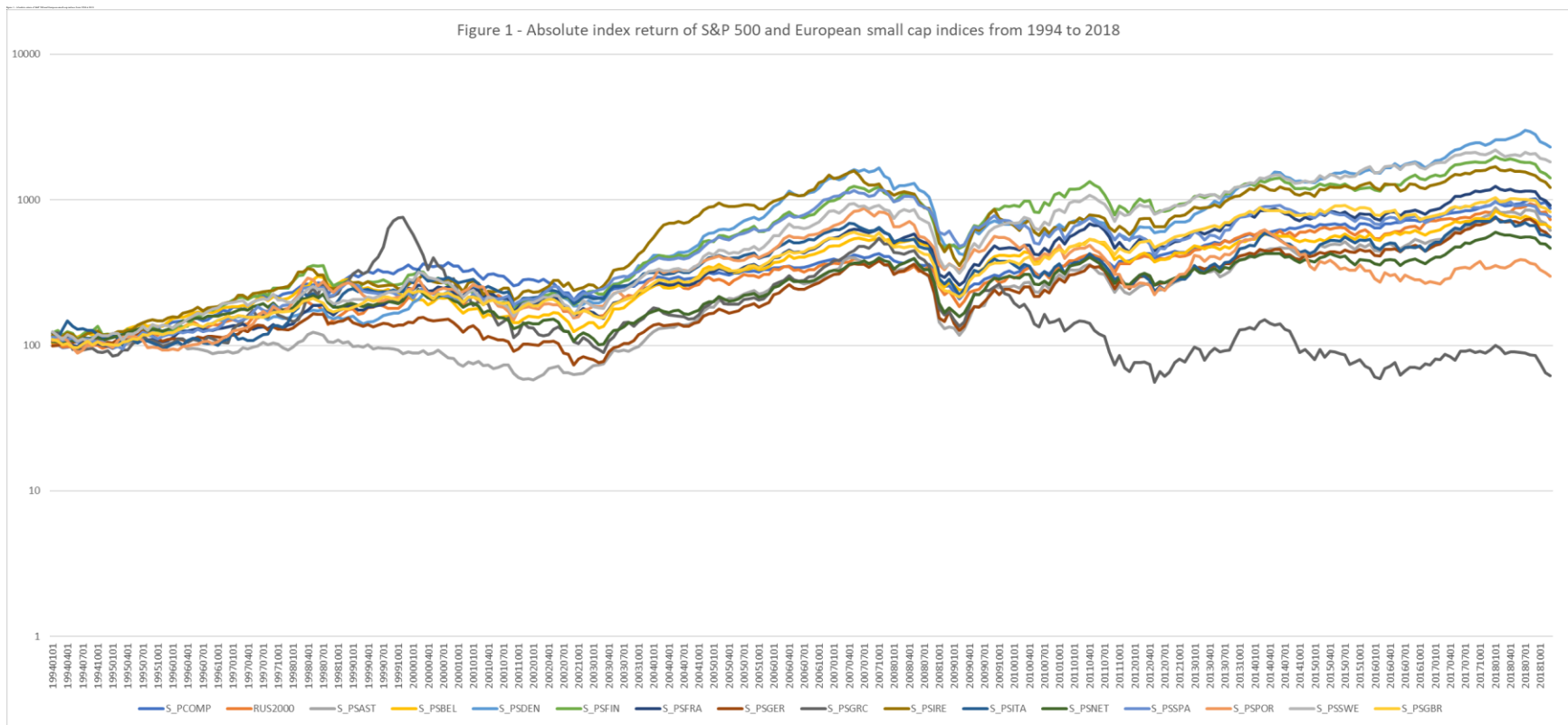


Table 1: Economic Data

This table provides descriptive statistics for sample countries at the end of the year 2018. The countries are sorted based on the stock market capitalization of all public listed companies. GDP, Population and GDP per capita data is obtained from World Development Indicator provided by World Bank. The emerging market dummy is obtained from International Monetary Fund (IMF). For countries with incomplete market capitalization data, the market capitalization is estimated using data real GDP from World Bank and the latest market capitalization over GDP ratio available from ceicdata.com. Unemployment data is display as a percentage of the total labor force. The GINI coefficient, Corporate Ehtics Index and Corporate Governance Index are estimated by World Bank.

Country Name	GDP (current US\$)	Total Population	GDP per capita (current US\$)	Market capitalization of listed domestic companies (current US\$)	Unemployment (% of total labor force)	GINI Index (World Bank Estimate)	Corporate Ethics Index	Corporate Governance Index
United States	\$ 19,390,604,000,000.00	325,719,178.00	\$ 59,531.66	\$ 32,120,702,650,000.00	4.04%	41.50	57.39	89.78
United Kingdom	\$ 2,622,433,959,604.16	66,022,273.00	\$ 39,720.44	\$ 2,868,942,751,806.95	4.00%	33.20	80.30	87.87
France	\$ 2,582,501,307,216.42	67,118,648.00	\$ 38,476.66	\$ 2,749,314,584,104.38	8.81%	32.70	59.73	73.74
Germany	\$ 3,677,439,129,776.60	82,695,000.00	\$ 44,469.91	\$ 2,262,222,570,000.00	3.72%	31.70	73.73	90.77
Netherlands	\$ 826,200,282,501.13	17,132,854.00	\$ 48,223.16	\$ 1,100,105,440,292.49	3.79%	28.20	85.16	88.53
Spain	\$ 1,311,320,015,515.99	46,572,028.00	\$ 28,156.82	\$ 888,837,580,000.00	14.55%	36.20	50.96	52.40
Sweden	\$ 538,040,458,217.00	10,067,744.00	\$ 53,442.01	\$ 781,557,569,606.01	6.32%	29.20	76.96	92.57
Italy	\$ 1,934,797,937,411.33	60,551,416.00	\$ 31,952.98	\$ 717,810,034,779.60	10.57%	35.40	40.86	32.63
Belgium	\$ 492,681,283,049.25	11,372,068.00	\$ 43,323.81	\$ 437,793,522,325.46	6.46%	27.70	65.02	85.86
Denmark	\$ 324,871,968,807.47	5,769,603.00	\$ 56,307.51	\$ 404,140,729,196.49	5.36%	28.20	85.88	94.85
Finland	\$ 251,884,887,972.77	5,511,303.00	\$ 45,703.33	\$ 251,129,233,308.85	8.25%	27.10	84.77	95.41
Austria	\$ 416,595,666,396.64	8,809,212.00	\$ 47,290.91	\$ 150,645,990,000.00	5.39%	30.50	69.72	78.44
Ireland	\$ 333,730,764,773.18	4,813,608.00	\$ 69,330.69	\$ 146,554,130,000.00	5.98%	31.80	60.25	80.42
Portugal	\$ 217,571,083,045.99	10,293,718.00	\$ 21,136.30	\$ 75,589,628,811.64	7.35%	35.50	55.07	49.50
Greece	\$ 200,290,000,000.00	11,142,161.00	\$ 17,975.87	\$ 50,613,283,000.00	21.07%	36.00	36.53	44.59

Table 2: Descriptive Statistics

This table presents descriptive statistics and risk-return characteristics for sample country return indices including: the S&P 500 and market indices for small caps and large caps stocks for 14 countries in the European Unions. Returns are expressed as percentage, with dividends included. Panel A shows the return for the complete sample and Panel B shows the return for the period leading up to and including the global financial crisis. Panel C and Panel D show the descriptive statistics for two sub samples of the interim period between the global financial crisis and brexit and the period from brexit onwards

	S	PCOMP	S	PLAST	S	PLBEL	S	PLDEN	S	PLFIN	S	PLFRA	S	PLGER	S	PLGRC	S	PLIRE	S	PLITA	S	PLNET	S	PLSPA	S	PLPOR	S	PLSWE	S	PLGBR		
Panel A - Complete Sample (1994/01-2018/12)																																
N	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	
Mean	0.8146	0.595333	0.741567	1.0438	0.712	0.7746	1.2625	0.3404	0.5822	0.688933	0.8711	0.876733	0.517433	1.060633	0.5774																	
Median	1.295	1.09	1.41	1.515	0.93	1.025	1.02	0.66	0.59	1.395	1.375	1.145	0.735	1.075	0.725																	
Std Dev	4.171712	6.806075	6.091405	5.519567	5.683077	6.493822	9.304931	10.25881	6.972924	6.205106	5.620615	6.904217	6.454927	7.230513	4.471357																	
Downside Deviation	3.229949	5.328512	5.291291	4.119789	4.044221	4.738082	6.52266	7.07058	4.502444	5.036453	4.483223	4.72322	4.479232	5.148128	3.118116																	
Sharpe Ratio	0.195268	0.087471	0.12174	0.189109	0.125284	0.119283	0.135681	0.033181	0.083494	0.111027	0.154983	0.126985	0.080161	0.146688	0.129133																	
Sortino Ratio	0.252202	0.111726	0.140149	0.253363	0.176054	0.163484	0.193556	0.048143	0.129308	0.136789	0.194302	0.185622	0.115518	0.206023	0.185176																	
VaR (0.05)	-7.0345	-10.1155	-9.4055	-7.725	-9.7455	-9.0855	-15.123	-16.4905	-10.8525	-10.249	-9.3625	-9.7005	-10.4045	-11.564	-6.491																	
Minimum	-16.79	-35.56	-37.21	-24.69	-20.97	-25.09	-35.65	-35.94	-23.98	-28.23	-25.4	-25.46	-28.04	-27.1	-18.45																	
Maximum	10.93	22.37	20.33	17.74	15.39	24.68	37.49	38.18	19.4	17.08	14.23	21.8	19.36	25.85	14.22																	
Skewness	-0.698424	-0.834031	-1.328809	-0.565275	-0.394484	-0.41879	-0.051279	-0.023148	-0.094253	-0.846356	-0.832801	-0.248427	-0.400655	-0.204027	-0.351528																	
Kurtosis	1.280537	4.03259	6.381143	2.158091	0.77942	1.741138	1.961111	1.36624	0.302509	2.535213	2.171843	1.081378	1.030499	1.787647	1.275257																	
Panel B - Period 1 (1994/01-2009/03)																																
N	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183	
Mean	0.55153	0.48388	0.587978	0.87	0.630273	0.716503	1.472022	1.055792	0.622404	0.383388	0.708415	1.060929	0.688579	0.982896	0.46																	
Median	1.24	1.12	1.43	1.53	1.22	1.11	1.6	1.27	0.6	1.41	1.34	1.43	1.11	1.5	0.63																	
Std Dev	4.462893	6.70211	6.506054	5.481598	5.650361	6.769488	10.71529	9.319533	6.664122	6.557913	5.82679	6.540558	6.46977	7.843441	4.352982																	
Downside risk	3.459893	5.933118	6.444731	4.59785	4.453807	5.320415	7.589145	6.45938	4.494869	5.635583	5.205398	4.921016	4.864927	5.875921	3.30934																	
Sharpe Ratio	0.123581	0.072198	0.090374	0.158713	0.111546	0.105843	0.137376	0.113288	0.093396	0.058462	0.121579	0.162208	0.10643	0.125314	0.105675																	
Sortino Ratio	0.159407	0.081556	0.091234	0.189219	0.141513	0.13467	0.193964	0.163451	0.13847	0.06803	0.136092	0.215591	0.141539	0.167275	0.139001																	
Minimum	-16.79	-35.56	-37.21	-24.69	-20.97	-25.09	-35.65	-35.94	-23.98	-28.23	-25.4	-25.46	-28.04	-27.1	-18.45																	
Maximum	9.78	21.11	20.33	14.06	15.39	24.68	37.49	38.18	18.89	17.03	13.68	16.34	19.36	22.78	10.34																	
Skewness	-0.788816	-1.463355	-1.828052	-1.057206	-0.646306	-0.568509	-0.169752	0.128198	-0.177476	-1.100504	-1.25243	-0.589421	-0.611017	-0.461633	-0.766715																	
Kurtosis	1.216501	6.507459	7.829469	3.141569	1.444318	2.191004	1.198599	2.855265	0.906633	2.835236	2.957373	1.7728	1.849229	1.35162	1.821446																	
Panel C - Period 2 (2009/04-2013/01)																																
N	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Mean	1.651739	1.54587	1.909348	2.318043	1.34587	1.767826	1.182174	-0.690435	1.013478	1.644565	1.767609	1.104348	0.686087	2.579783	1.700217																	
Median	2.09	2.105	2.17	2.675	2.455	2.415	2.43	-1.53	1.85	2.27	2.535	1.25	-0.03	2.345	1.65																	
Std Dev	4.390131	8.993207	6.569999	6.99717	7.529583	7.804034	9.013056	13.48671	9.320609	7.074989	6.806006	9.671186	7.640052	8.428471	5.785888																	
Downside risk	2.893794	5.878972	3.606376	4.781025	4.42932	5.234149	4.855746	7.601808	4.643251	4.748421	4.09497	6.002028	4.87321	4.967391	3.769172																	
Sharpe Ratio	0.376239	0.171893	0.290616	0.331283	0.178744	0.226527	0.131162	-0.051194	0.108735	0.232448	0.259713	0.11419	0.089801	0.30608	0.293856																	
Sortino Ratio	0.570787	0.262949	0.529437	0.484842	0.303855	0.337749	0.243459	-0.090825	0.218269	0.346339	0.431654	0.183996	0.140787	0.519344	0.451085																	
Minimum	-7.99	-20.27	-12.36	-13.31	-14.17	-19.2	-17.17	-29.25	-16.02	-14.22	-11.85	-20.31	-18.18	-14.21	-11.59																	
Maximum	10.93	22.37	14.87	17.74	14.29	16.79	28.86	29.72	19.4	15.61	14.23	21.8	15.91	25.85	14.22																	
Skewness	-0.205759	-0.170677	0.091757	-0.191733	-0.219015	-0.382144	0.403912	0.186399	-0.072487	-0.372516	-0.071766	-0.033883	-0.301139	0.290349	-0.055288																	
Kurtosis	-0.228674	0.161646	-0.41724	0.081811	-0.818674	0.074043	0.752186	-0.095956	-0.921673	-0.220712	-0.605879	-0.207465	-0.332573	0.657236	0.198218																	
Panel D - Period 3 (2013/02-2018/12)																																
N	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
Mean	0.950282	0.266761	0.380845	0.666197	0.511972	0.280845	0.774507	-0.835634	0.199155	0.857324	0.709577	0.254507	-0.032958	0.276761	0.152535																	
Median	1.29	0.08	1.32	0.72	0.12	0.19	0.07	0.1	0.22	0.96	1.21	0.24	-0.35	0.24	0.32																	
Std Dev	3.082386	5.324267	4.427067	4.386572	4.263584	4.573965	4.326577	10.16611	6.007823	4.426808	4.03288	5.63411	5.587193	3.941721	3.68302																	
Downside risk	2.437622	3.120289	2.849012	2.284107	2.268381	2.506352	2.509373	7.343239	3.898685	2.919084	2.400234	2.885852	3.251012	2.423097	2.226405																	
Sharpe Ratio	0.308294	0.050103	0.086026	0.151872	0.12008	0.061401	0.179011	-0.082198	0.033149	0.193666	0.175948	0.045173	-0.005899	0.070213	0.041416																	
Sortino Ratio	0.38984	0.085492	0.133676	0.291666	0.225699	0.112053	0.308646	-0.113796	0.051083	0.293696	0.295628	0.088191	-0.010138	0.114218	0.068512																	
Minimum	-9.03	-10.44	-11.77	-10.03	-9.24	-8.95	-11	-27.63	-13.28	-12.55	-8.4	-9.32	-14.04	-9.86	-7.59																	
Maximum	8.44	12.97	9.19	15.07	9.13	11.19	15.33	18.99	13.13	17.08	9.98	14.14	13.08	10.92	7.37																	
Skewness	-0.652869	0.080043	-0.260894	0.314473	0.157888	0.141908	0.411272	-0.402577	-0.04329	0.250928	-0.093243	0.304936	0.163573	0.043316	-0.058103																	
Kurtosis	1.28652	-0.396597	0.045107	0.550467	-0.664784	-0.447325	1.527201	-0.073734	-0.114299	2.604718	-0.490341	-0.455808	-0.082153	0.125887	-0.636952																	

Table 2: Descriptive Statistics (cont.)

This table presents descriptive statistics and risk-return characteristics for sample country return indices including: the S&P 500 and market indices for small caps and large caps stocks for 14 countries in the European Unions. Returns are expressed as percentage, with dividends included. Panel A shows the return for the complete sample and Panel B shows the return for the period leading up to and including the global financial crisis. Panel C and Panel D show the descriptive statistics for two sub samples of the interim period between the global financial crisis and brexit and the period from brexit onwards

	RUS2000	S PSAST	S PSBEL	S PSDEN	S PSFIN	S PSFRA	S PSGER	S PSGRC	S PSIRE	S PSITA	S PSNET	S PSSPA	S PSPOR	S PSSWE	S PSGBR
Panel A - Complete Sample (1994/01-2018/12)															
N	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Mean	0.815867	0.810505	0.771677	1.237179	1.105537	0.915828	0.769131	0.345658	1.067982	0.814974	0.683233	0.858243	0.616426	1.202181	0.839749
Median	1.565	1.01775	1.258765	1.560565	1.102925	1.042965	0.9833	0.415945	1.227315	0.65127	1.180435	0.863325	0.825295	1.13267	1.108005
Std Dev	5.452843	6.269549	5.353056	6.032751	6.619128	5.864373	6.139879	10.02069	6.771848	6.955178	5.754596	5.95708	7.063236	6.79056	5.116404
Downside Deviation	4.028733	4.775076	4.215531	4.74856	4.688959	4.388327	4.967471	6.542502	4.959256	4.493951	4.365536	4.064084	4.559898	4.537362	3.885512
Sharpe Ratio	0.149622	0.129276	0.144156	0.205077	0.167022	0.156168	0.125268	0.034494	0.157709	0.117175	0.118728	0.144071	0.087272	0.177037	0.164129
Sortino Ratio	0.202512	0.169737	0.183056	0.260538	0.235775	0.208696	0.154834	0.052833	0.215351	0.181349	0.156506	0.211177	0.135184	0.264952	0.216123
VaR (0.05)	-8.1	-9.949344	-7.856699	-8.477234	-9.6301	-9.301421	-8.430391	-17.16582	-10.45066	-11.16163	-8.988868	-8.504165	-10.5554	-9.687623	-8.108969
Minimum	-20.8	-35.6451	-30.62367	-29.45745	-25.46786	-28.23237	-32.61243	-33.94582	-29.60495	-23.87731	-27.69233	-19.48959	-23.4764	-26.65075	-26.79054
Maximum	16.51	19.54956	19.17809	22.27387	21.99275	18.43823	21.99829	33.84263	30.13815	26.94894	19.11285	18.27988	21.91312	30.13817	21.55774
Skewness	-0.521667	-0.680143	-0.847838	-0.620036	-0.260666	-0.594965	-0.859373	-0.011824	-0.192694	0.104102	-0.601766	-0.258856	-0.120791	0.050892	-0.617262
Kurtosis	1.182956	4.344634	4.27903	3.3091	1.525564	2.444159	4.006404	0.690209	2.770124	1.149011	2.293465	0.853359	0.43025	2.303487	3.452807
Panel B - Period 1 (1994/01-2009/03)															
N	183	183	183	183	183	183	183	183	183	183	183	183	183	183	183
Mean	0.546066	0.326228	0.636049	0.974114	1.084702	0.720329	0.36927	0.712347	0.984065	0.711683	0.44851	1.023617	0.915616	0.917871	0.578141
Median	1.46	0.60375	1.38374	1.60233	1.22277	1.24518	0.92837	0.85483	1.52503	0.77236	1.38171	1.31213	1.48103	0.90399	1.10408
Std Dev	5.680801	5.907918	5.45597	5.966097	6.612885	5.699973	6.164142	10.01463	6.630278	6.803287	5.672391	5.490765	6.612896	6.856055	4.990196
Downside risk	4.280903	5.139034	4.924308	5.302986	4.883981	4.828175	5.628722	6.927211	5.758988	4.610813	4.877889	3.92303	4.522628	4.979583	4.099938
Sharpe Ratio	0.096125	0.055219	0.116579	0.163275	0.164029	0.126374	0.059906	0.071131	0.14842	0.104609	0.079069	0.186425	0.138459	0.133877	0.115855
Sortino Ratio	0.127559	0.06348	0.129165	0.183692	0.222094	0.149193	0.065605	0.102833	0.170875	0.154351	0.091948	0.260925	0.202452	0.184327	0.141012
Minimum	-20.8	-35.6451	-30.62367	-29.45745	-25.46786	-28.23237	-32.61243	-33.94582	-29.60495	-23.87731	-27.69233	-19.48959	-23.4764	-26.65075	-26.79054
Maximum	16.51	14.32563	16.14442	16.56882	21.99275	16.23686	17.20117	33.84263	17.50915	26.94894	14.7543	13.81392	18.84715	23.73775	12.16868
Skewness	-0.67294	-1.533388	-1.430035	-1.147557	-0.491049	-1.112983	-1.450792	-0.135763	-0.962511	0.227305	-1.137097	-0.464368	-0.2781	-0.455388	-1.206477
Kurtosis	1.30399	7.996464	5.901961	4.583898	1.693184	4.139928	5.640348	1.189313	2.849135	2.469181	3.447159	0.905304	0.838422	1.674569	4.811807
Panel C - Period 2 (2009/04-2013/01)															
N	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Mean	1.951522	2.46697	1.748945	1.708354	2.120783	2.062215	2.340676	-0.134972	2.214158	1.216521	1.825301	0.847523	0.750858	2.802612	2.385592
Median	2.755	1.87195	1.51411	0.87555	1.59949	2.19366	2.492705	-0.44753	0.339985	0.638395	2.237755	1.63255	0.405495	2.40459	2.1117
Std Dev	6.036161	8.427547	6.659974	8.177126	9.178006	7.999048	8.066944	12.28084	9.774853	8.763179	7.71432	8.834411	9.097933	9.063925	6.483704
Downside risk	3.719275	5.371021	4.419021	4.809694	6.158311	5.118339	5.166758	6.90546	4.94986	4.844662	4.734239	5.410288	5.88569	4.998642	4.181236
Sharpe Ratio	0.323305	0.292727	0.262605	0.208919	0.231072	0.257808	0.290156	-0.01099	0.226516	0.138822	0.236612	0.095934	0.082531	0.309205	0.367937
Sortino Ratio	0.524705	0.459311	0.395777	0.35519	0.344377	0.402907	0.453026	-0.019546	0.447317	0.251105	0.385553	0.15665	0.127573	0.560675	0.570547
Minimum	-11.21	-14.08734	-14.1347	-17.1545	-18.91373	-16.59683	-15.06029	-24.54001	-17.8132	-16.23817	-14.25279	-18.93591	-19.0164	-15.83895	-11.1529
Maximum	15.46	19.54956	19.17809	22.27387	21.29371	18.43823	21.99829	26.29507	30.13815	18.66744	19.11285	18.27988	21.91312	30.13817	21.55774
Skewness	-0.046634	0.07185	-0.099786	0.153255	-0.182774	-0.25956	-0.113182	0.157881	0.526513	-0.11395	-0.07468	-0.210362	-0.158551	0.657172	0.113546
Kurtosis	-0.0023	-0.133689	0.453611	0.315486	-0.019001	-0.365181	-0.059835	-0.374639	0.534323	-0.887184	-0.18741	-0.328097	-0.274191	1.24536	0.837366
Panel D - Period 3 (2013/02-2018/12)															
N	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
Mean	0.775493	0.985507	0.488092	1.609951	0.50147	0.676993	0.781575	-0.288075	0.541685	0.821044	0.548293	0.438943	-0.241822	0.898081	0.512503
Median	1.1	1.07107	-0.12532	1.69797	0.84095	0.33582	0.74995	-1.11636	-0.10627	0.32175	0.37306	-0.08987	-0.68054	0.99573	0.99347
Std Dev	4.317001	5.389224	3.966299	4.410996	4.271378	4.502276	4.284635	8.383627	4.358337	6.065227	4.302995	4.771833	6.722779	4.466152	4.264715
Downside risk	3.36259	3.639639	1.844795	2.800702	2.5006	2.357908	2.735639	5.035073	2.486015	3.767861	2.424371	2.571324	3.605059	2.528151	3.259935
Sharpe Ratio	0.179637	0.182866	0.12306	0.364986	0.117402	0.150367	0.182413	-0.034362	0.124287	0.135369	0.127421	0.091986	-0.035971	0.201086	0.120173
Sortino Ratio	0.230624	0.270771	0.264578	0.574838	0.20054	0.287116	0.285701	-0.057214	0.217893	0.217907	0.226159	0.170707	-0.067079	0.355232	0.157213
Minimum	-11.88	-13.56073	-7.98888	-10.89339	-10.66951	-9.30136	-10.3247	-17.40864	-9.97921	-13.3007	-8.15928	-10.85737	-17.88917	-9.66444	-13.70802
Maximum	11.15	11.6912	12.75631	11.84712	10.69711	11.00321	10.48085	20.1683	11.55287	14.51517	9.61072	13.9431	16.5736	11.13715	9.06663
Skewness	-0.586353	-0.246469	0.400291	-0.143964	0.080481	0.27342	-0.201577	0.18709	0.147765	-0.051596	0.03362	0.436736	0.315149	0.11971	-0.574001
Kurtosis	0.78947	0.100869	-0.007481	0.038054	0.184718	-0.238674	-0.191298	-0.022359	-0.029669	-0.244819	-0.709004	0.480923	0.266205	-0.204609	1.158368

Table 3: Pearson Correlation Statistics

Panel A shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for the complete sample

Panel A - Complete Sample															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.70852	0.72363	0.73173	0.72409	0.61722	0.69869	0.57321	0.67969	0.59955	0.63679	0.56239	0.64105	0.48165	0.4701
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.70852	1	0.85745	0.80638	0.84228	0.7253	0.82223	0.70157	0.78194	0.78886	0.79074	0.75417	0.81128	0.60723	0.5985
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.72363	0.85745	1	0.8882	0.90966	0.803	0.83866	0.7938	0.84797	0.77215	0.8293	0.7684	0.77155	0.72338	0.63191
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.73173	0.80638	0.8882	1	0.88859	0.77208	0.8197	0.74547	0.84824	0.77839	0.8101	0.80531	0.78987	0.66175	0.59674
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.72409	0.84228	0.90966	0.88859	1	0.77948	0.86459	0.7858	0.8506	0.77848	0.82366	0.78525	0.7713	0.70273	0.61763
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.61722	0.7253	0.803	0.77208	0.77948	1	0.74737	0.77281	0.76004	0.69143	0.73303	0.71393	0.70467	0.71545	0.58859
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.69869	0.82223	0.83866	0.8197	0.86459	0.74737	1	0.71486	0.77866	0.78661	0.85179	0.71504	0.75104	0.60917	0.57901
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.57321	0.70157	0.7938	0.74547	0.7858	0.77281	0.71486	1	0.72941	0.64848	0.69039	0.65164	0.66254	0.72123	0.55488
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.67969	0.78194	0.84797	0.84824	0.8506	0.76004	0.77866	0.72941	1	0.73637	0.7662	0.7919	0.74152	0.66253	0.59644
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.59955	0.78886	0.77215	0.77839	0.77848	0.69143	0.78661	0.64848	0.73637	1	0.75601	0.75838	0.75647	0.58325	0.57011
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.63679	0.79074	0.8293	0.8101	0.82366	0.73303	0.85179	0.69039	0.7662	0.75601	1	0.74454	0.76265	0.61971	0.56792
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSAST	0.56239	0.75417	0.7684	0.80531	0.78525	0.71393	0.71504	0.65164	0.7919	0.75838	0.74454	1	0.74433	0.60515	0.58942
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSIRE	0.64105	0.81128	0.77155	0.78987	0.7713	0.70467	0.75104	0.66254	0.74152	0.75647	0.76265	0.74433	1	0.59076	0.54543
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSPOR	0.48165	0.60723	0.72338	0.66175	0.70273	0.71545	0.60917	0.72123	0.66253	0.58325	0.61971	0.60515	0.59076	1	0.58395
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGRC	0.4701	0.5985	0.63191	0.59674	0.61763	0.58859	0.57901	0.55488	0.59644	0.57011	0.56792	0.58942	0.54543	0.58395	1
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Table 3: Pearson Correlation Statistics (cont.)

Panel B shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for the period leading up to and including the global financial crisis

Panel B - Period 1															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.67599	0.69295	0.69626	0.69445	0.59492	0.65957	0.5344	0.65384	0.54484	0.57609	0.46271	0.62355	0.46337	0.40606
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.67599	1	0.8436	0.76732	0.83425	0.69401	0.7965	0.64556	0.75338	0.75881	0.75039	0.70081	0.77742	0.58246	0.51973
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.69295	0.8436	1	0.85319	0.89271	0.74585	0.80988	0.72458	0.81635	0.72213	0.77187	0.69633	0.73377	0.70204	0.56202
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.69626	0.76732	0.85319	1	0.87779	0.74379	0.78087	0.68523	0.8339	0.73062	0.74076	0.75678	0.7704	0.64108	0.5449
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.69445	0.83425	0.89271	0.87779	1	0.71921	0.86353	0.72133	0.82912	0.74908	0.77906	0.70962	0.741	0.6791	0.55053
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.59492	0.69401	0.74585	0.74379	0.71921	1	0.73082	0.68567	0.7246	0.63245	0.67227	0.64984	0.68083	0.64833	0.45399
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.65957	0.7965	0.80988	0.78087	0.86353	0.73082	1	0.6886	0.73088	0.75404	0.82514	0.64442	0.73848	0.59802	0.52737
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.5344	0.64556	0.72458	0.68523	0.72133	0.68567	0.6886	1	0.65728	0.54636	0.61607	0.53367	0.59441	0.65012	0.42632
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.65384	0.75338	0.81635	0.8339	0.82912	0.7246	0.73088	0.65728	1	0.69638	0.71407	0.73751	0.73133	0.61004	0.51393
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.54484	0.75881	0.72213	0.73062	0.74908	0.63245	0.75404	0.54636	0.69638	1	0.69353	0.73579	0.71376	0.54966	0.48777
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.57609	0.75039	0.77187	0.74076	0.77906	0.67227	0.82514	0.61607	0.71407	0.69353	1	0.67235	0.73061	0.59816	0.48161
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSAST	0.46271	0.70081	0.69633	0.75678	0.70962	0.64984	0.64442	0.53367	0.73751	0.73579	0.67235	1	0.70458	0.5329	0.5207
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSIRE	0.62355	0.77742	0.73377	0.7704	0.741	0.68083	0.73848	0.59441	0.73133	0.71376	0.73061	0.70458	1	0.56203	0.47395
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSPOR	0.46337	0.58246	0.70204	0.64108	0.6791	0.64833	0.59802	0.65012	0.61004	0.54966	0.59816	0.5329	0.56203	1	0.46969
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGRC	0.40606	0.51973	0.56202	0.5449	0.55053	0.45399	0.52737	0.42632	0.51393	0.48777	0.48161	0.5207	0.47395	0.46969	1
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Table 3: Pearson Correlation Statistics (cont.)

Panel C shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for interim period after the global financial crisis and leading up to brexit

Panel C - Period 2															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.85372	0.86392	0.89258	0.85689	0.79871	0.8654	0.79176	0.80426	0.82592	0.86487	0.79529	0.75139	0.60865	0.71233
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.85372	1	0.91741	0.92552	0.892	0.84347	0.90286	0.87656	0.90891	0.91166	0.91942	0.8814	0.89367	0.71478	0.8141
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.86392	0.91741	1	0.95638	0.94892	0.895	0.89926	0.93914	0.93634	0.88934	0.93773	0.88642	0.83978	0.79911	0.79771
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.89258	0.92552	0.95638	1	0.93143	0.86062	0.90303	0.90333	0.90598	0.89444	0.96056	0.90218	0.85118	0.74897	0.7598
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.85689	0.892	0.94892	0.93143	1	0.87724	0.90572	0.93666	0.93972	0.8838	0.92863	0.92846	0.82767	0.80673	0.78492
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.79871	0.84347	0.895	0.86062	0.87724	1	0.8122	0.93185	0.87756	0.81779	0.84779	0.83236	0.77011	0.85619	0.84094
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.8654	0.90286	0.89926	0.90303	0.90572	0.8122	1	0.83463	0.90822	0.87691	0.92177	0.87176	0.77276	0.66497	0.74432
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.79176	0.87656	0.93914	0.90333	0.93666	0.93185	0.83463	1	0.91515	0.88816	0.8964	0.87254	0.82732	0.89939	0.85211
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.80426	0.90891	0.93634	0.90598	0.93972	0.87756	0.90822	0.91515	1	0.88129	0.91542	0.92695	0.82212	0.82637	0.83745
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.82592	0.91166	0.88934	0.89444	0.8838	0.81779	0.87691	0.88816	0.88129	1	0.89906	0.89133	0.88975	0.70473	0.80062
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.86487	0.91942	0.93773	0.96056	0.92863	0.84779	0.92177	0.8964	0.91542	0.89906	1	0.90182	0.82393	0.72264	0.78552
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSAST	0.79529	0.8814	0.88642	0.90218	0.92846	0.83236	0.87176	0.87254	0.92695	0.89133	0.90182	1	0.85449	0.79105	0.78212
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSIRE	0.75139	0.89367	0.83978	0.85118	0.82767	0.77011	0.77276	0.82732	0.82212	0.88975	0.82393	0.85449	1	0.67289	0.71242
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSPOR	0.60865	0.71478	0.79911	0.74897	0.80673	0.85619	0.66497	0.89939	0.82637	0.70473	0.72264	0.79105	0.67289	1	0.81062
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGRC	0.71233	0.8141	0.79771	0.7598	0.78492	0.84094	0.74432	0.85211	0.83745	0.80062	0.78552	0.78212	0.71242	0.81062	1
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Table 3: Pearson Correlation Statistics (cont.)

Panel D shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for the Post Brexit period

Panel D - Period 3															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.67294	0.68824	0.6658	0.68712	0.53562	0.64648	0.48034	0.63238	0.52811	0.60849	0.65766	0.5983	0.46749	0.49027
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.67294	1	0.80931	0.75792	0.78917	0.68353	0.79485	0.66351	0.69384	0.72617	0.74574	0.72654	0.82749	0.57332	0.62639
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.68824	0.80931	1	0.91266	0.89945	0.85944	0.84678	0.82645	0.82631	0.75735	0.86723	0.8177	0.79152	0.71507	0.66826
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.6658	0.75792	0.91266	1	0.84728	0.77916	0.82489	0.75773	0.80787	0.77238	0.83813	0.82756	0.74984	0.67655	0.60872
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.68712	0.78917	0.89945	0.84728	1	0.85305	0.77361	0.80063	0.78008	0.69671	0.81101	0.81339	0.79037	0.66859	0.65175
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.53562	0.68353	0.85944	0.77916	0.85305	1	0.74145	0.82398	0.73121	0.69209	0.76363	0.75989	0.67549	0.70595	0.65208
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.64648	0.79485	0.84678	0.82489	0.77361	0.74145	1	0.64937	0.75403	0.76609	0.82325	0.71904	0.76006	0.62856	0.57335
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.48034	0.66351	0.82645	0.75773	0.80063	0.82398	0.64937	1	0.74571	0.65237	0.65935	0.72234	0.66955	0.71734	0.60859
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.63238	0.69384	0.82631	0.80787	0.78008	0.73121	0.75403	0.74571	1	0.65708	0.71858	0.79918	0.61949	0.65101	0.59769
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.52811	0.72617	0.75735	0.77238	0.69671	0.69209	0.76609	0.65237	0.65708	1	0.76062	0.61803	0.65873	0.55839	0.55148
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.60849	0.74574	0.86723	0.83813	0.81101	0.76363	0.82325	0.65935	0.71858	0.76062	1	0.77394	0.75847	0.56959	0.58663
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSAST	0.65766	0.72654	0.8177	0.82756	0.81339	0.75989	0.71904	0.72234	0.79918	0.61803	0.77394	1	0.71165	0.59974	0.60058
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSIRE	0.5983	0.82749	0.79152	0.74984	0.79037	0.67549	0.76006	0.66955	0.61949	0.65873	0.75847	0.71165	1	0.60281	0.58565
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSPOR	0.46749	0.57332	0.71507	0.67655	0.66859	0.70595	0.62856	0.71734	0.65101	0.55839	0.56959	0.59974	0.60281	1	0.65024
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGRC	0.49027	0.62639	0.66826	0.60872	0.65175	0.65208	0.57335	0.60859	0.59769	0.55148	0.58663	0.60058	0.58565	0.65024	1
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Table 3: Pearson Correlation Statistics

Panel A shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for the complete sample

Panel A - Complete Sample															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.70852	0.72363	0.73173	0.72409	0.61722	0.69869	0.57321	0.67969	0.59955	0.63679	0.56239	0.64105	0.48165	0.4701
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.70852	1	0.85745	0.80638	0.84228	0.7253	0.82223	0.70157	0.78194	0.78886	0.79074	0.75417	0.81128	0.60723	0.5985
			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.72363	0.85745	1	0.8882	0.90966	0.803	0.83866	0.7938	0.84797	0.77215	0.8293	0.7684	0.77155	0.72338	0.63191
				<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.73173	0.80638	0.8882	1	0.88859	0.77208	0.8197	0.74547	0.84824	0.77839	0.8101	0.80531	0.78987	0.66175	0.59674
					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.72409	0.84228	0.90966	0.88859	1	0.77948	0.86459	0.7858	0.8506	0.77848	0.82366	0.78525	0.7713	0.70273	0.61763
						<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.61722	0.7253	0.803	0.77208	0.77948	1	0.74737	0.77281	0.76004	0.69143	0.73303	0.71393	0.70467	0.71545	0.58859
							<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.69869	0.82223	0.83866	0.8197	0.86459	0.74737	1	0.71486	0.77866	0.78661	0.85179	0.71504	0.75104	0.60917	0.57901
								<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.57321	0.70157	0.7938	0.74547	0.7858	0.77281	0.71486	1	0.72941	0.64848	0.69039	0.65164	0.66254	0.72123	0.55488
									<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.67969	0.78194	0.84797	0.84824	0.8506	0.76004	0.77866	0.72941	1	0.73637	0.7662	0.7919	0.74152	0.66253	0.59644
										<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.59955	0.78886	0.77215	0.77839	0.77848	0.69143	0.78661	0.64848	0.73637	1	0.75601	0.75838	0.75647	0.58325	0.57011
											<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.63679	0.79074	0.8293	0.8101	0.82366	0.73303	0.85179	0.69039	0.7662	0.75601	1	0.74454	0.76265	0.61971	0.56792
												<.0001	<.0001	<.0001	<.0001
S_PSAST	0.56239	0.75417	0.7684	0.80531	0.78525	0.71393	0.71504	0.65164	0.7919	0.75838	0.74454	1	0.74433	0.60515	0.58942
													<.0001	<.0001	<.0001
S_PSIRE	0.64105	0.81128	0.77155	0.78987	0.7713	0.70467	0.75104	0.66254	0.74152	0.75647	0.76265	0.74433	1	0.59076	0.54543
														<.0001	<.0001
S_PSPOR	0.48165	0.60723	0.72338	0.66175	0.70273	0.71545	0.60917	0.72123	0.66253	0.58325	0.61971	0.60515	0.59076	1	0.58395
															<.0001
S_PSGRC	0.4701	0.5985	0.63191	0.59674	0.61763	0.58859	0.57901	0.55488	0.59644	0.57011	0.56792	0.58942	0.54543	0.58395	1
															<.0001

Table 3: Pearson Correlation Statistics (cont.)

Panel B shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for the period leading up to and including the global financial crisis

		Panel B - Pre Crisis													
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.67599	0.69295	0.69626	0.69445	0.59492	0.65957	0.5344	0.65384	0.54484	0.57609	0.46271	0.62355	0.46337	0.40606
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.67599	1	0.8436	0.76732	0.83425	0.69401	0.7965	0.64556	0.75338	0.75881	0.75039	0.70081	0.77742	0.58246	0.51973
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.69295	0.8436	1	0.85319	0.89271	0.74585	0.80988	0.72458	0.81635	0.72213	0.77187	0.69633	0.73377	0.70204	0.56202
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.69626	0.76732	0.85319	1	0.87779	0.74379	0.78087	0.68523	0.8339	0.73062	0.74076	0.75678	0.7704	0.64108	0.5449
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.69445	0.83425	0.89271	0.87779	1	0.71921	0.86353	0.72133	0.82912	0.74908	0.77906	0.70962	0.741	0.6791	0.55053
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.59492	0.69401	0.74585	0.74379	0.71921	1	0.73082	0.68567	0.7246	0.63245	0.67227	0.64984	0.68083	0.64833	0.45399
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.65957	0.7965	0.80988	0.78087	0.86353	0.73082	1	0.6886	0.73088	0.75404	0.82514	0.64442	0.73848	0.59802	0.52737
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.5344	0.64556	0.72458	0.68523	0.72133	0.68567	0.6886	1	0.65728	0.54636	0.61607	0.53367	0.59441	0.65012	0.42632
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.65384	0.75338	0.81635	0.8339	0.82912	0.7246	0.73088	0.65728	1	0.69638	0.71407	0.73751	0.73133	0.61004	0.51393
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.54484	0.75881	0.72213	0.73062	0.74908	0.63245	0.75404	0.54636	0.69638	1	0.69353	0.73579	0.71376	0.54966	0.48777
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.57609	0.75039	0.77187	0.74076	0.77906	0.67227	0.82514	0.61607	0.71407	0.69353	1	0.67235	0.73061	0.59816	0.48161
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSAST	0.46271	0.70081	0.69633	0.75678	0.70962	0.64984	0.64442	0.53367	0.73751	0.73579	0.67235	1	0.70458	0.5329	0.5207
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSIRE	0.62355	0.77742	0.73377	0.7704	0.741	0.68083	0.73848	0.59441	0.73133	0.71376	0.73061	0.70458	1	0.56203	0.47395
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSPOR	0.46337	0.58246	0.70204	0.64108	0.6791	0.64833	0.59802	0.65012	0.61004	0.54966	0.59816	0.5329	0.56203	1	0.46969
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGRC	0.40606	0.51973	0.56202	0.5449	0.55053	0.45399	0.52737	0.42632	0.51393	0.48777	0.48161	0.5207	0.47395	0.46969	1
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Table 3: Pearson Correlation Statistics (cont.)

Panel C shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for interim period after the global financial crisis and leading up to brexit

Panel C - Interim Period															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.85372	0.86392	0.89258	0.85689	0.79871	0.8654	0.79176	0.80426	0.82592	0.86487	0.79529	0.75139	0.60865	0.71233
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.85372	1	0.91741	0.92552	0.892	0.84347	0.90286	0.87656	0.90891	0.91166	0.91942	0.8814	0.89367	0.71478	0.8141
			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.86392	0.91741	1	0.95638	0.94892	0.895	0.89926	0.93914	0.93634	0.88934	0.93773	0.88642	0.83978	0.79911	0.79771
				<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.89258	0.92552	0.95638	1	0.93143	0.86062	0.90303	0.90333	0.90598	0.89444	0.96056	0.90218	0.85118	0.74897	0.7598
					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.85689	0.892	0.94892	0.93143	1	0.87724	0.90572	0.93666	0.93972	0.8838	0.92863	0.92846	0.82767	0.80673	0.78492
						<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.79871	0.84347	0.895	0.86062	0.87724	1	0.8122	0.93185	0.87756	0.81779	0.84779	0.83236	0.77011	0.85619	0.84094
							<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.8654	0.90286	0.89926	0.90303	0.90572	0.8122	1	0.83463	0.90822	0.87691	0.92177	0.87176	0.77276	0.66497	0.74432
								<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.79176	0.87656	0.93914	0.90333	0.93666	0.93185	0.83463	1	0.91515	0.88816	0.8964	0.87254	0.82732	0.89939	0.85211
									<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.80426	0.90891	0.93634	0.90598	0.93972	0.87756	0.90822	0.91515	1	0.88129	0.91542	0.92695	0.82212	0.82637	0.83745
										<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.82592	0.91166	0.88934	0.89444	0.8838	0.81779	0.87691	0.88816	0.88129	1	0.89906	0.89133	0.88975	0.70473	0.80062
											<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.86487	0.91942	0.93773	0.96056	0.92863	0.84779	0.92177	0.8964	0.91542	0.89906	1	0.90182	0.82393	0.72264	0.78552
												<.0001	<.0001	<.0001	<.0001
S_PSAST	0.79529	0.8814	0.88642	0.90218	0.92846	0.83236	0.87176	0.87254	0.92695	0.89133	0.90182	1	0.85449	0.79105	0.78212
													<.0001	<.0001	<.0001
S_PSIRE	0.75139	0.89367	0.83978	0.85118	0.82767	0.77011	0.77276	0.82732	0.82212	0.88975	0.82393	0.85449	1	0.67289	0.71242
														<.0001	<.0001
S_PSPOR	0.60865	0.71478	0.79911	0.74897	0.80673	0.85619	0.66497	0.89939	0.82637	0.70473	0.72264	0.79105	0.67289	1	0.81062
															<.0001
S_PSGRC	0.71233	0.8141	0.79771	0.7598	0.78492	0.84094	0.74432	0.85211	0.83745	0.80062	0.78552	0.78212	0.71242	0.81062	1

Table 3: Pearson Correlation Statistics (cont.)

Panel D shows the Pearson Correlation matrix of all small cap indices and the S&P 500 with the corresponding confidence level for the Post Brexit Sample

Panel D - Post Brexit															
	S_PCOMP	S_PSGBR	S_PSFRA	S_PSGER	S_PSNET	S_PSSPA	S_PSSWE	S_PSITA	S_PSBEL	S_PSDEN	S_PSFIN	S_PSAST	S_PSIRE	S_PSPOR	S_PSGRC
S_PCOMP	1	0.67294	0.68824	0.6658	0.68712	0.53562	0.64648	0.48034	0.63238	0.52811	0.60849	0.65766	0.5983	0.46749	0.49027
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGBR	0.67294	1	0.80931	0.75792	0.78917	0.68353	0.79485	0.66351	0.69384	0.72617	0.74574	0.72654	0.82749	0.57332	0.62639
	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFRA	0.68824	0.80931	1	0.91266	0.89945	0.85944	0.84678	0.82645	0.82631	0.75735	0.86723	0.8177	0.79152	0.71507	0.66826
	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSGER	0.6658	0.75792	0.91266	1	0.84728	0.77916	0.82489	0.75773	0.80787	0.77238	0.83813	0.82756	0.74984	0.67655	0.60872
	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSNET	0.68712	0.78917	0.89945	0.84728	1	0.85305	0.77361	0.80063	0.78008	0.69671	0.81101	0.81339	0.79037	0.66859	0.65175
	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSPA	0.53562	0.68353	0.85944	0.77916	0.85305	1	0.74145	0.82398	0.73121	0.69209	0.76363	0.75989	0.67549	0.70595	0.65208
	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSSWE	0.64648	0.79485	0.84678	0.82489	0.77361	0.74145	1	0.64937	0.75403	0.76609	0.82325	0.71904	0.76006	0.62856	0.57335
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSITA	0.48034	0.66351	0.82645	0.75773	0.80063	0.82398	0.64937	1	0.74571	0.65237	0.65935	0.72234	0.66955	0.71734	0.60859
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSBEL	0.63238	0.69384	0.82631	0.80787	0.78008	0.73121	0.75403	0.74571	1	0.65708	0.71858	0.79918	0.61949	0.65101	0.59769
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
S_PSDEN	0.52811	0.72617	0.75735	0.77238	0.69671	0.69209	0.76609	0.65237	0.65708	1	0.76062	0.61803	0.65873	0.55839	0.55148
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001
S_PSFIN	0.60849	0.74574	0.86723	0.83813	0.81101	0.76363	0.82325	0.65935	0.71858	0.76062	1	0.77394	0.75847	0.56959	0.58663
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001
S_PSAST	0.65766	0.72654	0.8177	0.82756	0.81339	0.75989	0.71904	0.72234	0.79918	0.61803	0.77394	1	0.71165	0.59974	0.60058
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001
S_PSIRE	0.5983	0.82749	0.79152	0.74984	0.79037	0.67549	0.76006	0.66955	0.61949	0.65873	0.75847	0.71165	1	0.60281	0.58565
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001
S_PSPOR	0.46749	0.57332	0.71507	0.67655	0.66859	0.70595	0.62856	0.71734	0.65101	0.55839	0.56959	0.59974	0.60281	1	0.65024
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001
S_PSGRC	0.49027	0.62639	0.66826	0.60872	0.65175	0.65208	0.57335	0.60859	0.59769	0.55148	0.58663	0.60058	0.58565	0.65024	1
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	

Table 4 - Spanning Test for European Large Caps Indices

Table 4 shows the spanning test result with all the European Large Caps Indices as Benchmark and the S&P 500 as the test asset

Panel A - Complete Sample													
ID	Country	Benchmark				FValue	NumDF	DenDF	ProbF	Add			
0	Large Cap US	S_PLAST	S_PLBEL	S_PLDEN	S_PLFIN	S_PLFRA	S_PLGER	S_PLGRC	63.42	2	285	<.0001	Y
		S_PLIRE	S_PLITA	S_PLNET	S_PLSPA	S_PLPOR	S_PLSWE	S_PLGBR					
Panel B - Period 1													
ID	Country	Benchmark				FValue	NumDF	DenDF	ProbF	Add			
0	Large Cap US	S_PLAST	S_PLBEL	S_PLDEN	S_PLFIN	S_PLFRA	S_PLGER	S_PLGRC	24.18	2	168	<.0001	Y
		S_PLIRE	S_PLITA	S_PLNET	S_PLSPA	S_PLPOR	S_PLSWE	S_PLGBR					
Panel C - Period 2													
ID	Country	Benchmark				FValue	NumDF	DenDF	ProbF	Add			
0	Large Cap US	S_PLAST	S_PLBEL	S_PLDEN	S_PLFIN	S_PLFRA	S_PLGER	S_PLGRC	10.72	2	31	0.0003	Y
		S_PLIRE	S_PLITA	S_PLNET	S_PLSPA	S_PLPOR	S_PLSWE	S_PLGBR					
Panel D - Period 3													
ID	Country	Benchmark				FValue	NumDF	DenDF	ProbF	Add			
0	Large Cap US	S_PLAST	S_PLBEL	S_PLDEN	S_PLFIN	S_PLFRA	S_PLGER	S_PLGRC	15.99	2	56	<.0001	Y
		S_PLIRE	S_PLITA	S_PLNET	S_PLSPA	S_PLPOR	S_PLSWE	S_PLGBR					

Table 5 - Spanning Test with Complete Sample

This table provides the spanning test results for the complete sample with the S&P 500 benchmark and the S&P 500 and large caps benchmark. The test asset is added to the benchmark portfolio if the spanning test reject the null hypothesis at 95% confidence level.

		S&P 500 as benchmark asset					
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF	Add
0	US Small Cap	S_PCOMP	0.98	2	298	0.3783	N
1	United Kingdom	S_PCOMP	3.42	2	298	0.0339	Y
2	France	S_PCOMP S_PSGBR	4.66	2	297	0.0101	Y
3	Germany	S_PCOMP S_PSGBR S_PSFRA	2.63	2	296	0.0741	N
4	Netherlands	S_PCOMP S_PSGBR S_PSFRA	1.35	2	296	0.2603	N
5	Spain	S_PCOMP S_PSGBR S_PSFRA	2.47	2	296	0.0862	N
6	Sweden	S_PCOMP S_PSGBR S_PSFRA	8.9	2	296	0.0002	Y
7	Italy	S_PCOMP S_PSGBR S_PSFRA S_PSSWE	0.94	2	295	0.3901	N
8	Belgium	S_PCOMP S_PSGBR S_PSFRA S_PSSWE	6.31	2	295	0.0021	Y
9	Denmark	S_PCOMP S_PSGBR S_PSFRA S_PSSWE S_PSBEL	3.28	2	294	0.0389	Y
10	Finland	S_PCOMP S_PSGBR S_PSFRA S_PSSWE S_PSBEL S_PSDEN	0.09	2	293	0.9171	N
11	Austria	S_PCOMP S_PSGBR S_PSFRA S_PSSWE S_PSBEL S_PSDEN	0.3	2	293	0.7409	N
12	Ireland	S_PCOMP S_PSGBR S_PSFRA S_PSSWE S_PSBEL S_PSDEN	4.03	2	293	0.0187	Y
13	Portugal	S_PCOMP S_PSGBR S_PSFRA S_PSSWE S_PSBEL S_PSDEN S_PSIRE	3.68	2	292	0.0264	Y
14	Greece	S_PCOMP S_PSGBR S_PSFRA S_PSSWE S_PSBEL S_PSDEN S_PSIRE S_PSPOR	3.55	2	291	0.03	Y
		S&P 500 and all large cap indices as benchmark assets					
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF	Add
0	US Small Cap	LB	1.03	2	284	0.3577	N
1	United Kingdom	LB	5.88	2	284	0.0032	Y
2	France	LB S_PSGBR	0.75	2	283	0.4742	N
3	Germany	LB S_PSGBR	0.44	2	283	0.6467	N
4	Netherlands	LB S_PSGBR	3.21	2	283	0.0417	Y
5	Spain	LB S_PSGBR S_PSNET	4.01	2	282	0.0192	Y
6	Sweden	LB S_PSGBR S_PSNET S_PSSPA	1.96	2	281	0.1421	N
7	Italy	LB S_PSGBR S_PSNET S_PSSPA	1.33	2	281	0.2669	N
8	Belgium	LB S_PSGBR S_PSNET S_PSSPA	0.83	2	281	0.4354	N
9	Denmark	LB S_PSGBR S_PSNET S_PSSPA	2.27	2	281	0.1052	N
10	Finland	LB S_PSGBR S_PSNET S_PSSPA	0.91	2	281	0.404	N
11	Austria	LB S_PSGBR S_PSNET S_PSSPA	0.74	2	281	0.4764	N
12	Ireland	LB S_PSGBR S_PSNET S_PSSPA	2.36	2	281	0.096	N
13	Portugal	LB S_PSGBR S_PSNET S_PSSPA	1.9	2	281	0.1521	N
14	Greece	LB S_PSGBR S_PSNET S_PSSPA	0.7	2	281	0.4989	N

Table 6 - Spanning Test with Period Split

This table provides the spanning test results for small cap indices with period split. Panel A shows the result for spanning result for the period leading up to and including the global financial crisis with the S&P 500 benchmark and the S&P 500 and large caps benchmark. The test asset is added to the benchmark portfolio if the spanning test reject the null hypothesis at 95% confidence level.

Panel A - Spanning test result for period I						
S&P 500 as benchmark asset						
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF Add
0	US Small Cap	S_PCOMP	0.01	2	181	0.9864 N
1	United Kingdom	S_PCOMP	7.95	2	181	0.0005 Y
2	France	S_PCOMP S_PSGBR	1.41	2	180	0.2468 N
3	Germany	S_PCOMP S_PSGBR	2.23	2	180	0.1105 N
4	Netherlands	S_PCOMP S_PSGBR	1.05	2	180	0.3514 N
5	Spain	S_PCOMP S_PSGBR	2.98	2	180	0.0533 N
6	Sweden	S_PCOMP S_PSGBR	6.15	2	180	0.0026 Y
7	Italy	S_PCOMP S_PSGBR S_PSSWE	0.87	2	179	0.4203 N
8	Belgium	S_PCOMP S_PSGBR S_PSSWE	1.45	2	179	0.2384 N
9	Denmark	S_PCOMP S_PSGBR S_PSSWE	3.12	2	179	0.0468 Y
10	Finland	S_PCOMP S_PSGBR S_PSSWE S_PSDEN	0.91	2	178	0.4061 N
11	Austria	S_PCOMP S_PSGBR S_PSSWE S_PSDEN	4.13	2	178	0.0177 Y
12	Ireland	S_PCOMP S_PSGBR S_PSSWE S_PSDEN S_PSAST	3.38	2	177	0.0363 Y
13	Portugal	S_PCOMP S_PSGBR S_PSSWE S_PSDEN S_PSAST S_PSIRE	2.22	2	176	0.1112 N
14	Greece	S_PCOMP S_PSGBR S_PSSWE S_PSDEN S_PSAST S_PSIRE	0.46	2	176	0.6351 N
S&P 500 and all large cap indices as benchmark assets						
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF Add
0	US Small Cap	LB	2.01	2	167	0.1368 N
1	United Kingdom	LB	3.63	2	167	0.0288 Y
2	France	LB S_PSGBR	0.89	2	166	0.4116 N
3	Germany	LB S_PSGBR	3.21	2	166	0.0429 Y
4	Netherlands	LB S_PSGBR S_PSGER	4.19	2	165	0.0167 Y
5	Spain	LB S_PSGBR S_PSGER S_PSNET	6.79	2	164	0.0015 Y
6	Sweden	LB S_PSGBR S_PSGER S_PSNET S_PSSPA	0.01	2	163	0.9885 N
7	Italy	LB S_PSGBR S_PSGER S_PSNET S_PSSPA	0.11	2	163	0.8925 N
8	Belgium	LB S_PSGBR S_PSGER S_PSNET S_PSSPA	0.24	2	163	0.7901 N
9	Denmark	LB S_PSGBR S_PSGER S_PSNET S_PSSPA	2.02	2	163	0.136 N
10	Finland	LB S_PSGBR S_PSGER S_PSNET S_PSSPA	0.65	2	163	0.5251 N
11	Austria	LB S_PSGBR S_PSGER S_PSNET S_PSSPA	3.75	2	163	0.0255 Y
12	Ireland	LB S_PSGBR S_PSGER S_PSNET S_PSSPA S_PSAST	3.17	2	162	0.0446 Y
13	Portugal	LB S_PSGBR S_PSGER S_PSNET S_PSSPA S_PSAST S_PSIRE	0.74	2	161	0.4789 N
14	Greece	LB S_PSGBR S_PSGER S_PSNET S_PSSPA S_PSAST S_PSIRE	0.52	2	161	0.5958 N

Table 6 - Spanning Test with Period Split (cont.)

This table provides the spanning test results for small cap indices with period split. Panel B shows the result for spanning result for the interim period after the global financial crisis and before Brexit with the S&P 500 benchmark and the S&P 500 and large caps benchmark. The test asset is added to the benchmark portfolio if the spanning test reject the null hypothesis at 95% confidence level.

Panel B - Spanning test result for period 2						
S&P 500 as benchmark asset						
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF Add
0	US Small Cap	S_PCOMP	7.77	2	44	0.0013 Y
1	United Kingdom	S_PCOMP RUS2000	2.66	2	43	0.0814 N
2	France	S_PCOMP RUS2000	6.05	2	43	0.0049 Y
3	Germany	S_PCOMP RUS2000 S_PSFRA	3.41	2	42	0.0423 Y
4	Netherlands	S_PCOMP RUS2000 S_PSFRA S_PSGER	0.23	2	41	0.794 N
5	Spain	S_PCOMP RUS2000 S_PSFRA S_PSGER	2.95	2	41	0.0633 N
6	Sweden	S_PCOMP RUS2000 S_PSFRA S_PSGER	2.1	2	41	0.1359 N
7	Italy	S_PCOMP RUS2000 S_PSFRA S_PSGER	1.76	2	41	0.1855 N
8	Belgium	S_PCOMP RUS2000 S_PSFRA S_PSGER	1.38	2	41	0.262 N
9	Denmark	S_PCOMP RUS2000 S_PSFRA S_PSGER	0.33	2	41	0.7213 N
10	Finland	S_PCOMP RUS2000 S_PSFRA S_PSGER	0.99	2	41	0.3794 N
11	Austria	S_PCOMP RUS2000 S_PSFRA S_PSGER	0.19	2	41	0.83 N
12	Ireland	S_PCOMP RUS2000 S_PSFRA S_PSGER	0.01	2	41	0.9897 N
13	Portugal	S_PCOMP RUS2000 S_PSFRA S_PSGER	1.41	2	41	0.2549 N
14	Greece	S_PCOMP RUS2000 S_PSFRA S_PSGER	2.93	2	41	0.0649 N
S&P 500 and all large cap indices as benchmark assets						
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF Add
0	US Small Cap	LB	0.75	2	30	0.4805 N
1	United Kingdom	LB	4.67	2	30	0.0172 Y
2	France	LB S_PSGBR	0.21	2	29	0.8138 N
3	Germany	LB S_PSGBR	2.17	2	29	0.132 N
4	Netherlands	LB S_PSGBR	0.1	2	29	0.9022 N
5	Spain	LB S_PSGBR	0.62	2	29	0.5463 N
6	Sweden	LB S_PSGBR	2.22	2	29	0.1273 N
7	Italy	LB S_PSGBR	0.51	2	29	0.6055 N
8	Belgium	LB S_PSGBR	1.29	2	29	0.2897 N
9	Denmark	LB S_PSGBR	0.15	2	29	0.8654 N
10	Finland	LB S_PSGBR	0.39	2	29	0.679 N
11	Austria	LB S_PSGBR	1.07	2	29	0.3574 N
12	Ireland	LB S_PSGBR	0.57	2	29	0.572 N
13	Portugal	LB S_PSGBR	2.28	2	29	0.1203 N
14	Greece	LB S_PSGBR	0.01	2	29	0.9853 N

Table 6 - Spanning Test with Period Split (cont.)

This table provides the spanning test results for small cap indices with period split. Panel C shows the result for spanning result for the post Brexit period with the S&P 500 benchmark and the S&P 500 and large caps benchmark. The test asset is added to the benchmark portfolio if the spanning test reject the null hypothesis at 95% confidence level.

Panel C - Spanning test result for period 3							
S&P 500 as benchmark asset							
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF	Add
0	US Small Cap	S_PCOMP	1.4	2	69	0.2546	N
1	United Kingdom	S_PCOMP	0.83	2	69	0.4402	N
2	France	S_PCOMP	0.25	2	69	0.7827	N
3	Germany	S_PCOMP	0.28	2	69	0.76	N
4	Netherlands	S_PCOMP	0.63	2	69	0.5333	N
5	Spain	S_PCOMP	1.15	2	69	0.3219	N
6	Sweden	S_PCOMP	0.12	2	69	0.8859	N
7	Italy	S_PCOMP	0.06	2	69	0.9461	N
8	Belgium	S_PCOMP	2	2	69	0.1436	N
9	Denmark	S_PCOMP	2.48	2	69	0.0912	N
10	Finland	S_PCOMP	1.31	2	69	0.2752	N
11	Austria	S_PCOMP	0.45	2	69	0.64	N
12	Ireland	S_PCOMP	1.12	2	69	0.3332	N
13	Portugal	S_PCOMP	1.41	2	69	0.2507	N
14	Greece	S_PCOMP	1.69	2	69	0.1925	N
S&P 500 and all large cap indices as benchmark assets							
ID	Country	Benchmark	FValue	NumDF	DenDF	ProbF	Add
0	US Small Cap	LB	1.12	2	55	0.3338	N
1	United Kingdom	LB	0.29	2	55	0.7529	N
2	France	LB	2.07	2	55	0.1361	N
3	Germany	LB	1.29	2	55	0.2827	N
4	Netherlands	LB	0.1	2	55	0.9026	N
5	Spain	LB	0.95	2	55	0.3915	N
6	Sweden	LB	3.22	2	55	0.0476	Y
7	Italy	LB S_PSSWE	2.76	2	54	0.0723	N
8	Belgium	LB S_PSSWE	0.8	2	54	0.4536	N
9	Denmark	LB S_PSSWE	1.89	2	54	0.1613	N
10	Finland	LB S_PSSWE	1.23	2	54	0.3007	N
11	Austria	LB S_PSSWE	2.23	2	54	0.1174	N
12	Ireland	LB S_PSSWE	1.44	2	54	0.245	N
13	Portugal	LB S_PSSWE	0.32	2	54	0.7273	N
14	Greece	LB S_PSSWE	0.19	2	54	0.8272	N

