An EDHEC-Risk Institute Publication

Accounting for Geographic Exposure in Performance and Risk Reporting for Equity Portfolios

March 2015

with the support of

caceis
INVESTOR SERVICES

EDHEC-RISK
Institute

Printed in France, March 2015. Copyright EDHEC 2015.
The opinions expressed in this study are those of the authors and do not necessarily reflect those of EDHEC Business School.
We thank CACEIS Investor Services for its support for our research.
S&P® and S&P 500® are registered trademarks of Standard & Poor's Financial Services LLC (S&P), a subsidiary of The McGraw-Hill Companies, Inc. FTSE® is a registered trade mark of the London Stock Exchange Plc and The Financial Times Limited. STOXX® is a registered trademark of STOXX Limited.

Table of Contents

Executive Summary 5

Introduction 13

Section 1: Data and Methodology 17

Section 2: Application to Performance and Risk Reporting 25

Section 3: Application to Performance Attribution 39

Conclusions 53

Appendix 57

References 75

About CACEIS Investor Services 77

About EDHEC-Risk Institute 79

EDHEC-Risk Institute Publications and Position Papers (2012-2015) 83

About the Authors

Noël Amenc is a professor of finance at EDHEC Business School, director of EDHEC-Risk Institute, and chief executive officer of ERI Scientific Beta. He has conducted active research in the fields of quantitative equity management, portfolio performance analysis, and active asset allocation, resulting in numerous academic and practitioner articles and books. He is on the editorial board of the *Journal of Portfolio Management* and serves as associate editor of the *Journal of Alternative Investments* and the *Journal of Index Investing*. He is a member of the Monetary Authority of Singapore Finance Research Council and the Consultative Working Group of the European Securities and Markets Authority Financial Innovation Standing Committee. He co-heads EDHEC-Risk Institute's research on the regulation of investment management. He holds a master's in economics and a PhD in finance from the University of Nice.

Kumar Gautam is a Quantitative Analyst at ERI Scientific Beta. He does research on portfolio construction, focusing on equity indexing strategies. He has a Master of Science in Finance from EDHEC Business School, France. He has previously worked as a financial journalist with Outlook Money, a finance magazine based in India.

Felix Goltz is Head of Applied Research at EDHEC-Risk Institute. He carries out research in empirical finance and asset allocation, with a focus on alternative investments and indexing strategies. His work has appeared in various international academic and practitioner journals and handbooks. He obtained a PhD in finance from the University of Nice Sophia-Antipolis after studying economics and business administration at the University of Bayreuth and EDHEC Business School.

Nicolas Gonzalez is a Senior Quantitative Analyst at ERI Scientific Beta. He carries out research on equity and portfolio construction. He holds a MSc in Statistics from the Ecole Nationale de la Statistique et d'Analyse de l'Information (ENSAI) with majors in Financial Engineering and Risk Management as well as a bachelor in Economics and Finance. From 2008 to 2012, Nicolas was a Quantitative Portfolio Manager at State Street Global Advisors on European Equities. Prior to that, he was a Research Analyst at the European Central Bank.

Jan-Philip Schade has worked as a Quantitative Analyst for Indices & Benchmarks within the internship programme at EDHEC-Risk Institute, with responsibility for quantitative research, performance analysis and reporting on passive equity investment strategies. His previous professional experience was with Allianz Global Investors and KPMG Advisory. He holds a Masters of Science with honours from the elite graduate programme in Finance and Information Management at Technische Universität Munich and the University of Augsburg.

Executive Summary

Executive Summary

A standard practice in reporting geographic exposure of equity portfolios is to report breakdown of portfolio constituents by country or region, which are assigned to a stock based on its place of listing, incorporation or headquarters. However, the practice is questionable in the context of a globalised marketplace where a company's operations are usually not restricted to any single country (or region). Moreover, now that accounting standards have made firm-level data on business activity across different geographies widely available, a natural question is whether such data can be used to obtain more meaningful geographic exposure reporting of equity portfolios.

Previous research on use of geographic segmentation data has primarily focused on improving forecasts of a company's earnings (see e.g. Roberts (1989), Balakrishnan *et al.* (1990) and Ahadiat (1993)). In this paper we analyse the usefulness of a company's reported geographic segmentation data (total sales disaggregated into sales from different geographies) in performance reporting and performance attribution.

First, we analyse the application of geographic segmentation data in reporting the geographic exposure (proportion of sales coming from different geographies) of equity portfolios. We report geographic exposure of five developed market indices (S&P 500, STOXX Europe 600, FTSE Developed Asia Pacific, FTSE 100 and STOXX Europe 50) to four regions (Africa & Middle East, Americas, Asia & Pacific and Europe) and to emerging and developed markets.

Second, we analyse the application of geographic segmentation data in performance attribution, where we attribute the yearly performance of the developed market index to the performance of portfolios which have varied levels of exposure to emerging markets or local markets (official market). Here, we consider only three broad market indices (S&P 500, STOXX Europe 600 & FTSE Developed Asia Pacific) and not narrow indices such as FTSE 100 and STOXX Europe 50, as sorting stocks based on varied levels of geographic exposure leads to portfolios having few stocks, which can lead to less meaningful results. We also analyse performance attribution of indices during different market conditions: performance attribution depending on (1) difference in return of emerging and developed market equity and (2) difference in return of local and foreign market equity.

Data and Methodology

We report the geographic exposure of the index constituents at the end of June every year over ten years (2004 to 2013). For the index constituents as of June *t*, we consider sales for fiscal year t-1 in order to avoid look-ahead bias. The source of geographic segmentation data is DataStream (Worldscope), supplemented by Bloomberg. It provides geographic breakdown of sales as reported by companies.

We report the geographic exposure of indices to four regions (Americas, Europe, Middle East & Africa and Asia & Pacific) as well as to developed and emerging markets. To determine countries that constitute the above mentioned four regions, we rely on the United Nations Statistics Division (UNSD),[1] which groups individual countries (economies) into sub-regions, further aggregated into

1 - Source: http://unstats.un.org/unsd/methods/m49/m49regin.htm

Executive Summary

geographic regions (continents). UNSD does not have any standard methodology to classify countries into developed and emerging markets, thus the classification of countries into Developed or Emerging is based on ERI Scientific Beta's methodology.[2] Arguably, the countries in the United Nations' list that are not categorised by ERI Scientific Beta have been grouped into the Emerging Market category.

Mapping reported geographic sales to individual countries

If a company reports sales per country, it is fairly simple to assign it to any of the four regions (based on UNSD classification) and to either the Developed or Emerging category (based on Scientific Beta classification). However, companies can also report sales from sub-regions (e.g. North America and South America), regions (e.g. Americas), special economic or political groupings (e.g. European Union) or a mix of these (e.g. Brazil and North America).

In such cases, to achieve our objective, which is to report sales of index constituents from the four mentioned regions and from developed and emerging markets, we follow a two-step process. First, we disaggregate sales for each reported geographic segment into country-level sales. The proportion of sales assigned to a country within a region is the same as the weight of the country's gross domestic product (GDP)[3] in the total GDP of the geography (Li *et al.* (2012)). Second, we aggregate country-level sales back to sales from four regions and from developed and emerging markets.

In what follows we summarise results of the application of segmentation data for reporting the geographic risk exposure and performance attribution of equity portfolios.

Application to performance and risk reporting

In this section, we summarise analysis of the application of segment data in reporting geographic exposure of equity portfolios. We report the exposure of the developed market indices to four regions and to developed and emerging markets. The exposure is reported for the beginning (FY-2003) and end (FY-2012) of our ten-year sample period.

In Table 1 below we report the regional exposure of developed market indices. Note that in FY-2003 all the indices have significant exposure to non-domestic

2 - Source: http://www.scientificbeta.com/#/tab/article/eri-scientific-beta-universe-construction-rules
3 - Source: http://unstats.un.org/unsd/snaama/dnllist.asp

Table 1: Regional exposure of Developed market indices - The table below reports the breakdown of sales of constituents of five indices (S&P 500, STOXX Europe 600, FTSE Developed Asia Pacific, FTSE 100 and STOXX Europe 50) into four regions (Africa and Middle East, Americas, Asia and Pacific and Europe). The index constituents are as of June 2004 and June 2013, for which sales data is of fiscal year 2003 and fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg.

	Africa & Middle East	Americas	Asia & Pacific	Europe	Africa & Middle East	Americas	Asia & Pacific	Europe
	FY-2003				FY-2012			
S&P 500	1.07%	80.58%	6.79%	11.55%	2.28%	73.30%	11.67%	12.75%
STOXX Europe 600	1.82%	26.72%	7.76%	63.70%	3.69%	24.72%	16.17%	55.42%
FTSE Developed Asia Pacific	0.73%	16.85%	74.68%	7.74%	1.59%	11.71%	79.35%	7.35%
FTSE 100	2.36%	30.82%	7.99%	58.83%	4.08%	24.81%	21.85%	49.27%
STOXX Europe 50	1.53%	33.98%	8.48%	56.01%	4.58%	28.53%	21.64%	45.25%

Executive Summary

regions. For example, the exposure of the S&P 500 to regions other than Americas is 19%. The exposure of the STOXX Europe 50 to non-domestic regions (regions other than Europe) is highest at 44%. Over a period of ten years, the exposure of these indices to non-domestic regions has further increased. For example, the exposure of the S&P 500 to regions other than the Americas has increased by 8% in a period of ten years to 27% in FY-2013.

To give another perspective on the importance of growing foreign market exposure of the developed market indices, we find that for indices such as the S&P 500 and STOXX Europe 600, the sum of market capitalisation of the index constituents (or cap-weight of index constituents) weighted by percentage of sales coming from foreign markets was 2,852 billion USD (or 29.96% in relative terms) and 2,469 billion USD (or 41.07%), respectively, in June 2004, which rose to 5,638 billion USD (38.75%) and 4,683 billion USD (53.28%), respectively, in June 2013 (See Appendix: Tables 7 and 13). We thus see a clear trend for foreign geographic exposure to constitute an increasingly important part of popular regional indices, while the importance of companies with a clear focus on the official region of the index in terms of geographic exposure has decreased correspondingly.

In the next table, we provide emerging and developed market exposure of the five developed market indices. All the developed market indices had noticeable exposure to emerging markets in FY-2003, wherein the S&P 500 and STOXX Europe 600 had the lowest (6.97%) and highest (10.67%) exposure, respectively. Interestingly, the emerging market exposure of all the developed market indices has almost (or more than) doubled in the ten-year sample period. For example, the emerging market exposure of STOXX Europe 600 has increased from 10.67% in FY-2003 to 22.69% in FY-2013, respectively.

Also, we find that for popular indices such as the S&P 500, FTSE 100 and STOXX Europe 50, the sum of market capitalisation of the index constituents (or cap-weight of index constituents) weighted by percentage of sales coming from emerging markets was 868 billion USD (or 9.12% in relative terms), 202 billion USD (or 11.39%) and 355 billion USD (12.48%), respectively, in June 2004, which rose to 2,391 billion USD (16.44%), 542 billion USD (24.63%) and 1,070 billion USD (28.11%), respectively, in June 2013 (See Appendix: Tables 7, 25 and 31). These figures also highlight the rise in the emerging market exposure of developed market indices.

Table 2: Emerging/Developed market exposure of Developed market indices- The table below reports the breakdown of sales of constituents of five indices (S&P 500, STOXX Europe 600, FTSE Developed Asia Pacific, FTSE 100 and STOXX Europe 50) into developed and emerging markets. The index constituents are as of June 2004 and June 2013, for which sales data is of fiscal year 2003 and fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg

	Emerging	Developed	Emerging	Developed
	FY-2003		FY-2012	
S&P 500	6.97%	93.03%	13.52%	86.48%
STOXX Europe 600	10.67%	89.33%	22.69%	77.31%
FTSE Developed Asia Pacific	8.29%	91.71%	16.55%	83.45%
FTSE 100	9.55%	90.45%	22.08%	77.92%
STOXX Europe 50	10.39%	89.61%	26.50%	73.50%

Executive Summary

The figures reported in Tables 1 and 2 tell us that the developed market indices have significant and increasing exposure to non-domestic regions and to emerging markets, which underlines the need to report geographic risk exposure of equity portfolios in terms of geographic segmentation data and not just to rely on simplistic labelling of indices based on stocks' place of listing or incorporation.

Application to performance attribution

In this section, we summarise the application of segment data in the performance attribution of equity portfolios. We analyse the contribution of stocks having varied emerging and local markets exposure to the performance of Developed market indices. Here we focus on performance attribution conditioned on two different market conditions: performance attribution depending on spread in return of emerging and developed market equity and performance attribution depending on spread in return of local and emerging market equity. To emphasise the core idea in this section, we report performance attribution during a bull market, i.e. when the return on emerging market (or local market) equity is higher than the return on developed market (or foreign market) equity.

Table 3 below reports return contributions to Developed market indices of stocks with varying emerging market exposure. We note that during bull markets, i.e. when the emerging market performed better than the developed market, the stocks with high exposure to the emerging market contributed more to the performance of the index compared to the contribution of stocks with low exposure to the emerging market. For example, during bull markets, the contribution of high emerging market exposure stocks to the performance of the STOXX Europe 600 is 7.83% compared to the contribution of low emerging market exposure stocks (5.47%).

Table 4 below reports return contributions to Developed market indices of stocks with varying local (official regions) and foreign market exposure. We note

Table 3: Return contribution to Developed market indices of stocks with varying Emerging Market exposure (bull market condition): The table below reports the breakdown of annualised excess returns of three developed market indices (S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific) into the performance of portfolios formed by sorting stocks based on their sales exposure to emerging markets. We summarise performance attribution for bull markets, wherein a bull market is defined as calendar year quarters where the spread between emerging and developed market returns is positive. The benchmark for emerging and developed markets is MSCI Emerging and MSCI World, respectively. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the S&P 500 and independent variables are the excess return on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using returns on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream, supplemented by Bloomberg.

		High		Low	
	Bull market excess return	Contribution	% Contribution	Contribution	% Contribution
S&P 500	11.77%	4.58%	38.88%	3.42%	29.04%
STOXX Europe 600	21.50%	7.83%	36.41%	5.47%	25.46%
FTSE Developed Asia Pacific	17.71%	9.42%	53.17%	3.42%	19.32%

Executive Summary

Table 4: Return contribution to Developed market indices of stocks with varying Local Market exposure (bull market condition): The table below reports the breakdown of the annualised excess return of three developed market indices (S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific) into the performance of portfolios formed by sorting stocks based on their sales exposure to the local market (official region). We summarise performance attribution for bull markets, wherein a bull market is defined as calendar year quarters where the spread between local and foreign market returns is positive. The local and foreign equity benchmark for the US market are MSCI USA and MSCI AC World ex-USA; for Developed Europe are MSCI Europe and MSCI AC World ex Europe; and for Developed Asia Pacific are FTSE AW Developed Asia Pacific and FTSE Global ex Asia Pacific. To form portfolios, we sort stocks by their local markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on S&P 500 and independent variables are the excess return on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using returns on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream, supplemented by Bloomberg.

		High		Low	
	Bull market excess return	Contribution	% Contribution	Contribution	% Contribution
S&P 500	10.72%	4.63%	43.17%	3.29%	30.68%
STOXX Europe 600	31.69%	10.15%	32.04%	10.01%	31.57%
FTSE Developed Asia Pacific	16.82%	7.53%	44.76%	4.40%	26.16%

that during bull markets, i.e. when local markets performed better than foreign markets, the stocks with high exposure to local markets contributed more to the performance of the index compared to the contribution of stocks with low exposure to local markets. For example, during bull markets, the contribution of high local market exposure stocks to the performance of FTSE Developed Asia Pacific is 7.53% compared to the contribution of low local market exposure stocks (4.40%).

Overall, these figures suggest that when emerging markets fare better than developed market equity, the stocks with higher exposure to emerging markets contribute more to the performance of indices than stocks with lower exposure to emerging markets. Likewise, we find that when local markets fare better than foreign market equity, the stocks with higher exposure to local markets contribute more to the performance of indices than stocks with lower exposure to local markets. As we measure the exposure of stocks in terms of proportion of sales coming from emerging or local markets, it again underlines the usefulness of using geographic segmentation data in analysing the performance of equity portfolios.

Conclusion

In this paper, we analyse the usefulness of geographic segmentation data in reporting the geographic risk exposure and performance attribution of equity portfolios. We find that the indices that are labelled as representing developed market equity have significant and increasing exposure to emerging markets. More globally, we observe that the economic exposure measured by sales in the domestic region that corresponds to the official definition of the index's universe has been tending to fall sharply compared to exposure to non-domestic regions. These economic exposures ultimately have an influence on variations in the performance of the index. As such, we find that the contribution to

Executive Summary

the performance of Developed market indices of stocks with varied geographic exposure (either emerging market or local market exposure) differs noticeably. These findings highlight the usefulness of geographic segmentation data in risk reporting and performance attribution of equity portfolios

This reporting will also allow investors to take account of the real geographic risks of their portfolios, whether involving the construction of a strategic or tactical allocation. It would be a shame if asset allocators compromised their asset allocation policy, which is often based on macro-economic scenarios that use regional dimensions, through poor evaluation of the geographic reality of their portfolio or benchmark.

Executive Summary

Introduction

Introduction

Performance and risk reports of equity portfolios frequently report a breakdown of portfolio holdings by geography, based on simple markers such as the stock's primary listing and the firm's place of incorporation and headquarters. However, it is questionable whether these markers are relevant for the underlying geographic exposure of a stock. For example, should an automaker who is listed, headquartered and incorporated in Germany, and sells his cars mainly to the US and China be considered as providing exposure to Germany, or even to Europe? Should stock of a Swiss-listed and headquartered pharmaceutical company which sells its products worldwide be considered to provide exposure to "Switzerland" or even to Europe? Beyond such examples, in a world of increasing globalisation, it is clear that the typical markers used for labelling firms as belonging to a certain country lose their relevance. In fact, even the practice of assigning a unique nationality for each stock seems obsolete in a world with multinational corporations. This question has numerous implications, whether involving performance attribution or geographical risk measurement for portfolios, and of course for investors' and managers' strategic or tactical allocation choices.

At the same time, changes in accounting standards have made firm-level data on business activity across geographic segments much more widely available over the recent decade. Given the rich information available on the breakdown of sales in particular, a natural question is whether such data can be used to obtain more meaningful geographic exposure reporting of equity portfolios. This paper analyses the application of a company's reported geographic segmentation data in portfolio construction. In particular, we analyse the application of a company's reported geographic segmentation of sales for two purposes: reporting the geographic exposure (proportion of sales coming from different geographies) of equity portfolios and analysing the performance of equity portfolios in terms of contribution from stocks with varied levels of exposure to different geographies.

A substantial number of papers in accounting research have analysed the application of geographic segmentation data, focusing primarily on its usefulness in improving forecasts of a company's earnings. Roberts (1989) notes that for UK companies an earnings forecast model which uses geographic segment data outperforms a model based on consolidated data. Balakrishnan *et al.* (1990) report that geographic segmentation data gives additional information about earnings, leading to better forecast of sales and earnings of companies. Similarly, Ahadiat (1993) notes that although consolidated data is useful in predicting earnings, the geographic segmentation improves the accuracy of the prediction model.

Li *et al.* (2014) extends the research to larger dataset than used by previous authors and also in another direction. The authors provide evidence that combining information on firm-level exposure to different countries and information about performance of the individual countries improves the forecast of company's fundamentals. Moreover, it documents that security prices are slow in incorporating information about geographic segmentation data, and a trading strategy constructed to exploit it has statistically significant performance that remains unexplained by standard

Introduction

risk factors, which include market, size, value and momentum (Fama and French, 1993; Carhart, 1997). Nguyen (2012) also documents that stock prices are slow to incorporate information about geographic exposure and a trading strategy which exploits it exhibits performance unexplained by risk factors in asset pricing models such as the Fama and French three factor model, Carhart four-factor model or Pastor and Stambaugh model (Pastor and Stambaugh, 2003) which includes liquidity as an additional risk factor.

In this paper, we further extend the application of geographic segmentation data. First we focus on applications of geographic segmentation data for reporting geographic exposure of equity portfolios. In particular, we report the geographic exposure of three broad developed market indices (representing large and mid-cap equity in the Developed world): the S&P 500, STOXX Europe 600, and FTSE Developed Asia Pacific. We also extend our analysis to two narrower indices: the FTSE 100 and STOXX Europe 50. We analyse the geographic exposure of these indices both in terms of their exposure to different geographic regions (such as the Americas, Europe, Middle East & Africa and Asia & Pacific) and to emerging and developed economies. The purpose of this analysis is to understand whether the companies in these indices have significant exposure to non-domestic markets (for example, non-European market exposure for companies in the STOXX Europe 600) and whether these developed market indices have significant exposure to emerging markets. We analyse the exposure of the indices for a 10-year timeframe from 2004 till 2013, to understand any change in the geographic exposure of these indices.

We find that all three broad equity indices have noticeable exposure to non-domestic markets (21% to 45% in fiscal year 2012). The STOXX Europe 600 has the highest exposure to non-domestic markets among the three indices. Also, except for FTSE Developed Asia Pacific, the exposure of the other two indices to non-domestic has also increased over the period of ten years. We noted very similar trends in terms of exposure of these developed market indices to emerging markets. All three broad developed market indices have significant exposure (14% to 23% in fiscal year 2012) to emerging markets, which has increased over the past ten years.

After analysing the geographic exposure, we analyse the effect of such exposure on the performance of the three broad developed market indices. In particular, we form portfolios with companies having varying degrees of exposure (in terms of geographic sales breakdown), and attribute index performance to these different geographic exposure portfolios[4]. First, we analyse the performance of indices by attributing their performance to the performance of portfolios of stocks with different levels of sales exposure to emerging market countries. This would highlight the contribution of stocks with high emerging market exposure to index performance, relative to stocks with low emerging market exposure. We also attribute index performance to portfolios of stocks with different levels of sales exposure to their respective home economy, allowing us to test whether performance is driven mainly by "local" exposure or "foreign" exposure. Furthermore, we analyse the performance attribution of these indices in different market conditions: first, depending on the spread between the return on emerging

4 - We consider only three broad indices for performance attribution analysis because portfolio formation in the case of narrow indices such as STOXX Europe 50 leads to very few stocks (at times less than 10) in resulting portfolios which can lead to less meaningful analysis.

Introduction

and developed market equity and second, depending on the spread between the return on local and foreign market equity.

We find that there are certain years when the difference in performance of high and low emerging market exposure portfolios to the contribution of index performance is large. For example, the contribution of high and low emerging market exposure portfolios during July 2004-June 2005 to the performance of the S&P 500 index was -0.70% and 5.04%, respectively. Also, we note that when the spread in returns of emerging and developed market equity is positive, the contribution of stocks with higher exposure to emerging markets to the performance of the developed market index is higher than the contribution of stocks with lower exposure to emerging market. Similarly, when the spread in returns of emerging and developed market equity is negative, the contribution of stocks with higher exposure to emerging markets to the performance of the developed market index is lower than the contribution of stocks with lower exposure to emerging markets.

Similarly, the difference in contribution of high and low local market exposure portfolios to the performance of indices is significant in certain years. For example, the contribution of high and low local market exposure portfolios during July 2004-June 2005 to the contribution of the S&P 500 was 4.29% and -1.27%, respectively. Also, we note that when the spread in returns of local and foreign market equity is positive, the contribution of stocks with higher exposure to local markets to the performance of the developed market index is higher than the contribution of stocks with lower (higher) exposure to local markets. Likewise, when the spread in returns of local and foreign market equity is negative, the contribution of stocks with higher exposure to local markets to the performance of the index is lower than the contribution of stocks with lower exposure to the local market.

We structure the paper as follows. Section 1 describes data and methodology. Section 2 reports the geographic exposure of developed markets indices using geographic segmentation data. Section 3 analyses the contribution of stocks having varied levels of geographic exposure to the performance of developed market indices.

Section 1: Data and Methodology

Section 1: Data and Methodology

Sample

We consider three broad developed market indices for our analysis - the S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific. We have selected these three indices so as to cover the main geographic regions across developed equity markets[5]. For comprehensiveness, we extend the analysis to two narrow yet well known indices: the FTSE 100 and the STOXX Europe 50. We analyse the geographic exposure of the constituents of these indices as of June every year, from 2004 until 2013 (10-year period). We have selected this period as we observe that as we go farther back in time, the number of companies for which geographic segmentation data is missing increases (see Table 1). The recent studies, which use geographic segmentation data, cover similar time frames. For example, Nguyen (2012) and Li *et al.* (2014) cover time frames of 1999-2010 and 1998-2010, respectively[6]. For the index constituents as of June *t*, we consider the sales for fiscal year *t*-1 to avoid a look-ahead bias.

Source of data

We extract index constituents from DataStream. The data on geographic breakdown of company's sales is from DataStream/Worldscope. The database provides geographic breakdown of sales as reported by the company. The maximum number of segments reported by the database is 10, and if the company breaks sales into more than 10 geographies, the sales from the remaining geographies are combined into the 10th segment. The number of companies in the FTSE Developed Asia Pacific index for which the geographic breakdown of sales is not available on DataStream is significant (see Table 1), and for such companies we use Bloomberg as a supplementary source of data.

As in this research, we report the sales of index constituents coming from four different regions (Americas/Europe/Middle East & Africa/Asia & Pacific), we need to determine the countries that constitute these regions. For this purpose we rely on the United Nations Statistics Division classification, which breaks down geographic regions (or continents) into sub-regions, which are further divided into individual countries/economies[7].

As we report sales of index constituents coming from developed and emerging markets, we also need to categorise countries into developed and emerging markets. Note that the United Nations does not follow any standard methodology to classify countries into developed and emerging markets. For this purpose, we rely on the ERI Scientific Beta classification of countries into Developed and Emerging market, which is based on a scientific methodology[8]. In addition, there are names in the United Nations' list of countries which are not categorised by ERI Scientific Beta. For the purpose of this research, we group such countries into Emerging market.

In this research, we also use country-level GDP data, which is extracted from the United Nations Statistics Division[9]. The GDP data is in US $ and at 2005 constant prices.

Mapping

There is no standard way in which a company reports breakdown of its sales into different geographies. The reporting of geographic breakdown of sales can be into individual countries, sub-regions (such as North America and South America), regions (such as the Americas), special economic/political unions (such as the European Union) or any mix of these

5 - The sum of market capitalisation of the three developed market indices considered here represent 83% of the market capitalisation of MSCI World All Cap (represents 99% free-float adjusted market cap of each country in MSCI list of 23 Developed countries) as of end of June 2013.
6 - Moreover, the complete list of index constituents for certain indices are not available prior to early 2000s. For example, the list of index constituents for FTSE Developed Asia Pacific and STOXX Europe 600 is available on DataStream only from August 2000 and August 1999, respectively.
7 - Note that the United Nations does not have a grouping named Middle East. However, the United Nations' grouping called Western Asia consists of most of the countries which are generally classified as Middle East. Therefore, for the purpose of this research, we consider most of the countries in the United Nations' grouping called Western Asia as Middle East. In addition, the UN classifies Iran as South Asia. We regroup Iran into Middle East. Source: http://unstats.un.org/unsd/methods/m49/m49regin.htm
8 - Source: http://www.scientificbeta.com/#/tab/article/eri-scientific-beta-universe-construction-rules
9 - Source: http://unstats.un.org/unsd/snaama/dnllist.asp

Section 1: Data and Methodology

(such as "sales coming from Brazil and North America").

Note that the objective of Section 2 of this paper is to analyse sales of an index coming from the four regions and from developed and emerging markets. Even if we assume a company precisely reports sales breakdown into the four regions mentioned above, we would not be able to map the sales coming from developed and emerging markets within the region. For example, if a company reports sales from Europe, we would need a methodology to break those sales into "Developed Europe" and "Emerging Europe".

Therefore, to achieve our objective, which is to report sales from an index into four regions and into developed and emerging market, we broadly follow a two step process.

Step 1: Disaggregate sales for each reported geographic segment into country-level sales

To disaggregate sales of each possible reported geography into countries, first we manually map that geography to individual countries. If the name of the reported geography is same as that provided by the United Nations, it is fairly simple to map that geography to countries that constitute that geography (as per the United Nations grouping). For example, if a company reports sales coming from Central America, we map Central America to the United Nations list of countries which constitute Central America.

In the event that a company reports geography such as Eurozone, Balkan and CIS, which are not specified by the United Nations, to identify countries that fall in these groupings we rely on definitions provided by other established organisations. For example, to map countries that constitute the OECD, we rely on the list of OECD members provided by the OECD. We refer readers to Table 1 in the Appendix which lists the source used by us to define geographic regions which are not defined in the United Nations division of regions into sub-regions and countries. Note that even if the definition of special regions overlaps with the United Nations' grouping, we ensure no country is mapped more than once. We explain this in detail in the next sub-section. For a quick overview, assume a company reports its sales for two segments: Nordic and Europe. We design an algorithm in such a way that we first map a geography (into individual countries) which is more precisely defined. In this case, we first map Nordic to its five member countries (Denmark, Sweden, Norway, Finland and Iceland, which are also European countries) and then we map Europe to countries defined by the United Nations but excluding the five Nordic countries already mapped earlier.

We note that over our sample period of 10 years, the companies in the S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific reported 538, 1,251 and 626 unique geographies, respectively. In case the name of a geography does not make any clear sense (such as "mountain"), we assign sales corresponding to that geography as zero.

Once each reported geographic segment is mapped to different countries, we break the sales corresponding to that geographic segment into country-level sales within the geography. The proportion of sales assigned to a country within a geography is the same as the weight of the country's GDP in the overall GDP of the geography.

Section 1: Data and Methodology

This methodology is similar to the one followed in Tuna, *et al.* (2014). We acknowledge that this inference from regional sales to country-level sales induces estimation error in reporting but in the absence of country-level sales data, we believe this inference is necessary. Given that the mapped country-level exposures of a firm may be based on our assumption that sales within a region can be mapped in proportion to GDP, we will base our main inferences in our study on high-level exposures to aggregate categories, e.g. to broad regions such as "Europe" or to broad categories such as "Emerging Markets".

Avoiding multiple assignments of sales to one country

There are complex ways in which companies report geographic segments but we design an algorithm in such a way that no country is mapped more than once. The principle we follow is the following: We first look for a reported geography which is most precisely defined and map it to individual countries. Next, we look at that reported geography which is next in order of precision and map it to individual countries. At this stage, if a country is already mapped in the previous stage, we do not map it again to the geography we are considering at the current stage. We then move to the next reported geography in the order of precision and repeat the process of mapping it to different countries (excluding countries already mapped in the previous stage) till all reported geographies are assigned to individual countries.

To understand the way we do it, let us consider the following example. A company reports sales for the following five segments: "Europe", "Japan", "Korea", "Germany", and "Other countries". For the three country-level reported segments (Japan, Korea, Germany), assigning sales is straightforward. Then, caution is required in assigning sales to countries within Europe. "Germany" is in Europe and sales have already been assigned to it. In assigning sales to countries within "Europe" as per their GDP weight, we exclude Germany from aggregate GDP of "Europe". Next, when we assign sales to countries within "Other Countries" we consider all countries falling in the United Nations' list except the countries that have already been assigned sales (countries in "Europe", "Japan", "Korea" and "Germany".

Step 2: Aggregate country-level sales back into sales from the four desired regions and into developed and emerging market.

Once a company's sales are disaggregated into various countries, aggregating it into the four regions or Developed vs. Emerging is straightforward. For example, for a given fiscal year, the sales of the S&P 500 index coming from the Americas is the sum of sales of each company coming from countries that fall within the Americas. Similarly, for any particular year, the sales of the S&P 500 index coming from Developed markets is the sum of sales of each company coming from countries that are classified as Developed.

Data issues

Here we describe the quality of the geographic segment level sales data that we use for this research. To summarise, we dealt with the following issues (see Table 1 for details).

Section 1: Data and Methodology

First, after downloading the constituents of the index for our 10-year sample period from DataStream, we find that there are companies for which the data provider does not provide total sales data. For example, for S&P 500 constituents, there are in total 33 companies across 10 years for which we do not find any sales data. From June 2004 till June 2009, the number drops from 10 to 3, and from June 2005 onwards, the total sales data is available for all the index constituents.

Next, there are companies for which the data provider gives total sales data but does not report the breakdown of total sales. For S&P companies, such observations totaled 117, with more such companies in previous years compared to recent years, dropping from 18 companies in June 2004 to 6 companies in June 2013. Such companies' aggregate sales represent around 1%-4% of aggregate sales of the S&P 500. The number of such companies is higher for FTSE Developed Asia Pacific. We searched these companies' geographic segment sales on alternation data source (Bloomberg), and found that these are mainly Japanese companies which do not report breakdown of sales as their sales is primarily domestic. For such companies we used Bloomberg to get geographic segment data. However, in spite of using an alternative data source, we did not get geographic segment level sales data for around 23%-28% companies for the fiscal year 2004 till fiscal year 2006. For the most recent period in our sample, i.e. June 2013, there are 36 such companies, representing around 4.55% of total sales of the index.

Next, we note that there are companies for which the sum of segment level sales is more than the total sales reported by the companies. To avoid using incorrect data, we follow Nguyen (2012), wherein we exclude from our sample those companies for which difference of segment level sales and total sales exceeds 10% of total sales reported by the company. For example, for the S&P 500, such companies' aggregate sales represent around 0.2%-8% aggregate sales of the S&P 500, with a higher figure for previous years compared to the more recent years.

Lastly, we assume segment sales to be zero if the corresponding segment name does not make clear sense, such as "mountain". Assigning a value of zero to any segment name implies that we do not count the corresponding segment value in calculating "sum of sales from individual segments", and hence the sum of weights assigned to the rest of the segments is equal to 1. For the S&P 500, the sum of sales value which cannot be assigned to any geography, due to segment names which do not make any clear sense, represents around 0.12%-0.56% aggregate sales of S&P 500.

In what follows, we report and analyse the sales of constituents of the five developed market indices from the four specified regions and from developed and emerging markets.

Section 1: Data and Methodology

Table 5: Data Quality - The table below reports the quality of geographic segment sales data and the percentage of error prone data relative to aggregate sales of the index constituents. The source of data is DataStream (Worldscope).We use Bloomberg as a supplementary source of geographic segmentation data for companies in the FTSE Developed Asia Pacific index for which segmented sales data was not available on DataStream. The figures reported in the table reflect the quality of data that we finally use for research (i.e. after using data from Bloomberg for missing values of segmented sales data for companies in the FTSE Developed Asia Pacific index).

Year	Index constituents	No sales data[1]	Companies not reporting segment data[2]	% sales volume without geo. breakdown[3]	Companies with sum of segment sales > 110% of "total sales"[4]	% sales volume where sum of segment sales > 110% of "total sales"[5]	Percentage of sales volume not assigned to any country[6]
S&P 500							
Jun-04	500	10	18	3.41%	8	8.01%	0.28%
Jun-05	500	9	19	2.36%	5	6.52%	0.20%
Jun-06	500	4	20	2.77%	5	3.55%	0.56%
Jun-07	500	4	14	2.21%	5	1.01%	0.12%
Jun-08	500	3	14	2.13%	6	0.93%	0.27%
Jun-09	500	3	9	1.31%	5	0.17%	0.17%
Jun-10	500	0	6	2.10%	10	2.70%	0.14%
Jun-11	500	0	6	2.18%	7	0.27%	0.13%
Jun-12	500	0	5	1.91%	9	0.94%	0.20%
Jun-13	500	0	6	2.02%	4	1.01%	0.22%
STOXX Europe 600							
Jun-04	600	9	49	3.78%	39	6.43%	0.51%
Jun-05	600	5	49	3.66%	35	5.05%	0.41%
Jun-06	600	4	47	3.51%	22	4.39%	0.23%
Jun-07	600	5	42	2.89%	19	3.34%	0.35%
Jun-08	600	3	41	2.74%	23	4.28%	0.32%
Jun-09	600	4	34	2.71%	25	3.13%	0.48%
Jun-10	600	2	34	2.00%	22	3.90%	0.80%
Jun-11	600	0	25	1.20%	15	3.82%	0.66%
Jun-12	600	0	23	0.82%	21	4.59%	0.59%
Jun-13	600	0	33	3.27%	14	1.16%	0.69%
FTSE Developed Asia Pacific							
Jun-04	734	31	205	24.53%	27	9.96%	0.24%
Jun-05	777	35	221	24.75%	32	7.12%	0.08%
Jun-06	773	30	175	20.76%	25	6.12%	0.07%
Jun-07	772	22	50	4.99%	28	5.15%	0.11%
Jun-08	771	22	21	2.55%	33	5.91%	0.24%
Jun-09	744	14	16	0.87%	23	3.58%	0.09%
Jun-10	830	12	34	1.87%	27	5.23%	0.37%
Jun-11	841	10	35	3.44%	25	9.16%	0.14%
Jun-12	840	7	45	5.36%	20	4.67%	0.15%
Jun-13	808	7	36	4.55%	21	3.07%	0.13%
FTSE 100							
Jun-04	100	3	8	2.39%	11	6.05%	0.00%
Jun-05	100	1	7	2.41%	12	8.53%	0.08%

Section 1: Data and Methodology

Jun-06	99	1	5	0.79%	10	7.45%	0.00%
Jun-07	100	0	8	2.84%	6	3.65%	0.00%
Jun-08	98	0	8	0.89%	6	3.57%	0.07%
Jun-09	98	0	10	2.77%	6	0.36%	0.15%
Jun-10	97	0	10	2.72%	6	6.80%	0.21%
Jun-11	98	0	5	1.74%	7	7.54%	0.28%
Jun-12	97	0	4	0.92%	5	3.68%	0.12%
Jun-13	98	0	6	3.79%	5	4.10%	0.15%
STOXX Europe 50							
Jun-04	50	1	1	1.37%	3	4.89%	0.48%
Jun-05	50	1	1	1.26%	3	4.18%	0.21%
Jun-06	50	0	1	0.88%	3	6.52%	0.22%
Jun-07	50	0	0	0.00%	2	4.47%	0.43%
Jun-08	50	0	0	0.00%	2	4.52%	0.47%
Jun-09	50	0	0	0.00%	2	5.42%	0.79%
Jun-10	50	0	0	0.00%	3	5.07%	1.48%
Jun-11	50	0	1	0.44%	3	5.96%	0.84%
Jun-12	50	0	0	0.00%	5	9.10%	0.74%
Jun-13	50	0	0	0.00%	2	0.98%	0.65%

1: Represents companies for which "Total Sales" data is not available on DataStream/Worldscope. For these companies, geographic breakdown of sales data is also not available.
2: Represents companies which report "Total Sales" data but for which geographic segment data is not available on DataStream/Worldscope.
3: It is calculated as the sum of the value of "total sales" of companies for which segment data is not available divided by sum of value of "total sales" of all index constituents.
4: Represents companies for which sum of sales from different geographies is 10% more than the "total sales" reported by the company. These are companies in addition to those which either do not report total sales or geographic breakdown of sales.
5: It is calculated as the value of "total sales" of companies for which sum of sales from different geographies is 10% more than "total sales" reported by the company divided by the sum of value of "total sales" of all index constituents. To calculate this figure we do not include the companies which either do not report total sales or geographic breakdown of total sales.
6: It is calculated as the value of segment level sales that cannot be assigned to any geography divided by the sum total of segment level sales. This figures arises when companies report segment sales but the name of the corresponding reported geography does not make clear sense, such as "mountain" and "riverside". We also ignore values such as "reconciliation", which mainly arises due to a mismatch between total reported sales and the sum total of sales from individual geographic segments. Also, segment sales which have negative values are ignored.

Section 1: Data and Methodology

Section 2: Application to Performance and Risk Reporting

Section 2: Application to Performance and Risk Reporting

The objective of this section is to analyse the exposure of Developed market indices to different geographies. We also analyse the variation in exposure of the Developed market indices to different geographies over the last 10 years. The Developed market indices we consider here are the S&P 500, STOXX Europe 600, FTSE Developed Asia Pacific, FTSE 100 and STOXX Europe 50. We classify geographies into four regions: the Americas, Europe, Middle East & Africa and Asia & Pacific. We also classify geographies into Developed and Emerging. The exposure is measured in terms of percentage of sales of index constituents coming from different geographies.

First, in Table 6 below, we report the breakdown of global GDP into the four regions and into developed and emerging markets for the year 2012 to provide a snapshot of the relative size of these markets. Next, in Table 7 below we provide a picture of the breakdown of sales of constituents of the three indices into four regions and into developed and emerging markets.

In Table 6, we see that the Americas have the largest share (35.27%) in world GDP followed by Europe (30.52%), Asia & Pacific (28.62) and Africa & Middle East (5.58%). The Developed market constitutes 68.58% of world GDP, and the remaining 31.42% is Emerging market.

In Table 7 below, the index constituents are as of June 2013, for which fiscal year 2012 sales have been considered. Two results from Table 7 are worth noting. First, it appears that each regional index has considerable exposure to other regions when considering the geographic exposure underlying the sales of the constituent

Table 6: Gross Domestic Product - The table below reports the breakdown of world GDP into four regions (Africa and Middle East/Americas/Asia & Pacific/Europe) and into developed and emerging markets. The GDP values are as of 2012 and at 2005 constant prices. The source of data is the United Nations Statistics Division (http://unstats.un.org/unsd/snaama/dnllist.asp).

Region	% of World GDP
Africa & Middle East	5.58%
Americas	35.27%
Asia & Pacific	28.62%
Europe	30.52%

Developed vs. Emerging	% of World GDP
Emerging	31.42%
Developed	68.58%

Table 7: Segment reporting - The table below reports the breakdown of sales of constituents of indices (S&P 500, STOXX Europe 600, FTSE Developed Asia Pacific, FTSE 100 and STOXX Europe 50) into four regions (Africa and Middle East/Americas/Asia & Pacific/Europe) and into developed and emerging market. The index constituents are as of June 2013, for which sales data is from fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg.

	Region				Emerging/Developed	
	Africa & Middle East	Americas	Asia & Pacific	Europe	Emerging	Developed
S&P 500	2.28%	73.30%	11.67%	12.75%	13.52%	86.48%
STOXX Europe 600	3.69%	24.72%	16.17%	55.42%	22.69%	77.31%
FTSE Developed Asia Pacific	1.59%	11.71%	79.35%	7.35%	16.55%	83.45%
FTSE 100	4.08%	24.81%	21.85%	49.27%	22.08%	77.92%
STOXX Europe 50	4.58%	28.53%	21.64%	45.25%	26.50%	73.50%

Section 2: Application to Performance and Risk Reporting

companies. For example, the STOXX Europe 600 companies generated only about 55% of their sales in Europe, and more than 40% of their sales in Asia or the Americas. The Asia and US indices are more heavily exposed to their "home" region, but sales in other regions still make up more than 20% of the geographic exposure at the index level. Second, while these indices track companies classified as belonging to developed markets, a significant percentage of sales of index constituents comes from emerging markets, with emerging markets exposure ranging from about 13% to 26.50%.

Overall, these results suggest that standard regional indices for developed markets come with considerable "off label" exposures, which in our view should be documented. Additional analysis in the subsections below provides a view of the evolution over time of these exposures. In the appendix, we have reported additional analysis such as the top 50 companies in the index by market capitalisation with their exposure to emerging markets and to non-domestic markets, the top 10 companies in the index with the highest exposure to emerging markets and non-domestic markets and the weight of companies in the index with less than and greater than 50% exposure to non-domestic markets.

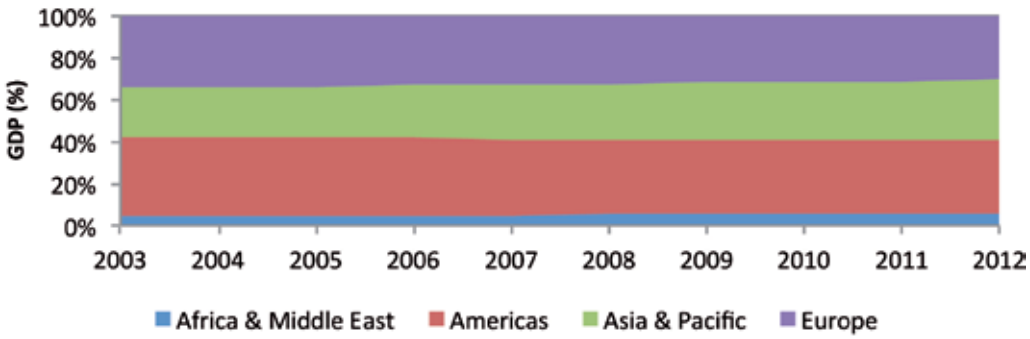
Geographic Exposure to Regions Through Time

We analyse the geographic exposure of the constituents of the indices as of June from 2004 until 2013 (10-year period). For the index constituents as of June t, we consider the sales for fiscal year t-1, to avoid a look-ahead bias.

First, in Figure 1 below we report the breakdown of global GDP into the four regions and into developed and emerging markets for the period 2003 to 2012 to give an idea of the relative size of these markets and how it has changed over time. We note that the share of the Americas and Europe in world GDP has declined marginally from around 37% to 35% and 34% to 31%, respectively, in the 10-year period. During the same period the share of Asia & Pacific and Africa & Middle East has increased from 24% to 29% and 4% to 6%, respectively.

Figure 2 below reports exposure of the S&P 500 index constituents to the four geographic regions. First, if we look only at the FY 2003 exposure, we note that around 80% of sales of S&P 500 companies comes from North America, while 20% comes from the rest of the world, which is a significant indication of a domestic trading pattern. Over the period of 10

Figure 1: Gross Domestic Product (Regional Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 2: S&P 500 (Regional Breakdown)

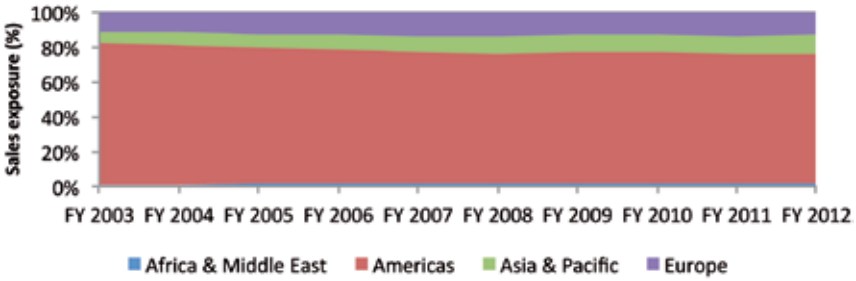
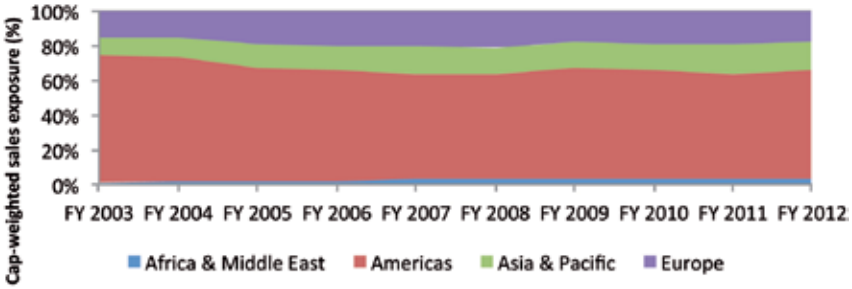


Figure 3: S&P 500 (Regional Breakdown)



years, the sales from the rest of the world have increased from 20% in FY 2003 to 27% in FY 2012, implying that exposure of US companies to the rest of the world has been increasing.

We also observe that exposure of US companies to Asia Pacific has increased significantly from 7% to 12%, although in absolute terms it is less due to a lower base. Also, note that although the exposure to Africa and Middle East is lower, it has increased from 1.07% to 2.28%. The exposure of US companies to Europe has remained almost the same with an increase from 12% in FY 2003 to 13% in FY 2012.

Beside Figure 2, we also provide cap-weighted sales exposure of companies in the S&P 500, wherein the sales exposure of a company to any region has been weighted by the market capitalisation weight of that company in the index. In this case too, we notice a similar trend. The sales exposure of US companies to regions other than the Americas is significant and has increased from 26% to 38% over a period of ten years. In terms of weight of stocks of companies in the index which are not majorly exposed to the US market (companies with less than 50% exposure to the US), we note that the market-capitalisation weight of such companies in the index has increased from 16.5% in June 2004 to 40% in June 2013 (see Appendix: Table 5).

Figures 4 and 5 below report sales and cap-weighted sales exposure of STOXX Europe 600 index constituents to the four regions. Note that the sales exposure (or cap-weighted sales exposure) of the STOXX Europe 600 to Europe has fallen from 64% (53%) in FY 2003 to 55% (47%) in FY 2012, which highlights the high exposure of European stocks to non-European

Section 2: Application to Performance and Risk Reporting

regions. At the same time, we also note that exposure (or cap-weighted sales exposure) of European companies to Asia Pacific has doubled from 8% (9%) to 16% (20%). Similarly, the sales exposure and cap-weighted sales exposure of European companies to Africa and the Middle East has doubled from 2% to 4%, although the base is low. The sales exposure (or cap-weighted sales exposure) to the Americas has declined from 27% (36%) to 25% (28%). Also we find that the weight of stocks of companies in the index which are not majorly exposed to the Developed Europe market (companies with less than 50% exposure to Developed Europe) has increased from 43.61% in June 2004 to 64.95% in June 2013 (see Appendix: Table 11).

The observations for FTSE Developed Asia Pacific companies reported in Figures 6 and 7 is different from the S&P 500 and STOXX Europe 600. We note that the percentage sales (or cap-weighted sales) of Asia Pacific companies from their local region (i.e., Asia Pacific) has increased from 75% (58%) to 79% (69%) from FY 2003 to FY 2012. Yet, for the most recent period, FY 2012, 20% of sales (or 31% of cap-weighted sales) comes from outside the region, which is significant. The reliance of Asia Pacific companies on European markets has remained constant at around 8% (10% in the case of cap-weighted sales) from FY 2003-FY 2012. The sales exposure (or cap-weighted sales exposure) to the Americas has declined from 17% (31%) to 12% (19%). The sales exposure (or cap-weighted sales exposure) to Africa and the Middle East has increased from 0.73% (1.25%) to 1.59% (1.63%). Also we find that the weight of stocks of companies in

Figure 4: STOXX Europe 600 (Regional Breakdown)

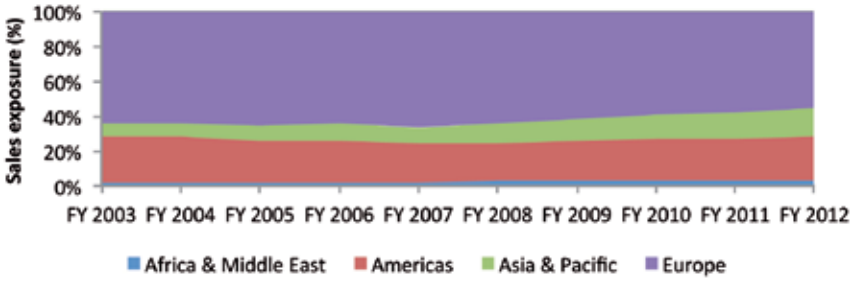
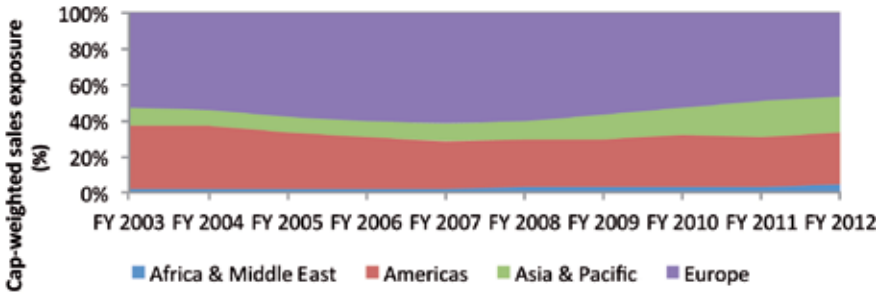


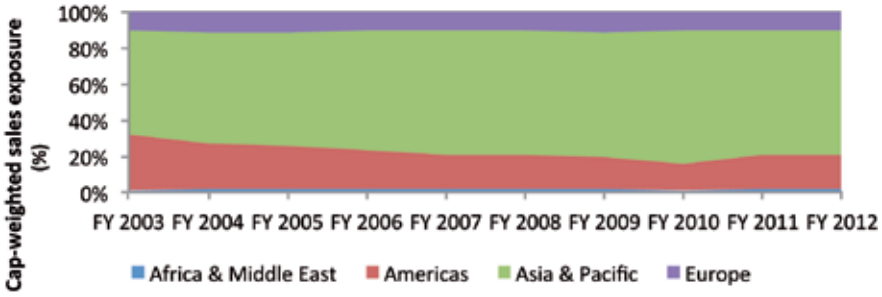
Figure 5: STOXX Europe 600 (Regional Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 6: FTSE Developed Asia Pacific (Regional Breakdown)

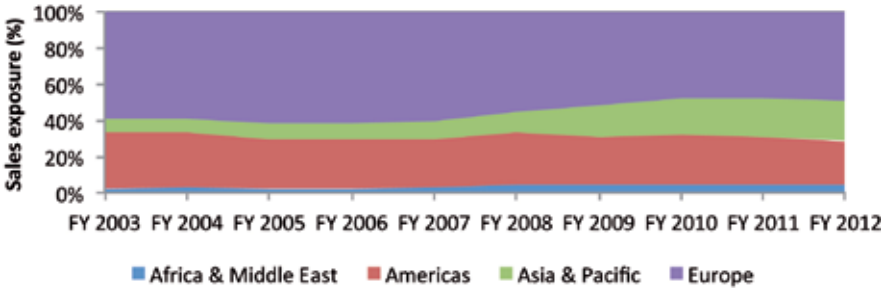
Figure 7: FTSE Developed Asia Pacific (Regional Breakdown)



the index which are not majorly exposed to the Developed Asia-Pacific market (companies with less than 50% exposure to Developed Asia-Pacific) has increased from 28.58% in June 2004 to 34.66% in June 2013 (see Appendix: Table 17).

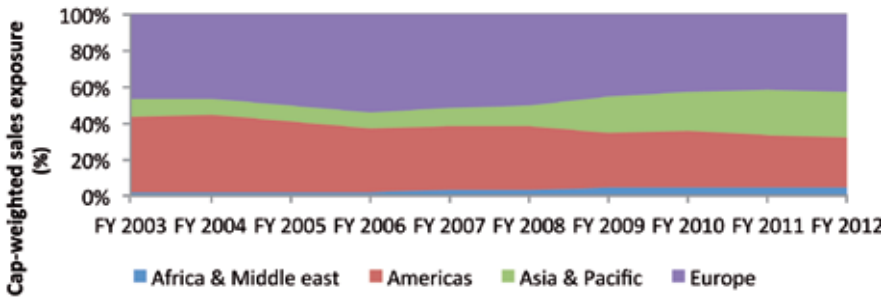
Figures 8 and 9 report sales and cap-weighted sales exposure of FTSE 100 constituents to the four regions. The sales exposure (or cap-weighted sales exposure) of index constituents to the European market has fallen from 59% (47%) in FY 2003 to 49% (43%) in FY 2012, which highlights the high exposure of United Kingdom-based stocks to non-European regions. Also the exposure (or cap-weighted sales exposure) of UK companies

Figure 8: FTSE 100 (Regional Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 9: FTSE 100 (Regional Breakdown)

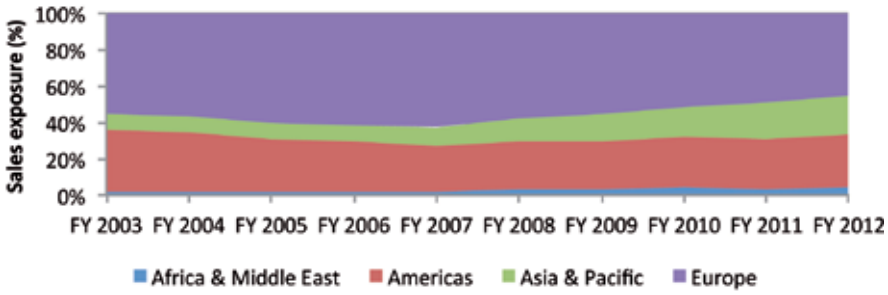


to Asia Pacific has more than doubled from 8% (10%) to 22% (25%). Similarly, the sales exposure and cap-weighted sales exposure of UK-listed companies to Africa and the Middle East has doubled from 2% to 4%, although the base is low. The sales exposure (or cap-weighted sales exposure) to the Americas has declined from 31% (42%) to 25% (28%). We also observe that the weight of stocks of companies in the index which are not majorly exposed to the UK market (companies with less than 50% exposure to UK) has increased from 71.15% in June 2004 to 83.20% in June 2013 (see Appendix: Table 29).

We also analyse the exposure of STOXX Europe 50 constituents to the four regions. The sales exposure (or cap-weighted sales exposure) of index constituents to the European market has fallen from 56% (50%) in FY 2003 to 45% (42%) in FY 2012, which again highlights the high exposure of European stocks to non-European regions. Also the exposure (or cap-weighted sales exposure) to Asia Pacific and Africa & Middle East has more than doubled from 9% to 22% and 2% to 5%, respectively. The sales exposure (or cap-weighted sales exposure) to the Americas has declined from 34% (40%) to 29% (31%). We also observe that the weight of stocks of companies in the index which are not majorly exposed to the Developed Europe market (companies with less than 50% exposure to Developed Europe) has increased from 57.28% in June 2004 to 84.48% in June 2013 (see Appendix: Table 23).

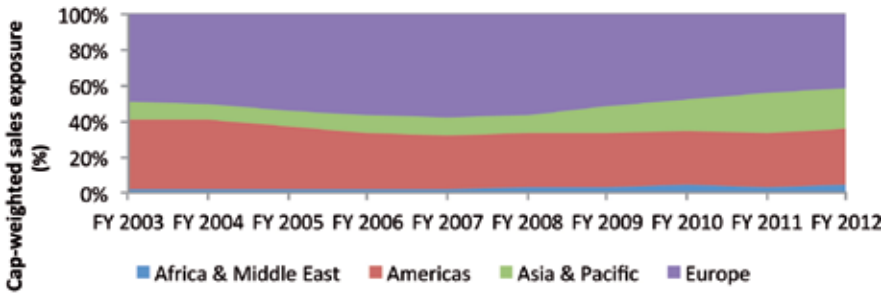
To summarise, first we note that the exposure of companies in the three indices to non-domestic regions is

Figure 10: STOXX Europe 50 (Regional Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 11: STOXX Europe 50 (Regional Breakdown)



significant, and among the three broad indices (S&P 500, STOXX Europe 500 and FTSE Developed Asia Pacific) the highest is the STOXX Europe 600 (45% in FY 2012) and the lowest is FTSE Developed Asia Pacific (21%).

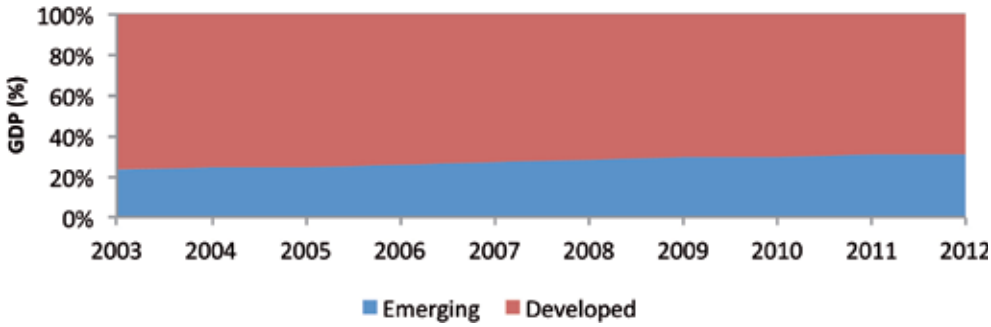
Moreover, we note that the exposure of companies in the S&P 500 and STOXX Europe 600 to non-domestic regions has increased noticeably: 19% to 27% for the S&P 500 and 36% to 45% for the STOXX Europe 600. The exception is Developed Asia Pacific companies, which have reduced exposure to foreign markets from 25% to 21% from FY2003 till FY 2012. We observe a similar trend if we weight a company's sales exposure by its cap-weight in the index. These observations highlight the need to report exposure of indices to regions based on geographic segmentation of sales data.

Exposure to Developed/Emerging Markets

After analysing the exposure of the five developed market indices to the four different geographic regions, in this section we analyse the exposure of companies in these indices to developed markets and emerging markets.

First, in Figure 12 below we report the breakdown of global GDP into developed and emerging markets for the period 2003 to 2012 to give an idea of the relative size of these markets and how it has evolved over time. We note that the share of Developed markets in world GDP has declined notably from around 77% to 69% in the 10-year period. During the same period the share of Emerging markets has increased from 23% to 31%.

Figure 12: Gross Domestic Product (Developed/Emerging Breakdown)



Section 2: Application to Performance and Risk Reporting

In Figures 13 and 14, we report the sales exposure and cap-weighted sales exposure of S&P 500 companies to developed and emerging markets. We note that the sales exposure (as well as cap-weighted sales exposure) of S&P 500 companies to emerging markets was relatively modest at 7% (9%) in FY 2003, but has now doubled to 14% (19%) in FY2012. To put it differently, the exposure of S&P 500 companies to Developed markets has dropped from 93% (91%) to 86% (81%) during FY2003-FY2012. Moreover, we note that the upward trend in sales exposure to Emerging markets is rather smooth, which means the exposure is increasing every year compared to the previous year, although there are blips in certain years if we look at cap-weighted sales exposure to emerging markets. In terms of the weight of stocks of companies in the index which are majorly exposed to emerging markets (companies with more than 50% exposure to emerging market), we note that the market-capitalisation weight of such companies in the index has increased from 0.10% in June 2004 to 2.87% in June 2013 (see Appendix: Table 6).

In Figures 15 and 16 below we report the breakdown of sales of STOXX Europe 600 companies into developed and emerging markets. The sales exposure (or cap-weighted sales exposure) of European companies to emerging markets has more than doubled from 11% (11%) in FY 2003 to 23% (25%) in FY2012, clearly suggesting increasing exposure to emerging markets. Here again, the trend is increasing from year to year. Also we find that the weight of stocks of companies in the index which are majorly exposed to Emerging markets (companies with more than 50% exposure to Emerging markets) has increased from 0.49% in June 2004 to 4.98% in June 2013 (see Appendix: Table 12).

Figure 13: S&P 500 (Developed/Emerging Breakdown)

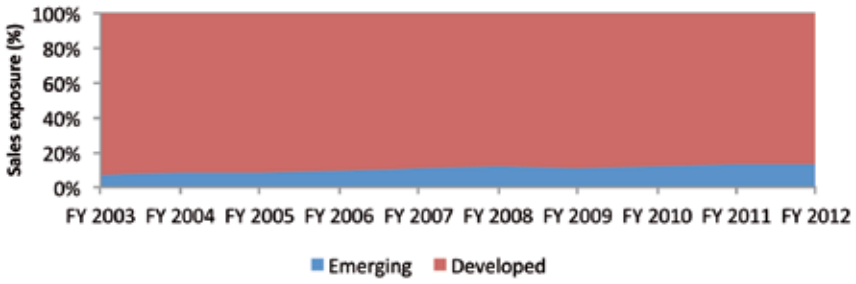
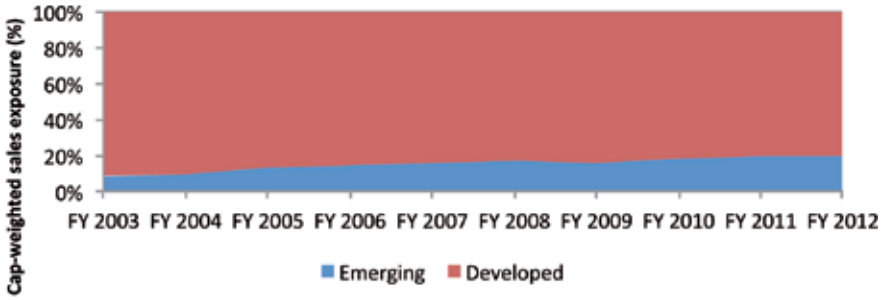


Figure 14: S&P 500 (Developed/Emerging Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 15: STOXX Europe 600 (Developed/Emerging Breakdown)

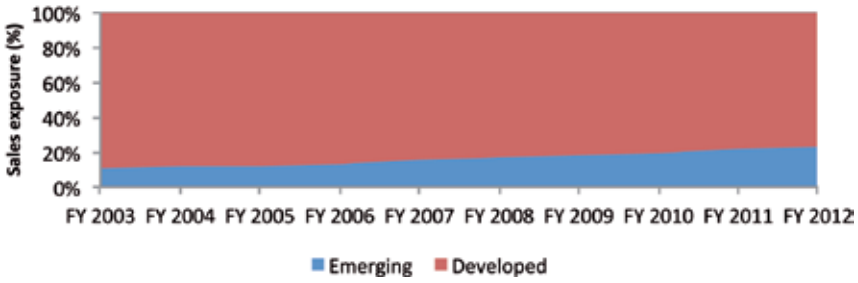
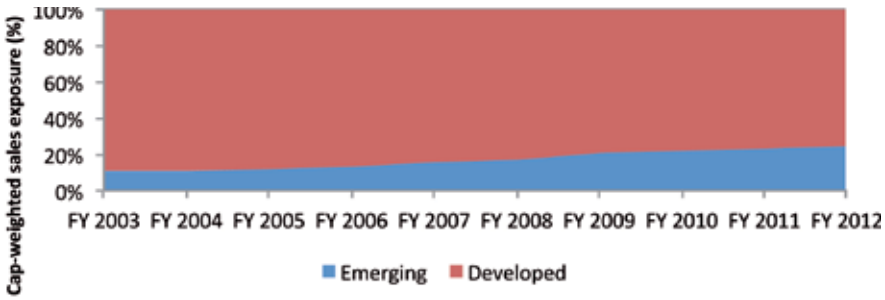


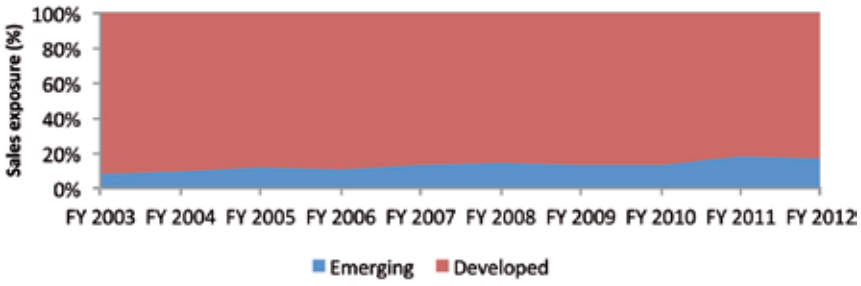
Figure 16: STOXX Europe 600 (Developed/Emerging Breakdown)



Similarly, for FTSE Developed Asia Pacific companies (Figures 17 and 18), the exposure to emerging markets has doubled from 8% (8%) in FY2003 to 17% (21%) in FY 2012. However, the upward trend in exposure to emerging markets is relatively less smooth (compared to the other two indices), where in a few years the exposure to emerging markets has dropped compared to the previous year. Also we find that the weight of stocks of companies in the index which are majorly exposed to Emerging markets (companies with less than 50% exposure to emerging markets) has increased from 3.16% in June 2004 to 8.49% in June 2013 (see Appendix: Table 18).

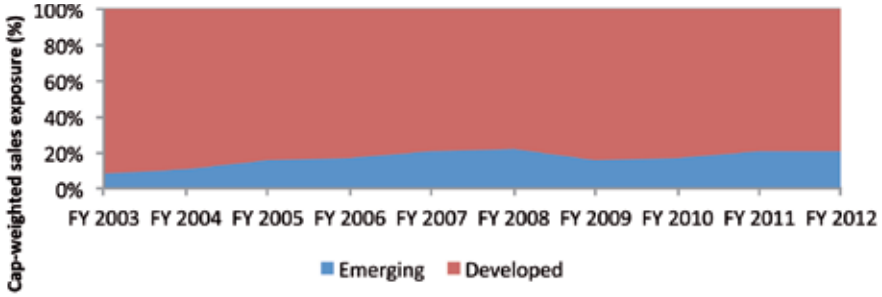
For FTSE 100 companies (Figures 19 and 20), the sales exposure (or cap-weighted sales exposure) to emerging markets has more than doubled from 10% (10%) in FY2003 to 22% (24%) in FY 2012. Also the upward trend in exposure to emerging

Figure 17: FTSE Developped Asia Pacific (Developed/Emerging Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 18: FTSE Developped Asia Pacific (Developed/Emerging Breakdown)



markets is smooth, implying the exposure has increased every year compared to the previous year. These results are confirmed by supplementary analysis of the time trend of geographic exposure in the index. In fact, the weight of stocks of companies in the index which are majorly exposed to Emerging markets (companies with more than 50% exposure to Emerging markets) has increased from 2.33% in June 2004 to 6.56% in June 2013 (see Appendix: Table 30).

Similarly, for STOXX Europe 50 companies (Figures 21 and 22), the sales exposure (or cap-weighted sales exposure) to emerging markets has more than doubled from 10% (11%) in FY2003 to 27% (27%) in FY 2012. Also the upward trend in exposure to emerging markets is smooth, implying the exposure has increased every year compared to the previous year. In complementary results, we also observe that the weight of stocks of companies in the index which are majorly exposed to Emerging markets (companies with more

Figure 19: FTSE 100 (Developed/Emerging Breakdown)

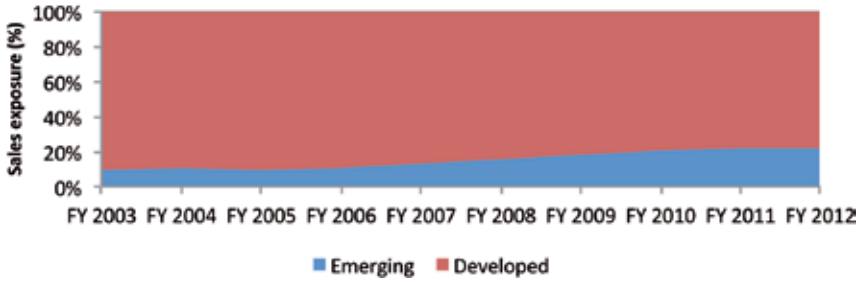
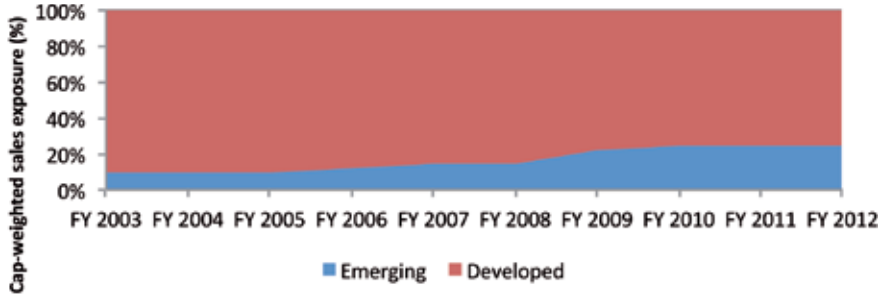


Figure 20: FTSE 100 (Developed/Emerging Breakdown)



Section 2: Application to Performance and Risk Reporting

Figure 21: STOXX Europe 50 (Developed/Emerging Breakdown)

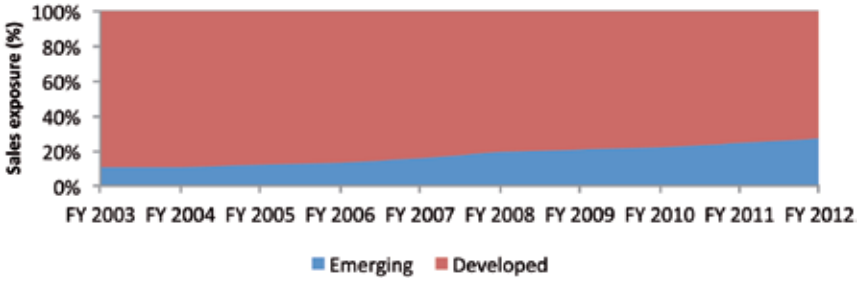
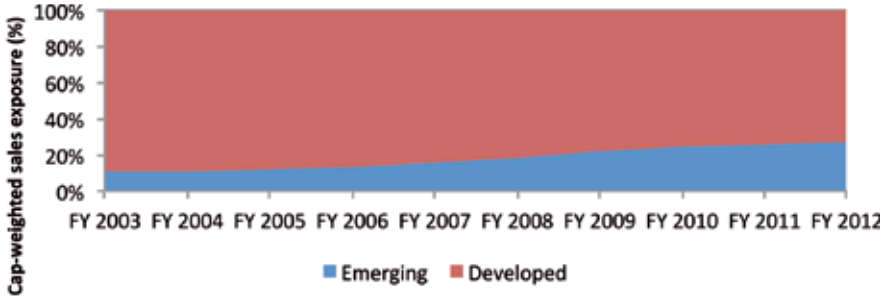


Figure 22: STOXX Europe 50 (Developed/Emerging Breakdown)



than 50% exposure to Emerging markets) has increased from 1.07% in June 2004 to 5.77% in June 2013 (see Appendix: Table 24), thus confirming the broad trend of an increasing role of foreign economic exposure which is unrelated to the official region of the index.

In summary, the companies in the three broad developed market indices (S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific) have noticeable exposure to emerging markets, and among them the highest is the STOXX Europe 600 (23% in FY 2012) and the lowest is the S&P 500 (14% in FY 2012). Also, we see an increase in the proportion of sales coming from emerging markets for the companies in all three broad developed market indices. Among the three, the percentage increase (over the 10-year period) in sales coming from emerging markets is highest for STOXX Europe 600 companies (increase of 12%) and lowest for S&P 500 companies (increase of 7%). This again highlights the need to report the exposure of equity portfolios to geographies based on segment level data.

Summary

We analysed the breakdown of sales of companies in the three broad Developed market indices and two narrow Developed market indices to four regions and into developed and emerging markets. We note that for each of the indices, a significant portion of their sales come from non-domestic regions (21% to 55% in FY 2012). Also, the proportion of sales coming from non-domestic regions has increased over the 10-year period FY2003 to FY2012, except for companies in the FTSE Developed Asia Pacific index. Among the three broad developed market indices, the companies in the STOXX Europe 50

Section 2: Application to Performance and Risk Reporting

have maximum exposure to non-domestic regions (55% in FY2012).

The breakdown of sales into developed and emerging markets suggests that the exposure of companies in the three broad developed market indices to emerging markets is noticeable. The companies in the STOXX Europe 600 have maximum exposure to emerging markets (23%). The exposure to emerging markets is also increasing, with the highest increase for companies in the STOXX Europe 600 (16%).

Overall, these observations underline the need to report the exposure of equity portfolios in terms of geographic sources of revenue and go beyond the simplistic measures such as place of listing of stocks or a company's headquarters and place of incorporation.

Section 2: Application to Performance and Risk Reporting

Section 3: Application to Performance Attribution

Section 3: Application to Performance Attribution

The previous section has documented that standard regional indices for developed markets carry considerable exposure to economies outside the declared region of the index due to the underlying structure of sales of index constituents. We now turn to a discussion of the effects that such exposure has on the performance of these indices. In particular, we distinguish between companies with varying degrees of underlying economic exposure (in terms of geographic sales breakdown), and attribute index performance to these different geographic exposure categories. First, we analyse the performance of developed market regional indices by attributing their performance to the performance of portfolios of stocks with different levels of sales exposure to emerging market countries, thus revealing for example how much the stocks with relatively high emerging market exposure have contributed to index performance. Second, we attribute index performance of portfolios of stocks with different levels of sales exposure to their respective home economy, allowing us to test whether performance is driven mainly by "local" exposure or "foreign" exposure.

We use the following methodology for performance attribution. For each of the three indices (S&P 500, STOXX Europe 600, and FTSE Developed Asia Pacific), we sort stocks at the end of June every year by their sales exposure to emerging markets[10]. The sales exposure to emerging markets means the percentage of total sales of a company coming from emerging market countries, which is defined and calculated as in Section 2 of this paper. We then create three portfolios: in the top portfolio we select the stocks with highest sales exposure to emerging markets and in the bottom portfolio we select the stocks with lowest sales exposure to emerging markets, wherein the number of stocks in both the top and the bottom portfolio is such that each portfolio's market capitalisation is 33% of the total market capitalisation of all the constituents in the respective indices. The middle portfolio has the stocks representing the remaining 34% market capitalisation of the index constituents.

We then attribute the return of the index to the performance of the three portfolios. By construction, as the three portfolios represent equal market capitalisation of the index, any deviation from an equal contribution to the return of the index reflects outperformance (or underperformance) of a portfolio relative to other portfolios, each having different levels of exposure to emerging market sales.

Similarly, we sort index constituents based on proportion of their sales coming from local markets. For example, we sort stocks in the S&P 500 by the proportion of their sales coming from the United States. Then we analyse the attribution of return of the indices to the three portfolios with different levels of sales exposure to their respective local markets.

Note that the index and portfolio return we consider in the analysis are total return series, wherein dividends are reinvested in the index or the portfolios.

The attribution of the index return into three portfolios is done using the Ordinary Least Square regression as explained below.

$$\begin{aligned} R_{i,t} - R_{f,t} = \alpha_i &+ \beta_1 \left(R_{P_{1,t}} - R_{f,t}\right) \\ &+ \beta_2 \left(R_{P_{2,t}} - R_{f,t}\right) \\ &+ \beta_3 \left(R_{P_{3,t}} - R_{f,t}\right) \\ &+ \epsilon_t, t = 1, \dots, T \end{aligned}$$

10 - Note that at this stage only those index constituents are considered for which data was used to report geographic exposure of indices (Section 2).

Section 3: Application to Performance Attribution

where, $R_{i,t}$ and $R_{f,t}$ are returns on the index and the risk-free rate, respectively. $R_{P_{1,t}}$, $R_{P_{2,t}}$ and $R_{P_{3,t}}$ are returns on the top portfolio, middle portfolio and bottom portfolio, respectively.

The contribution of a portfolio to the excess return of the index is computed as

$$C_i = \beta_i \times \left[\left(\prod_{t=1}^{T} 1 + (R_{P_{i,t}} - R_{f,t}) \right)^{260/T} - 1 \right]$$

where, C_i is the contribution of portfolio i and i $\in \{1, 2, 3\}$.

The unexplained performance is the difference in the excess returns of the index and the sum of the contributions from each of the portfolios.

First, in Section 3.1, we report yearly performance attribution of the three broad Developed market indices to the portfolios formed on the basis of exposure of stocks to emerging markets (local market) sales.

Next, in Section 3.2, we report conditional performance attribution of the three indices to the portfolios formed on the basis of exposure of stocks to emerging markets (local markets) sales. Here, we analyse performance attribution based on two different market conditions: First, performance attribution to stocks with different levels of emerging market exposure, depending on the spread in returns of emerging and developed market equity. Second, performance attribution to stocks having different levels of local market exposure, depending on the spread in returns of local and foreign market equity.

Note that we do not consider the FTSE 100 and STOXX Europe 50 for performance attribution analysis, as sorting stocks based on different levels of geographic exposure into three portfolios leads to few stocks in each portfolio (such as in the case of the STOXX Europe 50), leading to less meaningful results.

3.1: Contribution of Emerging/ Local Markets Exposure to the Performance of Developed Market Indices

In this section first we analyse the performance attribution of developed market indices to portfolios formed by sorting stocks based on their level of sales in emerging markets and local markets. We analyse the performance attribution for each of the years starting July 2004 till June 2014.

3.1.1: Contribution of emerging markets exposure to the performance of Developed market indices

In this sub-section, we analyse the performance attribution of developed market indices to portfolios formed by sorting stocks based on their level of sales in emerging markets. Table 8 below reports the performance attribution for the S&P 500 index.

We note that there are years when the contribution of high and low emerging market exposure portfolios contributed similarly to the excess return of the S&P 500 index (e.g. July 2005-June 2006), but there are years when the difference in contribution is noticeable. For example, in July 2004-June 2005, the contribution of the high emerging market exposure portfolio was -0.70%, while that of the low emerging market exposure portfolio was 5.04%. Also, in July 2007-June 2008, the negative contribution of the high

Section 3: Application to Performance Attribution

emerging market exposure portfolio was restricted to -2.89%, while the negative contribution of the low emerging market exposure portfolio was -7.06%. We also observe differences in the contributions of the high and low exposure portfolios for the period July 2012-June 2013.

Overall, it appears that in particular sub-periods, stocks with high emerging market exposure have provided significantly different contributions to the S&P 500 index return than their counterparts with low emerging market exposure. For example, during the period July 2012-June 2013, the contribution of high emerging-market-exposed stocks to the performance of the S&P 500 is relatively weak (3.64%) compared to the contribution of low emerging-market-exposed stocks (8.05%). Notably, during this period, Developed market equity outperformed emerging market equity by a large margin: the return on MSCI World (representing developed market) was 19.27%, whereas the return on MSCI Emerging (representing emerging market) was 3.23%.

In Table 9 we report results of performance attribution for the STOXX Europe 600. Here again we note that in certain years the contribution of high and low emerging-market-exposed stocks to the performance of the STOXX Europe 600 is similar (e.g. July 2006-June 2007).

However, there are periods when there is a noticeably large difference in the contributions of high and low emerging-market-exposure portfolios. For example, in July 2007-June 2008, the contribution of the high emerging-market-exposure portfolio was positive (0.06%) whereas the contribution of the low emerging-market-exposure portfolio was negative (-6.20%).

Table 8: Return contribution to S&P 500 of stocks with varying Emerging Market exposure: The table below reports the breakdown of the annualised excess return of the S&P 500 into the performance of three portfolios formed by sorting stocks based on their sales exposure to emerging markets. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the S&P 500 and independent variables are the excess return on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	S&P 500	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
July 2004 - June 2005	4.04%	**-0.70%**	**-17.33%**	-0.60%	-14.85%	**5.04%**	**124.75%**	0.31%	7.67%
July 2005 - June 2006	4.41%	**1.48%**	**33.56%**	1.22%	27.66%	**1.52%**	**34.47%**	0.20%	4.54%
July 2006 - June 2007	15.53%	**7.79%**	**50.16%**	3.10%	19.96%	**4.20%**	**27.04%**	0.45%	2.90%
July 2007 - June 2008	-16.02%	**-2.89%**	**NA**	-5.25%	NA	**-7.06%**	**NA**	-0.82%	NA
July 2008 - June 2009	-26.69%	**-7.93%**	**NA**	-7.66%	NA	**-10.72%**	**NA**	-0.38%	NA
July 2009 - June 2010	14.25%	**3.39%**	**23.79%**	5.22%	36.63%	**5.67%**	**39.79%**	-0.03%	-0.21%
July 2010 - June 2011	30.44%	**12.82%**	**42.12%**	7.64%	25.10%	**10.28%**	**33.77%**	-0.29%	-0.95%
July 2011 - June 2012	5.38%	**1.74%**	**32.34%**	1.33%	24.72%	**2.70%**	**50.19%**	-0.39%	-7.25%
July 2012 - June 2013	20.51%	**3.64%**	**17.75%**	8.66%	42.22%	**8.05%**	**39.25%**	0.16%	0.78%
July 2013 - June 2014	24.46%	**8.22%**	**33.61%**	8.75%	35.77%	**7.56%**	**30.91%**	-0.08%	-0.33%

Section 3: Application to Performance Attribution

During this period the performance of emerging market stocks was positive whereas that of developed market stocks was negative[11]. Perhaps this explains why companies with high sales exposure to emerging markets managed to contribute positively while companies with high sales exposure to developed markets contributed negatively. Table 10 corresponds to performance attribution for FTSE Developed Asia Pacific. The observations are similar to the ones highlighted above. There are years when the contribution of high and low emerging-market-exposure portfolios to the excess return of the FTSE Developed Asia Pacific index is similar (e.g. July 2004-June 2005), but there are years when the difference in contribution is noticeable.

For example, in July 2006-June 2007, the contribution of the high emerging-market-exposure portfolio was 6.35% whereas that of the low emerging-market -exposure portfolio was 1.49%. In July 2010-June 2011, the contribution of the high emerging-market-exposure portfolio was 12.74%, while that of the low emerging market portfolio was 5.39%.

To summarise, we note that there are certain years when the contribution of portfolios with different levels of sales exposure to emerging markets is similar but there are also years when the difference in contributions of high and low emerging market portfolios is large, which highlights the need to analyse the performance of equity portfolios in terms of their geographic exposure.

In what follows we analyse the contribution of portfolios formed on the basis of local market exposure to the performance of the three developed market equity indices.

11 - During July 2007-June 2008, the return on MSCI World and MSCI Emerging index was -10.18% and 4.89%, respectively.

Table 9: Return contribution to STOXX Europe 600 of stocks with varying Emerging Market exposure: The table below reports the breakdown of the annualised excess return of STOXX Europe 600 into the performance of three portfolios formed by sorting stocks based on their sales exposure to emerging markets. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is excess return on STOXX Europe 600 and independent variables are excess return on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope). In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	STOXX Europe 600	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
July 2004 - June 2005	15.19%	**4.53%**	**29.82%**	4.03%	26.53%	**5.74%**	**37.79%**	0.89%	5.86%
July 2005 - June 2006	22.06%	**7.92%**	**35.90%**	7.06%	32.00%	**5.84%**	**26.47%**	1.24%	5.62%
July 2006 - June 2007	28.55%	**8.98%**	**31.45%**	9.37%	32.82%	**9.71%**	**34.01%**	0.49%	1.72%
July 2007 - June 2008	-14.03%	**0.06%**	**NA**	-7.42%	NA	**-6.20%**	**NA**	-0.46%	NA
July 2008 - June 2009	-34.35%	**-7.48%**	**NA**	-16.60%	NA	**-11.57%**	**NA**	1.31%	NA
July 2009 - June 2010	6.62%	**2.92%**	**44.11%**	3.45%	52.11%	**-0.52%**	**-7.85%**	0.78%	11.78%
July 2010 - June 2011	37.11%	**15.22%**	**41.01%**	14.43%	38.88%	**7.81%**	**21.05%**	-0.35%	-0.94%
July 2011 - June 2012	-16.11%	**-5.32%**	**NA**	-7.36%	NA	**-4.53%**	**NA**	1.09%	NA
July 2012 - June 2013	20.34%	**3.94%**	**19.37%**	11.01%	54.13%	**5.90%**	**29.01%**	-0.51%	-2.51%
July 2013 - June 2014	30.35%	**8.85%**	**29.16%**	10.78%	35.52%	**10.98%**	**36.18%**	-0.25%	-0.82%

Section 3: Application to Performance Attribution

3.1.2 Contribution of local market exposure to the performance of Developed market indices

In this sub-section we analyse the performance attribution of the three developed market indices (S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific) to the portfolios formed by sorting stocks based on their exposure to local markets. For example, we attribute the performance of S&P 500 stocks to portfolios formed by sorting stocks based on the proportion of sales coming from the US. Similarly, we sort constituents of STOXX Europe 600 and FTSE Developed Asia Pacific based on the proportion of sales coming from Developed Europe and Developed Asia Pacific, respectively.

Table 11 below corresponds to performance attribution of the S&P 500. There are years when the contribution of high and low local-market-exposure portfolios to the performance of the S&P 500 is insignificant (e.g. July 2008-June 2009), but there are also periods when the difference in contribution is high. For example, in July 2004-June 2005, while the high local market contributed 4.29% to the performance of the index, the contribution of the low local-market-exposure portfolio was negative at (-1.27%). Similarly, in July 2012-June 2013, the high local-market-exposure portfolio contributed 7.60%, while the low local-market-exposure portfolio contributed 3.53%.

In Table 12 we report the performance attribution for the STOXX Europe 600 Index. Like before, there are years when the contribution of the high and low local-market-exposure portfolios is similar and years when it is noticeably different.

Table 10: Return contribution to FTSE Developed Asia Pacific of stocks with varying Emerging Market exposure: The table below reports the breakdown of the annualised excess return of FTSE Developed Asia Pacific into the performance of three portfolios formed by sorting stocks based on their sales exposure to emerging markets. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on FTSE Developed Asia Pacific and the independent variables are excess returns on the High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	FTSE Dev. APAC	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
July 2004 - June 2005	6.09%	**2.62%**	**43.02%**	0.49%	8.05%	**2.82%**	**46.31%**	0.15%	2.46%
July 2005 - June 2006	25.99%	**8.16%**	**31.40%**	10.81%	41.59%	**6.92%**	**26.63%**	0.10%	0.38%
July 2006 - June 2007	12.46%	**6.35%**	**50.96%**	3.00%	24.08%	**1.49%**	**11.96%**	1.61%	12.92%
July 2007 - June 2008	-10.54%	**-0.76%**	**NA**	-5.51%	NA	**-3.38%**	**NA**	-0.88%	NA
July 2008 - June 2009	-24.12%	**-6.51%**	**NA**	-9.71%	NA	**-5.62%**	**NA**	-2.28%	NA
July 2009 - June 2010	7.59%	**4.39%**	**57.84%**	1.88%	24.77%	**2.00%**	**26.35%**	-0.69%	-9.09%
July 2010 - June 2011	24.32%	**12.47%**	**51.27%**	6.43%	26.44%	**5.39%**	**22.16%**	0.03%	0.12%
July 2011 - June 2012	-9.42%	**-4.19%**	**NA**	-3.57%	NA	**-1.15%**	**NA**	-0.52%	NA
July 2012 - June 2013	16.25%	**3.45%**	**21.23%**	6.92%	42.58%	**6.72%**	**41.35%**	-0.84%	-5.17%
July 2013 - June 2014	14.54%	**2.92%**	**20.08%**	5.54%	38.10%	**6.23%**	**42.85%**	-0.15%	-1.03%

Section 3: Application to Performance Attribution

Table 11: Return contribution to S&P 500 of stocks with varying Local Market exposure: The table below reports the breakdown of the annualised excess return of the S&P 500 into the performance of three portfolios formed by sorting stocks based on their sales exposure to the United States market. To form portfolios, we sort stocks by their United States sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the S&P 500 and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using returns on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	S&P 500	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
July 2004 - June 2005	4.04%	**4.29%**	**106.19%**	0.10%	2.48%	**-1.27%**	**-31.44%**	0.91%	22.52%
July 2005 - June 2006	4.41%	**1.34%**	**30.39%**	1.96%	44.44%	**0.95%**	**21.54%**	0.17%	3.85%
July 2006 - June 2007	15.53%	**3.73%**	**24.02%**	3.12%	20.09%	**8.23%**	**52.99%**	0.46%	2.96%
July 2007 - June 2008	-16.02%	**-7.17%**	**NA**	-4.83%	NA	**-3.30%**	**NA**	-0.71%	NA
July 2008 - June 2009	-26.69%	**-9.88%**	**NA**	-7.00%	NA	**-9.37%**	**NA**	-0.43%	NA
July 2009 - June 2010	14.25%	**5.69%**	**39.93%**	4.86%	34.11%	**3.73%**	**26.18%**	-0.03%	-0.21%
July 2010 - June 2011	30.44%	**8.79%**	**28.88%**	7.83%	25.72%	**13.86%**	**45.53%**	-0.04%	-0.13%
July 2011 - June 2012	5.38%	**2.20%**	**40.89%**	0.85%	15.80%	**2.81%**	**52.23%**	-0.48%	-8.92%
July 2012 - June 2013	20.51%	**7.60%**	**37.06%**	9.36%	45.64%	**3.53%**	**17.21%**	0.03%	0.15%
July 2013 - June 2014	24.46%	**7.34%**	**30.01%**	8.06%	32.95%	**9.17%**	**37.49%**	-0.12%	-0.49%

Table 12: Return contribution to STOXX Europe 600 of stocks with varying Local Market exposure: The table below reports the breakdown of the annualised excess return of the STOXX Europe 600 into the performance of three portfolios formed by sorting stocks based on their sales exposure to Developed Europe. To form portfolios, we sort stocks by their Developed Europe sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the STOXX Europe 600 and the independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using returns on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	STOXX Europe 600	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
July 2004 - June 2005	15.19%	**5.46%**	**35.94%**	4.25%	27.98%	**4.40%**	**28.97%**	1.08%	7.11%
July 2005 - June 2006	22.06%	**6.20%**	**28.11%**	6.57%	29.78%	**7.98%**	**36.17%**	1.31%	5.94%
July 2006 - June 2007	28.55%	**8.96%**	**31.38%**	11.84%	41.47%	**7.33%**	**25.67%**	0.43%	1.51%
July 2007 - June 2008	-14.03%	**-7.04%**	**NA**	-2.82%	NA	**-2.92%**	**NA**	-1.25%	NA
July 2008 - June 2009	-34.35%	**-14.95%**	**NA**	-7.52%	NA	**-13.67%**	**NA**	1.80%	NA
July 2009 - June 2010	6.62%	**-1.36%**	**-20.54%**	1.39%	21.00%	**6.57%**	**99.24%**	0.02%	0.30%
July 2010 - June 2011	37.11%	**9.34%**	**25.17%**	13.15%	35.44%	**14.74%**	**39.72%**	-0.12%	-0.32%
July 2011 - June 2012	-16.11%	**-6.23%**	**NA**	-6.41%	NA	**-3.72%**	**NA**	0.26%	NA
July 2012 - June 2013	20.34%	**6.72%**	**33.04%**	5.55%	27.29%	**7.81%**	**38.40%**	0.26%	1.28%
July 2013 - June 2014	30.35%	**11.61%**	**38.25%**	10.35%	34.10%	**8.63%**	**28.43%**	-0.24%	-0.79%

Section 3: Application to Performance Attribution

For example, in July 2007-June 2008, the high local-market-exposure portfolio contributed -7.04%, whereas the contribution of the low local-market -exposure portfolio was -2.92%. Similarly, in July 2009 - June 2010, the contribution of the high local-market-exposure portfolio was -1.36% while that of the low local-market-exposure portfolio was 6.57. In 2009, the growth in aggregate gross domestic product of economies in the European Union was negative[12] compared to the previous year, which perhaps explains negative contribution of stocks with high exposure to the local market.

In Table 13 we report the performance attribution for the FTSE Developed Asia Pacific index. The observations here are similar to those for the S&P 500 and STOXX Europe 600. There are years when the difference in contribution of high and low local-market-exposure portfolios to the performance of the FTSE Developed Asia Pacific index is high. For example, in July 2006-June 2007, the high local-market-exposure portfolio contributed 2.76%, whereas the low local-market-exposure portfolio contributed 6.77% of the excess return of the index.

To summarise the analysis on the contribution of local market exposure to the performance of the three developed market indices, we note that there are certain years when the difference in contribution of high and low local-market-exposure portfolios is relatively larger, which underlines the need to analyse the performance of equity portfolios using geographic segmentation data.

12 - Source: http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00115&plugin=1

Table 13: Return contribution to FTSE Developed Asia Pacific of stocks with varying Local Market exposure: The table below reports the breakdown of the annualised excess return of FTSE Developed Asia Pacific into the performance of three portfolios formed by sorting stocks based on their sales exposure to Developed Asia Pacific. To form portfolios, we sort stocks by their Developed Asia Pacific sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is excess return on FTSE Developed Asia Pacific and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	FTSE Dev. APAC	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
July 2004 - June 2005	6.09%	**3.47%**	**56.98%**	1.89%	31.03%	**0.96%**	**15.76%**	-0.22%	-3.61%
July 2005 - June 2006	25.99%	**6.46%**	**24.86%**	12.46%	47.94%	**7.40%**	**28.47%**	-0.33%	-1.27%
July 2006 - June 2007	12.46%	**2.76%**	**22.15%**	1.84%	14.77%	**6.77%**	**54.33%**	1.10%	8.83%
July 2007 - June 2008	-10.54%	**-2.88%**	**NA**	-5.43%	NA	**-1.49%**	**NA**	-0.73%	NA
July 2008 - June 2009	-24.12%	**-5.44%**	**NA**	-9.54%	NA	**-6.88%**	**NA**	-2.26%	NA
July 2009 - June 2010	7.59%	**3.07%**	**40.45%**	1.50%	19.76%	**4.33%**	**57.05%**	-1.32%	-17.39%
July 2010 - June 2011	24.32%	**5.33%**	**21.92%**	6.81%	28.00%	**11.72%**	**48.19%**	0.46%	1.89%
July 2011 - June 2012	-9.42%	**-1.40%**	**NA**	-3.24%	NA	**-4.31%**	**NA**	-0.47%	NA
July 2012 - June 2013	16.25%	**6.89%**	**42.40%**	5.48%	33.72%	**4.65%**	**28.62%**	-0.78%	-4.80%
July 2013 - June 2014	14.54%	**5.73%**	**39.41%**	5.68%	39.06%	**3.21%**	**22.08%**	-0.07%	-0.48%

Section 3: Application to Performance Attribution

3.2: Performance attribution (conditional) of Emerging/local markets exposure to the performance of Developed market indices

In this section, first we analyse the performance attribution of Developed market indices to stocks with different levels of emerging market exposure, depending on the spread in return of emerging and developed market equity. We define a 'bull (or bear) market' condition as calendar year quarters when the difference in emerging and developed market equity is positive (or negative). The performance attribution is conducted separately for both bull and bear market conditions.

Second, we analyse the performance attribution of Developed market indices to stocks with different levels of local market exposure, depending on the spread in return of local and foreign market equity. We define a 'bull (or bear) market' condition as calendar year quarters when the difference in local and foreign market equity is positive (or negative). The performance attribution is conducted separately for both bull and bear market conditions.

3.2.1 Conditional analysis (bull and bear market)- Performance attribution of emerging market exposure to the performance of Developed market indices

In this section we analyse the performance attribution of emerging market exposure to the performance of developed market indices conditioned on the performance of emerging market equity relative to developed market equity. We consider MSCI Emerging and MSCI World as the benchmark for emerging and developed market equity, respectively.

In the table below we note that during bull markets, when the return of emerging market equity is higher than that of developed market equity, stocks with high exposure to emerging markets contributed more (4.58%) than stocks with low exposure to emerging markets (3.42%). Similarly, during bear markets, when the return on emerging markets was lower than developed markets, stocks with low emerging market exposure contributed more (0.80%) to the performance of the S&P 500 than stocks with high exposure to emerging markets (-1.25%).

Table 14: Return contribution to S&P 500 of stocks with varying Emerging Market exposure (Conditional Analysis based on Emerging vs. Developed market return spread): The table below reports the breakdown of the annualised excess return of the S&P 500 into the performance of three portfolios formed by sorting stocks based on their sales exposure to emerging markets. We report performance attribution separately for bull and bear markets, wherein bull (or bear) market is defined as calendar year quarters where the spread between emerging and developed market returns is positive (or negative). The benchmarks for emerging and developed markets are MSCI Emerging and MSCI World, respectively. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the S&P 500 and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives less meaningful figure. Such figures are replaced by NA.

	S&P 500	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
Bull Market	11.77%	**4.58%**	**38.88%**	3.34%	28.38%	**3.42%**	**29.04%**	0.44%	3.70%
Bear Market	-0.77%	**-1.25%**	**NA**	-0.26%	NA	**0.80%**	**- NA**	-0.06%	NA

Section 3: Application to Performance Attribution

In Table 15 below, we report the conditional performance attribution of the STOXX Europe 600. As in the previous case, we note that in the bull market phase, stocks with high exposure to emerging markets contributed more (7.83%) than stocks with low exposure to emerging markets (5.47%). However, during bear markets, when the return on emerging markets was lower than on developed markets, stocks with low emerging market exposure contributed less (-3.16%) to the performance of STOXX Europe 600 than stocks with high exposure to emerging markets (-2.63%).

For FTSE Developed Asia Pacific, we note that during bull markets, when the return of emerging market equity is higher than that of developed market equity, stocks with high exposure to emerging markets contributed significantly more (9.42%) than stocks with low exposure to emerging markets (3.42%). Similarly, during bear

Table 15: Return contribution to STOXX Europe 600 of stocks with varying Emerging Market exposure (Conditional Analysis based on Emerging vs. Developed market return spread): The table below reports the breakdown of the annualised excess returns of STOXX Europe 600 into the performance of three portfolios formed by sorting stocks based on their sales exposure to emerging markets. We report performance attribution separately for bull and bear markets, wherein bull (or bear) market is defined as calendar year quarters where the spread between emerging and developed market returns is positive (or negative). The benchmarks for emerging and developed markets are MSCI Emerging and MSCI World, respectively. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is excess return on the STOXX Europe 600 and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope). In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	STOXX Europe 600	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
Bull Market	21.50%	**7.83%**	**36.41%**	7.69%	35.76%	**5.47%**	**25.46%**	0.51%	2.37%
Bear Market	-9.97%	**-2.63%**	**NA**	-4.43%	NA	**-3.16%**	**NA**	0.25%	NA

Table 16: Return contribution to FTSE Developed Asia Pacific of stocks with varying Emerging Market exposure (Conditional Analysis based on Emerging vs. Developed market return spread): The table below reports the breakdown of the annualised excess returns of FTSE Developed Asia Pacific into the performance of three portfolios formed by sorting stocks based on their sales exposure to emerging market. We report performance attribution separately for bull and bear markets, wherein bull (or bear) market is defined as calendar year quarters where the spread between emerging and developed market returns is positive (or negative). The benchmarks for emerging and developed markets are MSCI Emerging and MSCI World, respectively. To form portfolios, we sort stocks by their emerging markets sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on FTSE Developed Asia Pacific and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	FTSE Dev. APAC	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
Bull Market	17.71%	**9.42%**	**53.17%**	6.14%	34.66%	**3.42%**	**19.32%**	-1.27%	-7.14%
Bear Market	-9.80%	**-4.59%**	**NA**	-4.23%	NA	**-0.25%**	**NA**	-0.72%	NA

Section 3: Application to Performance Attribution

markets, when the return on emerging markets was lower than developed markets, stocks with low emerging market exposure contributed more (-0.25%) to the performance of FTSE Developed Asia Pacific than stocks with high exposure to emerging markets (-4.59%).

Overall, the figures reported in the previous three tables suggest that when the emerging markets fare better than developed market equity, the stocks with higher exposure to emerging markets contribute more to the performance of indices than stocks with lower exposure to emerging markets. Similarly, when emerging market equity performs worse than developed market equity, the stocks with higher exposure to emerging markets contribute less to the performance of the developed market indices than stocks with lower exposure to emerging markets. Note that as we measure the exposure of stocks in terms of proportion of sales coming from emerging markets, it highlights the usefulness of using geographic segmentation data in analysing the performance of equity portfolios.

3.2.2 Conditional analysis (bull and bear market) - Performance attribution of local market exposure to the performance of Developed market indices

In this section we analyse the performance attribution of local market market exposure to the performance of developed market indices conditioned on the performance of local market equity relative to foreign market equity.

In the table below corresponding to the S&P 500, we note that during bull markets, i.e. the performance of local market equity (MSCI USA) is higher than that of foreign market equity (MSCI AC World ex-USA), stocks with high exposure to local markets contributed more (4.63%) than stocks with low exposure to local markets (3.29%). Similarly, during bear markets, i.e. when returns on local markets were lower than foreign markets, stocks with low local market exposure contributed more (1.29%) to the performance of the S&P 500 than stocks with high exposure to local markets (0.15%).

Table 17: Return contribution to S&P 500 of stocks with varying Local Market exposure (Conditional Analysis based on Domestic vs. Foreign market return spread): The table below reports the breakdown of the annualised excess return of the S&P 500 into the performance of three portfolios formed by sorting stocks based on their sales exposure to the United States market. We report performance attribution separately for bull and bear markets, wherein bull (or bear) market is defined as calendar year quarters where the spread between domestic and foreign market return is positive (or negative). The benchmarks for domestic and foreign markets are MSCI USA and MSCI AC World ex-USA, respectively. To form portfolios, we sort stocks by their United States sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the S&P 500 and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope). In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	S&P 500	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
Bull Market	10.72%	**4.63%**	**43.17%**	2.89%	26.96%	**3.29%**	**30.68%**	-0.09%	-0.81%
Bear Market	3.32%	**0.15%**	**4.44%**	1.50%	45.16%	**1.29%**	**38.81%**	0.38%	11.59%

Section 3: Application to Performance Attribution

In the case of the STOXX Europe 600, we note that in the bull market phase, the contribution of both high and low local market exposure stocks to the performance of the index is similar, 10.15% and 10.01%, respectively. However, for the bear market phase the figures are intuitive: when the return of local market equity (MSCI Europe) was lower than the performance of foreign market equity (MSCI AC World ex Europe), the stocks with high local market exposure contributed less (-9.46%) than stocks with low local market exposure (-5.67%).

For FTSE Developed Asia Pacific, we note that during bull markets, when the return of local market equity (FTSE AW Developed Asia Pacific) is higher than that of foreign market equity (FTSE Global ex Asia Pacific), stocks with high exposure to local markets contributed significantly more (7.53%) than stocks with low exposure to local markets (4.40%).

Table 18: Return contribution to STOXX Europe 600 of stocks with varying Local Market exposure (Conditional Analysis based on Domestic vs. Foreign market return spread): The table below reports the breakdown of the annualised excess return of the STOXX Europe 600 into the performance of three portfolios formed by sorting stocks based on their sales exposure to Developed Europe. We report performance attribution separately for bull and bear markets, wherein bull (or bear) market is defined as calendar year quarters where the spread between domestic and foreign market returns is positive (or negative). The benchmarks for domestic and foreign markets are MSCI Europe and MSCI AC World ex Europe, respectively. To form portfolios, we sort stocks by their Developed Europe sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on the STOXX Europe 600 and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope). In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	STOXX Europe 600	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
Bull Market	31.69%	**10.15%**	**32.04%**	11.15%	35.20%	**10.01%**	**31.57%**	0.38%	1.20%
Bear Market	-19.33%	**-9.46%**	**NA**	-4.46%	NA	**-5.67%**	**NA**	0.25%	NA

Table 19: Return contribution to FTSE Developed Asia Pacific of stocks with varying Local Market exposure (Conditional Analysis based on Domestic vs. Foreign market return spread): The table below reports the breakdown of the annualised excess return of the FTSE Developed Asia Pacific into the performance of three portfolios formed by sorting stocks based on their sales exposure to Developed Asia Pacific. We report performance attribution separately for bull and bear markets, wherein bull (or bear) market is defined as calendar year quarters where the spread between domestic and foreign market return is positive (or negative). The benchmarks for domestic and foreign markets are FTSE AW Developed Asia Pacific and FTSE Global ex Asia Pacific, respectively. To form portfolios, we sort stocks by their Developed Asia Pacific sales exposures. We then select the top stocks up to 33% of cumulative market cap (High), and the bottom stocks up to 33% cumulative market cap (Low), and form cap-weighted high and low exposure portfolios based on these sorts. Stocks which are not included in either extreme portfolio form the medium portfolio (Mid). The portfolios are formed at the end of June every year, using geographic segmentation data for the previous fiscal year. The statistics are based on daily total return series (with dividends reinvested) in USD. The portfolio constituents are weighted by their total market capitalisation in (USD) at the end of June every year. The figures for High and Low portfolios are highlighted in bold. For performance attribution, we use OLS regression, wherein the dependent variable is the excess return on FTSE Developed Asia Pacific and independent variables are excess returns on High, Mid and Low portfolios. All returns are in excess of the risk-free rate. The risk-free rate in US Dollars is measured using the return on the Secondary Market US Treasury Bills (3M). The source of geographic segmentation data is DataStream (Worldscope) supplemented by Bloomberg. In the event that the excess return on the index is negative, we do not calculate % contribution as it gives a less meaningful figure. Such figures are replaced by NA.

	FTSE Dev. APAC	High		Mid		Low		Unexplained	
		Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.	Contr.	% Contr.
Bull Market	16.82%	**7.53%**	**44.76%**	7.00%	41.59%	**4.40%**	**26.16%**	-2.11%	-12.52%
Bear Market	-1.45%	**-0.69%**	**NA**	-1.54%	NA	**1.18%**	**NA**	-0.40%	NA

Section 3: Application to Performance Attribution

Similarly, during bear markets, when the return on the local market was lower than that of the foreign market, stocks with low local market exposure contributed more (1.18%) to the performance of FTSE Developed Asia Pacific than stocks with high exposure to local market (-0.69%).

Broadly these figures suggest that when the local markets fare better than foreign market equity, the stocks with higher exposure to local markets contribute more to the performance of indices than stocks with lower exposure to local market. Likewise, when local market equity performs worse than foreign market equity, the stocks with high exposure to local markets contribute less to the performance of indices than stocks with lower exposure to local markets. As we measure the exposure of stocks in terms of proportion of sales coming from local or foreign markets, it again underlines the usefulness of using geographic segmentation data in analysing the performance of equity portfolios.

Summary

In this section, we analysed the contribution of high and low emerging market (and local market) exposed portfolios to the performance of the three developed market indices. As both the high and low portfolios represent equal market capitalisation of the index, any deviation from equal contribution can be interpreted as outperformance/underperformance of the respective geographically exposed segment. In terms of contribution of high and low emerging-market-exposed portfolios to the performance of the three developed market indices, we note that there are certain years when the difference in their contribution to the performance of the index is high. For example, for the S&P 500, the contribution of high and low emerging-market-exposure portfolios in July 2004-June 2005 was -0.70% and 5.04%, respectively.

Similarly, in terms of contribution of high and low local market exposure portfolios to the performance of the three developed market indices, we note that the difference in contribution during certain years is high. For example, for the S&P 500, the contribution of high and low local-market-exposure portfolios in July 2004-June 2005 was 4.29% and -1.27%, respectively.

We also analysed the performance attribution conditioned on difference market conditions. In particular, we analysed performance attribution of Developed market indices to stocks with different levels of emerging market exposure, depending on the spread in return of emerging and developed market equity. We note that when the spread is positive, the stocks with high exposure to emerging markets contribute more to the performance of the index than stocks with low exposure to emerging markets, and vice-versa. Also, we analysed the performance attribution of Developed market indices to stocks with different levels of local market exposure, depending on the spread in return of local and foreign market equity. Here also, we note that when the spread is positive, the stocks with high exposure to local markets contribute more to the performance of the index than stocks with low exposure to the local markets, and vice-versa.

Overall, the results in this section suggest that there is a difference in the contribution of stocks with varying levels of geographic exposure (either emerging/

Section 3: Application to Performance Attribution

developed exposure or local/foreign exposure) to the performance of the developed market indices, highlighting the usefulness of geographic segmentation data in performance attribution of equity portfolios.

Conclusions

Conclusions

In this paper we analyse the application of geographic segmentation data. First, we analyse the sales exposure of companies in the three broad Developed market indices (S&P 500, STOXX Europe 600 and FTSE Developed Asia Pacific) to four geographic regions (the Americas, Europe, Asia & Pacific and Africa & Middle East) and to developed and emerging markets. We note that for each of the indices, a significant portion of their sales come from non-domestic regions (21% to 45% in FY 2012). Also, the proportion of sales coming from non-domestic regions has increased over the 10-year period FY2003 to FY2012, except for companies in the FTSE Developed Asia Pacific index. Among the three indices, the companies in STOXX Europe have maximum exposure to non-domestic regions (45% in FY2012).

The breakdown of sales into developed and emerging markets tells us that the exposure of companies in the three developed market indices to emerging markets is significant. The companies in the STOXX Europe 600 have maximum exposure to emerging markets (45%). The exposure to emerging the markets has also increased over time, with the highest increase for companies in the STOXX Europe 600 (increase of 12%).

We also extend this analysis to two narrow indices (FTSE 100 and STOXX Europe 50) and notice similar trends in terms of their exposure to non-domestic regions and emerging markets.

Second, we analyse the effects of such exposure on the performance of these indices by distinguishing between companies with varying degrees of underlying economic exposure (in terms of geographic sales breakdown), and attribute index performance to these different geographic exposure categories. We note that there are certain years when the difference in contribution of high and low "local" market exposure portfolios to the performance of indices is large. For example, during July 2004-June 2005, the contribution of high and low local-market-exposure portfolios to the performance of the S&P 500 is 4.29% and -1.27%, respectively. Similarly, there are years when the contribution of high and low emerging market portfolios to the performance of the index is large. For example, in July 2004-June 2005, the contribution of high and low local-market-exposure portfolios to the performance of the S&P 500 is -0.70% and 5.04%, respectively.

We also extend this analysis to performance attribution conditioned upon on different market conditions. We note that when emerging markets perform better than developed markets, the stocks with high exposure to emerging markets contribute more to the performance of the index than stocks with low exposure to emerging markets. Likewise, when emerging markets perform worse than developed market equity, the stocks with higher exposure to emerging markets contribute less to the performance of the developed market indices than stocks with lower exposure to the emerging markets. Also, we note that when local market equity performs better (worse) than foreign market equity, the stocks with high exposure to local markets contribute more (less) to the performance of the index than stocks with low exposure to the local market. Similarly, when the local market performs worse than the foreign market, the stocks with high exposure to local markets contribute less to the performance of indices than stocks with lower exposure to local market.

To summarise, the need to report the geographic exposure of equity indices

Conclusions

is clearly highlighted from the evidence that exposure of the three developed markets indices to non-domestic regions and to emerging markets is significant and has increased over the past years. Also, the observation that during certain years the difference in contribution of stocks with varied geographic exposure to the performance of the index is large, highlights the importance of analysing the performance of equity portfolios in terms of geographic exposure.

Conclusions

Appendix

Appendix

Table 1: Special regions- The table below lists the source we used to define those specific regions that are reported by companies but are not defined in the United Nations country classification.

Geographic region	Source of data
Central and Eastern Europe	http://stats.oecd.org/glossary/detail.asp?ID=303
European Union	http://europa.eu/about-eu/countries/index_en.htm
CIS	http://stats.oecd.org/glossary/detail.asp?ID=392
OECD	http://www.oecd.org/about/membersandpartners/list-oecd-member-countries.htm
Eurozone	http://www.eurozone.europa.eu/euro-area/euro-area-member-states/
Pacific	http://www.scientificbeta.com/#/tab/article/eri-scientific-beta-universe-construction-rules
EU-15	http://www.oecd.org/newsroom/36371703.pdf (130000)
Balkans	http://www.worldatlas.com/webimage/countrys/europe/balkans.htm
Baltic	http://www.worldatlas.com/webimage/countrys/europe/baltic.htm
Nordic	https://unstats.un.org/unsd/dnss/docViewer.aspx%3FdocID%3D2764+&cd=1&hl=en&ct=clnk
Persian Gulf	http://www.worldatlas.com/aatlas/infopage/persiangulf.htm
Scandinavia	http://www.worldatlas.com/webimage/countrys/europe/euscan.htm

S&P 500: Geographic Exposure

Table 2: Non United States and Emerging market exposure of Top 50 companies (by market capitalisation weight) in S&P 500 - The table below lists the non-United States and emerging market sales, as % of total sales, of the top 50 companies in the S&P 500 by market capitalisation. The index constituents and market capitalisation weight is as of end of June 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

	Non-US sales (% of total sales)	Emerging market sales (% of total sales)
3M	64.82%	30.73%
AT&T	0.00%	0.00%
ABBVIE	40.50%	11.02%
ALTRIA GROUP	0.00%	0.00%
AMAZON.COM	47.79%	18.95%
AMERICAN EXPRESS	29.51%	14.46%
AMERICAN INTL.GP.	29.68%	12.90%
AMGEN	22.30%	9.47%
APPLE	61.06%	30.92%
BANK OF AMERICA	13.39%	5.30%
BOEING	54.46%	30.96%
BRISTOL MYERS SQUIBB	39.96%	12.29%
CVS HEALTH	0.00%	0.00%
CISCO SYSTEMS	42.47%	14.88%
CITIGROUP	57.99%	36.09%
COCA COLA	51.12%	20.96%
COMCAST A	0.00%	0.00%
CONOCOPHILLIPS	47.60%	6.70%
EXXON MOBIL	66.61%	28.36%
GENERAL ELECTRIC	52.24%	16.77%
GILEAD SCIENCES	42.37%	9.79%

Appendix

GOLDMAN SACHS GP.	40.99%	15.31%
GOOGLE A	53.16%	19.67%
HOME DEPOT	100.00%	44.33%
INTEL	81.47%	30.22%
INTERNATIONAL BUS.MCHS.	67.64%	29.94%
JP MORGAN CHASE & CO.	19.02%	8.32%
JOHNSON & JOHNSON	55.63%	23.06%
MASTERCARD	61.01%	25.98%
MCDONALDS	66.14%	20.47%
MERCK & COMPANY	56.86%	20.69%
MICROSOFT	47.31%	20.11%
OCCIDENTAL PTL.	36.46%	30.98%
ORACLE	57.53%	21.95%
PEPSICO	49.08%	26.58%
PFIZER	60.86%	23.20%
PHILIP MORRIS INTL.	100.00%	58.19%
PROCTER & GAMBLE	64.76%	27.57%
QUALCOMM	94.13%	55.73%
SCHLUMBERGER	70.35%	37.07%
US BANCORP	0.00%	0.00%
UNION PACIFIC	0.00%	0.00%
UNITED TECHNOLOGIES	44.23%	17.92%
UNITEDHEALTH GROUP	0.00%	0.00%
VERIZON COMMUNICATIONS	0.00%	0.00%
VISA A	45.11%	19.21%
WAL MART STORES	29.46%	12.74%
WALT DISNEY	31.11%	8.79%
WELLS FARGO & CO	0.00%	0.00%
EBAY	51.83%	13.05%

Table 3: Companies in S&P 500 with highest exposure to non-United States market- The table below lists the companies which have highest exposure (% of sales) to non-United States markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and cap-weighted rank are as of June -end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country within the geography (see Section 1).

Name	Non-US sales (% of total sales)	Cap-weighted rank
COCA COLA ENTS.	100.00%	338
HOME DEPOT	100.00%	26
MOLSON COORS BREWING B	100.00%	381
PHILIP MORRIS INTL.	100.00%	18
BROADCOM A	96.80%	203
DIAMOND OFFS.DRL.	94.18%	333
QUALCOMM	94.13%	27
ADVANCED MICRO DEVC.	92.49%	483
TEXAS INSTRUMENTS	87.56%	89
MEAD JOHNSON NUTRITION	86.57%	219

Appendix

Table 4: Companies in S&P 500 with highest exposure to emerging markets - The table below lists the companies which have highest exposure (% of sales) to emerging markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and market capitalisation are as of June-end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope).If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

Name	Emerging market sales (% of total sales)	Cap-weighted rank
WYNN RESORTS	71.15%	271
DIAMOND OFFS.DRL.	69.66%	333
AES	67.30%	350
JABIL CIRCUIT	64.22%	457
ADVANCED MICRO DEVC.	62.33%	483
MICRON TECHNOLOGY	60.28%	239
YUM! BRANDS	59.18%	111
PHILIP MORRIS INTL.	58.19%	18
NVIDIA	57.58%	367
SANDISK	56.40%	238

Table 5: Weight of stocks with > 50% and < 50% United States exposure in S&P 500- The table below reports weights of stocks in the S&P 500 with more than 50% and less than 50% exposure to United States. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% US exposure	Weight of stocks with < 50% US exposure
2004	83.50%	16.50%
2005	81.63%	18.37%
2006	76.97%	23.03%
2007	74.06%	25.94%
2008	63.76%	36.24%
2009	62.91%	37.09%
2010	62.40%	37.60%
2011	59.61%	40.39%
2012	56.20%	43.80%
2013	59.89%	40.11%

Table 6: Weight of stocks with > 50% and < 50% Emerging market exposure in S&P 500- The table below reports weights of stocks in the S&P 500 with more than 50% and less than 50% exposure to Emerging markets. The weights represents market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Emerging market exposure	Weight of stocks with < 50% Emerging market exposure
2004	0.10%	99.90%
2005	0.40%	99.60%
2006	0.48%	99.52%
2007	0.58%	99.42%
2008	1.72%	98.28%
2009	1.86%	98.14%
2010	1.22%	98.78%
2011	2.49%	97.51%
2012	2.69%	97.31%
2013	2.87%	97.13%

Appendix

Table 7: Sum of market capitalisation (or market-cap weight) of index constituents weighted by foreign/emerging market exposure (S&P 500) - The table below reports the sum of market capitalisations (or market-cap weight) of index constituents weighted by proportion of sales coming from foreign/emerging markets. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope). In the table below Mcap implies market capitalisation and CW implies cap-weight of index constituent.

	Σ MCap x Foreign Exposure	ΣCW x Foreign Exposure	Σ MCap x Emerging Exposure	Σ CW x Emerging Exposure
2004	2,852,257	29.96%	868,534	9.12%
2005	3,018,843	30.06%	964,998	9.61%
2006	3,480,065	31.67%	1,190,568	10.83%
2007	4,438,225	33.77%	1,545,782	11.76%
2008	4,211,044	38.02%	1,545,252	13.95%
2009	3,088,392	37.85%	1,178,511	14.44%
2010	3,398,664	37.04%	1,347,844	14.69%
2011	4,690,211	38.74%	1,949,716	16.10%
2012	4,854,328	39.21%	2,065,918	16.69%
2013	5,637,967	38.75%	2,391,347	16.44%

STOXX Europe 600: Geographic Exposure

Table 8: Non-Developed Europe and Emerging market exposure of Top 50 companies (by market capitalisation weight) in the STOXX Europe 600- The table below lists the non-Developed Europe markets and emerging market sales, as % of total sales, of top 50 companies in the STOXX Europe 600 by market capitalisation. The index constituents and market capitalisation weights are as of end of June 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

	Non-Developed European sales (% of total sales)	Emerging market sales (% of total sales)
ABB LTD N	69.17%	34.28%
ALLIANZ (XET)	42.54%	18.70%
ANHEUSER-BUSCH INBEV	88.08%	41.00%
ASTRAZENECA	74.84%	25.49%
AXA	41.96%	5.91%
BARCLAYS	56.94%	28.09%
BASF (XET)	69.29%	28.39%
BAYER (XET)	64.50%	30.74%
BBV.ARGENTARIA	65.45%	52.73%
BANCO SANTANDER	61.97%	56.36%
BG GROUP	67.68%	23.25%
BHP BILLITON	90.06%	52.14%
BMW (XET)	69.08%	37.24%
BNP PARIBAS	31.17%	14.96%
BP	65.71%	20.41%
BRITISH AMERICAN TOBACCO	77.50%	45.14%
RICHEMONT N	76.51%	44.49%
DAIMLER (XET)	68.88%	24.59%
DANONE	55.21%	25.88%
DEUTSCHE BANK (XET)	42.88%	17.52%
DEUTSCHE TELEKOM (XET)	35.05%	4.62%

Appendix

EDF	9.95%	4.24%
ENI	55.30%	39.39%
GDF SUEZ	23.59%	14.00%
GLAXOSMITHKLINE	74.58%	28.20%
GLENCORE	56.24%	30.05%
HENNES & MAURITZ B	40.97%	19.95%
HSBC HDG. (ORD $0.50)	73.89%	26.91%
INDITEX	29.62%	12.75%
LOREAL	55.40%	20.75%
LLOYDS BANKING GROUP	4.48%	1.91%
LVMH	72.64%	34.20%
NESTLE R	74.99%	33.46%
NORDEA BANK	9.76%	7.66%
NOVARTIS R	74.32%	25.94%
NOVO NORDISK B	74.63%	13.70%
RECKITT BENCKISER GROUP	52.06%	50.10%
RIO TINTO	89.16%	49.53%
ROCHE HOLDING	73.10%	20.37%
ROYAL DUTCH SHELL A	63.26%	26.54%
SANOFI	72.12%	27.46%
SAP (XET)	68.81%	0.00%
SIEMENS (XET)	55.28%	22.32%
STANDARD CHARTERED	98.32%	37.37%
TELEFONICA	54.25%	48.29%
TOTAL	46.99%	25.43%
UBS R	52.45%	7.03%
UNILEVER CERTS.	73.15%	29.96%
UNILEVER (UK)	73.15%	29.96%
VODAFONE GROUP	29.29%	29.29%

Table 9: Companies in STOXX Europe 600 with highest exposure to non-Developed European market - The table below lists the companies which have highest exposure (% of sales) to non-Developed Europe markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and cap-weighted rank are as of June -end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country within the geography (see Section 1).

Name	Non-Developed Europe sales (% of total sales)	Cap-weighted rank
'AFREN'	100.00%	507
'COCA COLA HBC (ATH)'	100.00%	229
'ELAN DEAD - 19/12/13'	100.00%	263
'ENAGAS'	100.00%	306
'EXOR ORD'	100.00%	257
'FRESNILLO'	100.00%	199
'INTERNATIONAL PSNL.FIN.'	100.00%	518
'MAUREL ET PROM'	100.00%	529
'RANDGOLD RESOURCES'	100.00%	313
'FLSMIDTH & CO."B"'	99.75%	488

Appendix

Table 10: Companies in STOXX Europe 600 with highest exposure to emerging markets - The table below lists the companies which have highest exposure (% of sales) to emerging markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and market capitalisation are as of June-end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

Name	Emerging market sales (% of total sales)	Cap-weighted rank
'AFREN'	100.00%	507
'COCA COLA HBC (ATH)'	100.00%	229
'FRESNILLO'	100.00%	199
'INTERNATIONAL PSNL.FIN.'	100.00%	518
'MAUREL ET PROM'	100.00%	529
'RANDGOLD RESOURCES'	100.00%	313
'ENAGAS'	97.99%	306
'TULLOW OIL'	89.80%	153
'POLYMETAL INTERNATIONAL'	89.13%	471
'VEDANTA RESOURCES'	83.24%	391

Table 11: Weight of stocks with > 50% and < 50% Developed Europe exposure in STOXX Europe 600- The table below reports the weight of stocks in the STOXX Europe 600 index with more than 50% and less than 50% exposure to Developed European markets. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Dev. Europe exposure	Weight of stocks with < 50% Dev. Europe exposure
2004	56.39%	43.61%
2005	55.60%	44.40%
2006	58.67%	41.33%
2007	57.47%	42.53%
2008	57.06%	42.94%
2009	55.60%	44.40%
2010	48.59%	51.41%
2011	45.11%	54.89%
2012	37.55%	62.45%
2013	35.05%	64.95%

Table 12: Weight of stocks with > 50% and < 50% Emerging market exposure in STOXX Europe 600- The table below reports the weight of stocks in the STOXX Europe 600 with more than 50% and less than 50% exposure to Emerging markets. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Emerging market exposure	Weight of stocks with < 50% Emerging market exposure
2004	0.94%	99.06%
2005	1.03%	98.97%
2006	2.31%	97.69%
2007	3.25%	96.75%
2008	3.71%	96.29%
2009	3.53%	96.47%
2010	2.76%	97.24%
2011	3.68%	96.32%
2012	6.39%	93.61%
2013	4.98%	95.02%

Appendix

Table 13: Sum of market capitalisation (or market-cap weight) of index constituents weighted by foreign/emerging market exposure (STOXX Europe 600) - The table below reports the sum of market capitalisations (or market-cap weights) of index constituents weighted by proportion of sales coming from foreign/emerging markets. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope). In the table below Mcap implies market capitalisation and CW implies cap-weight of index constituent.

	Σ MCap x Foreign Exposure	Σ CW x Foreign Exposure	Σ MCap x Emerging Exposure	Σ CW x Emerging Exposure
2004	2,469,392	41.07%	719,386	41.07%
2005	2,768,253	39.95%	877,584	39.95%
2006	3,491,211	39.88%	1,255,791	39.88%
2007	4,657,206	40.46%	1,799,312	40.46%
2008	4,181,202	42.11%	1,792,527	42.11%
2009	2,808,329	42.76%	1,246,994	42.76%
2010	3,191,219	47.09%	1,393,777	47.09%
2011	4,564,035	49.21%	2,041,759	49.21%
2012	3,869,218	52.39%	1,747,183	52.39%
2013	4,683,065	53.28%	2,100,157	53.28%

FTSE Developed Asia Pacific: Geographic Exposure

Table 14: Non-Developed Asia Pacific and Emerging market exposure of Top 50 companies (by market capitalisation weight) in FTSE Developed Asia Pacific - The table below lists the non-Developed Asia Pacific and emerging market sales, as % of total sales, of the top 50 companies in FTSE Developed Asia Pacific by market capitalisation. The index constituents and market capitalisation weights are as of end of June 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope), supplemented by Bloomberg. If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

	Non- Developed Asia Pacific sales (% of total sales)	Emerging market sales (% of total sales)
AIA GROUP	50.57%	43.08%
AUS.AND NZ.BANKING GP.	13.83%	4.32%
BHP BILLITON	70.35%	55.01%
BRIDGESTONE	73.02%	27.65%
CANON	71.28%	24.52%
CENTRAL JAPAN RAILWAY	0.00%	0.00%
CHEUNG KONG HOLDINGS	62.08%	62.08%
COMMONWEALTH BK.OF AUS.	3.14%	1.14%
CSL	81.52%	14.66%
DBS GROUP HOLDINGS	17.85%	15.49%
DENSO	45.25%	44.75%
EAST JAPAN RAILWAY	0.00%	0.00%
FANUC	68.18%	46.30%
FAST RETAILING	21.66%	7.86%
HANG SENG BANK	8.13%	5.52%
HITACHI	38.69%	22.81%
HONDA MOTOR	73.65%	23.77%
HUTCHISON WHAMPOA	74.15%	22.07%
HYUNDAI MOTOR	50.74%	7.15%
JAPAN TOBACCO	45.81%	16.61%
JARDINE MATHESON HDG.	89.23%	83.27%

Appendix

JARDINE STRATEGIC HDG.	88.87%	88.12%
KDDI	0.00%	0.00%
MITSUBISHI	14.58%	9.73%
MITSUBISHI ESTATE	0.00%	0.00%
MITSUBISHI UFJ FINL.GP.	27.05%	9.90%
MITSUI FUDOSAN	0.00%	0.00%
MIZUHO FINL.GP.	15.69%	6.83%
NATIONAL AUS.BANK	14.29%	2.15%
NIPPON STL.& SUMIT.MTL.	28.75%	21.56%
NISSAN MOTOR	74.58%	28.60%
NOMURA HDG.	23.82%	5.27%
NTT DOCOMO INC	0.00%	0.00%
OVERSEA-CHINESE BKG.	29.50%	28.88%
SAMSUNG ELECTRONICS	74.22%	29.56%
SANDS CHINA	100.00%	100.00%
SEVEN & I HDG.	24.85%	0.95%
SHIN-ETSU CHEMICAL	61.76%	26.30%
SINGAPORE TELECOM	0.00%	0.00%
SUMITOMO MITSUI FINL.GP.	12.79%	4.90%
SUN HUNG KAI PROPERTIES	4.50%	4.18%
TAKEDA PHARMACEUTICAL	50.82%	10.78%
TELSTRA	7.42%	2.69%
TOYOTA MOTOR	56.91%	22.85%
WESFARMERS	0.06%	0.02%
WESTPAC BANKING	1.01%	0.37%
WHARF HOLDINGS	37.06%	37.06%
WOODSIDE PETROLEUM	52.55%	48.34%
WOOLWORTHS	0.00%	0.00%
YAHOO JAPAN	0.00%	0.00%

Table 15: Companies in FTSE Developed Asia Pacific with highest exposure to non-Dev. Asia Pacific markets - The table below lists the companies which have the highest exposure (% of sales) to non-Dev. Asia Pacific markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and cap-weighted rank are as of June -end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope), supplemented by Bloomberg. If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country within the geography (see Section 1).

Name	Non-Dev. Asia Pacific sales (% of total sales)	Cap-weighted rank
'CHINA MENGNIU DAIRY'	100.00%	229
'FIRST PACIFIC'	100.00%	296
'GOLDEN AGRI-RESOURCES'	100.00%	249
'HOPEWELL HGHWY.INFR.'	100.00%	643
'HUABAO INTL.HDG.'	100.00%	663
'HUTCHISON HARBOUR RING'	100.00%	733
'HYUNDAI STEEL'	100.00%	285
'MGM CHINA HOLDINGS'	100.00%	151
'MONGOLIAN MINING'	100.00%	732
'NEW WORLD CHINA LD.'	100.00%	398

Appendix

Table 16: Companies in FTSE Developed Asia Pacific with highest exposure to emerging markets - The table below lists the companies which have highest exposure (% of sales) to emerging markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and market capitalisation are as of June-end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope), supplemented by Bloomberg. If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

Name	Emerging market sales (% of total sales)	Cap-weighted rank
'CHINA MENGNIU DAIRY'	100.00%	229
'FIRST PACIFIC'	100.00%	296
'GOLDEN AGRI-RESOURCES'	100.00%	249
'HOPEWELL HGHWY.INFR.'	100.00%	643
'HUABAO INTL.HDG.'	100.00%	663
'HUTCHISON HARBOUR RING'	100.00%	733
'HYUNDAI STEEL'	100.00%	285
'MGM CHINA HOLDINGS'	100.00%	151
'MONGOLIAN MINING'	100.00%	732
'NEW WORLD CHINA LD.'	100.00%	398

Table 17: Weight of stocks with > 50% and < 50% Dev. Asia Pacific exposure in FTSE Developed Asia Pacific - The table below reports weights of stocks in FTSE Developed Asia Pacific with more than 50% and less than 50% exposure to Dev. Asia Pacific. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope), supplemented by Bloomberg.

	Weight of stocks with > 50% Dev. Asia Pacific exposure	Weight of stocks with < 50% Dev. Asia Pacific exposure
2004	71.42%	28.58%
2005	74.21%	25.79%
2006	71.31%	28.69%
2007	71.23%	28.77%
2008	66.88%	33.12%
2009	67.45%	32.55%
2010	70.23%	29.77%
2011	69.86%	30.14%
2012	63.71%	36.29%
2013	65.34%	34.66%

Table 18: Weight of stocks with > 50% and < 50% Emerging market exposure in FTSE Developed Asia-Pacific- The table below reports weights of stocks in FTSE Developed Asia Pacific with more than 50% and less than 50% exposure to Emerging markets. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Emerging market exposure	Weight of stocks with < 50% Emerging market exposure
2004	3.16%	96.84%
2005	3.17%	96.83%
2006	7.23%	92.77%
2007	8.46%	91.54%
2008	12.13%	87.87%
2009	13.59%	86.41%
2010	7.99%	92.01%
2011	10.52%	89.48%
2012	12.68%	87.32%
2013	8.49%	91.51%

Appendix

Table 19: Sum of market capitalisations (or market-cap weights) of index constituents weighted by foreign/emerging market exposure (FTSE Developed Asia Pacific) - The table below reports the sum of market capitalisations (or market-cap weights) of index constituents weighted by proportion of sales coming from foreign/emerging markets. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope). In the table below Mcap implies market capitalisation and CW implies cap-weight of index constituent.

	Σ MCap x Foreign Exposure	Σ CW x Foreign Exposure	Σ MCap x Emerging Exposure	Σ CW x Emerging Exposure
2004	763,430	31.24%	227,779	9.32%
2005	842,638	30.54%	284,116	10.30%
2006	1,331,296	34.14%	584,474	14.99%
2007	1,813,450	32.87%	895,565	16.23%
2008	1,886,078	36.21%	1,033,884	19.85%
2009	1,531,029	35.49%	907,650	21.04%
2010	1,594,333	32.58%	855,379	17.48%
2011	2,010,060	34.06%	1,167,996	19.79%
2012	1,996,166	37.08%	1,187,893	22.07%
2013	2,122,143	34.65%	1,167,074	19.06%

STOXX Europe 50: Geographic Exposure

Table 20: Non-Developed Europe and Emerging market exposure of companies in STOXX Europe 50 - The table below lists the non-Developed Europe and emerging market sales, as % of total sales, of companies in the STOXX Europe 50. The index constituents and market capitalisation weights are as of end of June 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

	Non-Developed Europe sales (% of total sales)	Emerging market sales (% of total sales)
ABB LTD N	69.17%	34.28%
AIR LIQUIDE	56.48%	26.76%
ALLIANZ (XET)	42.54%	18.70%
ANHEUSER-BUSCH INBEV	88.08%	41.00%
ASTRAZENECA	74.84%	25.49%
BARCLAYS	56.94%	28.09%
BASF (XET)	69.29%	28.39%
BAYER (XET)	64.50%	30.74%
BBV.ARGENTARIA	65.45%	52.73%
BANCO SANTANDER	61.97%	56.36%
BG GROUP	67.68%	23.25%
BHP BILLITON	90.06%	52.14%
BNP PARIBAS	31.17%	14.96%
BP	65.71%	20.41%
BRITISH AMERICAN TOBACCO	77.50%	45.14%
RICHEMONT N	76.51%	44.49%
CREDIT SUISSE GROUP N	53.27%	15.70%
DAIMLER (XET)	68.88%	24.59%
DEUTSCHE BANK (XET)	42.88%	17.52%
DEUTSCHE TELEKOM (XET)	35.05%	4.62%
E ON (XET)	0.16%	0.07%
ENI	55.30%	39.39%
ERICSSON B	74.70%	33.58%

Appendix

GLAXOSMITHKLINE	74.58%	28.20%
GLENCORE	56.24%	30.05%
HSBC HDG. (ORD $0.50)	73.89%	26.91%
ING GROEP	48.01%	1.36%
LVMH	72.64%	34.20%
NATIONAL GRID	56.62%	0.00%
NESTLE R	74.99%	33.46%
NOVARTIS R	74.32%	25.94%
RECKITT BENCKISER GROUP	52.06%	50.10%
RIO TINTO	89.16%	49.53%
ROCHE HOLDING	73.10%	20.37%
ROYAL DUTCH SHELL A	63.26%	26.54%
SANOFI	72.12%	27.46%
SAP (XET)	68.81%	0.00%
SCHNEIDER ELECTRIC SE	79.77%	35.42%
SIEMENS (XET)	55.28%	22.32%
STANDARD CHARTERED	98.32%	37.37%
TELEFONICA	54.25%	48.29%
TESCO	20.16%	11.67%
TOTAL	46.99%	25.43%
UBS R	52.45%	7.03%
UNILEVER CERTS.	73.15%	29.96%
UNILEVER (UK)	73.15%	29.96%
VODAFONE GROUP	29.29%	29.29%
ZURICH INSURANCE GROUP	50.29%	14.49%

Table 21: Companies in STOXX Europe 50 with highest exposure to non-Developed Europe markets - The table below lists the companies which have the highest exposure (% of sales) to non-Developed Europe markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and cap-weighted rank are as of June-end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country within the geography (see Section 1).

Name	Non-Developed Europe sales (% of total sales)	Cap-weighted rank
STANDARD CHARTERED	98.32%	32
BHP BILLITON	90.06%	31
RIO TINTO	89.16%	28
ANHEUSER-BUSCH INBEV	88.08%	5
SCHNEIDER ELECTRIC SE	79.77%	43
BRITISH AMERICAN TOBACCO	77.50%	12
RICHEMONT N	76.51%	38
NESTLE R	74.99%	1
ASTRAZENECA	74.84%	25
ERICSSON B	74.70%	47

Appendix

Table 22: Companies in STOXX Europe 50 with highest exposure to emerging markets - The table below lists the companies in the STOXX Europe 50 which have the highest exposure (% of sales) to emerging markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and market capitalisation are as of June -end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope).If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on GDP weight of the country with the geography (see Section 2).

Name	Emerging market sales (% of total sales)	Cap-weighted rank
BANCO SANTANDER	56.36%	19
BBV.ARGENTARIA	52.73%	37
BHP BILLITON	52.14%	31
RECKITT BENCKISER GROUP	50.10%	35
RIO TINTO	49.53%	28
TELEFONICA	48.29%	26
BRITISH AMERICAN TOBACCO	45.14%	12
RICHEMONT N	44.49%	38
ANHEUSER-BUSCH INBEV	41.00%	5
ENI	39.39%	18

Table 23: Weight of stocks with > 50% and < 50% Developed Europe exposure in STOXX Europe 50 - The table below reports weights of stocks in the STOXX Europe 50 with more than 50% and less than 50% exposure to Developed Europe. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Developed Europe exposure	Weight of stocks with < 50% Developed Europe exposure
2004	42.72%	57.28%
2005	42.77%	57.23%
2006	49.42%	50.58%
2007	49.80%	50.20%
2008	52.37%	47.63%
2009	48.53%	51.47%
2010	37.86%	62.14%
2011	36.55%	63.45%
2012	21.36%	78.64%
2013	15.52%	84.48%

Table 24: Weight of stocks with > 50% and < 50% Emerging market exposure in STOXX Europe 50 - The table below reports weights of stocks in the STOXX Europe 50 with more than 50% and less than 50% exposure to Emerging markets. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Emerging market exposure	Weight of stocks with < 50% Emerging market exposure
2004	1.07%	98.93%
2005	1.10%	98.90%
2006	2.97%	97.03%
2007	3.69%	96.31%
2008	2.21%	97.79%
2009	2.29%	97.71%
2010	1.16%	98.84%
2011	3.22%	96.78%
2012	8.11%	91.89%
2013	5.77%	94.23%

Appendix

Table 25: Sum of market capitalisations (or market-cap weights) of index constituents weighted by foreign/emerging market exposure (STOXX Europe 50) - The table below reports the sum of market capitalisations (or market-cap weights) of index constituents weighted by proportion of sales coming from foreign/emerging markets. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope). In the table below Mcap implies market capitalisation and CW implies cap-weight of index constituent.

	Σ MCap x Foreign Exposure	Σ CW x Foreign Exposure	Σ MCap x Emerging Exposure	Σ CW x Emerging Exposure
2004	1,379,298	48.44%	355,426	12.48%
2005	1,523,741	48.03%	423,511	13.35%
2006	1,733,551	46.41%	546,135	14.62%
2007	2,111,064	44.79%	753,324	15.98%
2008	1,920,302	45.77%	788,945	18.80%
2009	1,400,434	47.40%	626,891	21.22%
2010	1,516,915	52.16%	658,081	22.63%
2011	2,137,090	56.55%	934,319	24.72%
2012	1,975,914	62.14%	873,340	27.47%
2013	2,460,613	64.62%	1,070,452	28.11%

FTSE 100: Geographic Exposure

Table 26: Non-UK and Emerging market exposure of companies in FTSE 100 - The table below lists the non-UK and emerging market sales, as % of total sales, of companies in the FTSE 100. The index constituents and market capitalisation weights are as of end of June 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

	Non-UK sales (% of total sales)	Emerging market sales (% of total sales)
ANTOFAGASTA	99.42%	42.28%
ARM HOLDINGS	85.81%	13.61%
ASSOCIATED BRIT.FOODS	57.17%	18.91%
ASTRAZENECA	93.41%	25.49%
BAE SYSTEMS	76.33%	18.41%
BARCLAYS	69.90%	28.09%
BG GROUP	83.88%	23.25%
BHP BILLITON	98.68%	52.14%
BP	79.93%	20.41%
BRITISH AMERICAN TOBACCO	100.00%	45.14%
BRITISH SKY BCAST.GP.	6.16%	2.02%
BT GROUP	23.52%	7.03%
BURBERRY GROUP	74.63%	32.89%
CAPITA	3.58%	1.18%
CENTRICA	29.03%	2.40%
COMPASS GROUP	95.86%	19.70%
EXPERIAN	83.09%	27.04%
FRESNILLO	100.00%	100.00%
GLAXOSMITHKLINE	94.23%	28.20%
GLENCORE	92.68%	30.05%
HSBC HDG. (ORD $0.50)	95.63%	26.91%
ITV	13.71%	4.51%
JOHNSON MATTHEY	66.79%	19.79%

Appendix

KINGFISHER	63.16%	13.01%
LAND SECURITIES GROUP	0.00%	0.00%
LLOYDS BANKING GROUP	5.81%	1.91%
MARKS & SPENCER GROUP	10.73%	3.53%
MORRISON(WM)SPMKTS.	0.00%	0.00%
NATIONAL GRID	56.62%	0.00%
NEXT	1.44%	1.02%
PRUDENTIAL	59.11%	11.45%
RECKITT BENCKISER GROUP	91.98%	50.10%
RIO TINTO	98.78%	49.53%
ROLLS-ROYCE HOLDINGS	83.50%	28.64%
ROYAL BANK OF SCTL.GP.	52.14%	9.38%
ROYAL DUTCH SHELL A	93.86%	26.54%
SAINSBURY (J)	0.00%	0.00%
SSE	2.06%	0.33%
SHIRE	95.58%	13.06%
SMITH & NEPHEW	92.82%	23.96%
SMITHS GROUP	95.09%	15.64%
STANDARD CHARTERED	98.32%	37.37%
STANDARD LIFE	34.64%	5.77%
TESCO	32.92%	11.67%
TULLOW OIL	98.81%	89.80%
UNILEVER (UK)	100.00%	29.96%
VODAFONE GROUP	84.14%	29.29%
WHITBREAD	2.73%	0.90%
WOLSELEY	85.86%	5.54%
WPP	87.71%	23.77%

Table 27: Companies in FTSE 100 with highest exposure to non-UK markets - The table below lists the companies which have the highest exposure (% of sales) to non-UK markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and cap-weighted rank are as of June-end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country within the geography (see Section 1).

Name	Non-UK sales (% of total sales)	Cap-weighted rank
'BRITISH AMERICAN TOBACCO'	100.00%	6
'FRESNILLO'	100.00%	43
'G4S'	100.00%	82
'RANDGOLD RESOURCES'	100.00%	75
'UNILEVER (UK)'	100.00%	15
'ANTOFAGASTA'	99.42%	37
'TATE & LYLE'	99.30%	72
'TULLOW OIL'	98.81%	33
'RIO TINTO'	98.78%	10
'BHP BILLITON'	98.68%	13

Appendix

Table 28: Companies in FTSE 100 with highest exposure to emerging markets - The table below lists the companies in the FTSE 100 which have the highest exposure (% of sales) to emerging markets. The table also lists the cap-weighted rank of the stock in the index. The index constituents and market capitalisation are as of June-end 2013, for which sales data is taken for fiscal year 2012. The source of geographic segmentation data is DataStream (Worldscope). If a company reports sales for a geography (other than country-level sales), we break down geographic sales to country-level sales based on the GDP weight of the country with the geography (see Section 1).

Name	Emerging market sales (% of total sales)	Cap-weighted rank
FRESNILLO	100.00%	43
RANDGOLD RESOURCES	100.00%	75
TULLOW OIL	89.80%	33
VEDANTA RESOURCES	83.24%	87
PETROFAC	73.05%	65
BHP BILLITON	52.14%	13
RECKITT BENCKISER GROUP	50.10%	16
RIO TINTO	49.53%	10
G4S	49.24%	82
BRITISH AMERICAN TOBACCO	45.14%	6

Table 29: Weight of stocks with > 50% and < 50% UK exposure in FTSE 100 - The table below reports weights of stocks in the FTSE 100 with more than 50% and less than 50% exposure to the UK. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% UK exposure	Weight of stocks with < 50% UK exposure
2004	28.85%	71.15%
2005	29.11%	70.89%
2006	31.91%	68.09%
2007	33.16%	66.84%
2008	21.85%	78.15%
2009	18.35%	81.65%
2010	16.55%	83.45%
2011	15.73%	84.27%
2012	14.75%	85.25%
2013	16.80%	83.20%

Table 30: Weight of stocks with > 50% and < 50% Emerging market exposure in FTSE 100 - The table below reports weights of stocks in the FTSE 100 with more than 50% and less than 50% exposure to Emerging markets. The weights represent market capitalisation weights at the end of June every year. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope).

	Weight of stocks with > 50% Emerging market exposure	Weight of stocks with < 50% Emerging market exposure
2004	2.33%	97.67%
2005	2.05%	97.95%
2006	3.53%	96.47%
2007	3.77%	96.23%
2008	8.18%	91.82%
2009	4.74%	95.26%
2010	3.49%	96.51%
2011	3.84%	96.16%
2012	11.20%	88.80%
2013	6.56%	93.44%

Appendix

Table 31: Sum of market capitalisations (or market-cap weights) of index constituents weighted by foreign/emerging market exposure (FTSE 100) - The table below reports the sum of market capitalisations (or market-cap weights) of index constituents weighted by proportion of sales coming from foreign/emerging markets. The currency used is US $. The exposure is calculated using segment sales data for the previous fiscal year. The source of geographic segmentation data is DataStream (Worldscope). In the table below Mcap implies market capitalisation and CW implies cap-weight of index constituent.

	Σ MCap x Foreign Exposure	Σ CW x Foreign Exposure	Σ MCap x Emerging Exposure	Σ CW x Emerging Exposure
2004	1,180,952	66.70%	201,681	11.39%
2005	1,295,065	67.33%	230,492	11.98%
2006	1,549,638	65.93%	329,100	14.00%
2007	1,881,256	65.38%	421,534	14.65%
2008	1,829,911	73.49%	523,616	21.03%
2009	1,234,511	75.63%	357,319	21.89%
2010	1,300,327	76.47%	414,665	24.39%
2011	1,685,609	77.25%	572,458	26.23%
2012	1,584,634	78.01%	549,553	27.05%
2013	1,653,120	75.17%	541,666	24.63%

Appendix

References

References

- Ahadiat, N. 1993. Geographic Segment Disclosure and the Predictive Ability of the Earnings Data. *Journal of International Business Studies*, 24(2): 357-371.
- Arouri, M. H., Bellalah, M. and Nguyen, D. K. 2010. The Co-movements in International Stock Markets: New Evidence From Latin American Emerging Countries. Applied Economics Letters. 17(13): 1323-1328.
- Balakrishnan, R., Harris, Trevor S. and Sen, Pradyot K. 1990. The Predictive Ability of Geographic Segment Disclosures. *Journal of Accounting Research*.
- Carhart, Mark M. 1997. On Persistence in Mutual Fund Performance. *Journal of Finance* 52 (1): 57–82.
- Fama, E.F. and French, K. R. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*. 33(1): 3–56.
- Li, N., Richardson, S. and Tuna, I. 2012. Macro to Micro: Country Exposures, Firm Fundamentals and Stock Returns. San Diego Meetings Paper, available at SSRN: http://ssrn.com/abstract=2017091
- Nguyen, Q. H. 2012. Geographic Momentum. Working Paper, available at SSRN: http://ssrn.com/abstract=1921537.
- Pastor, L., Stambaugh, R. F. 2003. Liquidity Risk and Expected Stock Returns. *Journal of Political Economy* 111: 642-685.
- Roberts, Clare B.1989. Forecasting Earnings Using Geographical Segment Data: Some UK Evidence. *Journal of International Financial Management and Accounting.*

About CACEIS Investor Services

About CACEIS Investor Services

CACEIS is the asset servicing banking group dedicated to institutional and corporate clients.

Through offices across Europe, North America and Asia, CACEIS offers a broad range of services covering execution, clearing, depositary and custody, fund administration, middle office outsourcing, forex, securities lending, fund distribution support and issuer services.

With assets under custody of €2.4 trillion and assets under administration of €1.4 trillion, CACEIS is one of the world market leaders in asset servicing, the second depositary bank and the leading fund administrator for European funds (figures as of 31 December 2014).

www.caceis.com

About EDHEC-Risk Institute

About EDHEC-Risk Institute

Founded in 1906, EDHEC is one of the foremost international business schools. Accredited by the three main international academic organisations, EQUIS, AACSB, and Association of MBAs, EDHEC has for a number of years been pursuing a strategy of international excellence that led it to set up EDHEC-Risk Institute in 2001. This institute now boasts a team of over 95 permanent professors, engineers and support staff, as well as 48 research associates from the financial industry and affiliate professors..

The Choice of Asset Allocation and Risk Management

EDHEC-Risk structures all of its research work around asset allocation and risk management. This strategic choice is applied to all of the Institute's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; taking extreme risks into account in portfolio construction; studying the usefulness of derivatives in implementing asset-liability management approaches; or orienting the concept of dynamic "core-satellite" investment management in the framework of absolute return or target-date funds.

Academic Excellence and Industry Relevance

In an attempt to ensure that the research it carries out is truly applicable, EDHEC has implemented a dual validation system for the work of EDHEC-Risk. All research work must be part of a research programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the Institute's advisory board. This board is made up of internationally recognised researchers, the Institute's business partners, and representatives of major international institutional investors. Management of the research programmes respects a rigorous validation process, which guarantees the scientific quality and the operational usefulness of the programmes.

Six research programmes have been conducted by the centre to date:

- Asset allocation and alternative diversification
- Style and performance analysis
- Indices and benchmarking
- Operational risks and performance
- Asset allocation and derivative instruments
- ALM and asset management

These programmes receive the support of a large number of financial companies. The results of the research programmes are disseminated through the EDHEC-Risk locations in Singapore, which was established at the invitation of the Monetary Authority of Singapore (MAS); the City of London in the United Kingdom; Nice and Paris in France; and New York in the United States.

EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs or major research projects:

- Core-Satellite and ETF Investment, *in partnership with Amundi ETF*
- Regulation and Institutional Investment, *in partnership with AXA Investment Managers*
- Asset-Liability Management and Institutional Investment Management, *in partnership with BNP Paribas Investment Partners*
- Risk and Regulation in the European Fund Management Industry, *in partnership with CACEIS*
- Exploring the Commodity Futures Risk Premium: Implications for Asset Allocation and Regulation, *in partnership with CME Group*

About EDHEC-Risk Institute

- Asset-Liability Management in Private Wealth Management, *in partnership with Coutts & Co.*
- Asset-Liability Management Techniques for Sovereign Wealth Fund Management, *in partnership with Deutsche Bank*
- The Benefits of Volatility Derivatives in Equity Portfolio Management, *in partnership with Eurex*
- Structured Products and Derivative Instruments, *sponsored by the French Banking Federation (FBF)*
- Optimising Bond Portfolios, in partnership *with the French Central Bank (BDF Gestion)*
- Asset Allocation Solutions, *in partnership with Lyxor Asset Management*
- Infrastructure Equity Investment Management and Benchmarking, *in partnership with Meridiam and Campbell Lutyens*
- Investment and Governance Characteristics of Infrastructure Debt Investments, *in partnership with Natixis*
- Advanced Modelling for Alternative Investments, *in partnership with Newedge Prime Brokerage*
- Advanced Investment Solutions for Liability Hedging for Inflation Risk, *in partnership with Ontario Teachers' Pension Plan*
- The Case for Inflation-Linked Corporate Bonds: Issuers' and Investors' Perspectives, *in partnership with Rothschild & Cie*
- Solvency II, *in partnership with Russell Investments*
- Structured Equity Investment Strategies for Long-Term Asian Investors, *in partnership with Société Générale Corporate & Investment Banking*

The philosophy of the Institute is to validate its work by publication in international academic journals, as well as to make it available to the sector through its position papers, published studies, and conferences.

Each year, EDHEC-Risk organises three conferences for professionals in order to present the results of its research, one in London (EDHEC-Risk Days Europe), one in Singapore (EDHEC-Risk Days Asia), and one in New York (EDHEC-Risk Days North America) attracting more than 2,500 professional delegates.

EDHEC also provides professionals with access to its website, www.edhec-risk.com, which is entirely devoted to international asset management research. The website, which has more than 65,000 regular visitors, is aimed at professionals who wish to benefit from EDHEC's analysis and expertise in the area of applied portfolio management research. Its monthly newsletter is distributed to more than 1.5 million readers.

EDHEC-Risk Institute: Key Figures, 2013-2014

Nbr of permanent staff	97
Nbr of research associates	26
Nbr of affiliate professors	28
Overall budget	€13,500,000
External financing	€10,100,000
Nbr of conference delegates	1,782
Nbr of participants at EDHEC-Risk Institute Executive Education seminars	1,576

About EDHEC-Risk Institute

The EDHEC-Risk Institute PhD in Finance

The EDHEC-Risk Institute PhD in Finance is designed for professionals who aspire to higher intellectual levels and aim to redefine the investment banking and asset management industries. It is offered in two tracks: a residential track for high-potential graduate students, who hold part-time positions at EDHEC, and an executive track for practitioners who keep their full-time jobs. Drawing its faculty from the world's best universities, such as Princeton, Wharton, Oxford, Chicago and CalTech, and enjoying the support of the research centre with the greatest impact on the financial industry, the EDHEC-Risk Institute PhD in Finance creates an extraordinary platform for professional development and industry innovation.

Research for Business

The Institute's activities have also given rise to executive education and research service offshoots. EDHEC-Risk's executive education programmes help investment professionals to upgrade their skills with advanced risk and asset management training across traditional and alternative classes. In partnership with CFA Institute, it has developed advanced seminars based on its research which are available to CFA charterholders and have been taking place since 2008 in New York, Singapore and London.

In 2012, EDHEC-Risk Institute signed two strategic partnership agreements with the Operations Research and Financial Engineering department of Princeton University to set up a joint research programme in the area of risk and investment management, and with Yale School of Management to set up joint certified executive training courses in North America and Europe in the area of investment management.

As part of its policy of transferring know-how to the industry, EDHEC-Risk Institute has also set up ERI Scientific Beta. ERI Scientific Beta is an original initiative which aims to favour the adoption of the latest advances in smart beta design and implementation by the whole investment industry. Its academic origin provides the foundation for its strategy: offer, in the best economic conditions possible, the smart beta solutions that are most proven scientifically with full transparency in both the methods and the associated risks.

EDHEC-Risk Institute Publications and Position Papers (2012-2015)

EDHEC-Risk Institute Publications (2012-2015)

2015

- Amenc, N., F. Ducoulombier, F. Goltz, V. Le Sourd, A. Lodh and E. Shirbini, The EDHEC European Survey 2014 (March).
- Deguest, R., L. Martellini, V. Milhau, A. Suri and H. Wang. Introducing a Comprehensive Risk Allocation Framework for Goals-Based Wealth Management (March).
- Amenc, N., S. Badaoui, F. Goltz, V. Le Sourd and A. Lodh, Alternative Equity Beta Investing: A Survey (February).
- Blanc-Brude, F., and M. Hasan. The Valuation of Privately-Held Infrastructure Equity Investments (January).

2014

- Coqueret, G., R. Deguest, L. Martellini, and V. Milhau. Equity Portfolios with Improved Liability-Hedging Benefits (December).
- Blanc-Brude, F., and D. Makovsek. How Much Construction Risk do Sponsors take in Project Finance. (August).
- Loh, L., and S. Stoyanov. The Impact of Risk Controls and Strategy-Specific Risk Diversification on Extreme Risk (August).
- Blanc-Brude, F., and F. Ducoulombier. Superannuation v2.0 (July).
- Loh, L., and S. Stoyanov. Tail Risk of Smart Beta Portfolios: An Extreme Value Theory Approach (July).
- Foulquier, P. M. Arouri and A. Le Maistre. P. A Proposal for an Interest Rate Dampener for Solvency II to Manage Pro-Cyclical Effects and Improve Asset-Liability Management (June).
- Amenc, N., R. Deguest, F. Goltz, A. Lodh, L. Martellini and E.Schirbini. Risk Allocation, Factor Investing and Smart Beta: Reconciling Innovations in Equity Portfolio Construction (June).
- Martellini, L., V. Milhau and A. Tarelli. Towards Conditional Risk Parity – Improving Risk Budgeting Techniques in Changing Economic Environments (April).
- Amenc, N., and F. Ducoulombier. Index Transparency – A Survey of European Investors Perceptions, Needs and Expectations (March).
- Ducoulombier, F., F. Goltz, V. Le Sourd, and A. Lodh. The EDHEC European ETF Survey 2013 (March).
- Badaoui, S., Deguest, R., L. Martellini and V. Milhau. Dynamic Liability-Driven Investing Strategies: The Emergence of a New Investment Paradigm for Pension Funds? (February).
- Deguest, R., and L. Martellini. Improved Risk Reporting with Factor-Based Diversification Measures (February).
- Loh, L., and S. Stoyanov. Tail Risk of Equity Market Indices: An Extreme Value Theory Approach (February).

EDHEC-Risk Institute Publications (2012-2015)

2013

- Lixia, L., and S. Stoyanov. Tail Risk of Asian Markets: An Extreme Value Theory Approach (August).
- Goltz, F., L. Martellini, and S. Stoyanov. Analysing statistical robustness of cross-sectional volatility. (August).
- Lixia, L., L. Martellini, and S. Stoyanov. The local volatility factor for asian stock markets. (August).
- Martellini, L., and V. Milhau. Analysing and decomposing the sources of added-value of corporate bonds within institutional investors' portfolios (August).
- Deguest, R., L. Martellini, and A. Meucci. Risk parity and beyond - From asset allocation to risk allocation decisions (June).
- Blanc-Brude, F., Cocquemas, F., Georgieva, A. Investment Solutions for East Asia's Pension Savings - Financing lifecycle deficits today and tomorrow (May)
- Blanc-Brude, F. and O.R.H. Ismail. Who is afraid of construction risk? (March)
- Lixia, L., L. Martellini, and S. Stoyanov. The relevance of country- and sector-specific model-free volatility indicators (March).
- Calamia, A., L. Deville, and F. Riva. Liquidity in european equity ETFs: What really matters? (March).
- Deguest, R., L. Martellini, and V. Milhau. The benefits of sovereign, municipal and corporate inflation-linked bonds in long-term investment decisions (February).
- Deguest, R., L. Martellini, and V. Milhau. Hedging versus insurance: Long-horizon investing with short-term constraints (February).
- Amenc, N., F. Goltz, N. Gonzalez, N. Shah, E. Shirbini and N. Tessaromatis. The EDHEC european ETF survey 2012 (February).
- Padmanaban, N., M. Mukai, L . Tang, and V. Le Sourd. Assessing the quality of asian stock market indices (February).
- Goltz, F., V. Le Sourd, M. Mukai, and F. Rachidy. Reactions to "A review of corporate bond indices: Construction principles, return heterogeneity, and fluctuations in risk exposures" (January).
- Joenväärä, J., and R. Kosowski. An analysis of the convergence between mainstream and alternative asset management (January).
- Cocquemas, F. Towar¬ds better consideration of pension liabilities in european union countries (January).
- Blanc-Brude, F. Towards efficient benchmarks for infrastructure equity investments (January).

EDHEC-Risk Institute Publications (2012-2015)

2012

- Arias, L., P. Foulquier and A. Le Maistre. Les impacts de Solvabilité II sur la gestion obligataire (December).
- Arias, L., P. Foulquier and A. Le Maistre. The Impact of Solvency II on Bond Management (December).
- Amenc, N., and F. Ducoulombier. Proposals for better management of non-financial risks within the european fund management industry (December).
- Cocquemas, F. Improving Risk Management in DC and Hybrid Pension Plans (November).
- Amenc, N., F. Cocquemas, L. Martellini, and S. Sender. Response to the european commission white paper "An agenda for adequate, safe and sustainable pensions" (October).
- La gestion indicielle dans l'immobilier et l'indice EDHEC IEIF Immobilier d'Entreprise France (September).
- Real estate indexing and the EDHEC IEIF commercial property (France) index (September).
- Goltz, F., S. Stoyanov. The risks of volatility ETNs: A recent incident and underlying issues (September).
- Almeida, C., and R. Garcia. Robust assessment of hedge fund performance through nonparametric discounting (June).
- Amenc, N., F. Goltz, V. Milhau, and M. Mukai. Reactions to the EDHEC study "Optimal design of corporate market debt programmes in the presence of interest-rate and inflation risks" (May).
- Goltz, F., L. Martellini, and S. Stoyanov. EDHEC-Risk equity volatility index: Methodology (May).
- Amenc, N., F. Goltz, M. Masayoshi, P. Narasimhan and L. Tang. EDHEC-Risk Asian index survey 2011 (May).
- Guobuzaite, R., and L. Martellini. The benefits of volatility derivatives in equity portfolio management (April).
- Amenc, N., F. Goltz, L. Tang, and V. Vaidyanathan. EDHEC-Risk North American index survey 2011 (March).
- Amenc, N., F. Cocquemas, R. Deguest, P. Foulquier, L. Martellini, and S. Sender. Introducing the EDHEC-Risk Solvency II Benchmarks – maximising the benefits of equity investments for insurance companies facing Solvency II constraints - Summary - (March).
- Schoeffler, P. Optimal market estimates of French office property performance (March).
- Le Sourd, V. Performance of socially responsible investment funds against an efficient SRI Index: The impact of benchmark choice when evaluating active managers – an update (March).
- Martellini, L., V. Milhau, and A.Tarelli. Dynamic investment strategies for corporate pension funds in the presence of sponsor risk (March).

EDHEC-Risk Institute Publications (2012-2015)

- Goltz, F., and L. Tang. The EDHEC European ETF survey 2011 (March).
- Sender, S. Shifting towards hybrid pension systems: A European perspective (March).
- Blanc-Brude, F. Pension fund investment in social infrastructure (February).
- Ducoulombier, F., Lixia, L., and S. Stoyanov. What asset-liability management strategy for sovereign wealth funds? (February).
- Amenc, N., Cocquemas, F., and S. Sender. Shedding light on non-financial risks – a European survey (January).
- Amenc, N., F. Cocquemas, R. Deguest, P. Foulquier, Martellini, L., and S. Sender. Ground Rules for the EDHEC-Risk Solvency II Benchmarks. (January).
- Amenc, N., F. Cocquemas, R. Deguest, P. Foulquier, Martellini, L., and S. Sender. Introducing the EDHEC-Risk Solvency Benchmarks – Maximising the Benefits of Equity Investments for Insurance Companies facing Solvency II Constraints - Synthesis -. (January).
- Amenc, N., F. Cocquemas, R. Deguest, P. Foulquier, Martellini, L., and S. Sender. Introducing the EDHEC-Risk Solvency Benchmarks – Maximising the Benefits of Equity Investments for Insurance Companies facing Solvency II Constraints (January).
- Schoeffler.P. Les estimateurs de marché optimaux de la performance de l'immobilier de bureaux en France (January).

EDHEC-Risk Institute Position Papers (2012-2015)

2014

- Blanc-Brude, F. Benchmarking Long-Term Investment in Infrastructure: Objectives, Roadmap and Recent Progress (June).

2012

- Till, H. Who sank the boat? (June).
- Uppal, R. Financial Regulation (April).
- Amenc, N., F. Ducoulombier, F. Goltz, and L. Tang. What are the risks of European ETFs? (January).

Notes

For more information, please contact:
Carolyn Essid on +33 493 187 824
or by e-mail to: carolyn.essid@edhec-risk.com

EDHEC-Risk Institute
393 promenade des Anglais
BP 3116 - 06202 Nice Cedex 3
France
Tel: +33 (0)4 93 18 78 24

EDHEC Risk Institute—Europe
10 Fleet Place, Ludgate
London EC4M 7RB
United Kingdom
Tel: +44 207 871 6740

EDHEC Risk Institute—Asia
1 George Street
#07-02
Singapore 049145
Tel: +65 6438 0030

EDHEC Risk Institute—North America
One Boston Place, 201 Washington Street
Suite 2608/2640 — Boston, MA 02108
United States of America
Tel: +1 857 239 8891

EDHEC Risk Institute—France
16-18 rue du 4 septembre
75002 Paris
France
Tel: +33 (0)1 53 32 76 30

www.edhec-risk.com