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STOXX TRUE EXPOSURE™ INDICES - AN ALTERNATIVE METRIC TO THE TRADITIONAL COUNTRY FACTOR DEFINITION

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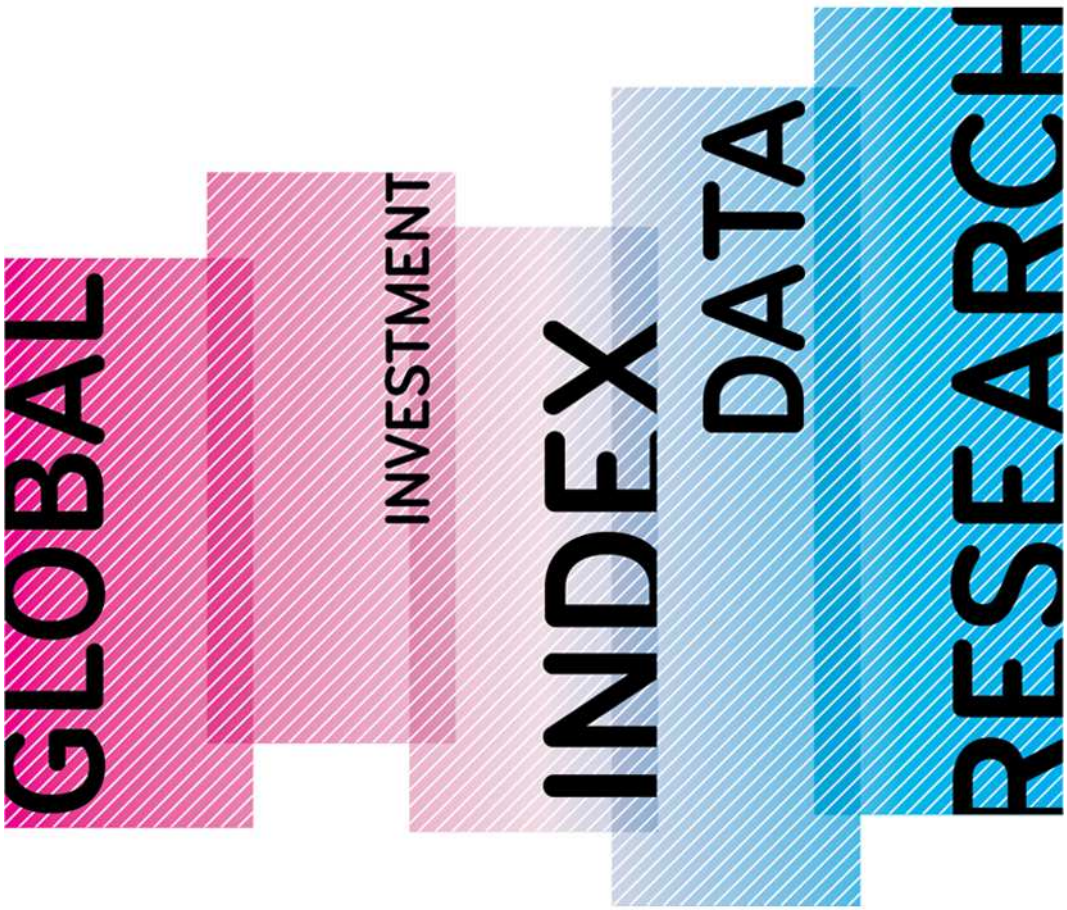

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Abstract

This research paper provides a review of the investment rationale behind the concept of revenue-exposure indices, in which the indices' constituents are disentangled according to the sources of revenues.

As globalization across regions and industry sectors rapidly progresses, companies selected into standard equity indices are often found to have a geographically diverse revenue base. As a result, an investment in a given market index provides exposure not only to the targeted country or region but also to foreign regions and the risk factors thereof.

STOXX has developed a new index family called STOXX True Exposure or STOXX TRU. Other than traditional regional equity indices, STOXX TRU indices explicitly take into account the geographic source of revenue generation for each company selected into the indices. These indices aim to address the "home bias" in asset allocation practices, with a view to boosting portfolio returns in given market conditions. In fact, as uncorrelated drivers become prominent in portfolio construction diversification, pure-play country revenue-exposed indices might insulate to some extent global portfolios from major dislocation factors originating either in countries or regions other than the core exposure of the indices.

Determining the economic exposure of companies represents a new factor in the construction of diversified equity portfolios that could well serve as an alternative metric to the traditional country factor definition.

A wide body of academic literature has analyzed the relationship between economic exposure to country and regional risks and company valuations as well as the impact on stock performance. Nonetheless, the cost exposures across countries have not been investigated thoroughly to assess in full the fundamental exposure at the company level. That determination is left for future research and appears to be promising.

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"WISDOM COMES ALONE THROUGH SUFFERING."
Aeschylus (c. 523 BC-c. 456 BC)

1 STOXX True Exposure Indices–An introduction and literature review

Traditional market capitalization-based equity indices select companies primarily according to their country or region of domicile. However, this selection methodology does not take into account the sources of the index constituents' revenues; companies that are selected into standard equity indices are often found to have a geographically diversified revenue base. A company selected into the S&P 500 index may well generate the majority of its revenue in countries other than the US, maintaining exposure to a number of global, regional and country risk factors.

As globalization increases and companies operate across various regions and countries, it becomes increasingly difficult to disentangle the sources of revenue of the companies. In other words, globalization has blurred the geographic distinction for global investors. Consequently, an investment into traditional equity indices such as the S&P 500 index provides exposure not only to the targeted country or region but also to foreign regions, areas to which the investor may not want to be exposed.

Nonetheless, in many cases—plan sponsors are a typical example—investors' propensity to allocate a considerable proportion of assets in their home countries (the so-called "home bias") remains strong.

In this context, STOXX has developed a new index family called STOXX True Exposure or STOXX TRU. Unlike traditional regional equity indices, STOXX TRU indices explicitly take into account the geographic source of revenue generation for each company selected into the index. This enables the investor to gain a significantly more focused or distilled exposure to the targeted region by being in control of actual exposures on the constituent level. The economic exposure of companies represents a new factor in the construction of diversified equity portfolios, which could well serve as an alternative metric to the traditional country factor definition.

Academic literature has analyzed the relationship between economic exposure to country and regional risks and company valuations as well as the impact on stock performance. The significance of country factors (which in a number of cases dominate industry factors in explaining the return component of stock returns) is generally attributable to country-specific characteristics, investors' "home bias" and industry-sector specificities existing in many countries.

Back in 1994, Heston and Rouwenhorst[1] analyzed (for the period 1978 through 1992) the influence of industrial structure on the cross-sectional volatility and correlation structure of country index returns for 12 European countries. They found that "diversification across countries within an industry is a much more effective tool for risk reduction than industry diversification within a country."

[1] Heston, S. L. and K. G. Rouwenhorst (1994), "Does Industrial Structure Explain the Benefits of International Diversification?," Journal of Financial Economics, Vol. 36, No. 1, pp. 3-27, August.

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Older papers, based on a limited sample of firms (making it difficult to generalize results and infer unbiased conclusions), examined the usefulness of geographic segment disclosures to improve forecasts of earnings at the parent-company level (Balakrishnan, Harris and Sen[2] and Roberts[3]).

In a recent paper, Li, Richardson and Tuna[4] showed that geographic segment sales breakdown and forecasts of country-level performance contributed significantly to forecast domestic firm-level profitability. The underlying data sample included (for the 1998-2010 period) 135,974 US "domestic" firm-year observations with exposure only to their home country and 62,341 non-US "non-domestic" firm-year observations that had exposure to multiple countries. In particular, the authors found that for domestic firms a combination of country exposures with country-level forecasts was strongly associated with future changes in net operating assets. An increase of one percentage point in expectations of real GDP growth translated to an additional 31 basis points of return on net operating assets.

Cavaglia, Brightman and Aked[5], in estimating a factor model for 21 developed equity markets covering the period December 1985 through November 1999 produced new evidence that supported the economic and statistical significance of industry factors as compared to country factors. Their findings "imply that over the most recent five years, diversification across industries rather than across countries is a more effective tool for reducing the risk of global equity portfolios."

The relative importance of industrial and country factors in international stock returns was investigated further in a paper authored by Isakov and Sonney[6], which analyzed a sample of more than 4,000 stocks listed in 20 developed countries for the period 1997-2000. For that period, the authors found compelling evidence of the significance of a country factor in explaining stock market returns. Nonetheless, the paper suggested that the result "has to be interpreted with caution though, as an analysis that allows for time-varying relative influences demonstrates the rapidly increasing impact of industry effects in recent times." In particular, when limiting the analysis to a sample of stocks of the eight member countries of the European Monetary Union (EMU), the authors found that the influence of industry factors on stock returns was stronger than the country effects. The trend relating to an increase in the significance of industry factors was more likely "attributable to an increasing globalization of the world economy rather than to convergence of EMU economies." Nonetheless, because of the limited period analyzed, the authors could not infer any conclusions beyond that period about the relative influences of the two factors in explaining stock price behavior.

Additional studies focused on the analysis of the relative importance of country factors versus industry-related factors in explaining stock market returns after the start of the EMU. Those followed research by Goldman Sachs Investment Research[7] and Morgan Stanley Dean Witter[8], which anticipated a decreased

[2] Balakrishnan, R., T. S. Harris and P. K. Sen (1990), "The Predictive Ability of Geographic Segment Disclosures," Journal of Accounting Research, Vol. 28, No. 2, pp. 305-325, Autumn.
[3] Roberts, C. B. (1989), "Forecasting Earnings Using Geographical Segment Data: Some UK Evidence," Journal of International Financial Management and Accounting, Vol. 1, No. 2, pp. 130-151.
[4] Li, N., S. A. Richardson and A. I. Tuna (2014), "Macro to Micro: Country Exposures, Firm Fundamentals and Stock Returns," Journal of Accounting and Economics, Vol. 58, No. 1, pp. 1-20, August.
[5] Cavaglia, S., C. Brightman and M. Aked (2000), "The Increasing Importance of Industry Factors," Financial Analysts Journal, Vol. 56, No. 5, pp. 41-54, September/October.
[6] Isakov, D. and F. Sonney (2003), "Are practitioners right? On the relative importance of industrial factors in international stock returns," SSRN, February.
[7] Goldman Sachs Investment Research (1998), "Sectors versus Country: When Is an Asset Class an Asset Class?," Portfolio Strategy, p.21, March.

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importance of country factors in favor of industry sector components because of the fading of country risk. Working on a dataset of 92 weekly return observations for the period April 1997 through October 2000 and including country indices from 10 of the 11 countries originally participating in the EMU (excluding Luxembourg), Kraus[9] found that European industry factors "have dramatically increased in importance with the launch of the single currency." In particular, "sector factors account for 120 percent of total return variance after the start of the EMU as compared to 60 percent before." At the same time, the author found the emergence of a country-size factor contributing to explaining European stock returns since the start of the EMU.

An alternative method of analyzing the relative influence of country factors compared to industry-sector characteristics was proposed by Sell[10]. A cluster-analysis approach that analyzed the pattern of company returns over time to determine a group of company similarities was used in the study, which relied on a dataset of dollar-denominated monthly returns for 3,328 to 4,748 international companies incorporated in 18 countries for the period 1989 to 1999. The companies were clustered in each group with respect to their country of incorporation and industry sector of business activity. Given companies from most countries fell into a relatively smaller number of groups compared to companies from any single sector (which fell across a larger number of groups), the findings were interpreted as being new evidence suggesting that "companies group by country rather than by industry."

On the other hand, Damodaran[11] analyzed the exposure to country risk as an explicit factor in company valuation. In addition to the traditional exposure to market risk, the author measured the company's exposure to country risk through a lambda approach (i.e., the factor that allowed each company to have an exposure to country risk as different from all other market risk). He concluded that "the assessment of country risk has become a central component of valuation."

Data from S&P Dow Jones Indices show that foreign sales account for more than two-fifths of total S&P 500 turnover, with 239 companies in the index sourcing between 15% and 85% of their revenues from foreign countries. According to the latest available readings for 2013, based on a subsample of firms reporting data on foreign sales, 46.3% of sales were produced and sold outside the US, a marginal decrease from the 46.6% reported for 2012.

Information technology held the top spot in the 2013 ranking of foreign sales as a percentage of total sector sales, with 56.6% of sales originating from abroad (down from 58.3% for 2012). Energy was the runner-up, with 54.6% of foreign sales (up from 52.6% for 2012). The information technology sector accounted for 14.8% of all US foreign sales, down from 16.2% for 2012.

On the other hand, leveraging on the potential of "alternative" weighting schemes more closely tied to macro dynamics, traditional market cap-weighted indices do not accurately reflect macroeconomic growth dynamics. The table below plots the correlation across various periods between traditional market-cap-weighted indices and real GDP growth. The relationship between market cap-weighted benchmarks

[8] Morgan Stanley Dean Witter (1998), Global Equity and Derivative Markets, Vol. 8, No. 6, June.
[9] Kraus, T. (2001), "The Impact of the EMU on the Structure of European Equity Returns: An Empirical Analysis of the First 21 Months," IMF WP/01/84, June.
[10] Sell, C. W. (2002), "Another Method of Analyzing the Importance of a Company's Country versus Sector Characteristics," SSRN, February.
[11] Damodaran, A. (2003), "Country Risk and Company Exposure: Theory and Practice," Journal of Applied Finance, Vol. 13, No. 2, pp. 64-78, Fall/Winter.

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and real GDP growth proved to be weaker for the most recent periods, when stock market dynamics were mainly driven by abundant liquidity drivers sustained by central banks' ultra-loosening monetary policy and massive asset purchases.

TABLE 1: GDP GROWTH RATE CORRELATIONS VERSUS MARKET BENCHMARKS

	US Real GDP/ S&P 500	US Real GDP/ STOXX USA 900	Eurozone Real GDP/ EURO STOXX	Germany Real GDP/DAX
2Q 2002-1Q2015	53.18%	53.45%	41.14%	38.23%
1Q 2008-1Q 2015	63.98%	63.07%	44.70%	43.51%
1Q 2010-1Q 2015	9.52%	8.40%	18.09%	24.78%

Source: STOXX

In order to provide the best tradeoff between exposure and other dimensions such as industry and country allocations, STOXX provides four index versions for each country or region. These versions differ with respect to the required minimum revenue exposure per company. Exposure levels range from 25% to 100% in steps of 25 percentage points. A company that generates 60% of its revenue in the United States would be selected into the STOXX TRU USA 25% and the STOXX TRU USA 50% indices but would be excluded from the STOXX TRU USA 75% and STOXX TRU USA 100% indices.

To take into account market representation and tradability, companies are weighted according to the product of exposure and free-float market capitalization. In addition, companies selected into the respective index need to have either a three-month average daily trading volume (ADTV) of EUR1 million or to meet the liquidity criteria of the respective underlying equity index.

The following table provides an overview of the STOXX TRU index family:

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TABLE 2: STOXX TRU INDEX FAMILY

Indices	Exposure Levels	Weighting	Capping	# Components
Country True Exposure Indices	25%, 50%, 75%, 100%	Free-float MC * Exposure	5%	All Share
STOXX True Exposure USA Index				
STOXX True Exposure UK Index				
STOXX True Exposure Canada Index				
STOXX True Exposure Japan Index				
STOXX True Exposure Australia Index				
Regional True Exposure Indices	25%, 50%, 75%, 100%	Free-float MC * Exposure	5%	All Share
STOXX True Exposure Asia /Pacific Index				
STOXX True Exposure North America Index				
STOXX True Exposure Europe Index				
Euro STOXX True Exposure Index				
Global True Exposure Indices	25%, 50%, 75%, 100%	Free-float MC * Exposure	5%	All Share
STOXX True Exposure Emerging Markets Index				
STOXX True Exposure Developed Markets Index				
STOXX True Exposure Developed Markets ex USA Index				
STOXX True Exposure Developed Markets ex Europe Index				

Source: STOXX

2 Analysis of risk-return characteristics

An analysis of the performance of the STOXX TRU indices confirmed that pure-play home country-biased indices outperformed the underlying market-cap benchmarks in both absolute and risk-adjusted terms over various measurement periods.

In particular, Tables 3 through 5 below show that the gross return versions of the STOXX True Exposure USA 100% Index, the STOXX True Exposure Developed Markets ex USA 100% Index and the STOXX True Exposure Emerging Markets 100% Index generated superior returns—in both absolute and risk-adjusted terms. That was against both the underlying STOXX market-cap benchmarks and leading global stock market benchmarks for various measurement periods, with a certain level of reduction in volatility relative to the underlying benchmark.

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Among others, the traditional risk/return annualized measure for the STOXX True Exposure USA 100% Gross Return Index over the five-year period ended May 8, 2015 was 1.00, compared to 0.91 for the S&P 500 Total Return Index and 0.89 for the STOXX USA 900 Gross Return Index. Similarly, for the same five-year period, the risk/return annualized reading for the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index is of 0.63 compared to 0.53 for the MSCI World ex US Total Return Index and 0.55 for the STOXX Developed Markets ex USA Gross Return benchmark. Also, the risk/return annualized reading for the STOXX True Exposure Emerging Markets 100% Gross Return Index is 0.42 compared to 0.27 for the MSCI Emerging Markets Total Return Index and 0.34 for the STOXX Emerging Markets Gross Return benchmark.

TABLE 3 STOXX TRUE EXPOSURE USA 100% INDEX AND S&P 500 INDEX, SUMMARY OF RISK/RETURN MEASURES (SEP. 24, 2007-MAY 8, 2015, GROSS RETURN INDICES)[12]

	STOXX True Exposure USA 100% - Gross Return			S&P500 Total Return		
	Annualized Return (%)	Annualized Volatility (%)	Return/Risk Annualized	Annualized Return (%)	Annualized Volatility (%)	Return/Risk Annualized
2-Year	14.53	10.81	1.22	16.23	11.31	1.30
3-Year	17.55	10.92	1.42	18.28	11.73	1.37
5-Year	16.98	14.95	1.00	16.17	15.56	0.91
Since inception	8.35	22.61	0.34	6.75	22.16	0.28
	Max Drawdown (%)	ßeta		Max Drawdown (%)		
Since Sep. 24, 2007	-52.47	0.99		-55.25		

Source: STOXX

TABLE 4 STOXX TRUE EXPOSURE DEVELOPED MARKETS EX USA 100% INDEX AND MSCI WORLD EX US INDEX, SUMMARY OF RISK/RETURN MEASURES (SEP. 24, 2007- MAY 8, 2015, GROSS RETURN INDICES)

	STOXX True Exposure Developed Markets ex USA 100% - Gross Return			MSCI World ex US Total Return		
	Annualized Return (%)	Annualized Volatility (%)	Return/Risk Annualized	Annualized Return (%)	Annualized Volatility (%)	Return/Risk Annualized
2-Year	5.56	11.86	0.46	6.86	10.80	0.65
3-Year	13.83	11.40	1.08	12.68	11.90	0.93
5-Year	9.04	12.86	0.64	9.76	15.99	0.53
Since inception	2.90	16.07	0.17	1.30	20.88	0.06
	Max Drawdown (%)	ßeta		Max Drawdown (%)		
Since Sep. 24, 2007	-43.83	0.57		-60.11		

Source: STOXX

[12] βeta in tables 3 through 5 is computed taking into account a risk-free rate given by the 3-month U.S. T-bill total return index.

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TABLE 5 STOXX TRUE EXPOSURE EMERGING MARKETS 100% INDEX AND MSCI EMERGING MARKETS INDEX, SUMMARY OF RISK/RETURN MEASURES (SEP. 24, 2007- MAY 8, 2015, GROSS RETURN INDICES)

	STOXX True Exposure Emerging Markets 100% - Gross Return			MSCI Emerging Markets Total Return		
	Annualized Return (%)	Annualized Volatility (%)	Return/Risk Annualized	Annualized Return (%)	Annualized Volatility (%)	Return/Risk Annualized
2-Year	1.25	13.05	0.13	1.51	12.56	0.15
3-Year	6.93	12.67	0.50	4.32	12.74	0.30
5-Year	7.08	15.16	0.42	5.07	15.85	0.27
Since inception	2.83	20.90	0.13	0.98	22.38	0.04
Max Drawdown (	Max Drawdown (%)	ßeta		Max Drawdown (%)		
Since Sep. 24, 2007	-64.5	0.88		-65.14		

Source: STOXX

Historically, the pure-play home country-biased STOXX True Exposure indices have performed relatively better in volatile periods, whenever volatility patterns were triggered by information flow and dislocation factors originating in countries other than the home country. The charts below plot the daily log return difference between the STOXX True Exposure USA 100% Gross Return Index and the S&P 500 Total Return Index. Also, the 20-day correlations between the daily log return difference between the STOXX True Exposure USA 100% Gross Return Index and the S&P 500 Total Return Index and the CBOE Volatility Index (VIX)[13] log returns are included in the chart.

The STOXX True Exposure USA 100% Index outperformed the stock market benchmark in days when the correlation between the log return differential and the implied volatility was tapering. That was particularly true around some market dislocation events that will be analyzed in more detail later in the report (we refer to sharp market correction episodes for the periods August through September 2011; May 2013 through June 2013; and October 2014 through January 2015). The next chart (Figure 2) also suggests some level of correlation pattern around the same market episodes between the positive log return difference between the STOXX True Exposure USA 100% Gross Return Index and the S&P 500 Total Return Index, along with lower implied volatility levels.

[13] The VIX aims to supply a script for replicating volatility exposure with a portfolio of S&P 500 Index options. It is a gauge of market fear, since it reflects the assessment of market expectations on future levels of realized volatility.

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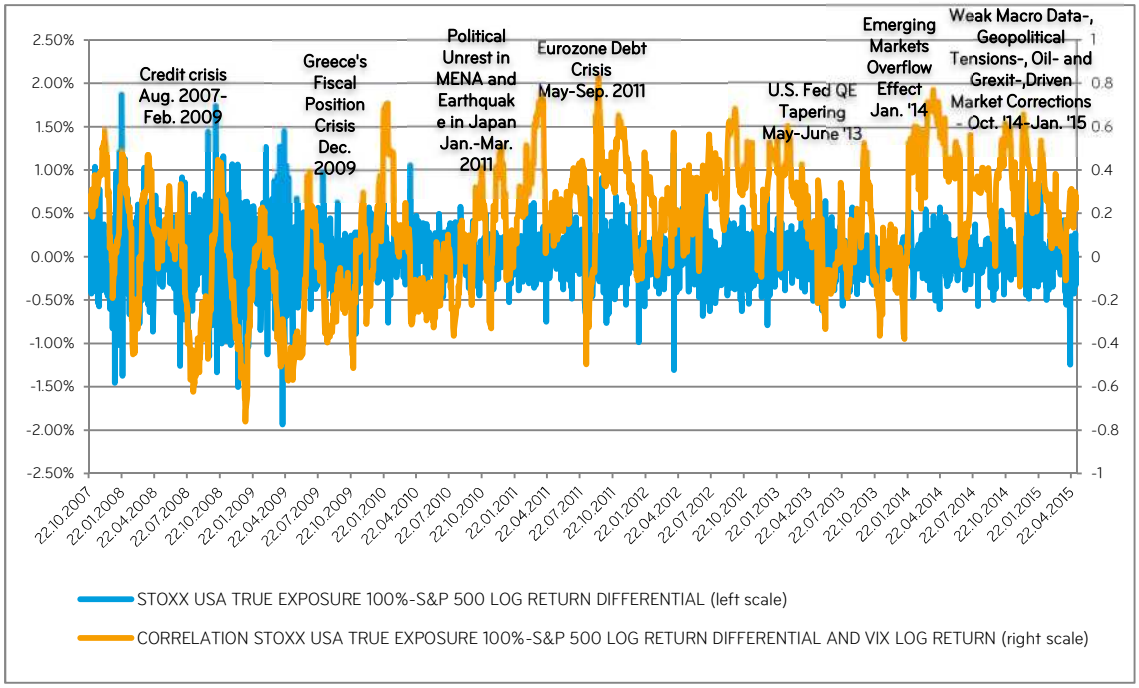
FIGURE 1 STOXX TRUE EXPOSURE USA 100%, S&P 500 LOG-RETURN DIFFERENTIAL AND 20-DAY CORRELATION LOG RETURN DIFFERENTIAL, VIX LOG RETURN (OCT. 22, 2007-MAY 8, 2015, GROSS RETURNS EXCEPT FOR VIX)



Source: STOXX

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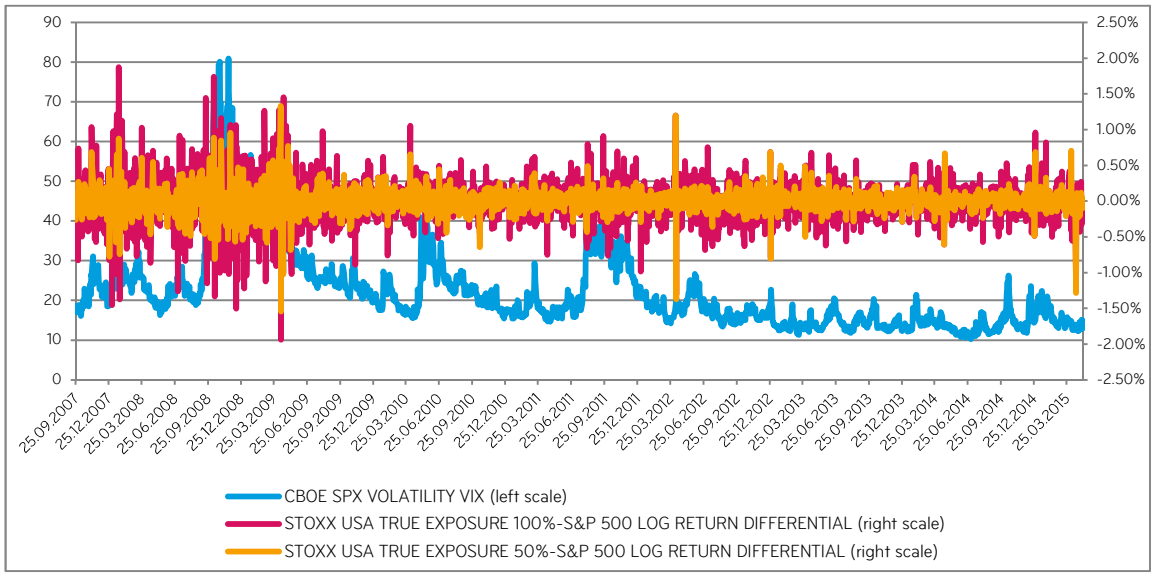
FIGURE 2 STOXX TRUE EXPOSURE USA 100%, S&P 500 LOG-RETURN DIFFERENTIAL, STOXX TRUE EXPOSURE USA 50%, S&P 500 LOG-RETURN DIFFERENTIAL AND VIX (SEP. 25, 2007-MAY 8, 2015, GROSS RETURNS EXCEPT FOR VIX)



Source: STOXX

The charts below plot indexed performance, 20-day annualized rolling-window volatility, correlation and maximum drawdown of the STOXX True Exposure USA 100% Gross Return Index, the STOXX USA Gross Return benchmark and the S&P 500 Total Return Index for the period Sep. 24, 2007-May 8, 2015[14]. Similar charts for the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index, the STOXX True Exposure Emerging Markets 100% Gross Return Index and their respective market benchmarks are shown in the Appendix of the current research report.

Generally speaking, except for periods of volatility clustering, lower volatility levels were observed in periods of decreased correlation patterns between the STOXX True Exposure indices and the underlying market-cap-weighted benchmarks.

[14] The STOXX True Exposure indices were launched on Jun. 8, 2015 (hereinafter, launch date). Index values calculated for any date or period prior to the index's launch date are considered backtested. In order to deliver a selection bias-free analysis, performance comparisons and other analytics shown in the research paper make reference to a subsample of STOXX benchmarks (referred to as either COV or STOXX benchmark throughout the research paper), whereby constituent data for which revenue exposure data were not available for the backtested periods were excluded from the list of constituents.

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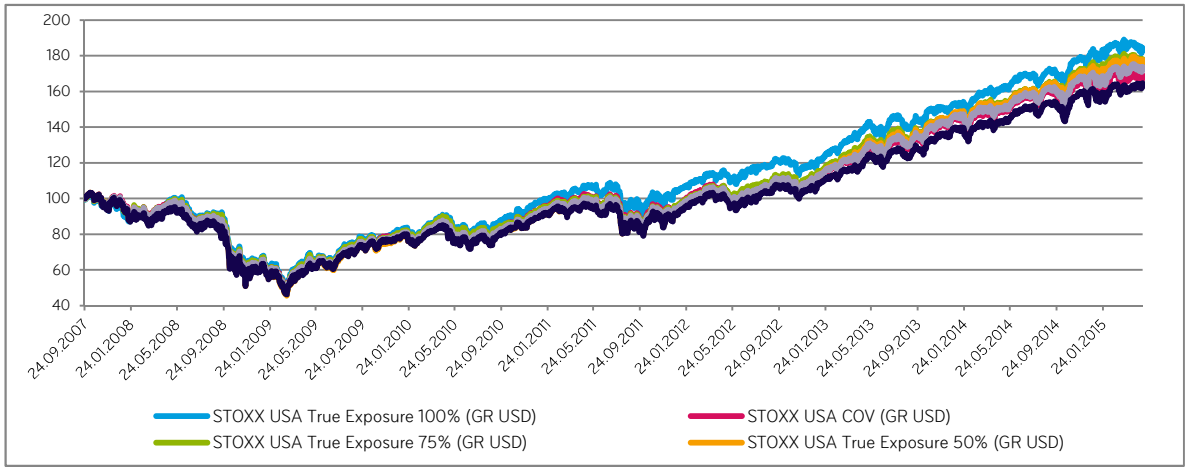
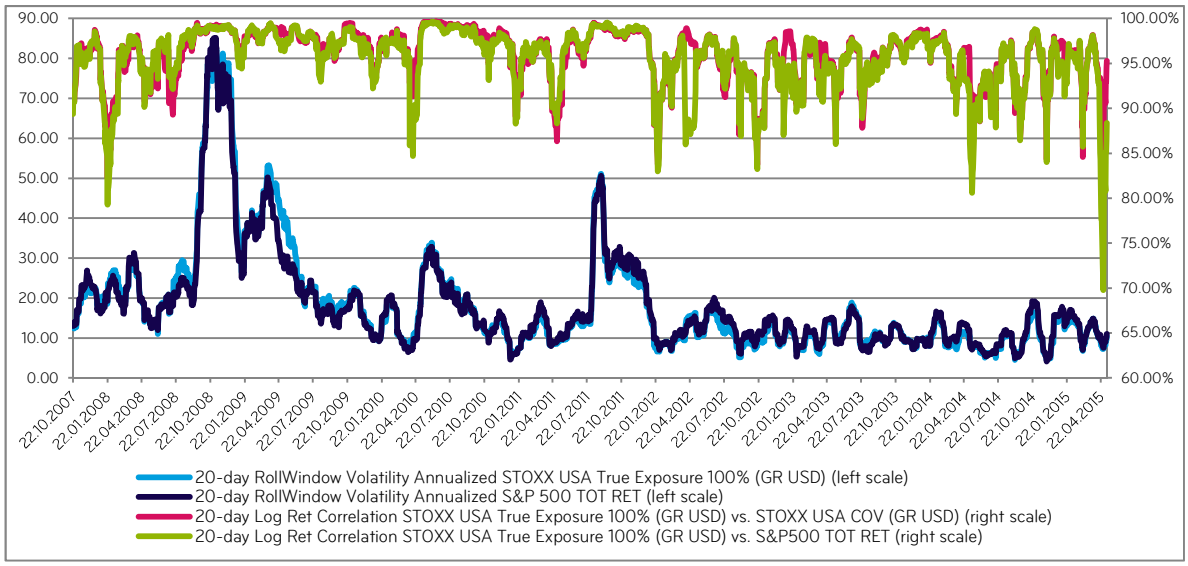
FIGURE 3 STOXX TRUE EXPOSURE USA INDICES, STOXX USA COV AND S&P 500 INDEX, INDEXED PERFORMANCE (SEP. 24, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

FIGURE 4 STOXX TRUE EXPOSURE USA 100 INDEX, STOXX USA COV AND S&P 500 INDEX, 20-DAY LOG RETURN CORRELATION VERSUS 20-DAY ROLLING-WINDOW VOLATILITY (OCT. 22, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

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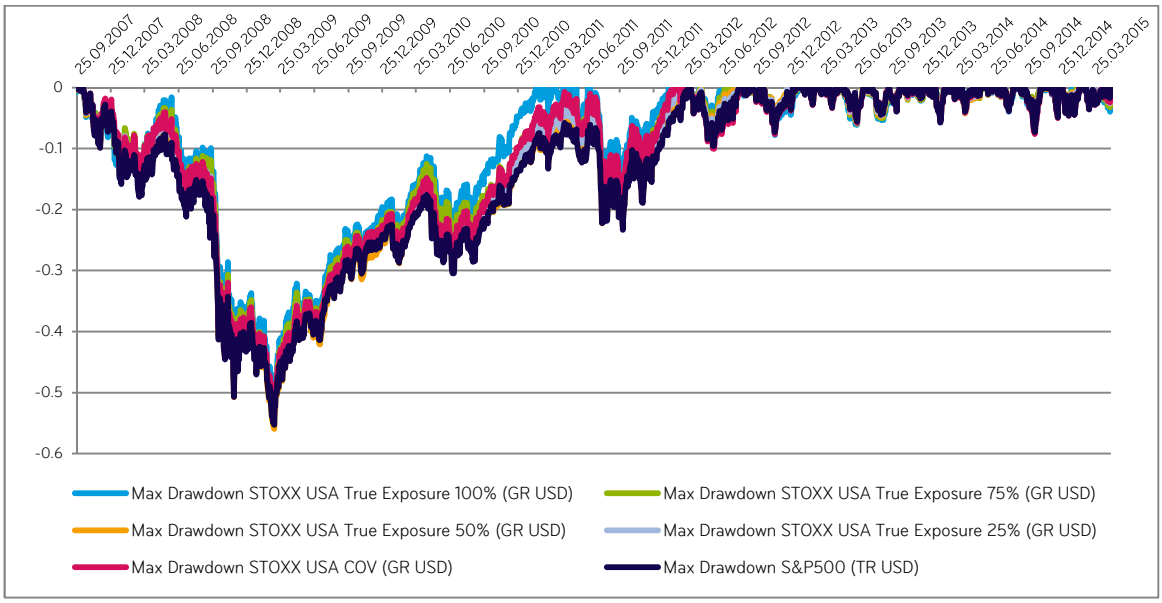
FIGURE 5 STOXX TRUE EXPOSURE USA INDICES, STOXX USA COV AND S&P 500 INDEX, MAXIMUM DRAWDOWN (SEP. 25, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

The asymmetric response of home country-biased indices to market movements points to their expected underperformance in bull markets and their ability to provide a certain level of downside-risk protection in uncertain market conditions, bear markets and market dislocations in general—compared to the underlying benchmark—whenever disturbance factors are triggered by information flows originating in foreign countries and/or regions.

Based on daily gross returns for the period Sep. 25, 2007-May 8, 2015 (1,989 daily observations), the STOXX True Exposure USA 100% Gross Return Index outperformed the S&P 500 Total Return Index 55.91%[15] of the time during down markets, while it outperformed the leading US market benchmark only 46.80% of the time during up markets.

The median level of daily outperformance of the STOXX True Exposure USA 100% Gross Return Index was 0.17% during up-market periods and 0.18% during down-market periods.

Based on daily gross returns for the period Sep. 25, 2007-May 8, 2015, the capture ratio of the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index against the MSCI World ex US Total Return Index was 66.18% during down markets, while it was a much lower 32.52% during up markets.

[15] That percentage is generally referred to as the capture ratio.

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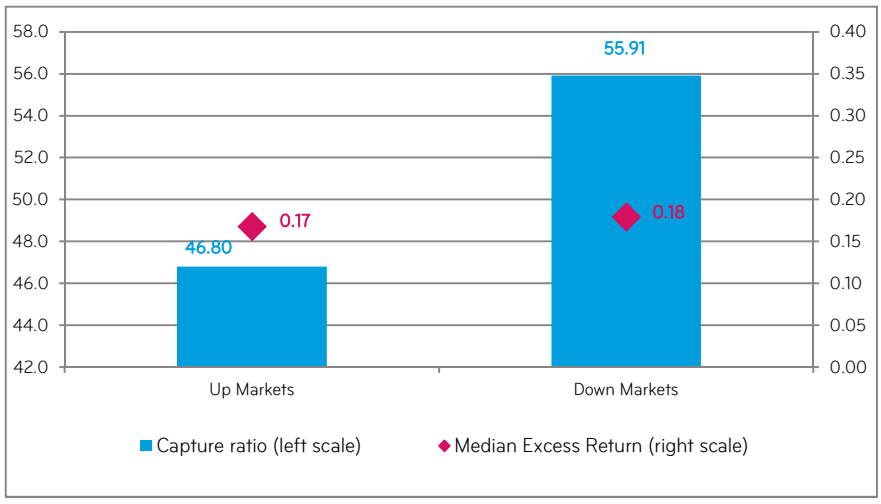
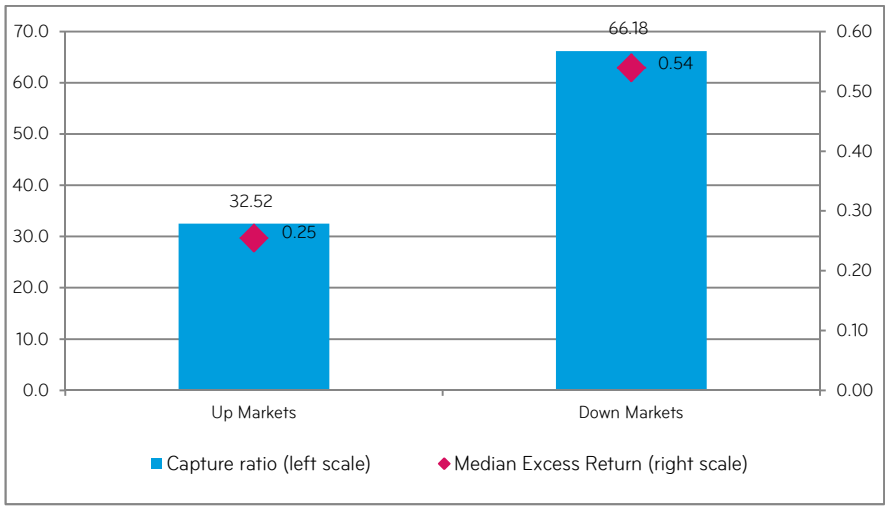
The median level of daily outperformance of the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index was 0.25% during up-market periods and 0.54% during down-market periods.

FIGURE 6 STOXX TRUE EXPOSURE USA 100% INDEX VERSUS S&P 500 INDEX, CAPTURE RATIO AND MEDIAN EXCESS RETURN (SEP. 25, 2007-MAY 8, 2015, GROSS-RETURNS)



Source: STOXX

FIGURE 7 STOXX TRUE EXPOSURE DEVELOPED MARKET EX USA 100% INDEX VERSUS MSCI WORLD EX US INDEX, CAPTURE RATIO AND MEDIAN EXCESS RETURN (SEP. 25, 2007-MAY 8, 2015, GROSS-RETURNS)



Source: STOXX

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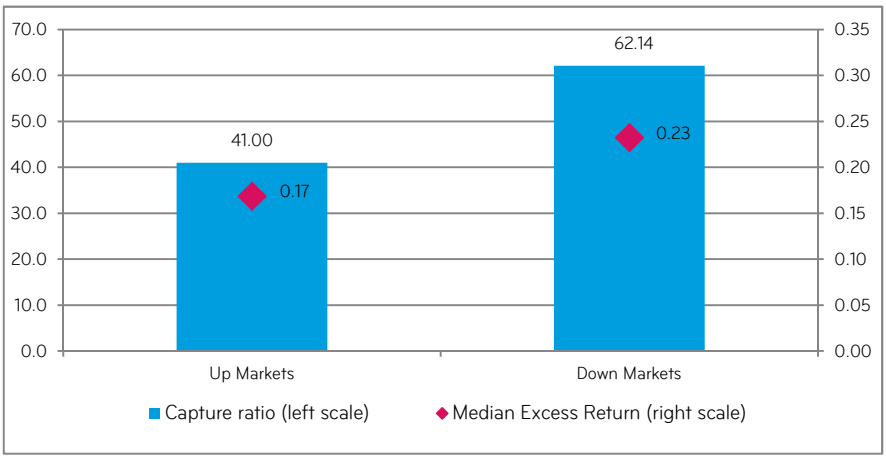
Based on daily gross returns for the period Sep. 25, 2007-May 8, 2015, the capture ratio of the STOXX True Exposure Emerging Markets 100% Gross Return Index against the MSCI Emerging Markets Total Return Index was 62.14% during down markets, while it was a lower 41.00% during up markets.

The median level of daily outperformance of the STOXX True Exposure Emerging Markets 100% Gross Return Index was 0.17% during up-market periods and 0.23% during down-market periods.

FIGURE 8 STOXX TRUE EXPOSURE EMERGING MARKETS 100% VERSUS MSCI EMERGING MARKETS INDEX, CAPTURE RATIO AND MEDIAN EXCESS RETURN (SEP. 25, 2007-MAY 8, 2015, GROSS-RETURNS)



Source: STOXX

3 Analysis of correlation and measures of dispersion

Cross-sectional dispersion, also referred to as either dispersion or stock-pairwise volatility, measures the degree of variation of a portfolio's constituents and represents the opportunity for active portfolio management. In periods of high cross-sectional dispersion, the performance range between the top performers and the worst performers is relatively wide. Conversely, when cross-sectional dispersion is low, the performance range tightens.

Cross-sectional dispersion is an intuitive measure of the benefits of diversification, since it accounts for the effect of both correlation and volatility patterns. An increased dispersion of returns generally determines a lower intracorrelation, i.e., a lower correlation among constituents and to a certain extent sectors. Generally speaking, lower intracorrelation among portfolio constituents and sectors leads to higher levels of diversification for both managers and investors (a desirable feature) as well as higher expected risk-adjusted returns.

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Cross-sectional dispersion is generally computed for equally weighted portfolios as the cross-sectional standard deviation of the portfolio constituents' performances for the measurement period. For unequally weighted portfolios, cross-sectional dispersion is computed by weighting portfolio constituents by their respective weightings in the standard deviation calculation. Computation of cross-sectional dispersion requires specification of the period for which returns are measured as well as the breakdown level at which the calculation is performed (for an equity index, the cross-sectional volatility could be measured alternatively at the country or sector level).

$$\textit{Cross-sectional dispersion} = \sqrt{\sum_{i=1}^{n} w_i \left(r_i - r_p\right)^2}$$

where:

r_p=portfolio return

r_i=i_{th} constituent return

w_i=i_{th} constituent weight

n=index's constituents number

Differently from time-series volatility, cross-sectional dispersion is computed by taking into account only the most recent information, and it measures the cross-sectional variation only over a single period. Under a list of simplifying assumptions, Solnik and Roulet[16] showed that cross-sectional dispersion of stock market returns is an alternative to the time-series approach to estimate the global correlation level of equity markets. In other words, cross-sectional volatility provides an "instantaneous" measure of realized correlation.

Intuitively, cross-sectional dispersion accounts for a diversification benefit. It is a cost-opportunity measure, since it computes the cross-sectional variation that is not reflected in the overall market movement and, therefore, is not captured when the market portfolio as a single investable asset is taken into account.

[16] Solnik, B. and J. Roulet (2000), "Dispersion as Cross-Sectional Correlation," Financial Analysts Journal, Vol. 56, No. 1, pp. 54-61, January/February.

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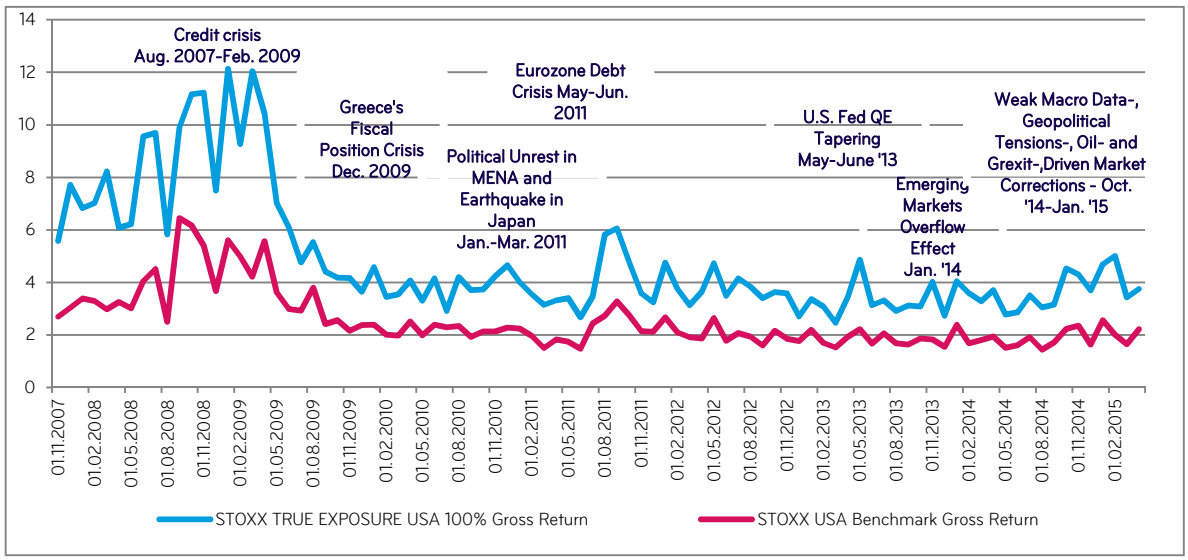
FIGURE 9 STOXX TRUE EXPOSURE USA 100% GROSS RETURN INDEX VERSUS STOXX USA BENCHMARK GROSS RETURN INDEX, MONTHLY CROSS-SECTIONAL DISPERSION (NOVEMBER, 2007-APRIL, 2015)



Source: STOXX

The chart above plots the cross-sectional dispersion for the STOXX True Exposure USA 100% Index and the STOXX USA Benchmark Index. The superior diversification benefits of the STOXX True Exposure Index in periods of market dislocation and disturbance are reflected in the higher values of the cross-sectional dispersion compared to that of the "plain-vanilla" benchmark.

Those benefits were particularly evident in the sharp market correction episodes (August through September 2011; May through June 2013; January 2014; and October 2014 through January 2015) when cross-sectional dispersion for the STOXX True Exposure Index spiked. It is noteworthy that the cross-sectional dispersion of the STOXX True Exposure USA 100% Gross Return Index jumped to 6.06 for September 2011; 4.87 for May 2013, 4.53 for October 2014; and 5.01 for February 2015. For the same dates, those readings compared to 3.28, 2.22, 2.22 and 2.00, respectively, for the STOXX USA Benchmark Index. (A more detailed sector allocation analysis for those market correction episodes is performed later in the report.)

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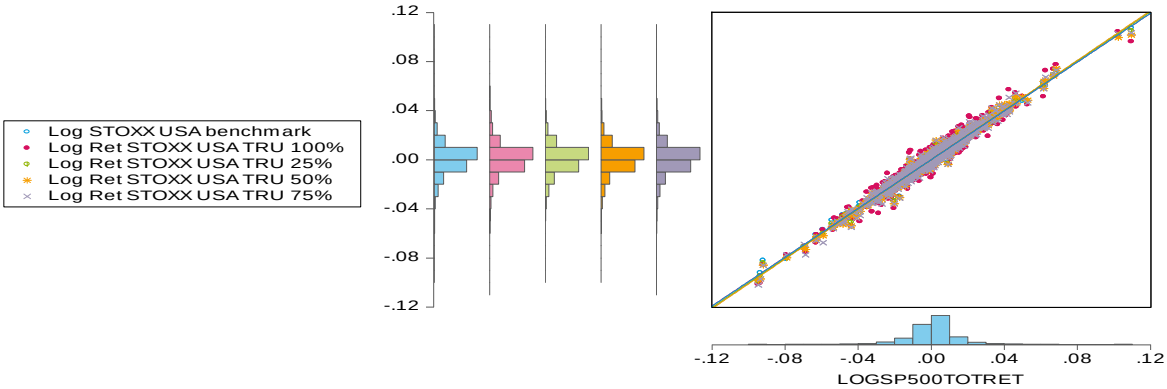
FIGURE 10 S&P 500 TOTAL RETURN INDEX VERSUS STOXX USA GROSS RETURN BENCHMARK AND TRUE EXPOSURE USA INDICES, SCATTERPLOT (SEP. 25, 2007-MAY 8, 2015)



Source: STOXX

The scatterplot for the S&P 500 Total Return Index, the corresponding STOXX USA Gross Return benchmark and the STOXX True Exposure USA indices show positive correlations among the stock indices' log returns. Also, the traditional calculation of the correlation coefficient among the indices for different sample periods (full sample for the Mar. 10, 2009-May 8, 2015 period[17]) confirms the strength of the linear relationship between the log return distribution of the two time series of the indices. The correlation coefficient among the indices calculated for each of the two periods above was in excess of 0.97, with marginal reduction for the Mar. 10, 2009-May 8, 2015 subsample period.

TABLE 6 CORRELATION MATRIX, STOXX USA BENCHMARK, STOXX TRUE EXPOSURE USA INDICES, AND S&P 500 INDEX (SEP. 25, 2007-MAY 8, 2015, DAILY LOG GROSS RETURNS)

	LOGSP500TOTRET	LOGSTXUSBMK	LOGSTXUSTRU100	LOGSTXUSTRU25	LOGSTXUSTRU50	LOGSTXUSTRU75
LOGSP500TOTRET	**1**	0.995948	0.973146	0.994932	0.99195	0.98538
LOGSTXUSBMK	0.995948	**1**	0.975134	0.998225	0.994611	0.987703
LOGSTXUSTRU100	0.973146	0.975134	**1**	0.984045	0.987747	0.993319
LOGSTXUSTRU25	0.994932	0.998225	0.984045	**1**	0.998823	0.994508
LOGSTXUSTRU50	0.99195	0.994611	0.987747	0.998823	**1**	0.996787
LOGSTXUSTRU75	0.98538	0.987703	0.993319	0.994508	0.996787	**1**

Legend: LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index; LOGSTXUSTRU25: STOXX True Exposure USA 25% Index; LOGSTXUSTRU50: STOXX True Exposure USA 50% Index; LOGSTXUSTRU100: STOXX True Exposure USA 75% Index.

Source: STOXX

[17] Mar. 10, 2009 is generally considered the turning point in the US financial and economic crisis, since at its March meeting, the Federal Open Market Committee ramped up its quantitative-easing program, purchasing more mortgage-backed securities and authorizing acquisition of up to USD300 billion of longer-term Treasury securities.

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TABLE 7 CORRELATION MATRIX, STOXX USA BENCHMARK, STOXX TRUE EXPOSURE USA INDICES, AND S&P 500 INDEX (MAR. 10, 2009-MAY 8, 2015, DAILY LOG GROSS RETURNS)

	LOGSP500TOTRET	LOGSTXUSBMK	LOGSTXUSTRU100	LOGSTXUSTRU25	LOGSTXUSTRU50	LOGSTXUSTRU75
LOGSP500TOTRET	**1**	0.995461	0.967691	0.993143	0.989216	0.980873
LOGSTXUSBMK	0.995461	**1**	0.972769	0.99792	0.994294	0.98609
LOGSTXUSTRU100	0.967691	0.972769	**1**	0.982642	0.986345	0.993185
LOGSTXUSTRU25	0.993143	0.99792	0.982642	**1**	0.998834	0.993662
LOGSTXUSTRU50	0.989216	0.994294	0.986345	0.998834	**1**	0.996056
LOGSTXUSTRU75	0.980873	0.98609	0.993185	0.993662	0.996056	**1**

Legend: LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index; LOGSTXUSTRU25: STOXX True Exposure USA 25% Index; LOGSTXUSTRU50: STOXX True Exposure USA 50% Index; LOGSTXUSTRU100: STOXX True Exposure USA 75% Index.

Source: STOXX

At a more accurate level, given the leptokurtic and negatively skewed distribution of log returns of the traditional market cap-weighted indices and the STOXX True Exposure Indices, a nonparametric statistic (Kendall's tau) was computed. (Kendall's tau is a nonparametric statistic that is based on ranked data and uses and makes reference to the relative orderings of rankings.) Despite lowering the strength of the linear relationship between the STOXX True Exposure USA 100% and the S&P 500 and the STOXX USA benchmark to 0.82 and 0.83, respectively, for the overall period, the Kendall's tau statistic measures of association confirmed the existence of a significant positive relationship between each pair of the log return time series. The number of concordances in the rankings of the two time series of returns outnumbered the number of discordances.

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TABLE 8 S&P 500 TOTAL RETURN INDEX VERSUS STOXX USA GROSS RETURN BENCHMARK AND TRUE EXPOSURE USA GROSS RETURN INDICES, KENDALL'S TAU (SEP. 25, 2007-MAY 8, 2015, DAILY LOG-RETURNS)

Covariance Analysis: Kendall's tau
Sample (adjusted): 9/25/2007 5/08/2015
Included observations: 1989 after adjustments
Balanced sample (listwise missing value deletion)
tau-b
tau-a
Concordances (C)
Discordances (D)
Probability

	LOGSP500TOTRET	LOGSTXUSBMK	LOGSTXUSTRU100	LOGSTXUSTRU25	LOGSTXUSTRU50	LOGSTXUSTRU75
LOGSP500TOTRET	1					
	0.998743					
	1974581					
	0					

LOGSTXUSBMK	0.942109	1				
	0.941517	1				
	1918011	1977066				
	56570	0				
	0 -----					
LOGSTXUSTRU100	0.81967	0.827354	1			
	0.819155	0.827354	1			
	1797052	1806400	1977066			
	177529	170666	0			
	0	0 -----				
LOGSTXUSTRU25	0.92836	0.953161	0.861767	1		
	0.927776	0.953161	0.861767	1		
	1904428	1930764	1840418	1977066		
	70153	46302	136648	0		
	0	0	0 -----			
LOGSTXUSTRU50	0.90436	0.919899	0.877774	0.963402	1	
	0.903791	0.919899	0.877774	0.963402	1	
	1880718	1897884	1856242	1940888	1977066	
	93863	79182	120824	36178	0	
	0	0	0	0 -----		
LOGSTXUSTRU75	0.864161	0.874911	0.911761	0.915804	0.935635	1
	0.863618	0.874911	0.911761	0.915804	0.935635	1
	1841005	1853411	1889839	1893835	1913439	1977066
	133576	123655	87227	83231	63627	0
	0	0	0	0	0 -----	

Legend: LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index; LOGSTXUSTRU25: STOXX True Exposure USA 25% Index; LOGSTXUSTRU50: STOXX True Exposure USA 50% Index; LOGSTXUSTRU100: STOXX True Exposure USA 75% Index.

Source: STOXX

The Kendall's tau statistic measures for the subsample period (Mar. 10, 2009-May 8, 2015) did not show significant changes in the strength of the linear relationship between the STOXX True Exposure USA 100% and the S&P 500 and the STOXX USA benchmark.

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TABLE 9 S&P 500 TOTAL RETURN INDEX VERSUS STOXX USA GROSS RETURN BENCHMARK AND TRUE EXPOSURE USA GROSS RETURN INDICES, KENDALL'S TAU (MAR. 10, 2009-MAY 8, 2015, DAILY LOG RETURNS)

Covariance Analysis: Kendall's tau
Sample (adjusted): 3/10/2009 5/08/2015
Included observations: 1609 after adjustments
tau-b
tau-a
Concordances (C)
Discordances (D)
Probability

	LOGSP500TOTRET	LOGSTXUSBMK	LOGSTXUSTRU100	LOGSTXUSTRU25	LOGSTXUSTRU50	LOGSTXUSTRU75
LOGSP500TOTRET	1					
	0.99881					
	1292096					
	0					

LOGSTXUSBMK	0.946632	1				
	0.946068	1				
	1257982	1293636				
	34114	0				
	0 -----					
LOGSTXUSTRU100	0.818227	0.830088	1			
	0.81774	0.830088	1			
	1174977	1183734	1293636			
	117119	109902	0			
	0	0 -----				
LOGSTXUSTRU25	0.927258	0.953511	0.863986	1		
	0.926706	0.953511	0.863986	1		
	1245458	1263566	1205660	1293636		
	46638	30070	87976	0		
	0	0	0 -----			
LOGSTXUSTRU50	0.902329	0.922989	0.878426	0.965409	1	
	0.901792	0.922989	0.878426	0.965409	1	
	1229343	1243824	1215000	1271262	1293636	
	62753	49812	78636	22374	0	
	0	0	0	0 -----		
LOGSTXUSTRU75	0.860771	0.876191	0.914659	0.916143	0.933861	1
	0.860259	0.876191	0.914659	0.916143	0.933861	1
	1202479	1213554	1238436	1239396	1250856	1293636
	89617	80082	55200	54240	42780	0
	0	0	0	0	0 -----	

Legend: LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index; LOGSTXUSTRU25: STOXX True Exposure USA 25% Index; LOGSTXUSTRU50: STOXX True Exposure USA 50% Index; LOGSTXUSTRU100: STOXX True Exposure USA 75% Index.

Source: STOXX

In light of the results above, and given that the existence of a correlation does not necessarily imply causation in a significant sense of the word[18], we ran a five-day lag length Granger[19] causality test among the traditional market cap-weighted indices and the STOXX TRU Indices.

The Granger approach helps to identify the direction of causality between two variables and to see how much of the current value of the variable can be explained by past values of a given factor. Then one can see whether adding lagged values of the same variable can improve the explanation. Granger causality does not necessarily indicate causation in the broader sense of the term. Rather, it measures information content and to what extent one variable can help predict the other. A two-way causation between two variables is frequently the case, although there are many cases where causality runs only one way.

[18] The econometric analysis is full of significant correlations that are simply spurious or meaningless. Among others, it is worth noting a positive correlation between the death rate in the UK and the proportion of marriages solemnized in the Church of England.
[19] Granger, C. W. J. (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," Econometrica, Vol. 37, No. 3, pp. 424-438, August.

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For the overall period, with the exception of the STOXX® True Exposure USA 75% Index, the Granger causality test did not generate statistically significant results. In other words, we could not reject the null hypothesis of the absence of either a one-way or two-way causation among the traditional market-cap-weighted benchmark and the STOXX True Exposure USA Indices. Conversely, the results of the Granger causality test for the STOXX True Exposure USA 75% Index showed a two-way causation with the S&P 500 Index that was statistically significant at the 95% confidence interval. The fact that we could not reject the null hypothesis of the absence of either a one-way or two-way causation between the STOXX True Exposure USA 100% Index and the S&P 500 Index appeared to suggest for the STOXX True Exposure Index a certain level of insulation from information content driven by dynamics originating in the US's leading stock market benchmark.

TABLE 10 S&P 500 TOTAL RETURN INDEX, STOXX USA GROSS RETURN BENCHMARK AND TRUE EXPOSURE USA INDICES, PAIRWISE GRANGER CAUSALITY TESTS (SEP. 24, 2007-MAY 8, 2015, DAILY LOG RETURNS)

Pairwise Granger Causality Tests

Sample: 9/24/2007 5/08/2015
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGSTXUSBMK does not Granger Cause LOGSP500TOTRET	1984	1.01134	0.4093
LOGSP500TOTRET does not Granger Cause LOGSTXUSBMK		1.15863	0.3273
LOGSTXUSTRU100 does not Granger Cause LOGSP500TOTRET	1984	1.25138	0.2825
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU100		1.67957	0.1362
LOGSTXUSTRU25 does not Granger Cause LOGSP500TOTRET	1984	1.48467	0.1916
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU25		1.67588	0.1371
LOGSTXUSTRU50 does not Granger Cause LOGSP500TOTRET	1984	2.01219	0.0740
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU50		2.09304	0.0636
LOGSTXUSTRU75 does not Granger Cause LOGSP500TOTRET	1984	2.72336	0.0185
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU75		2.74509	0.0177
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSBMK	1984	0.91326	0.4713
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU100		1.15238	0.3305
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSBMK	1984	1.92019	0.0879
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU25		1.86994	0.0964
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSBMK	1984	1.80890	0.1078
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU50		1.91034	0.0895
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSBMK	1984	2.69426	0.0196
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU75		2.67767	0.0203
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSTRU100	1984	0.97790	0.4298
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSTRU25		0.73004	0.6009
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSTRU100	1984	0.69146	0.6299
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSTRU50		0.56123	0.7298
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSTRU100	1984	1.34391	0.2429
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSTRU75		1.32655	0.2499
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSTRU25	1984	2.24181	0.0478
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSTRU50		2.37478	0.0369
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSTRU25	1984	2.76033	0.0172
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSTRU75		2.82394	0.0151
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSTRU50	1984	2.41582	0.0341
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSTRU75		2.40788	0.0346

Legend: LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index; LOGSTXUSTRU25: STOXX True Exposure USA 25% Index; LOGSTXUSTRU50: STOXX True Exposure USA 50% Index; LOGSTXUSTRU100: STOXX True Exposure USA 75% Index.

Source: STOXX

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For the subsample period (Mar. 10, 2009-May 8, 2015), a statistically significant one-way causation (but not the other way) from the STOXX True Exposure USA 100% Index to the S&P 500 Index was supported by solid data evidence, with the F-statistic being significant at the 95% confidence interval. Also in this case, the result appeared to confirm the ability of the STOXX TRU Index to insulate from information content originating in the core US stock market benchmark.

TABLE 11 S&P 500 TOTAL RETURN INDEX, STOXX USA GROSS RETURN BENCHMARK AND TRUE EXPOSURE USA INDICES, PAIRWISE GRANGER CAUSALITY TESTS (MAR. 10, 2009-MAY 8, 2015, DAILY LOG RETURNS)

Pairwise Granger Causality Tests

Sample: 3/10/2009 5/08/2015
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGSTXUSBMK does not Granger Cause LOGSP500TOTRET	1609	0.67028	0.6460
LOGSP500TOTRET does not Granger Cause LOGSTXUSBMK		0.81590	0.5382
LOGSTXUSTRU100 does not Granger Cause LOGSP500TOTRET	1609	2.64770	0.0216
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU100		2.14886	0.0573
LOGSTXUSTRU25 does not Granger Cause LOGSP500TOTRET	1609	1.78507	0.1128
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU25		2.21784	0.0502
LOGSTXUSTRU50 does not Granger Cause LOGSP500TOTRET	1609	2.29085	0.0436
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU50		2.56454	0.0255
LOGSTXUSTRU75 does not Granger Cause LOGSP500TOTRET	1609	1.99309	0.0768
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU75		1.73570	0.1233
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSBMK	1609	2.03830	0.0706
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU100		1.50001	0.1867
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSBMK	1609	2.26825	0.0455
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU25		2.14806	0.0573
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSBMK	1609	2.22478	0.0495
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU50		2.11260	0.0613
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSBMK	1609	1.55755	0.1690
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU75		1.13440	0.3400
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSTRU100	1609	1.41891	0.2144
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSTRU25		1.79419	0.1109
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSTRU100	1609	1.06991	0.3752
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSTRU50		1.39140	0.2245
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSTRU100	1609	1.52508	0.1788
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSTRU75		1.60191	0.1564
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSTRU25	1609	1.82699	0.1045
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSTRU50		1.86436	0.0976
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSTRU25	1609	0.98265	0.4269
LOGSTXUSTRU25 does not Granger Cause LOGSTXUSTRU75		0.74100	0.5927
LOGSTXUSTRU75 does not Granger Cause LOGSTXUSTRU50	1609	0.30830	0.9081
LOGSTXUSTRU50 does not Granger Cause LOGSTXUSTRU75		0.16955	0.9738

Legend: LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index; LOGSTXUSTRU25: STOXX True Exposure USA 25% Index; LOGSTXUSTRU50: STOXX True Exposure USA 50% Index; LOGSTXUSTRU100: STOXX True Exposure USA 75% Index.

Source: STOXX

In order to assess the degree of relationship among the index constituents and the extent to which underlying market movements are shared among them, we computed—based on daily log return data for

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the various constituents—the stock pairwise correlation for the indices. For an index of n constituents, that required calculating n*(n-1)/2 pairwise correlations and then computing the weighted average of those correlations.

Under a number of assumptions (among others, the correlation of all the different constituents of the index is assumed to be identical[20]), the correlation implied by index and single-stock implied volatility can be estimated as the variance of the index divided by the weighted average single-component variances. A rule of thumb says that such a computation returns a correlation level that is a point or two higher than the actual pairwise correlation. Nonetheless, that is a reasonable approximation of the true value.

$$\textit{Pairwise correlation} \approx \frac{\sigma_I^2}{\sum_{i=1}^{n} w_i \sigma_i^2}$$

where:

σ_I^2=index variance

σ_I^2=i_{th} constituent variance

w_i=i_{th} constituent weight

n=index's constituent number

The chart below plots the stock pairwise correlation for both the STOXX True Exposure USA 100% and the STOXX USA benchmark for the period November, 2007-May, 2015. Despite a few noticeable exceptions, the lower intracorrelation and the lower level of market variance that is shared among the constituents of the low-risk-weighted index are reflected in the lower values of the stock pairwise correlation of the STOXX True Exposure USA 100% Gross Return Index compared to the underlying STOXX USA benchmark. That was particularly evident in some of the sharp market correction episodes referred to in the analysis of the cross-sectional dispersion.

[20] Please refer to Bennett, C. (2014), "Trading Volatility: Trading Volatility, Correlation, Term Structure and Skew."

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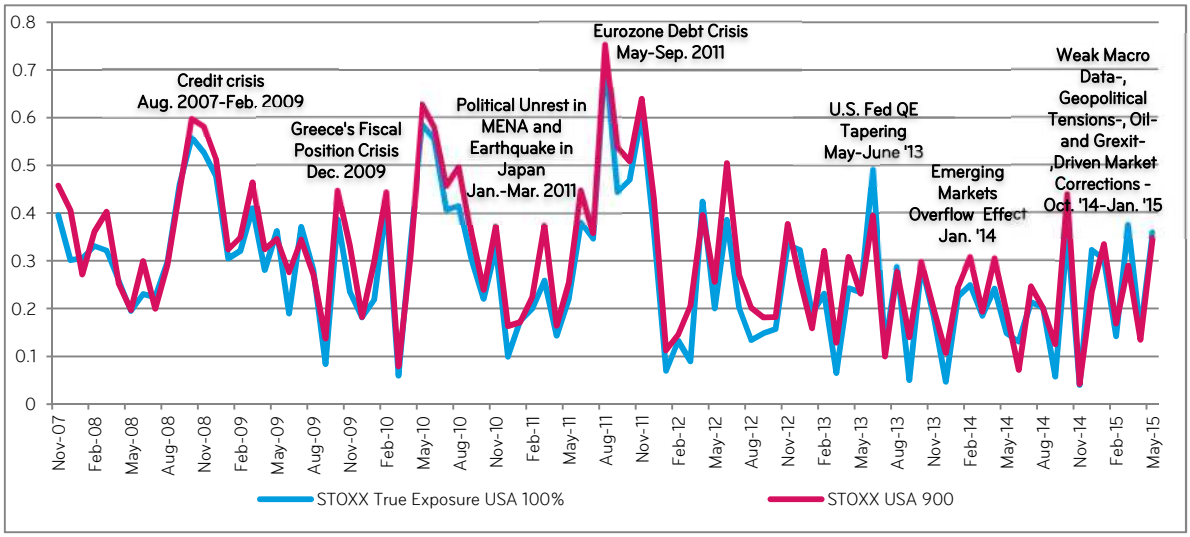
FIGURE 11 STOXX TRU USA 100% GROSS RETURN INDEX VERSUS STOXX USA 900 GROSS RETURN INDEX, STOCK PAIRWISE CORRELATION (NOVEMBER, 2007-MAY, 2015)



Source: STOXX

In particular, in September, 2011, the Eurozone debt crisis that had agitated global financial markets throughout the summer season culminated in the US Federal Reserve's Operation Twist[21]. For that month, the 0.44 pairwise correlation of the STOXX True Exposure USA 100% compared with a 0.54 reading for the STOXX USA benchmark. The STOXX True Exposure USA 100% Index posted a negative 6.03% return for September, 2011. For the same month, that performance reading compared to negative 7.50% and negative 7.03% returns for the STOXX USA Gross Return benchmark and the S&P 500 Total Return index, respectively.

Conversely, in June 2013 (and even earlier in May), when the markets perceived the preannouncement by the Federal Reserve about the tapering of asset purchases as an early signal of the start of a tightening cycle, amid rosier US recovery expectations the 0.49 pairwise correlation of the STOXX True Exposure USA 100% compared with a 0.39 reading for the STOXX USA benchmark. For June, 2013, the higher pairwise correlation of the STOXX True Exposure USA 100% reflected a higher sector concentration; the average weighting of financial stocks belonging to an interest rate-sensitive sector that had experienced a period of low volatility in stock prices stood at 29.91%. For the same month, that reading compared to a

[21] In order to fend off a double-dip recession and ensure that over time inflation would be at levels consistent with its dual mandate of fostering maximum employment and price stability, on Sep. 21, 2011, the US Federal Open Market Committee decided to extend the average maturity of its securities holdings. According to "Operation Twist," named after a similar measure launched in the 1960s under President Kennedy, the Committee would buy by the end of June, 2012 USD400 billion of Treasury bonds with remaining maturities of six years to thirty years, funding the operation with sales of an equivalent amount of Treasury securities with remaining maturities of three years or less.

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16.69% financial-stocks weighting within the STOXX USA benchmark. The STOXX True Exposure USA 100% Index posted a positive 0.42% return for June, 2013. For the same month, that performance reading compared to negative 1.40% and negative 1.34% returns for the STOXX USA Gross Return benchmark and the S&P 500 Total Return index, respectively.

Nonetheless, it was at the portfolio-construction level that the diversification benefits across STOXX TRU indices were felt the most. (In fact, generally speaking, cross correlations against traditional market benchmarks decrease compared to the underlying STOXX benchmark whenever True Exposure indices are taken into account.) Among others, as the correlation matrix below attests, the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index showed correlations against the MSCI Emerging Markets Total Return, the MSCI World ex US Total Return and the S&P 500 Total Return Indices that were 21 bps, 26 bps and 32 bps, respectively, lower than the peer STOXX market cap-weighted benchmarks.

TABLE 12 CORRELATION MATRIX, STOXX BENCHMARKS, STOXX TRUE EXPOSURE INDICES, AND MARKET CAP WEIGHTED INDICES (SEP. 25, 2007-MAY 8, 2015, DAILY LOG GROSS RETURNS)

	LOGMSCIEMGMKTS	LOGMSCIWLDEXUS	LOGSP500TOTRET	LOGSTXDEVTRU100	LOGSTXDEVBMK	LOGSTXEMGBMK	LOGSTXEMGTRU100	LOGSTXUSBMK	LOGSTXUSTRU100
LOGMSCIEMGMKTS	**1**	0.828526	0.498726	0.618621	0.829267	0.972106	0.94171	0.507966	0.464039
LOGMSCIWLDEXUS	0.828526	**1**	0.557689	0.740708	0.997226	0.801309	0.759217	0.566722	0.512388
LOGSP500TOTRET	0.498726	0.557689	**1**	0.219442	0.538042	0.584764	0.559449	0.995948	0.973146
LOGSTXDEVTRU100	0.618621	0.740708	0.219442	**1**	0.773195	0.576163	0.555046	0.229451	0.187005
LOGSTXDEVBMK	0.829267	0.997226	0.538042	0.773195	**1**	0.79935	0.758541	0.547679	0.492708
LOGSTXEMGBMK	0.972106	0.801309	0.584764	0.576163	0.79935	**1**	0.972265	0.593326	0.552071
LOGSTXEMGTRU100	0.94171	0.759217	0.559449	0.555046	0.758541	0.972265	**1**	0.566249	0.528322
LOGSTXUSBMK	0.507966	0.566722	0.995948	0.229451	0.547679	0.593326	0.566249	**1**	0.975134
LOGSTXUSTRU100	0.464039	0.512388	0.973146	0.187005	0.492708	0.552071	0.528322	0.975134	**1**

Legend: LOGMSCIEMGMKTS: Log return MSCI Emerging Markets Total Return Index; LOGMSCIWLDEXUS: Log return MSCI World ex US Total Return Index; LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXDEVTRU100: Log return STOXX True Exposure Developed Markets ex USA 100% Index; LOGSTXDEVBMK: Log return STOXX True Exposure Developed Markets ex USA Benchmark; LOGSTXEMGBMK: STOXX True Exposure Emerging Markets 100% Benchmark; LOGSTXEMGTRU100: STOXX True Exposure Emerging Markets 100% Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index.

Source: STOXX

Also, in this case, given the non-normal (i.e., leptokurtic and negatively skewed) distributions of log returns of the traditional market-cap-weighted indices and the STOXX TRU indices, an unbiased nonparametric statistic (Kendall's tau) was computed. Generally speaking, Kendall's tau showed correlation measures lower, in both absolute and STOXX market cap-weighted benchmark-relative terms, than the traditional parametric correlation statistics.

According to the Kendall's tau statistic measures of association, the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index showed relative readings against the MSCI Emerging Markets Total Return, the MSCI World ex US Total Return and the S&P 500 Total Return Indices that were 16 bps, 41 bps, and 20 bps, respectively, lower than the peer STOXX market-cap weighted benchmarks.

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TABLE 13 STOXX BENCHMARKS, STOXX TRUE EXPOSURE INDICES, AND MARKET-CAP WEIGHTED INDICES, KENDALL'S TAU (SEP. 25, 2007-MAY 8, 2015, DAILY LOG GROSS RETURNS)

Covariance Analysis: Kendall's tau
Sample (adjusted): 9/25/2007 5/08/2015
Included observations: 1989 after adjustments
Balanced sample (listwise missing value deletion)

tau-b
tau-a
Concordances (C)
Discordances (D)
Probability

	LOGMSCIEMGMKTS	LOGMSCIWLDEXUS	LOGSP500TOTRET	LOGSTXDEVTRU100	LOGSTXDEVBMK	LOGSTXEMGBMK	LOGSTXEMGTRU100	LOGSTXUSBMK	LOGSTXUSTRU100
LOGMSCIEMGMKTS	1								
	1								
	1977066								
	0								

LOGMSCIWLDEXUS	0.583252	1							
	0.583252	0.999998							
	1565095	1977063							
	411968	0							
	0	-----							
LOGSP500TOTRET	0.292157	0.363392	1						
	0.291974	0.363163	0.998743						
	1275916	1346289	1974581						
	698665	628292	0						
	0	0	-----						
LOGSTXDEVTRU100	0.42584	0.548168	0.145593	1					
	0.42584	0.548167	0.145502	1					
	1409490	1530413	1131124	1977066					
	567576	446650	843457	0					
	0	0	0	-----					
LOGSTXDEVBMK	0.585359	0.954451	0.34988	0.577861	1				
	0.585359	0.95445	0.34966	0.577861	1				
	1567180	1932037	1332941	1559768	1977066				
	409886	45026	641640	417298	0				
	0	0	0	0	-----				
LOGSTXEMGBMK	0.883246	0.566374	0.325712	0.407701	0.566816	1			
	0.883246	0.566373	0.325507	0.407701	0.566816	1			
	1861651	1548410	1309065	1391559	1548849	1977066			
	115415	428653	665516	585507	428217	0			
	0	0	0	0	0	-----			
LOGSTXEMGTRU100	0.794408	0.519104	0.314202	0.386153	0.520637	0.842015	1		
	0.794408	0.519104	0.314004	0.386153	0.520637	0.842015	1		
	1773832	1501683	1297694	1370258	1503200	1820893	1977066		
	203234	475380	676887	606808	473866	156173	0		
	0	0	0	0	0	0	-----		
LOGSTXUSBMK	0.29959	0.371163	0.942109	0.153412	0.358755	0.334044	0.321067	1	
	0.29959	0.371163	0.941517	0.153412	0.358755	0.334044	0.321067	1	
	1284688	1355438	1918011	1140186	1343174	1318747	1305918	1977066	
	692378	621625	56570	836880	633892	658319	671148	0	
	0	0	0	0	0	0	0	-----	
LOGSTXUSTRU100	0.263579	0.328848	0.81967	0.131171	0.316531	0.298165	0.288896	0.827354	1
	0.263579	0.328847	0.819155	0.131171	0.316531	0.298165	0.288896	0.827354	1
	1249090	1313608	1797052	1118200	1301434	1283279	1274116	1806400	1977066
	727976	663455	177529	858866	675632	693787	702950	170666	0
	0	0	0	0	0	0	0	0	-----

Legend: LOGMSCIEMGMKTS: Log return MSCI Emerging Markets Total Return Index; LOGMSCIWLDEXUS: Log return MSCI World ex US Total Return Index; LOGSP500TOTRET: Log return S&P500 Total Return Index; LOGSTXDEVTRU100: Log return STOXX True Exposure Developed Markets ex USA 100% Index; LOGSTXDEVBMK: Log return STOXX True Exposure Developed Markets ex USA Benchmark; LOGSTXEMGBMK: STOXX True Exposure Emerging Markets 100% Benchmark; LOGSTXEMGTRU100: STOXX True Exposure Emerging Markets 100% Index; LOGSTXUSBMK: STOXX True Exposure USA 100% Benchmark; LOGSTXUSTRU100: STOXX True Exposure USA 100% Index.

Source: STOXX

We also ran a five-day lag length Granger pairwise causality test among the traditional market-cap-weighted indices (S&P 500 Total Return Index, MSCI World ex US Total Return Index, MSCI Emerging Markets Total Return Index, STOXX market-cap weighted benchmarks for the US, developed markets ex-US and emerging markets) and the STOXX TRU indices.

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TABLE 14 S&P 500 TOTAL RETURN INDEX, MSCI WORLD EX US TOTAL RETURN INDEX, MSCI EMERGING MARKETS TOTAL RETURN INDEX, STOXX GROSS RETURN BENCHMARKS AND TRUE EXPOSURE INDICES, PAIRWISE GRANGER CAUSALITY TESTS (SEP. 25, 2007-MAY 8, 2015, DAILY LOG RETURNS)

Pairwise Granger Causality Tests

Sample: 9/24/2007 5/08/2015
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGMSCIWLDEXUS does not Granger Cause LOGMSCIEMGMKTS	1984	5.10193	0.0001
LOGMSCIEMGMKTS does not Granger Cause LOGMSCIWLDEXUS		6.29730	8.E-06
LOGSP500TOTRET does not Granger Cause LOGMSCIEMGMKTS	1984	62.3283	2.E-60
LOGMSCIEMGMKTS does not Granger Cause LOGSP500TOTRET		3.23312	0.0065
LOGSTXDEVTRU100 does not Granger Cause LOGMSCIEMGMKTS	1984	10.7953	3.E-10
LOGMSCIEMGMKTS does not Granger Cause LOGSTXDEVTRU100		28.4128	7.E-28
LOGSTXDEVBMK does not Granger Cause LOGMSCIEMGMKTS	1984	4.30514	0.0007
LOGMSCIEMGMKTS does not Granger Cause LOGSTXDEVBMK		6.89213	2.E-06
LOGSTXEMGBMK does not Granger Cause LOGMSCIEMGMKTS	1984	13.4881	6.E-13
LOGMSCIEMGMKTS does not Granger Cause LOGSTXEMGBMK		1.85066	0.0999
LOGSTXEMGTRU100 does not Granger Cause LOGMSCIEMGMKTS	1984	6.62193	4.E-06
LOGMSCIEMGMKTS does not Granger Cause LOGSTXEMGTRU100		0.95754	0.4426
LOGSTXUSBMK does not Granger Cause LOGMSCIEMGMKTS	1984	62.0492	3.E-60
LOGMSCIEMGMKTS does not Granger Cause LOGSTXUSBMK		2.99325	0.0107
LOGSTXUSTRU100 does not Granger Cause LOGMSCIEMGMKTS	1984	60.8166	4.E-59
LOGMSCIEMGMKTS does not Granger Cause LOGSTXUSTRU100		2.20451	0.0514
LOGSP500TOTRET does not Granger Cause LOGMSCIWLDEXUS	1984	85.1295	4.E-81
LOGMSCIWLDEXUS does not Granger Cause LOGSP500TOTRET		1.91344	0.0890
LOGSTXDEVTRU100 does not Granger Cause LOGMSCIWLDEXUS	1984	10.9138	2.E-10
LOGMSCIWLDEXUS does not Granger Cause LOGSTXDEVTRU100		65.6199	2.E-63
LOGSTXDEVBMK does not Granger Cause LOGMSCIWLDEXUS	1984	5.80090	3.E-05
LOGMSCIWLDEXUS does not Granger Cause LOGSTXDEVBMK		9.12679	1.E-08
LOGSTXEMGBMK does not Granger Cause LOGMSCIWLDEXUS	1984	12.9373	2.E-12
LOGMSCIWLDEXUS does not Granger Cause LOGSTXEMGBMK		1.13266	0.3408
LOGSTXEMGTRU100 does not Granger Cause LOGMSCIWLDEXUS	1984	10.6826	4.E-10
LOGMSCIWLDEXUS does not Granger Cause LOGSTXEMGTRU100		0.93979	0.4540
LOGSTXUSBMK does not Granger Cause LOGMSCIWLDEXUS	1984	84.8393	6.E-81
LOGMSCIWLDEXUS does not Granger Cause LOGSTXUSBMK		1.62664	0.1496
LOGSTXUSTRU100 does not Granger Cause LOGMSCIWLDEXUS	1984	80.0221	1.E-76
LOGMSCIWLDEXUS does not Granger Cause LOGSTXUSTRU100		1.14370	0.3350
LOGSTXDEVTRU100 does not Granger Cause LOGSP500TOTRET	1984	0.50358	0.7738
LOGSP500TOTRET does not Granger Cause LOGSTXDEVTRU100		141.307	2E-128
LOGSTXDEVBMK does not Granger Cause LOGSP500TOTRET	1984	1.73864	0.1225
LOGSP500TOTRET does not Granger Cause LOGSTXDEVBMK		92.4713	1.E-87
LOGSTXEMGBMK does not Granger Cause LOGSP500TOTRET	1984	3.26839	0.0061
LOGSP500TOTRET does not Granger Cause LOGSTXEMGBMK		25.5561	5.E-25
LOGSTXEMGTRU100 does not Granger Cause LOGSP500TOTRET	1984	2.44917	0.0319
LOGSP500TOTRET does not Granger Cause LOGSTXEMGTRU100		23.0275	2.E-22
LOGSTXUSBMK does not Granger Cause LOGSP500TOTRET	1984	1.01134	0.4093
LOGSP500TOTRET does not Granger Cause LOGSTXUSBMK		1.15863	0.3273
LOGSTXUSTRU100 does not Granger Cause LOGSP500TOTRET	1984	1.25138	0.2825
LOGSP500TOTRET does not Granger Cause LOGSTXUSTRU100		1.67957	0.1362
LOGSTXDEVBMK does not Granger Cause LOGSTXDEVTRU100	1984	63.0192	4.E-61
LOGSTXDEVTRU100 does not Granger Cause LOGSTXDEVBMK		14.1816	1.E-13
LOGSTXEMGBMK does not Granger Cause LOGSTXDEVTRU100	1984	38.6628	6.E-38
LOGSTXDEVTRU100 does not Granger Cause LOGSTXEMGBMK		8.66489	4.E-08
LOGSTXEMGTRU100 does not Granger Cause LOGSTXDEVTRU100	1984	36.9953	2.E-36
LOGSTXDEVTRU100 does not Granger Cause LOGSTXEMGTRU100		7.02642	2.E-06
LOGSTXUSBMK does not Granger Cause LOGSTXDEVTRU100	1984	140.629	8E-128
LOGSTXDEVTRU100 does not Granger Cause LOGSTXUSBMK		0.50724	0.7710
LOGSTXUSTRU100 does not Granger Cause LOGSTXDEVTRU100	1984	134.874	3E-123
LOGSTXDEVTRU100 does not Granger Cause LOGSTXUSTRU100		0.85705	0.5093
LOGSTXEMGBMK does not Granger Cause LOGSTXDEVBMK	1984	14.1435	1.E-13
LOGSTXDEVBMK does not Granger Cause LOGSTXEMGBMK		1.25571	0.2805
LOGSTXEMGTRU100 does not Granger Cause LOGSTXDEVBMK	1984	11.6343	4.E-11
LOGSTXDEVBMK does not Granger Cause LOGSTXEMGTRU100		0.77343	0.5688
LOGSTXUSBMK does not Granger Cause LOGSTXDEVBMK	1984	92.0972	3.E-87
LOGSTXDEVBMK does not Granger Cause LOGSTXUSBMK		1.48498	0.1915
LOGSTXUSTRU100 does not Granger Cause LOGSTXDEVBMK	1984	86.7515	1.E-82
LOGSTXDEVBMK does not Granger Cause LOGSTXUSTRU100		1.02817	0.3993
LOGSTXEMGTRU100 does not Granger Cause LOGSTXEMGBMK	1984	0.94466	0.4508
LOGSTXEMGBMK does not Granger Cause LOGSTXEMGTRU100		1.56643	0.1663
LOGSTXUSBMK does not Granger Cause LOGSTXEMGBMK	1984	25.1023	1.E-24
LOGSTXEMGBMK does not Granger Cause LOGSTXUSBMK		3.08281	0.0089
LOGSTXUSTRU100 does not Granger Cause LOGSTXEMGBMK	1984	25.1377	1.E-24
LOGSTXEMGBMK does not Granger Cause LOGSTXUSTRU100		2.29591	0.0431
LOGSTXUSBMK does not Granger Cause LOGSTXEMGTRU100	1984	22.6657	4.E-22
LOGSTXEMGTRU100 does not Granger Cause LOGSTXUSBMK		2.29425	0.0432
LOGSTXUSTRU100 does not Granger Cause LOGSTXEMGTRU100	1984	22.3471	7.E-22
LOGSTXEMGTRU100 does not Granger Cause LOGSTXUSTRU100		1.53075	0.1769
LOGSTXUSTRU100 does not Granger Cause LOGSTXUSBMK	1984	0.91326	0.4713
LOGSTXUSBMK does not Granger Cause LOGSTXUSTRU100		1.15238	0.3305

Legend: Please refer to the legend given on Table 13.

Source: STOXX

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In this case, the data evidence also did not allow rejection of the null hypothesis of the absence of a one-way causation from any of the leading market-cap-weighted benchmarks to the STOXX True Exposure USA 100% Index. Once again, the findings appeared to suggest, for the STOXX True Exposure USA 100% Index, a certain level of insulation from information content driven by dynamics originating in the global leading stock market benchmarks.

4 Industry sector analysis - The US market

As expected, given the weighting mechanism based on home-country revenue exposure and the relatively high "foreign bias" of certain industry sectors (such as technology), the STOXX True Exposure USA 100% Index showed a higher sector concentration than the underlying STOXX USA benchmark. The technology sector accounted for a median weighting of 0.37% for the overall measurement period, and it entered the index only in December 2008.

The sector concentrations of the STOXX True Exposure USA 100% Index and the STOXX USA benchmark were computed according to the Herfindahl-Hirschman Index (HHI)[22] and are shown in the charts below.

The relatively lower sector-concentration risk of the STOXX USA benchmark did not pay off in performance terms throughout the September 2007-May, 2015 period. With the exception of the period January 2009-August 2009, when consumer services accounted for the largest representation within the index, interest rate-sensitive financials was the industry sector with the largest weighting throughout the entire measurement period for the STOXX True Exposure USA 100% Index.

Conversely, the STOXX USA benchmark showed higher industry-sector dynamics in the largest weighting representation. In fact, financials accounted for the maximum sector weighting for the periods from May-June 2009; August 2009 through March 2011; February 2013 through January 2014; and April 2014 through May 2015; industrials for the September 2007-February 2008 period; oil and gas from March 2008 through April 2009 and later in July 2009; and technology from April 2011 through January 2013 and for the February 2014 through May 2014 period.

[22] The Herfindahl-Hirshman Index (HHI) is calculated as the sum of the square of 10 ICB sectors' average weightings for each calendar month. A higher number of the HHI implies higher sector concentration and vice versa.

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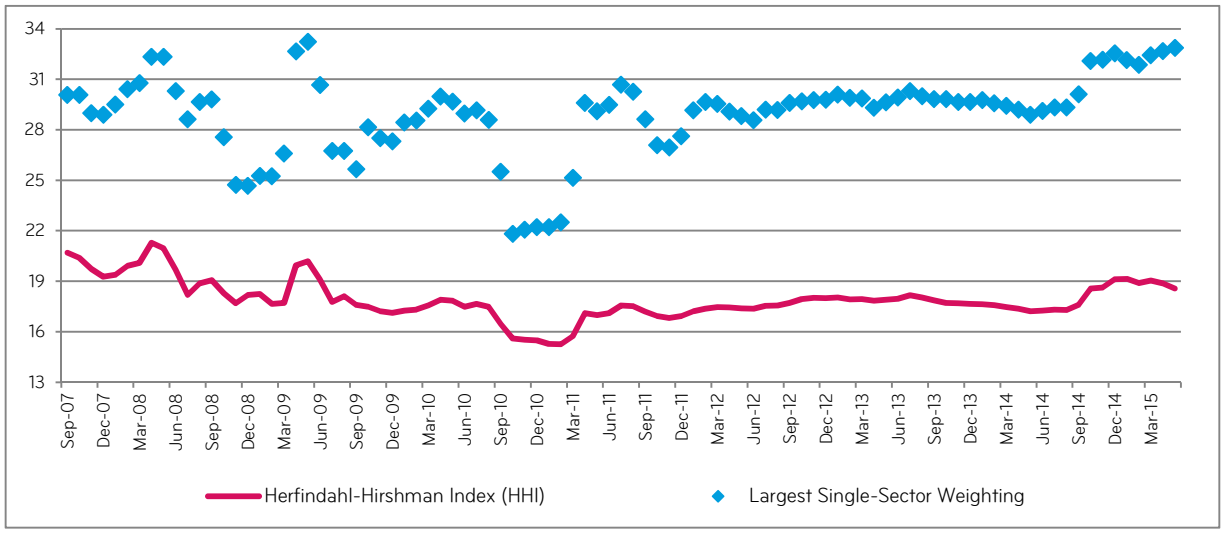
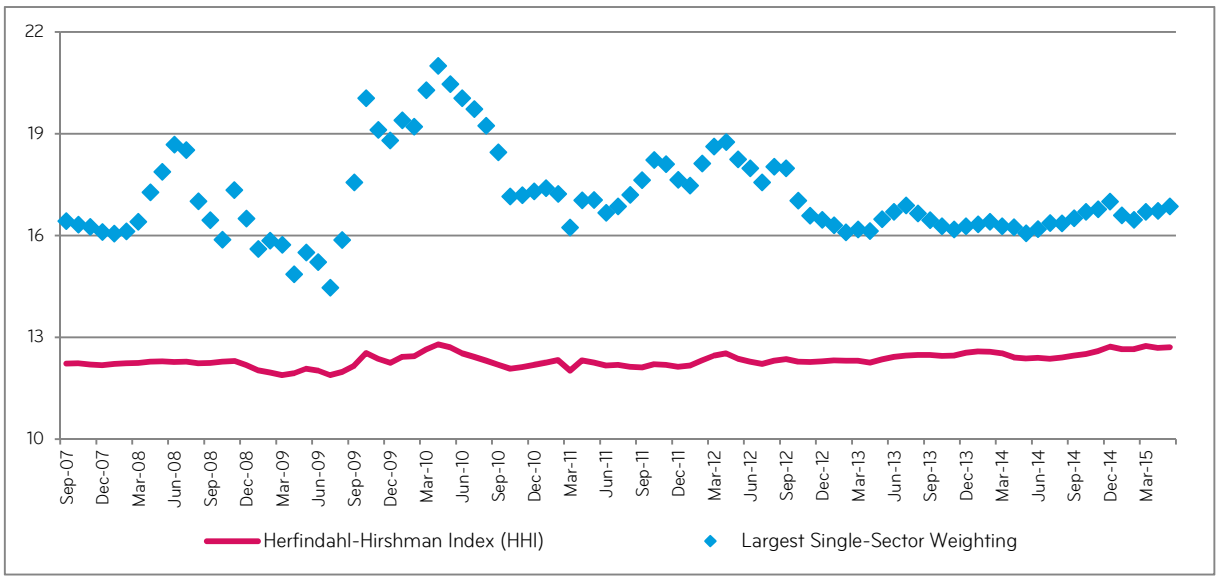
FIGURE 12 STOXX TRUE EXPOSURE USA 100% GROSS RETURN, HERFINDAHL-HIRSHMAN INDEX (HHI) VERSUS LARGEST SINGLE-SECTOR WEIGHTINGS (SEPTEMBER, 2007-MAY, 2015, PERCENTAGES)



Source: STOXX

FIGURE 13 STOXX USA BENCHMARK GROSS RETURN, HERFINDAHL-HIRSHMAN INDEX (HHI) VERSUS LARGEST SINGLE-SECTOR WEIGHTINGS (SEPTEMBER, 2007-APRIL, 2015, PERCENTAGES)



Source: STOXX

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Figures 14 and 15 show the historical sector weightings of the STOXX True Exposure USA 100% Index and the STOXX USA benchmark for the period from September 2012-May 2015. The sector allocation of the STOXX True Exposure USA 100% Index was less evenly spread than that of the STOXX USA benchmark because of its specific weighting mechanism of constituents based on company revenue exposure.

It is worth highlighting the sector allocation around three major market events: the June-September 2011 period when the Eurozone debt crisis that agitated the global financial markets throughout the summer season collided with the US's Operation Twist, triggering severe dips in stock market prices in September; the "taper tantrum" of May 2013-June 2013; and the sharp market corrections that between October 2014 and January 2015 were primarily driven by geopolitical tensions, macro information arrival, the crude oil slump and Grexit fears. The three market episodes highlight the potential of a home country bias in the STOXX True Exposure USA 100% Index to either provide a certain degree of insulation from market disturbances originating abroad or to factor in early performance drivers sustained by anticipated changes in the market cycle.

Compared to the STOXX USA benchmark, the STOXX True Exposure USA 100% Index ended second quarter 2011 with a relatively lower exposure to industrials (6.35% average weighting against 13.38% for the plain-vanilla STOXX USA benchmark) and higher exposures to consumer services (+17.58% average weighting against 11.23%) and utilities (+15.19% average weighting against 3.47%). The difference in the average weightings for the sectors above accounted the most for the active return recorded by the STOXX True Exposure USA 100% Index against the market benchmark during the period. The last sector in particular—a more defensive one, in addition to some subsectors of consumer services—appeared to show a counter-cyclical exposure and provided some level of insulation from market dislocation factors that operated across the global markets. The average weighting of utilities—more defensive and noncyclical stocks—within the STOXX True Exposure USA 100% Index was increased 7.0 percentage points and 5.6 percentage points for August and September 2011. Conversely, for the same index, in the last two months of third quarter 2011, the average weighting of financial stocks was decreased 1.4 percentage points and 5.4 percentage points, respectively.

Accounting for early signals of the start of a tightening cycle amid rosier US recovery expectations, the preannouncements made by the Federal Reserve in May and June 2013 about the tapering of asset purchases drove the outperformance of the STOXX True Exposure USA 100% Index against market cap benchmarks for the period. In June 2013 the average weighting (29.91%) of financial stocks—belonging to an interest rate-sensitive sector and having experienced a period of low volatility in stock prices—within the STOXX True Exposure USA 100% Index exceeded by 13.2 percentage points the average weighting of the sector within the STOXX USA market-cap-weighted benchmark.

At the same time, for May 2013 and June 2013, the weighting of utilities—more defensive and noncyclical stocks—within the STOXX True Exposure USA 100% Index was reduced 4.9 percentage points and 3.1 percentage points, respectively. Nonetheless, anticipated changes in the economy and interest rates were expected to have a muted impact on the revenue and earnings of companies within the utility sector. Telecommunications' weighting in the STOXX TRU Index was reduced 2.8 percentage points and 0.9 percentage point, respectively.

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Financial stocks' weighting in the STOXX USA benchmark was increased 1.3 percentage points at the June 2013 rebalancing. That followed an average increase for the financial sector for May 2013 to the tune of 2.2 percentage points. For the last two months of second quarter 2013, utilities and telecommunications recorded decreases to the tune of 5.6 percentage points and 3.4 percentage points, respectively, for the former sector, and 4.3 percentage points and 3.3 percentage points, respectively, for the latter sector.

In last quarter 2014, deflationary concerns, the oil price fall and the creeping resurgence of the sovereign debt-induced crisis took their toll, and global markets plunged to record lows around mid-October. The VSTOXX climbed 76.59% on Oct. 16, 2014, from September's month-end close, paring down thereafter and closing 42.82% below its mid-October peak. Similarly, the US gauge of market fears—the VIX—rose about 61% to 26.25 in the first half of October from September's close, halved thereafter and closed at 14.03 on Oct. 31, 2014.

Doom and gloom were at play in the second week of December 2014 when the global stock markets resumed their selloff. Concerns about ECB balance sheet expansion, the oil price nosedive, implications arising from the announced political elections in Greece and the Grexit argument, the expected results of the further round of ECB stress tests on European banks and—last but not least—the Bank of Russia's failed defense of the ruble weighed on market sentiment. On Dec. 15 the VSTOXX spiked to 29.53 from November's close at 18.02, hitting a reading above its historical 25.27 average. Implied volatility edged downward thereafter, closing on Dec. 30 slightly above the historical average. Similarly, on Dec. 16 the VIX spiked to 23.57 from November's close at 13.33, standing above its historical 19.95 average. Implied volatility edged downward thereafter, closing on Dec. 30, 2014, below its historical average.

January 2015 saw an exacerbation of the currency war. A higher volatility scenario materialized in global markets amid the "Francogeddon" move by the Swiss National Bank and expectations of aggressive ECB bond buying. The VSTOXX, after rising about 12.0% for the first half of the month, pared down thereafter and closed January 5.57% below reading for the end of December 2014. At the same time, the VIX rose 9.22% for January, closing the month just below the 21 level.

For the Sep. 30, 2014-Jan. 30, 2015 period, the STOXX True Exposure USA 100% Gross Return Index returned a positive 6.08% return in US Dollar terms. For the same period, the 75%, 50% and 25% versions of the STOXX True Exposure USA Index returned positive returns to the tune of 4.72%, 3.51%, and 2.81%, respectively. For the same period, those readings compared to a lower positive 1.67% performance for the STOXX USA Gross Return benchmark and a 1.78% positive return for the S&P 500 Total Return Index.

In the scenario above, the outperformance of the STOXX True Exposure USA 100% Gross Return Index was sustained by the overweighting of both financial stocks and utilities as well as the underweighting of oil and gas and industrial stocks compared to the traditional market cap-weighted indices. Despite a low-yield investment environment putting pressure on banks' net interest margin—hurting in turn banks' profitability and corporate earnings, the stock price pattern (and volatility thereof) of financials was primarily driven by the ultra-loosening monetary policy of the central banks on the one side and expectations about the start of a tightening cycle by the Fed on the other.

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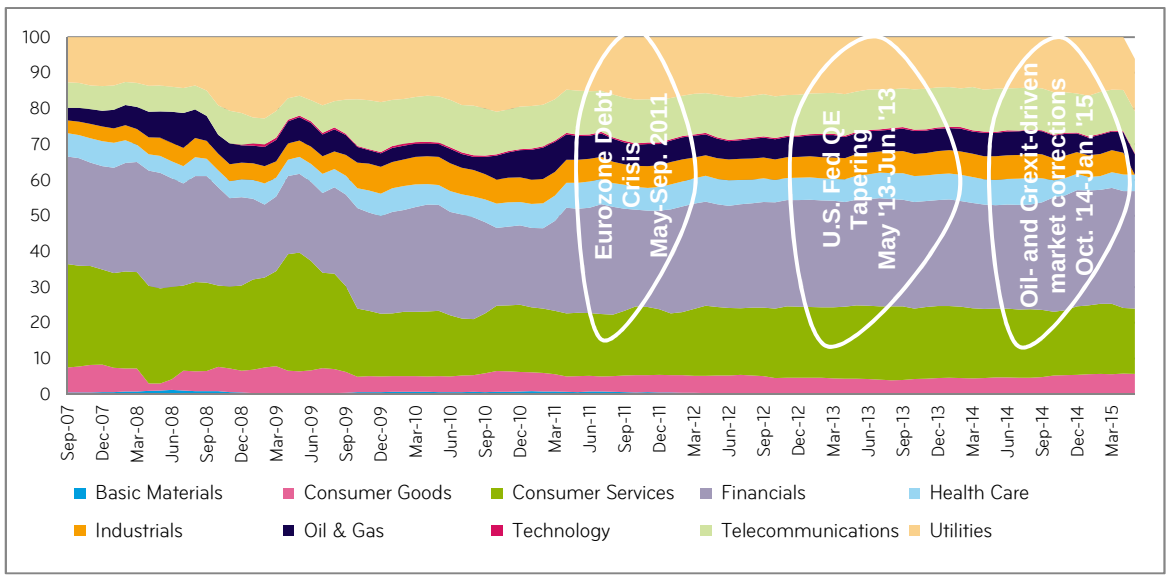
As a result, financial stocks' weighting in the STOXX True Exposure USA 100% Gross Return Index recorded two successive increases, 2.6 percentage points (preceding a 6.6 percentage point rise for October, 2014) and 1.2 percentage points at the September 2014 and December 2014 rebalancings. It was noteworthy that utility stocks recorded a 1.7 percentage point overweighting at the September 2014 rebalancing (preceding a 7.6-percentage-point increase for October 2014). Also, a 2.7-percentage-point increase was observed in the defensive sector at the December 2014 rebalancing. The weighting of stocks belonging to the oil and gas sector in the STOXX TRU Index was progressively reduced at both the September 2014 (-2.4 percentage points) and the December 2014 (-16.2 percentage points) rebalancings. Similarly, the average weightings of industrials decreased both for September 2014 (-2.4 percentage points, preceding a further 8.3-percentage-point decline for October 2014) and a 2.3 percentage point decline for December 2014.

In March 2015, the STOXX True Exposure USA 100% Gross Return Index recorded a 1.8 percentage point increase in the average weighting of financials. At the same time, it lowered the average weighting of both oil and gas and utility stocks to the tune of 3.5 percentage points and 4.5 percentage points, respectively, while the decrease in the average weighting of financial stocks was only marginal (-0.3 percentage point).

FIGURE 14 HISTORICAL SECTOR WEIGHTINGS OF THE STOXX TRUE EXPOSURE USA 100% GROSS RETURN (SEPTEMBER, 2007-MAY, 2015)



Source: STOXX

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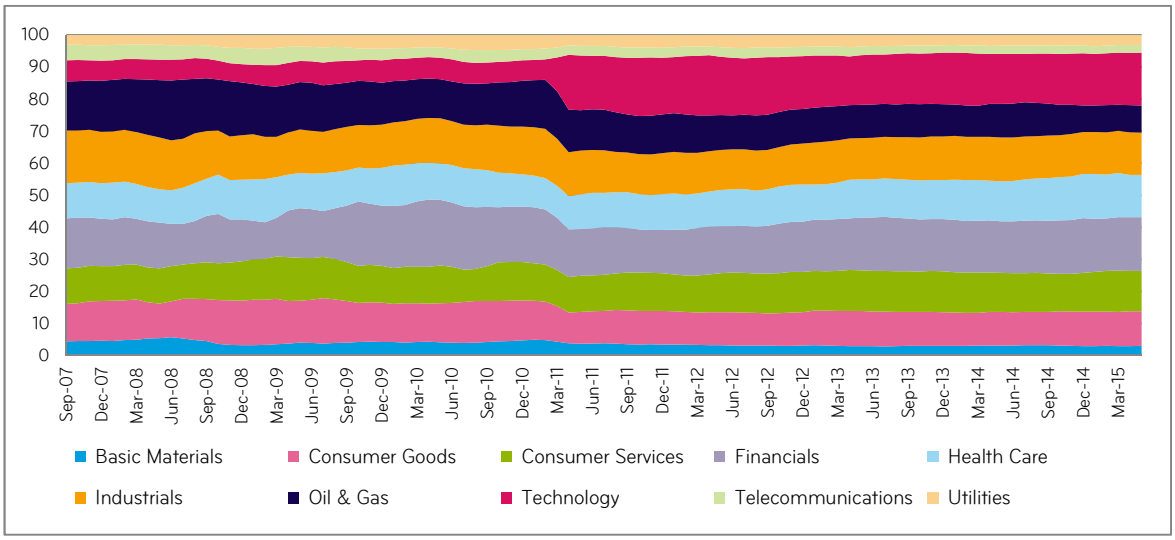
FIGURE 15 HISTORICAL SECTOR WEIGHTINGS OF THE STOXX USA BENCHMARK GROSS RETURN (SEPTEMBER 2007-MAY 2015)



Source: STOXX

5 Conclusions

The analysis performed on STOXX TRU Indices shows the potential for investors to gain significantly more focused or distilled exposure to a targeted region by being in control of actual exposure at the constituent level. In particular, knowing the economic exposure of companies represents a new factor in the construction of diversified equity portfolios, which could well serve as an alternative metric to the traditional country-factor definition.

In this study, pure-play home country-biased indices outperformed the underlying market cap benchmarks over various measurement periods. Outperformance was particularly evident for risk-adjusted measures, and those measures can be particularly appealing for institutional investors, who are traditionally risk-averse. The traditional risk/return annualized measure of 1.42 for the STOXX True Exposure USA 100% Gross Return Index over the three-year period ended May 8, 2015, compared to 1.37 for the S&P 500 Total Return Index and 1.31 for the STOXX USA Gross Return Index. Similarly, for the same three-year period, the risk/return annualized reading of 1.08 for the STOXX True Exposure Developed Markets ex USA 100% Gross Return Index compared to 0.93 for the MSCI World ex US Total Return Index and 0.96 for the STOXX Developed Markets ex USA Gross Return benchmark. Also, the risk/return annualized reading of 0.50 for the STOXX True Exposure Emerging Markets 100% Gross

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Return Index compared to 0.30 for the MSCI Emerging Markets Total Return Index and 0.43 for the STOXX Emerging Markets Gross Return benchmark.

The potential for outperforming traditional market cap-weighted indices is threefold, with different factors accounting for the outperformance potential in any of those instances:

First, the superior diversification benefits of the STOXX TRU Indices in periods of market dislocation and disturbance are reflected in the higher values of the cross-sectional dispersion, compared to those of the plain-vanilla benchmark. Cross-sectional dispersion or stock-pairwise volatility represents the opportunity for active portfolio management in that it measures the degree of variation of a portfolio's constituents. In particular, in periods of high cross-sectional dispersion, the performance range between the top performers and the worst performers is relatively wide.

Secondly, the potential of STOXX TRU Indices to return superior performance readings in given market conditions relies on drivers uncorrelated with market dislocation factors originating in either countries or regions other than the home country. The results of a pairwise Granger causality test failed to show a one-way causation from the S&P 500 Total Return Index to the STOXX True Exposure USA 100% Gross Return Index over various measurement periods. Those findings appear to suggest for the STOXX TRU Index a certain level of insulation from information content driven by dynamics originating in the US' leading stock market benchmark. Similar conclusions could be drawn also for the one-way causation from either the MSCI World ex US Total Return Index or the MSCI Emerging Markets Total Return Index to the STOXX True Exposure USA 100% Gross Return Index over various measurement periods. Nonetheless, it is at the portfolio construction level that the diversification benefits across STOXX TRU Indices are felt the most. In fact, generally speaking, cross correlations against traditional market benchmarks decrease compared to the underlying STOXX benchmark whenever STOXX TRU Indices are taken into account.

Finally, data findings on sector allocations for the analysis period (Sep. 24, 2007-May 8, 2015) for the US market validate the potential of a home-country bias in the STOXX TRU Indices to either provide a certain degree of insulation from market disturbances originating abroad or to factor in early performance drivers sustained by anticipated changes in the market cycle.

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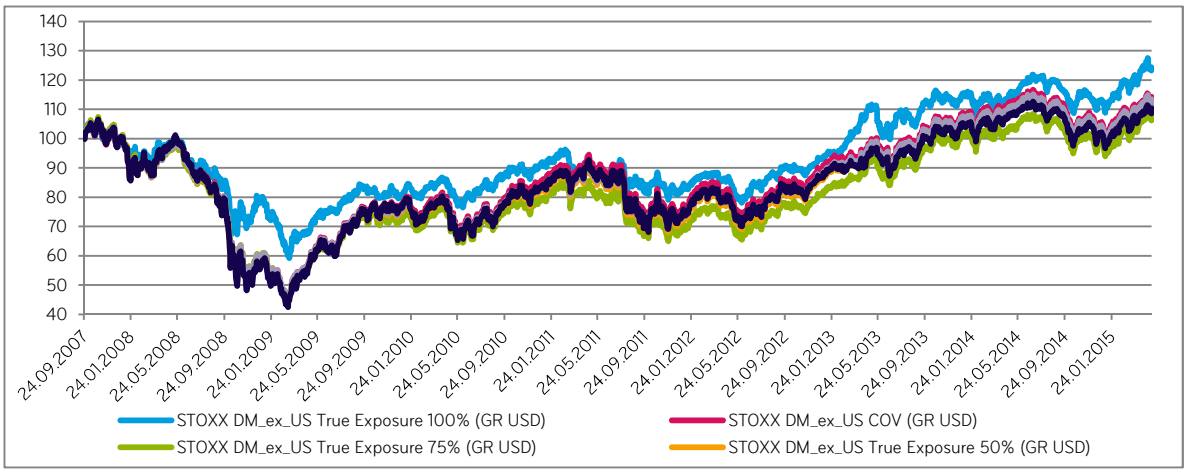
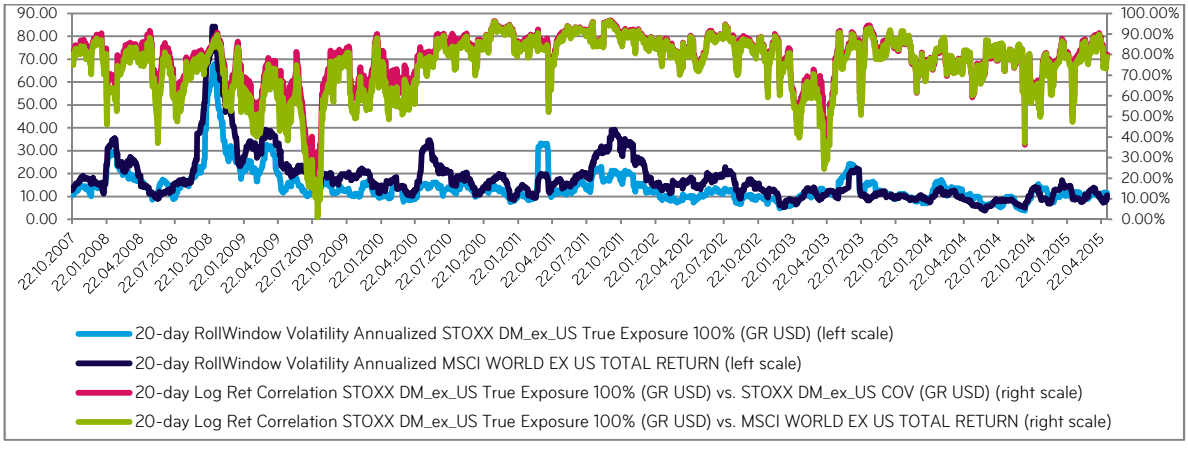
Appendix A

FIGURE 16 STOXX TRUE EXPOSURE DEVELOPED MARKETS EX USA INDICES, STOXX DEVELOPED MARKETS EX USA COV AND MSCI WORLD EX US INDEX, INDEXED PERFORMANCE (SEP. 24, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

FIGURE 17 STOXX TRUE EXPOSURE DEVELOPED MARKETS EX USA INDICES, STOXX DEVELOPED MARKETS EX USA COV AND MSCI WORLD EX US INDEX, 20-DAY LOG RETURN CORRELATION VERSUS 20-DAY ROLLING-WINDOW VOLATILITY (OCT. 22, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

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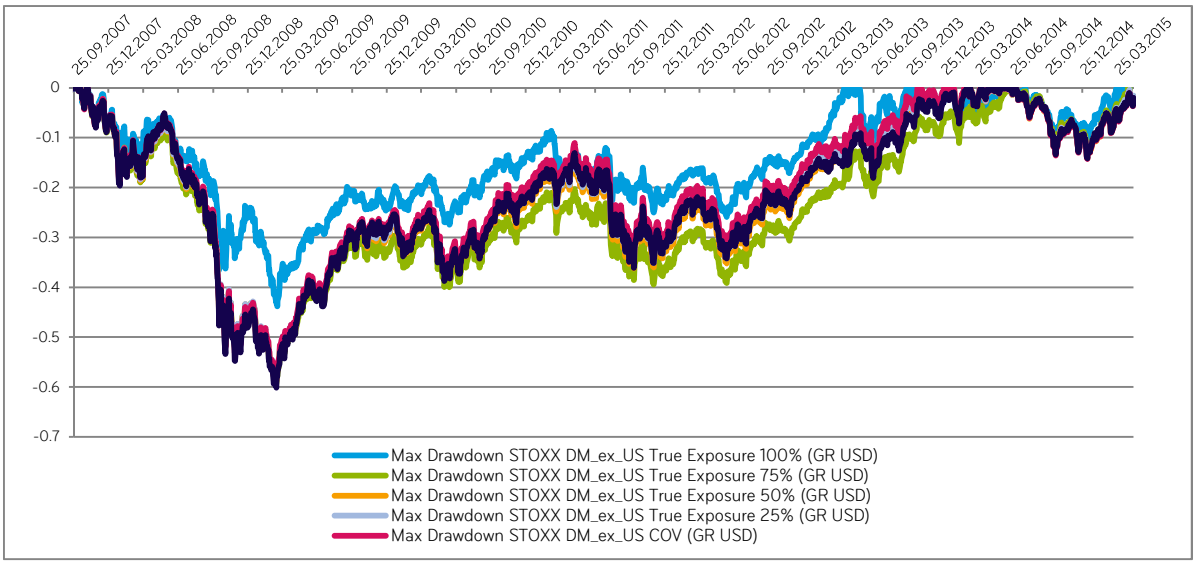
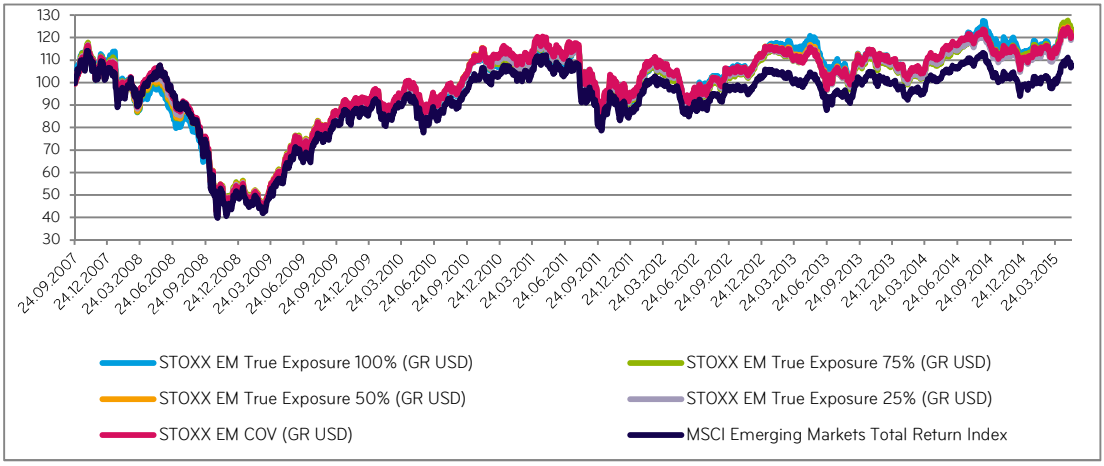
FIGURE 18 STOXX TRUE EXPOSURE DEVELOPED MARKETS EX USA INDICES, STOXX DEVELOPED MARKETS EX USA COV AND MSCI WORLD EX US INDEX, MAXIMUM DRAWDOWN (SEP. 25, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

FIGURE 19 STOXX TRUE EXPOSURE EMERGING MARKETS INDICES, STOXX EMERGING MARKETS COV AND MSCI EMERGING MARKETS INDEX, INDEXED PERFORMANCE (SEP. 24, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

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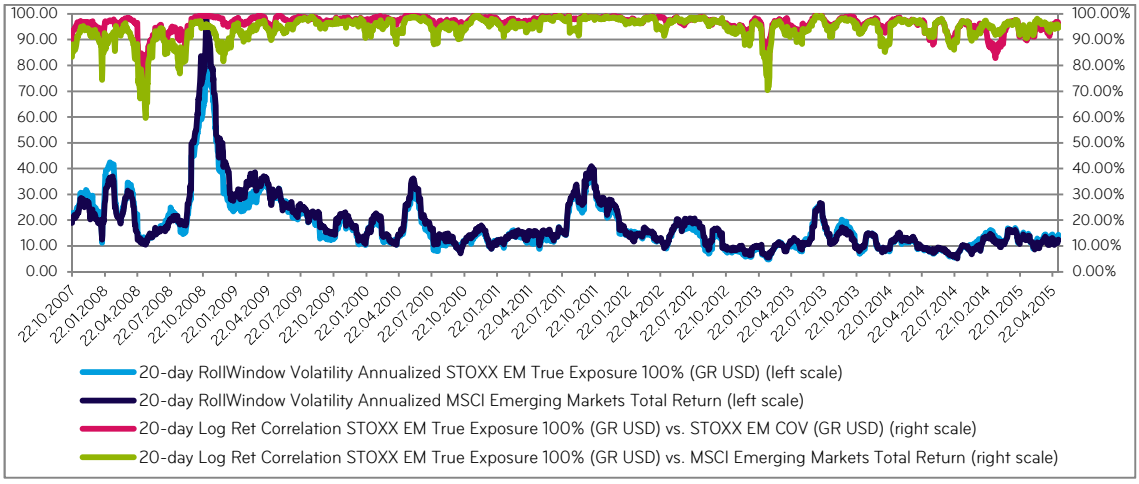
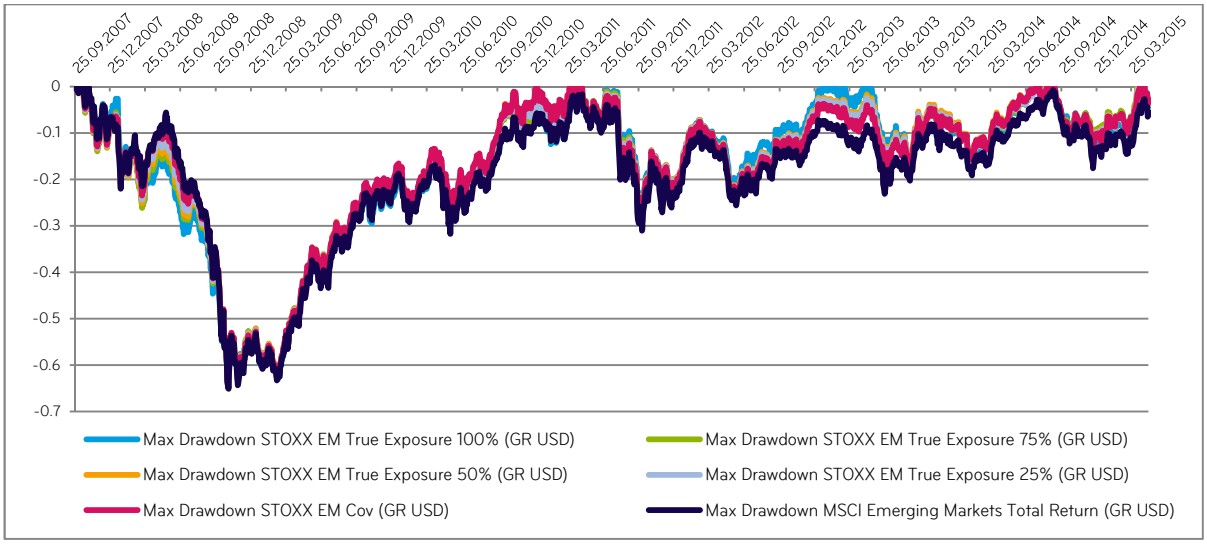
FIGURE 20 STOXX TRUE EXPOSURE EMERGING MARKETS INDICES, STOXX EMERGING MARKETS COV AND MSCI EMERGING MARKETS INDEX, 20-DAY LOG RETURN CORRELATION VERSUS 20-DAY ROLLING-WINDOW VOLATILITY (OCT. 22, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

FIGURE 21 STOXX TRUE EXPOSURE EMERGING MARKETS INDICES, STOXX EMERGING MARKETS COV AND MSCI EMERGING MARKETS INDEX, MAXIMUM DRAWDOWN (SEP. 25, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

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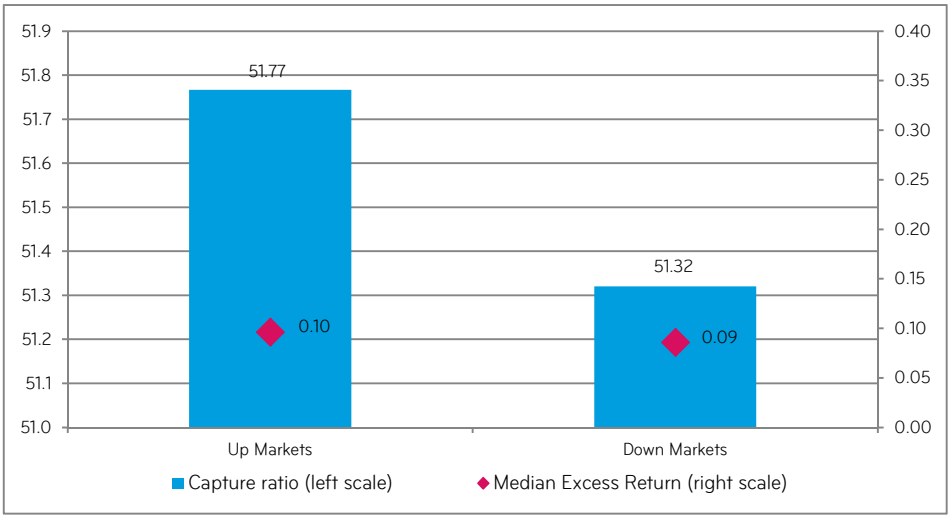
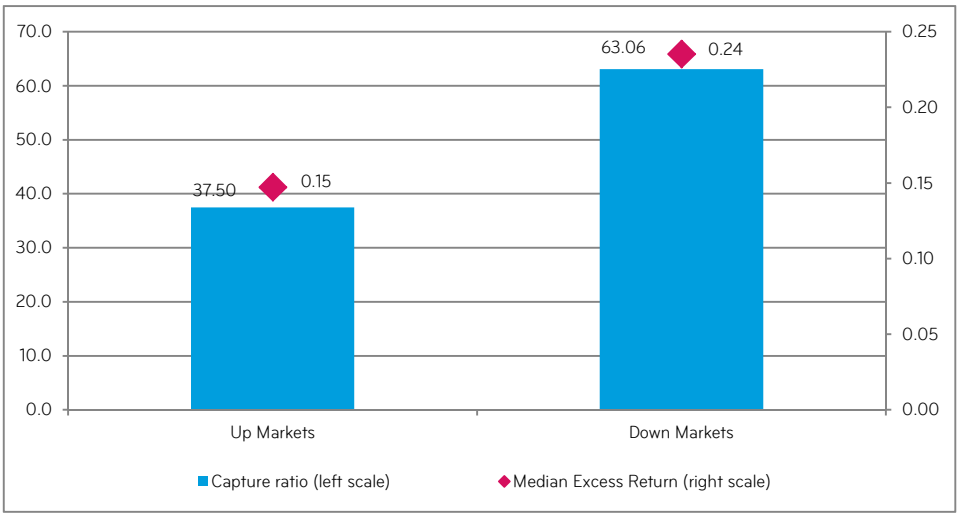
FIGURE 22 STOXX TRUE EXPOSURE USA 50% INDEX VERSUS S&P 500 INDEX, CAPTURE RATIO AND MEDIAN EXCESS RETURN (SEP. 25, 2007-MAY 8, 2015, GROSS-RETURNS)



Source: STOXX

FIGURE 23 STOXX TRUE EXPOSURE DEVELOPED MARKET EX USA 75% INDEX VERSUS MSCI WORLD EX US INDEX, CAPTURE RATIO AND MEDIAN EXCESS RETURN (SEP. 25, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

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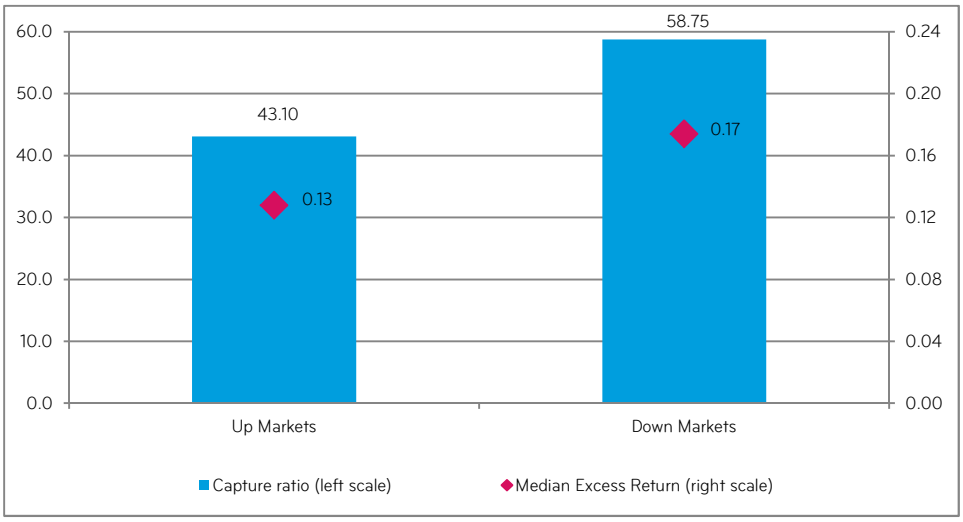
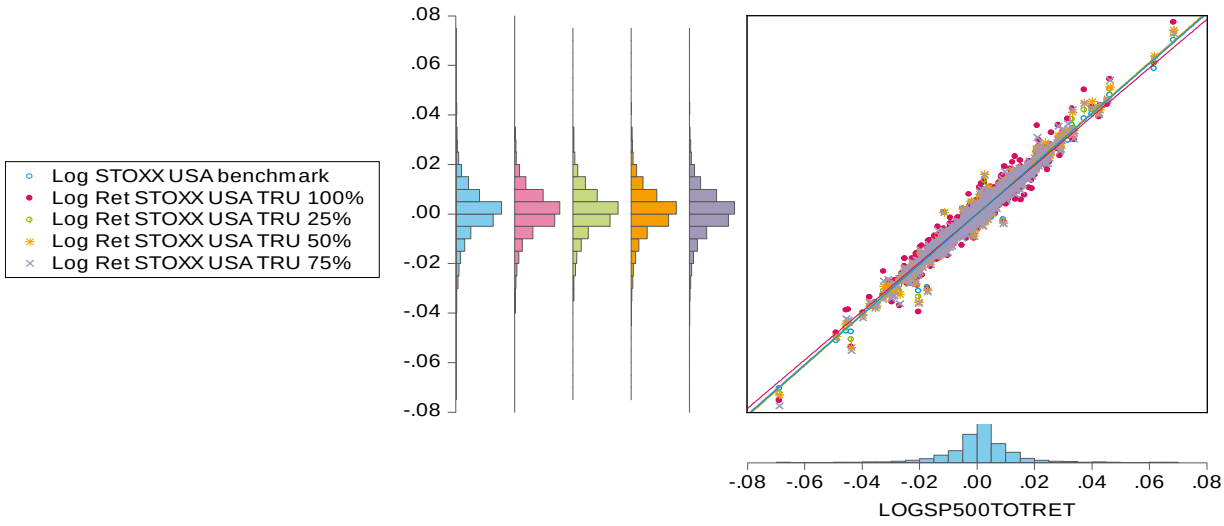
FIGURE 24 STOXX TRUE EXPOSURE EMERGING MARKETS 75% VERSUS MSCI EMERGING MARKETS INDEX, CAPTURE RATIO AND MEDIAN EXCESS RETURN (SEP. 25, 2007-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

FIGURE 25 S&P 500 INDEX VERSUS STOXX USA GROSS RETURN BENCHMARK AND TRUE EXPOSURE USA INDICES, SCATTERPLOT (MAR. 10, 2009-MAY 8, 2015, GROSS RETURNS)



Source: STOXX

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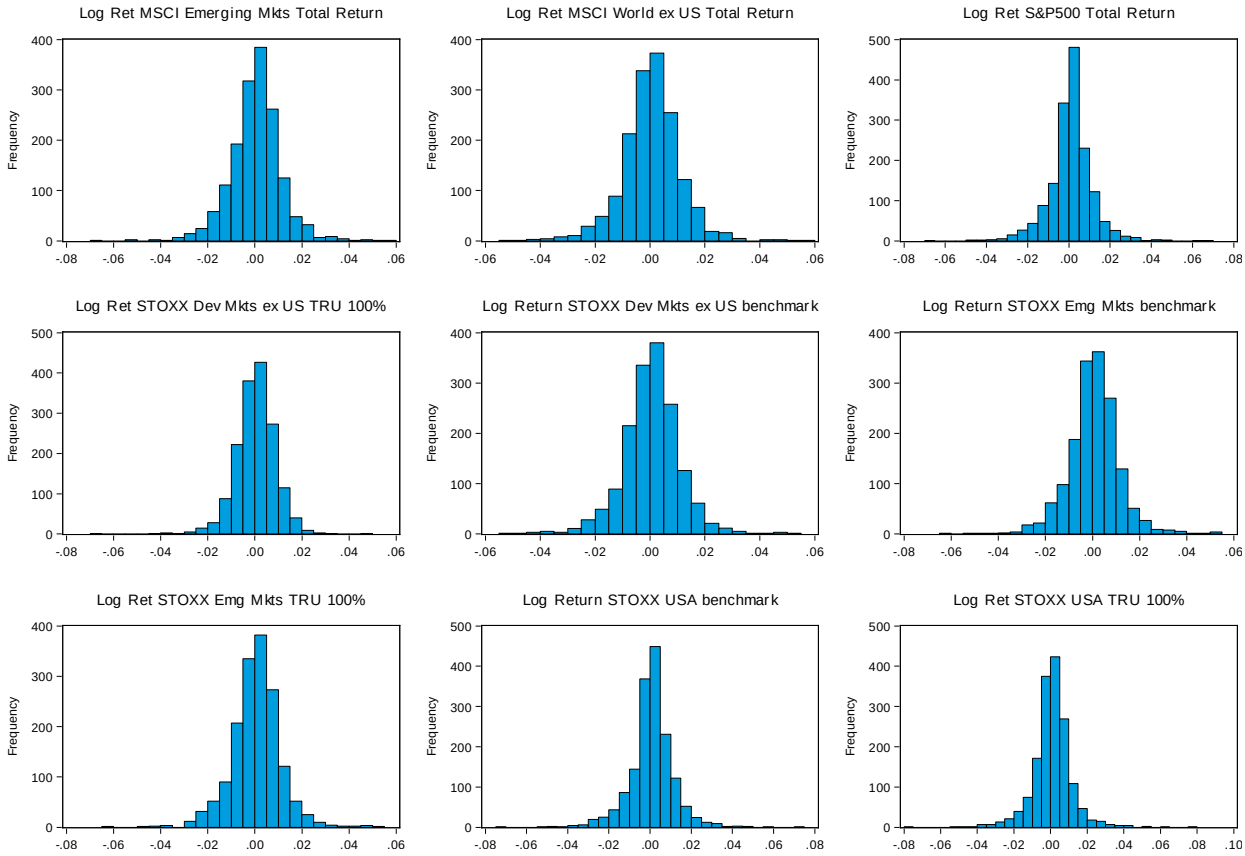
FIGURE 25 STOXX TRUE EXPOSURE INDICES, STOXX BENCHMARKS AND MARKET CAP WEIGHTED BENCHMARKS, DISTRIBUTION HISTOGRAMS (SEP. 25, 2007-MAY 8, 2015, GROSS LOG RETURNS)



Source: STOXX

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STOXX Ltd. is a global index provider, currently calculating a global, comprehensive index family of over 7,000 strictly rules-based and transparent indices. Best known for the leading European equity indices EURO STOXX 50, STOXX Europe 50 and STOXX Europe 600, STOXX Ltd. maintains and calculates the STOXX Global index family which consists of total market, broad and blue-chip indices for the regions Americas, Europe, Asia/Pacific and sub-regions Latin America and BRIC (Brazil, Russia, India and China) as well as global markets.

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