MSCI

Index Report

Global Equity Allocation

Analysis of Issues Related to Geographic Allocation of Equities

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Contents

Executive Summary

This report discusses the key issues regarding the equity allocation of portfolio capital across different geographical areas. It draws on insights gathered globally by MSCI through interactions with large pension funds and sovereign wealth funds around the world as well as its own research in this area. Focus is paid to analyzing issues from the perspective of a long term institutional investor with sizable assets.

Here, we discuss important criteria and considerations for allocating institutional equity investments across regions/countries. Among the topics highlighted in this report are:

- The implications of weighting schemes including those based on market-capitalization and GDP
- The implications of having greater/lower concentration of the portfolio in US and Europe equity investments
- The characteristics of emerging markets and their risks and rewards

The globalization of economies and the increased integration of capital markets have prompted many institutional investors to rethink their equity investment process. As asset growth is the main objective of equity allocation, biasing it towards the domestic market may come with potentially huge opportunity costs. Increasingly, institutional investors are shifting from the traditional domestic versus international divide towards an integrated global perspective and a reduction in “home bias”. In this new paradigm, the full equity opportunity set spans the globe. For investors with very long horizons in particular, the opportunity set not only spans the globe but also spans micro caps and frontier markets because with long-term growth as the objective, the natural starting point is an opportunity set that is defined as broadly as possible. Section I of this report provides a comprehensive look at this issue of globalization and the changing landscape of institutional equity investing.

Having established in Section I the rationale for using the global opportunity set as the starting point for asset allocation, Section II examines alternative weighting schemes to determine the geographic asset allocation. While market cap weights are a natural starting point for several reasons, both theoretical and practical, alternative weighting schemes may be attractive for certain reasons. In particular, investors concerned about price inefficiencies or temporary price disequilibria or volatility of security and sector weights may prefer a weighting scheme not based on prices.

Section II focuses specifically on the use of GDP weights to set the country weights in the equity portfolio. Proponents of GDP-weighting highlight several advantages. First, it weights countries based on their economic size, not on the size of their markets, which can sometimes reflect a narrower view of the economy particularly in emerging markets. Second, GDP weighting is not dependent on stock prices which means countries which experience a temporary bubble will not be as heavily weighted as they would be in a market-cap-weighting scheme. Third, GDP weighting has provided increased exposure to emerging markets thus benefiting from the emerging market risk premium. Nevertheless, the success of GDP weighting assumes that economic growth will translate into market returns and that the markets under consideration are sufficiently large, liquid, and representative of their economies. In sum, GDP weights provide another perspective to geographic allocation highlighting the fact that while market cap weights are a natural starting point, an institution’s actual allocation depends on its constraints, preferences, objectives and investment beliefs on additional sources of return.

Section III explores an important dimension to evaluating different geographical weighting schemes – the concentration risk implied by the actual weights themselves. The US for instance comprises roughly 45% of the world’s market cap currently; Europe on the other hand makes up only 25%. This raises the question of whether using a market-cap weighting scheme exposes the investor to significant concentration risk. We delve into the US and Europe cases in greater detail, examining a range of criteria which reflect the risks of these two entities. In our analysis we treat Europe as a single bloc given its integrated economy. While there remains a risk to the continuation of the Euro zone, at least in its current form, for this analysis we assume that the countries that make up Europe will continue to have close economic ties.

Overall, we find that both markets are broad and well-diversified with more similarities than differences. Contagion risks from foreign sources are important for both US and Europe since they have a high exposure to economies abroad. Sovereign event risk, or so-called country factor risk, can also not be diversified away, and to a large extent, cannot be forecast with any great deal of certainty. However, over the long run, both markets have been among the least volatile. Moreover, political and legal institutions are among the most robust in the world, and corporate governance of higher quality. In sum, while there is unavoidable macroeconomic concentration risk in having large weights in the US and Europe, at the same time there are good arguments for having large weights in these markets. Still, some investors may have reason for reducing concentration risk, particularly regarding the current US weight in a market-cap-weighted index. For instance, GDP weighting would result in a lower weight of only 28% to US equities.

Finally, we look at emerging markets equities in Section IV. Emerging markets today constitute a non-negligible part of the opportunity set for global investors. In recent decades, they have allowed investors to take advantage of the relatively greater set of economic growth opportunities in the developing world. Proponents of emerging markets argue for taking advantage of higher growth rates in these markets and a potential risk premium captured by emerging markets. In fact, because forecasts of economic growth do not take into account increases in free float through the effect of market liberalization on ownership structure, they may underestimate the actual growth potential. Proponents also point out the potential diversification benefits emerging markets may bring.

The main risk to emerging market investing remains the possibility that the previous trend of globalization may reverse. In addition, emerging markets are more volatile and can suffer long periods of disruption such as the late 1990s during the Russian Ruble and Asian crises. Finally, governance dimensions such as investor protection and shareholder rights are generally less established relative to their developed market counterparts. In sum, emerging markets are a critical part of the global opportunity set comprising 12% of the global market capitalization currently. We note that if economic weight rather than market weight is used, emerging markets would have a weight of 29%, and using full market cap instead of free float market cap would result in a weight of 16%. Allocations such as these may be considered for investors who are less sensitive to short-term volatility and desire greater exposure to potential long-term economic growth.

Section I: The Globalization of Equity Portfolios

Section I focuses on understanding why the global equity opportunity set is the natural starting point for the equity allocation of a long term investor.

A Globalized Opportunity Set: Reducing Home Bias

Over the past few decades, globalization of economic activity and increased integration of capital markets have led to a dramatic expansion of the equity universe for international investors. Institutional investors now can access a deeper and broader global equity opportunity set.

The globalization of the equity opportunity set allowed institutional investors to expand their equity investment universe and allocate assets to international equities.[1] However, most institutional investors, and European ones in particular, continue to maintain an investment process that separates equity policy portfolios into domestic and international equities at the strategic level, with a significant "home bias" that over weights domestic or European equities.[2]

Exhibit 1 presents the current levels of home bias in selected European equity markets, as well as the US and Japan, using data from the Coordinated Portfolio Investment Survey (CPIS) conducted by the IMF. The data reveals significant levels of home bias in these major markets, with Japan being the most home-biased, and the US and UK both exhibiting a level of home bias around 52% in 2010. However, Exhibit 1 also shows a decline in home bias over the last decade. In addition, a number of large and leading global pension plans in recent years have moved to a framework where Global Equity is viewed as a single strategic asset class.

Exhibit 1: Equity Home Bias in Selected Countries

Country	1997	2001	2004	2007	2010*
Denmark	79.7%	56.1%	51.4%	48.1%	44.0%
Finland	94.1%	74.4%	51.3%	48.9%	40.3%
France	83.5%	69.4%	59.5%	65.2%	58.3%
Germany	NA	49.9%	43.3%	42.6%	42.0%
Netherlands	70.2%	35.4%	20.1%	11.1%	2.7%
Norway	84.6%	50.4%	46.1%	46.7%	29.6%
Sweden	79.2%	51.1%	50.8%	49.8%	49.6%
Switzerland	NA	57.3%	52.6%	52.1%	51.2%
United Kingdom	75.9%	64.0%	56.1%	55.8%	51.6%
USA	79.0%	69.6%	59.1%	58.8%	52.8%
Japan	92.1%	86.1%	84.7%	85.0%	79.7%
Canada	75.4%	59.7%	63.7%	66.1%	68.4%

Source: IMF (CPIS), MSCI. Home bias is defined as 1 - (actual international equity allocation / market-cap based international equity allocation). 2010 numbers are based on the preliminary CPIS data.

[1] See Aylur Subramanian, Nielsen, and Fachinotti (2009)

[2] For more discussion on this topic, see Kang and Melas (2010).

The Expansion of the Global Opportunity Set: Evolution of Market Portfolio

The potential benefits of global investing are grounded in modern portfolio theory -- in particular the Capital Asset Pricing Model (CAPM).[3] In its original form, the Capital Asset Pricing Model (CAPM) suggested that all investors hold a combination of the risky market portfolio and cash, depending on their risk tolerance.[4] Although, the market portfolio - which was defined as a combination of all risky assets imaginable, including equities, fixed income, human capital, etc. - was neither observable nor investable, proxies for the market portfolio were developed.[5] The CAPM (which originally covered only domestic assets) was quickly extended to an international version of the framework, the International CAPM (I-CAPM).[6] According to the I-CAPM, in an efficient and integrated world capital market, the global market portfolio would replace the domestic market portfolio implying that domestic allocations should not exceed the relative country share in the global market portfolio. Since the mid 1970s, broad global indices like the MSCI World Index (developed markets only) and later the MSCI ACWI (developed and emerging markets beginning in 1987) have been used as proxies for the global market portfolio.

Exhibit 2 provides the evolution of global market portfolio as seen by the evolution in the MSCI Global Equity Indices. When MSCI started calculating indices in 1970, the global universe covered only 16 countries consisting of the main developed markets. In the 1980s, with the expansion of global investing, coverage was expanded to 35 countries and the launch of the MSCI Emerging Markets Index. In the 2000s, as global investors started to explore additional opportunities, MSCI responded by significantly extending its coverage once again and launching the Gulf Cooperation Council (GCC) and the Frontier Markets (FM) indices.

*Exhibit 2: The Number of Countries and Securities Included in the Global Equity Opportunity Set**

	1969	1974	1979	1989	1999	2009	2010	2011
Number of countries in the global opportunity set*	16	19	19	35	47	70	71	70
Number of securities in the global opportunity set*	602	1,108	1,109	1,840	2,192	8,802	14,275	14,605

Source: MSCI, data as of year end. Note: * MSCI EAFE Index (for security data) plus USA and Canada (for country data) in 1969, MSCI World Index between 1974 and 1989, MSCI ACWI Index in 1999, MSCI ACWI + Frontier Markets IMI in 2009, MSCI ACWI + Frontier market All Cap Index in 2010 and 2011.

Coverage has also increased in depth as smaller companies were increasingly considered suitable for international investing. The number of securities covered by the MSCI indices has grown from 600 to more than 14000 in the last forty years. Small cap indices are available for all the countries MSCI covers including emerging and frontier markets and micro cap indices for all developed markets countries.

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[3] Markowitz (1952)

[4] Sharpe (1964) and Linter (1965)

[5] In the U.S. investors used the S&P 500 and later the broader Wilshire 5000 as an investable proxy for their market portfolio. The S&P 500 is a market capitalization weighted portfolio of the U.S.'s largest stocks and covers approximately 75% of the U.S. equity universe. The Wilshire 5000 index is the broadest index for the U.S. equity market, measuring the performance of all U.S. equity securities with readily available data. Dennis A.Tito, A new capital market index (1974)

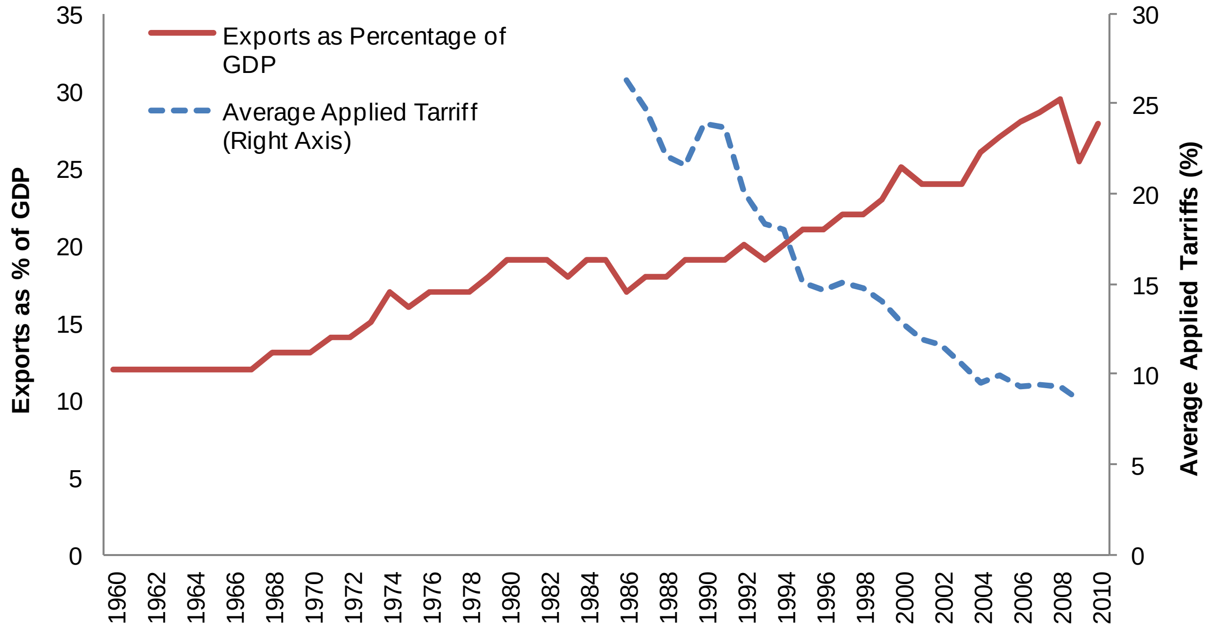
[6] Adler & Dumas, 1983; Solnik, 1977; Stulz, 1981; Wheatley, 1988.

Globalization and Liberalization

Globalization has been one of the most significant trends of the last 40 years. Over this period, trade barriers and tariffs have been greatly reduced or eliminated altogether, foreign direct investments have increased steadily and the scope of companies operations have expanded well beyond local boundaries. In parallel, capital markets around the world have become more accessible and efficient for foreign and domestic investors alike and a common Financial Accounting Standard has been adopted across more than 100 countries.

Illustrating this trend, the Exhibit 3 shows how world exports as a percentage of global GDP have nearly doubled in the last 20 years. One of the main factors behind this increase in exports has been the gradual removal of trade barriers, as illustrated by the decline in average applied tariffs from 26.3% in 1986 to 8.6% in 2009.

Exhibit 3: Share of Exports in the World's GDP and Average Applied Tariffs, 1960 – 2010

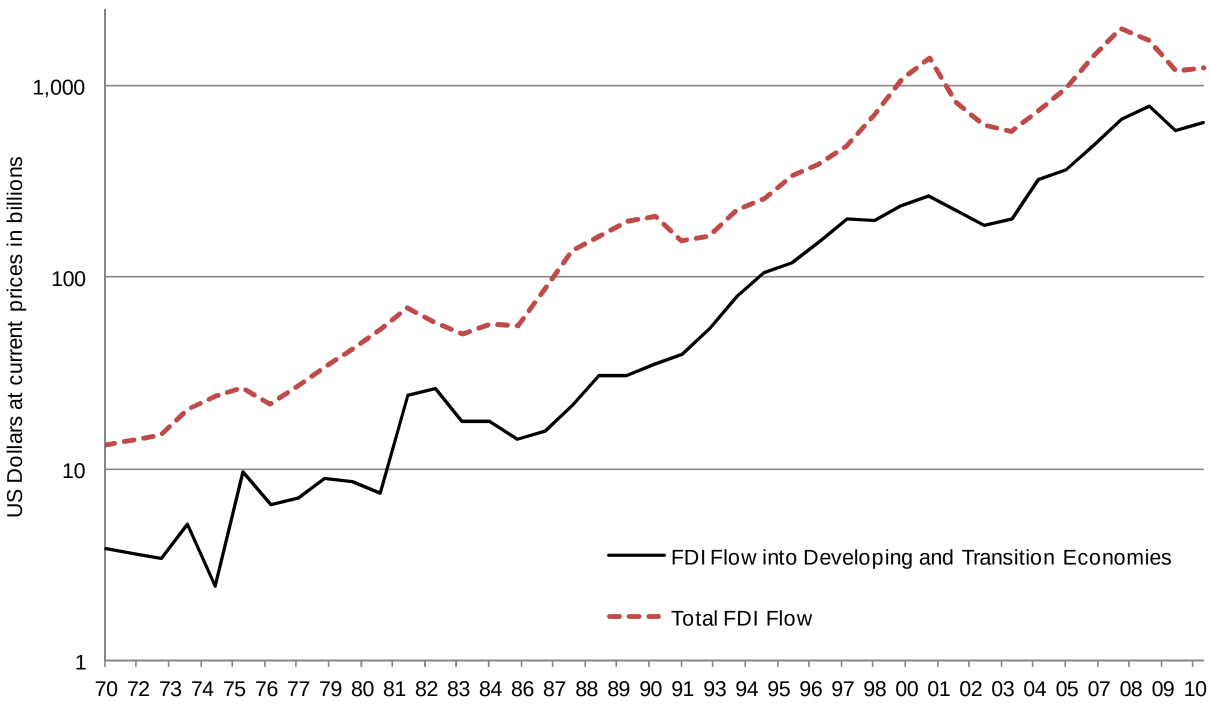


Source: World Bank, UNCTAD

As the importance of foreign business grew, many companies moved from being exporters to set up full-scale operations that take full advantage of opened economies. Others shifted their production sites to take advantage of lower costs, or sought access to supplies of natural resources.

This move by companies outside of their home country is illustrated by the trend in FDI (Foreign Direct Investment). As seen in Exhibit 4, incoming FDI in the world, particularly emerging economies, has been growing over the last decades, albeit subject to global investment cycles.

Exhibit 4: Foreign Direct Investment: Total Flows and Flows to Developing Economies



Source: UNCTAD

As a result of these fundamental transformations in the world economy and in the way companies operate, it has become increasingly difficult to disentangle companies from their global footprint. Exhibit 5 shows the percentage of foreign sales against total sales, as well as the percentage of foreign assets compared to countries in the MSCI World Index.   Investors in these countries can take on significant international exposure indirectly even with purely domestic allocations.

Exhibit 5: Foreign Sales and Assets as a Percent of Total Sales and Assets for MSCI World Countries

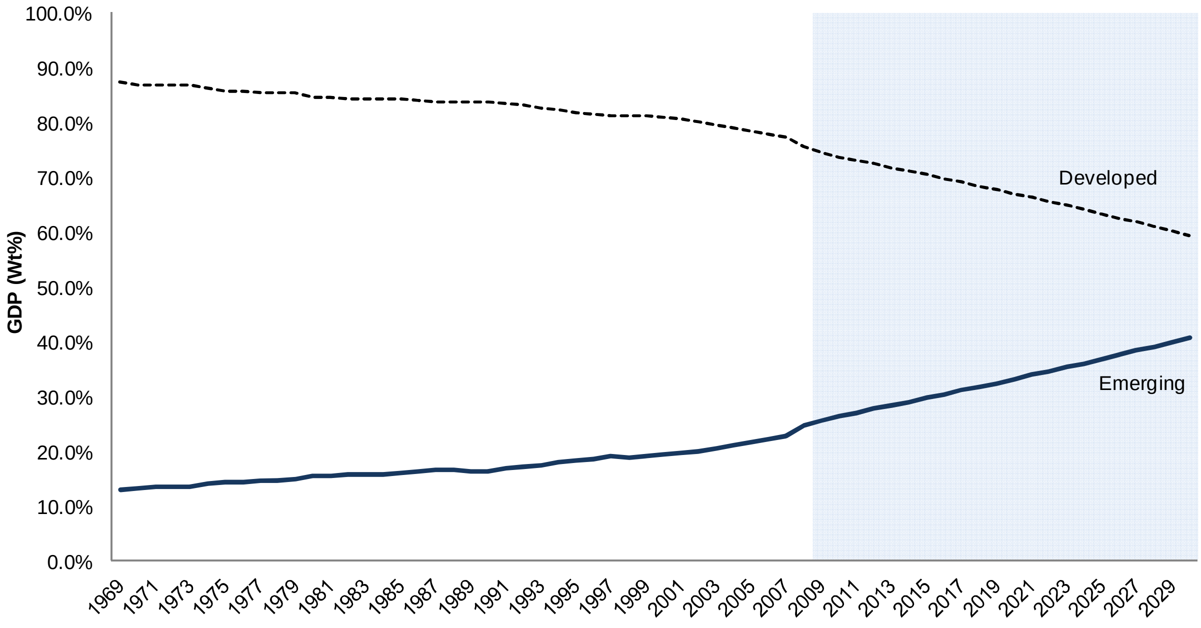
Country	Foreign Sales as % of Total Sales	Foreign Assets as % of Total Assets
Austria	34.7%	24.0%
Belgium	59.1%	60.2%
Switzerland	64.1%	52.9%
Germany	48.0%	36.0%
Denmark	56.3%	37.9%
Spain	39.8%	17.1%
Finland	42.8%	30.4%
France	45.3%	24.2%
United Kingdom	53.9%	45.3%
Greece	50.4%	42.0%
Ireland	68.2%	56.0%
Italy	27.9%	19.8%
Netherlands	57.7%	35.1%
Norway	30.3%	36.5%
Portugal	24.0%	17.0%
Israel	55.6%	41.9%
Sweden	43.5%	28.9%
Australia	31.8%	22.7%
Hong Kong	26.3%	28.2%
Japan	32.7%	18.4%
New Zealand	6.0%	4.0%
Singapore	32.7%	22.5%
Canada	45.3%	39.6%
United States	39.5%	28.9%

Source: MSCI, Worldscope. Data as of 2011

The Increasing Role of Emerging Markets

The increased integration of economies and markets globally has resulted in a shift in the balance of economic weights from the traditional developed economies to developing countries. As a group, the latter have gained weight both in market capitalization and in contribution to the world economy. In only 20 years as shown in the graph below, the real GDP share for emerging countries has more than doubled from 12% in 1969 to over 25% today.

Exhibit 6: Share of real GDP of emerging and developed markets, history and projections



Source: World Bank, USDA

Exhibit 7 details the relative contribution to the World GDP of developed and developing economies by focusing on the 10 largest economies. Based on USDA projections, 20 years from now all four BRIC (Brazil, Russia, India and China) countries will be in the top 10 economies as measured by their nominal GDP, highlighting for developed market investors that "growth may be elsewhere".

Exhibit 7: Top Ten GDP Weights: Past, Present and Future?

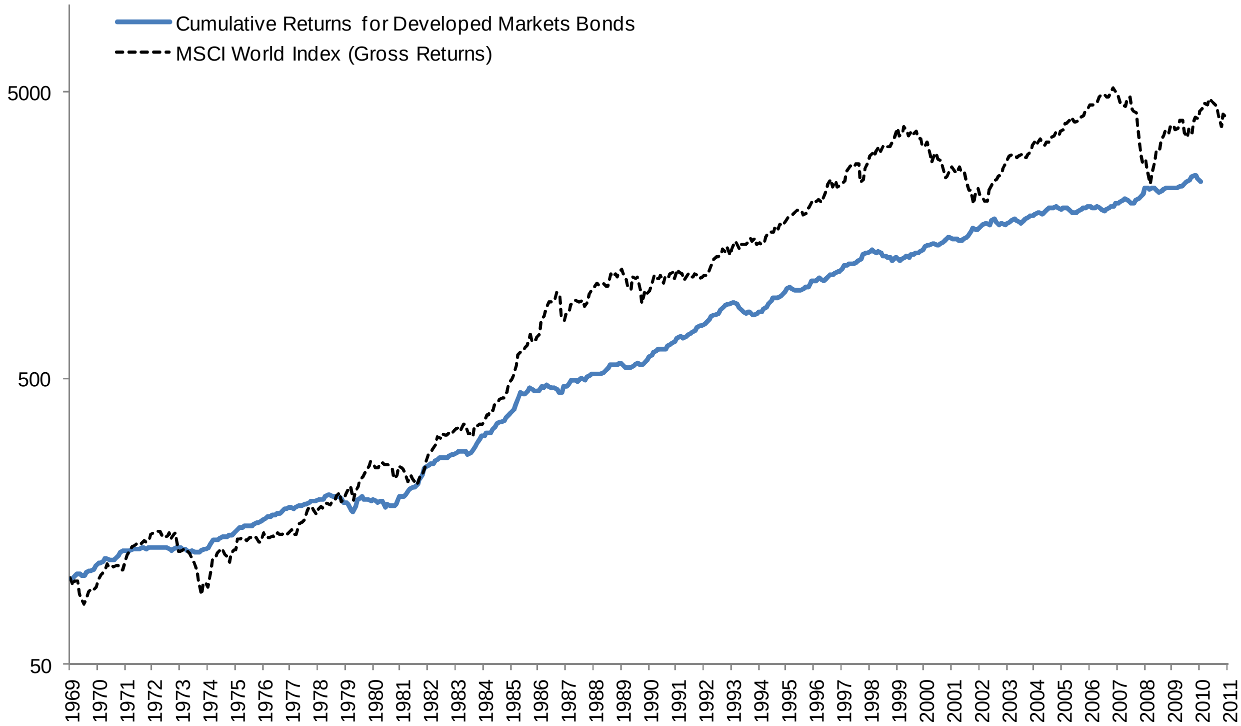
Rank	1987		2011*		2030**	
	Country	GDP Wt	Country	GDP Wt	Country	GDP Wt
1	United States	30.1%	USA	25.4%	United States	22.2%
2	Japan	16.2%	China	10.2%	China	16.9%
3	Germany	6.6%	Japan	9.6%	India	6.1%
4	United Kingdom	4.9%	Germany	5.8%	Japan	5.5%
5	France	4.5%	France	4.5%	Germany	4.2%
6	Italy	3.9%	United Kingdom	3.9%	United Kingdom	3.7%
7	Canada	2.3%	Brazil	3.6%	Brazil	2.7%
8	Brazil	2.1%	Italy	3.6%	Italy	2.2%
9	Spain	1.8%	India	2.9%	Russia	2.0%
10	Russia	1.7%	Canada	2.7%	Canada	2.0%

Source: World Bank, USDA. Note: *Data for 2011 is as of May 31, 2011 ** Projected

Changing Approaches to Equity Allocation

In the context of a multi-asset class portfolio, the policy objective of the equity allocation is generally asset growth maximization. Over the last 40 years, and in spite of two major market crises in the last 10 years, the cumulative return of equities has been higher than for a global bond portfolio, although with higher volatility (Exhibit 8).

Exhibit 8: Cumulative Returns of Developed Global Equities and Bonds (1969 to 2011)*



Source: MSCI. The cumulative returns for developed market bonds is constructed using the long term government bond yields for 10 countries from the OECD. Returns are in USD. *Data for the bond series ends in 2010 in this exhibit.

In the US, institutional investors traditionally allocated the majority of equity investments domestically. There were several rationale for this. First, US equity markets dominated the global equity opportunity set; its share of the MSCI World Index was 70% in 1970. Second, international equity markets were viewed as difficult to access. Third, domestic equities were seen as a better match for domestic liabilities. Finally, currency risk was considered an unavoidable part of international equity investing. In the last few decades, these rationales have become harder to sustain. US markets have fallen in their share of global market cap, accessibility to international capital markets has generally improved[7], domestic equities have demonstrated that they provide no better link to domestic pension liabilities than global equities, and short term currency risk has been made manageable through the availability of hedging instruments[8]. For more detailed discussion on long term currency risk, please refer to Appendix A.

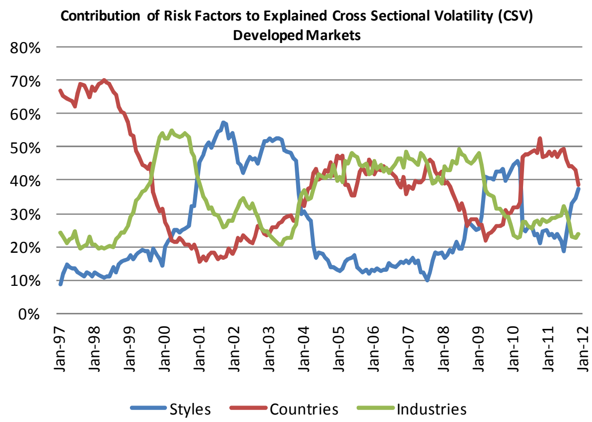
[7] Barriers to foreign investment have been lifted or reduced in most countries and market infrastructure improvements have contributed to lower costs and lower operational risks. Most developed markets now trade at similar levels of efficiency. The consolidation of stock exchanges (for example NYSE Euronext or Nasdaq OMX) and competition within markets are likely to accelerate this trend.

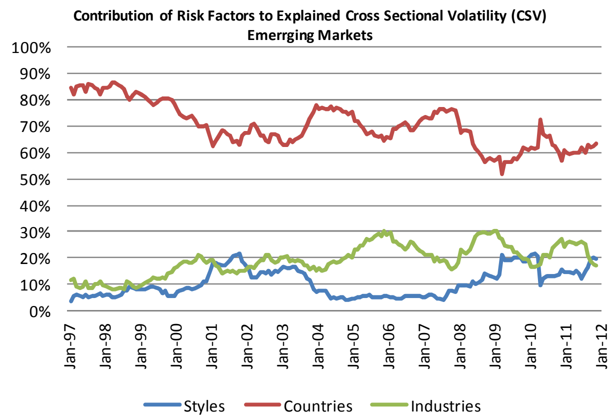
[8] The long-term hedged and un-hedged non-U.S. equity performance for U.S. investors has been quite similar, validating the argument that prices of cross-border real assets tend to equilibrate over time. For investors with long horizons, currency risk has been to shown to be relatively less important than equity risk.

With the exception of the first, similar changes have also occurred for European institutional investors. In Europe, historically there has been a regional approach to equity allocation, which uses preset fixed weights for the various regions , and which now faces fundamental challenges. This regional approach may reflect, in part, the historical path that European institutional investors took in expanding their equity opportunity set, first from domestic equities to European equities, then to international developed markets with regional mandates, and finally to emerging markets. It may also reflect the perception that regional/country factors are of foremost importance to equity allocation, which was historically the conventional wisdom.

In today's more global economy, there is growing evidence that regional equity markets are converging, and that country factors are becoming relatively less important in driving the variations in global security returns. Exhibit 9 shows the proportion of return cross-sectionally that is explained by countries, industries, and styles (risk premia).[9] Over the last decade, global industry and style factors have been more important in certain years than country factors in explaining developed market returns. Meanwhile, in emerging markets, the story is quite different; here, country factors have been and remain more important than industry and style factors.

Exhibit 9: Risk and Return Drivers in Developed and Emerging Markets





Source: MSCI

The increasing importance of industries as determinants of global security returns can also be seen in the heterogeneity of sector returns in the last decade. Exhibit 10 shows the dramatically different performance of the three best-performing global sectors (Energy, Materials, and Consumer Staples) and the three worst-performing sectors (Information Technology, Telecommunications Services, and Financials) over the last ten years, relative to global equities (as measured by MSCI ACWI).

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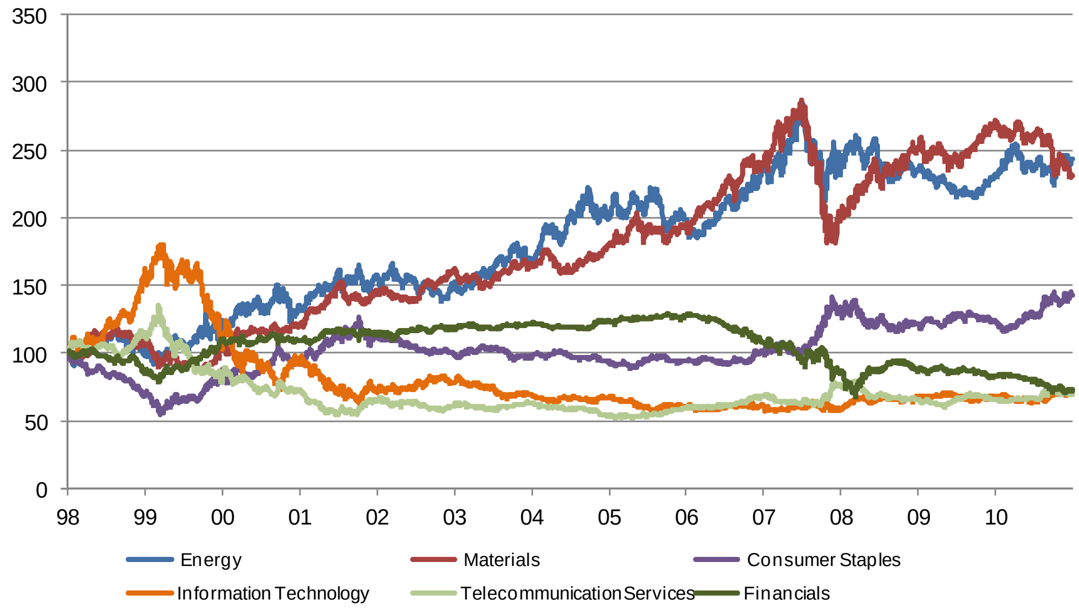
[9] Countries, industries, and styles (or risk premia) are identified using the Barra Global Equity Model (GEM2). There are 134 factors in the model. Here, we take the standard deviation of cross-sectional component returns for individual stocks, where the component returns are the contribution to return to each stock from each source of risk. The ratios of the computed standard deviation to the whole are shown. Standard deviations are computed with a weighting scheme based on market capitalization of the individual stocks. The final measure shown in the exhibit is the contribution from factors to cross-sectional volatility (CSV), also called cross-sectional standard deviation or cross-sectional dispersion. Note that the ratio is smoothed by taking the average over the past 12 months. .

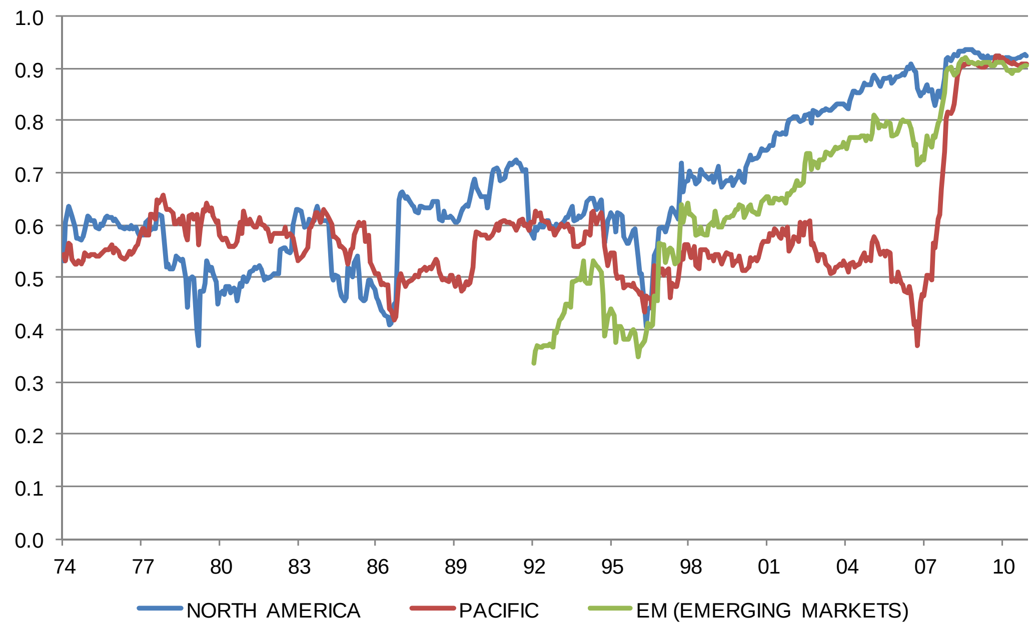
Exhibit 10: Performance of Selected Global Sectors Relative to Global Equity



Source: MSCI, performance is in USD.

With industry membership becoming more important to stock returns, country membership has necessarily become less important. Not surprisingly, correlations between European equities and other regional equity markets have risen significantly over the last decade (Exhibit 11).

Exhibit 11: Rising Correlation between European Equities and Other Regional Equities



Source: MSCI

The increasingly global nature of business activities and the increased integration between global financial markets has led to a marked convergence among regional equity markets, even if the recent global crisis has exacerbated the extent of the convergence. This trend has weakened the traditional framework of regional allocations used by European investors. Moreover, as asset growth is the main objective of equity allocation, biasing it towards the domestic market may come with potentially huge opportunity costs.

In this new paradigm, the full equity opportunity set spans the globe and is the natural starting point for equity allocation. A representative benchmark or index must be similarly broad but still investable. The MSCI Global Investable Market Indices Methodology was developed with this goal in mind. Today, the MSCI ACWI spans both developed and emerging markets and encompasses 45 countries.

Summary

The last few decades have seen the increasing globalization of economies accompanied by the integration of financial markets. This trend has led to a marked convergence among regional equity markets and has pushed investors from the traditional domestic versus international divide (or regional divide) towards an integrated global perspective. At the same time, there has been a decrease in the relative preference investors have for domestic equities ("home bias"). Institutional investors across the world have gradually recognized the traditional rationale for home bias has weakened. As asset growth is the main objective of equity allocation, biasing it towards the domestic market may come with potentially huge opportunity costs. In this new paradigm, the full equity opportunity set spans the globe and is the natural starting point for equity allocation.

Section II: Alternative Weighting Schemes: Market-Cap Weighting versus GDP Weighting

Having established in Section I the rationale for using the global opportunity set as the starting point for asset allocation, in this section we examine the rationale for alternative weighting schemes to determine the geographic asset allocation, with a focus on the use of GDP weights to set the country weights in the equity portfolio.

Market Capitalization Weighting versus Alternative Weighting Schemes

A capitalization-weighted index is an index whose components are weighted according to the total market value of their outstanding shares. The impact of a component's price change is proportional to the issue's overall market value, which is the share price times the number of shares outstanding. There are many reasons why market-cap-weighting has been the dominant standard for stock market indexes. First, market-cap-weighted indices offer an objective way to describe the composition of the opportunity set using capitalization as the proxy for size. Second, they are relatively simple to calculate since the weightings of index components automatically adjust as stock prices change daily. Market-cap-weighting is also consistent with a passive buy and hold strategy. Third, the weighting scheme favors stocks with higher trading liquidity and capacity since it tilts towards larger companies.

However, in the presence of price inefficiency and mean reversion, the capitalization weighting scheme can be less than desirable when price bubbles and other temporary price disequilibria will affect weights. This may result in performance drag and volatility of security and sector weights resulting in excessive volatility in returns.

Alternative weighting schemes have been proposed which do not use prices in the weighting. An equal-weighting scheme for instance results in less volatile industry weights. Other alternative weighting schemes which aim to reduce volatility include risk-weighting, minimum volatility, and diversity-weighted. Other weighting schemes aim to enhance returns. One example is weighting based on fundamental characteristics such as price-to-book-value. These and other weighting schemes are further discussed in Melas, Briand, and Urwin (2011).

GDP Weighting of Global Equities

Market-cap-weighted indices reflect the available investment opportunity set in public equity markets. By design, they ignore any unlisted companies, whether privately held or state-owned, since these are not accessible to the investing public. One of the oldest alternative weighting schemes is one that weights countries by their Gross Domestic Product (GDP). Consequently, the weights of countries in the GDP-weighted index will represent the relative importance of a country’s economy as opposed to the size of its equity market.

MSCI GDP Weighted Indices were first launched more than 20 years ago. The MSCI World GDP Index, reflecting developed markets, aimed at the time to address the issue of the large weight of Japan in the MSCI World Index. Later, the GDP-weighted indices were extended to cover emerging markets. Within emerging markets, weighting based on economic size rather than market capitalization was a way to address the divergence between economic size and market size of many countries with the faster growing economies. The idea was that developing countries would progressively adopt market-oriented policies in a globalizing world. For further discussion of emerging markets, see Section V.

The GDP-weighting scheme overweights (underweights) countries with economic weight greater (smaller) than the market capitalization weight. According to the MSCI GDP weighting methodology, the weights of the countries in the index are set in May of each year to each country's nominal GDP as a percentage of the total. Note that between the May rebalancing, the country weights naturally evolve with changes in the countries' prices and market capitalizations.

Exhibit 12 summarizes the effects of GDP-weighting. Within developed markets, the largest overweights are to Japan, Germany, and Italy. Meanwhile the largest underweights are to the USA, UK, and Switzerland. When emerging markets are added to the developed markets universe, the largest overweight becomes China, with India, Russia, Brazil, and Mexico all appearing in the top 10 overweights. In both cases, GDP-weighting implies a greater allocation towards Europe.

Exhibit 12: Top 10 Over-and Underweighted Countries in MSCI GDP-Weighted Indices

Developed Markets Only	MSCI World GDP-Weighted Index	MSCI World Index	Difference	Developed and Emerging Markets	MSCI ACWI GDP-Weighted Index	MSCI ACWI Index	Difference
Top 10 Overweights							
JAPAN	15.34%	9.36%	5.98%	CHINA	9.83%	2.23%	7.60%
GERMANY	7.62%	3.46%	4.16%	JAPAN	10.68%	8.16%	2.52%
ITALY	4.20%	0.99%	3.21%	GERMANY	5.31%	3.02%	2.29%
SPAIN	3.23%	1.39%	1.84%	ITALY	2.92%	0.86%	2.06%
FRANCE	5.68%	3.88%	1.80%	INDIA	2.68%	0.85%	1.82%
NETHERLANDS	1.86%	1.04%	0.81%	RUSSIA	2.58%	0.87%	1.71%
BELGIUM	1.11%	0.41%	0.71%	BRAZIL	3.46%	1.89%	1.57%
NORWAY	1.05%	0.40%	0.65%	MEXICO	1.86%	0.59%	1.27%
AUSTRIA	0.69%	0.10%	0.59%	SPAIN	2.25%	1.21%	1.04%
IRELAND	0.56%	0.11%	0.45%	INDONESIA	1.37%	0.37%	0.99%
Top 10 Underweights							
USA	39.46%	52.07%	-12.61%	USA	27.49%	45.41%	-17.92%
UNITED KINGDOM	5.87%	9.77%	-3.90%	UNITED KINGDOM	4.09%	8.52%	-4.44%
SWITZERLAND	1.28%	3.60%	-2.33%	SWITZERLAND	0.89%	3.14%	-2.25%
CANADA	3.85%	5.16%	-1.31%	CANADA	2.68%	4.50%	-1.82%
HONG KONG	0.56%	1.21%	-0.65%	AUSTRALIA	2.24%	3.28%	-1.05%
AUSTRALIA	3.21%	3.76%	-0.55%	TAIWAN	0.70%	1.39%	-0.69%
SWEDEN	1.00%	1.24%	-0.24%	HONG KONG	0.39%	1.05%	-0.66%
SINGAPORE	0.54%	0.73%	-0.19%	SWEDEN	0.70%	1.08%	-0.38%
FINLAND	0.51%	0.39%	0.12%	SOUTH AFRICA	0.65%	0.97%	-0.32%
ISRAEL	0.47%	0.27%	0.20%	SINGAPORE	0.38%	0.64%	-0.26%
Dev. Europe ex UK/Switz.	44.04%	26.54%	17.51%	Dev. Europe ex UK/Switz.	21.25%	12.64%	8.61%

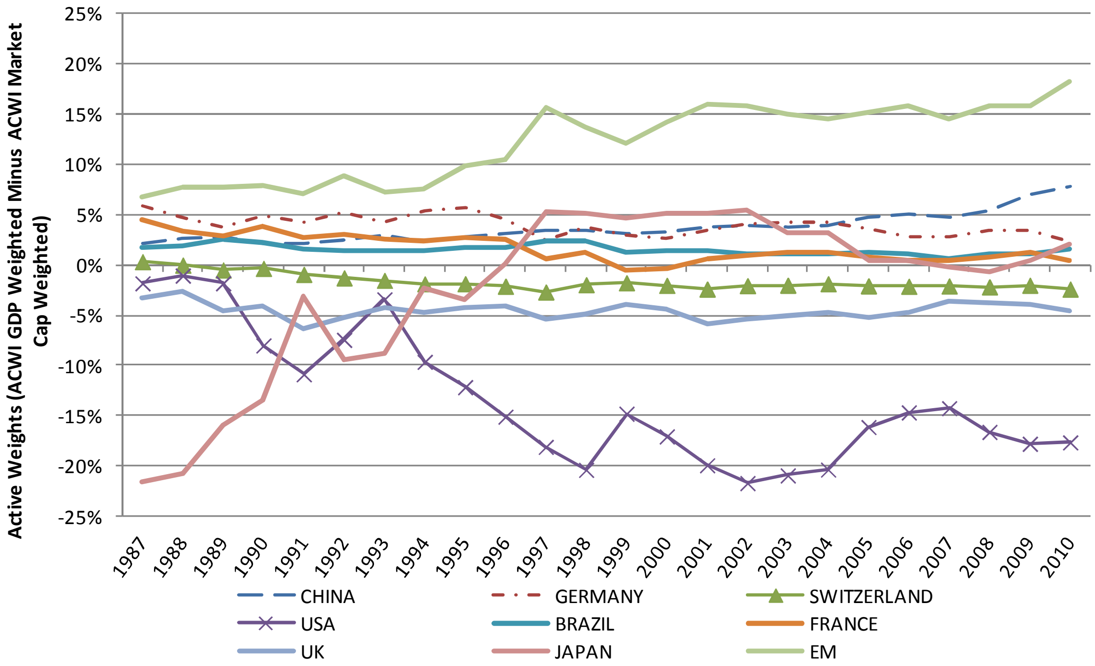
Source: MSCI. Data as of November 30, 2011.

Over time, of course, these weights have not remained constant. Exhibit 13 displays the difference between the GDP weight and the market capitalization weight of select countries and emerging markets in MSCI ACWI.

Japan began in 1988 as a large underweight in the GDP index – its GDP weight was 19.3% while its market-capitalization weight is 40.8%. However, after the burst of the asset price bubble, the underweight was progressively reduced. Today, Japan has the largest overweight amongst developed markets.

Some countries have had more stable differences between economic and market capitalization weights throughout the history of MSCI ACWI. The large economies of continental Europe, such as Germany, Italy, and France have been persistently over-weighted in the MSCI ACWI GDP Weighted Index. This may be explained by a relatively high proportion of companies not publicly listed in these countries. Meanwhile, the US has consistently been underweighted throughout history.

Exhibit 13: Difference between GDP and market capitalization weights of select countries and emerging markets in MSCI ACWI (1988-2010)



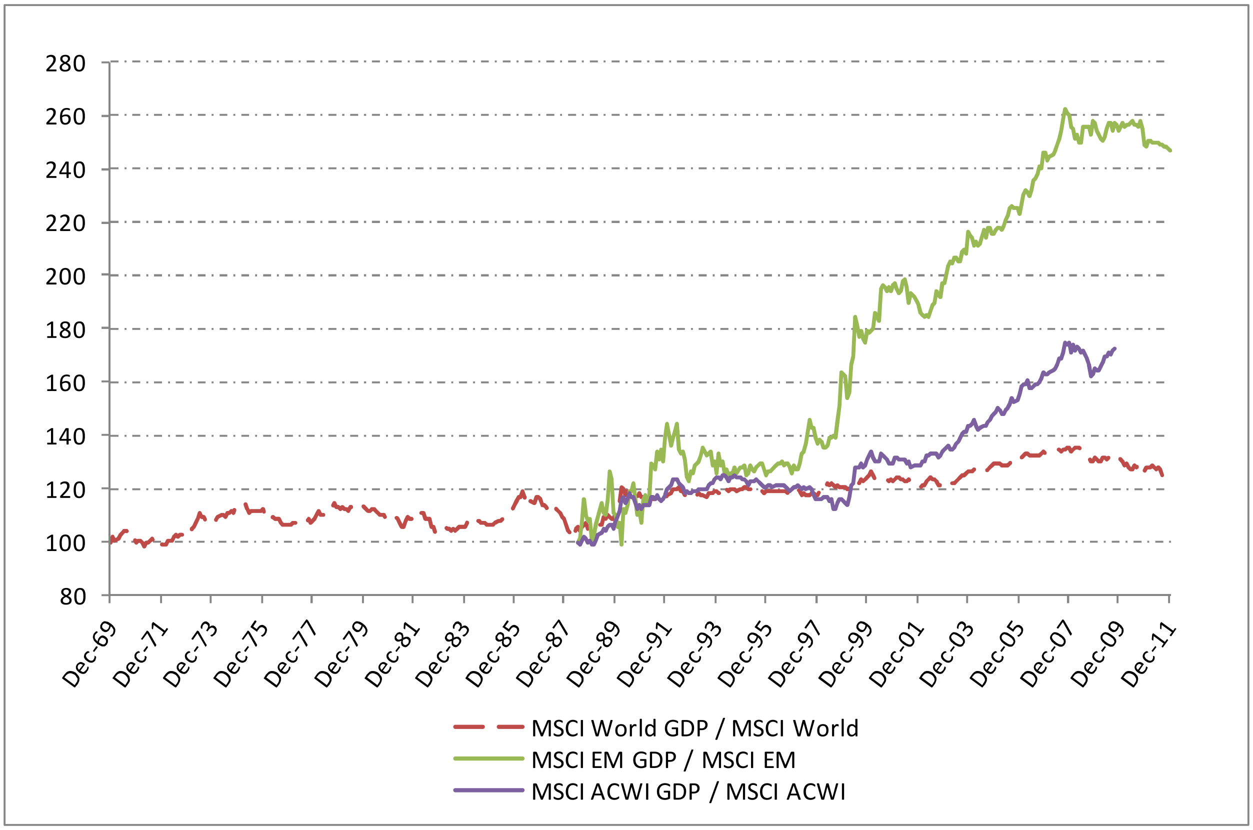
Source: GDP figures from the World Bank. Market capitalization weights from MSCI. A note on timing: GDP for 2010 is reported in June 2011. It is compared against market cap as of June 2011.

Since 1987, the overweight of emerging market countries in MSCI ACWI has grown from 6.8% to 18.2%. The EM GDP weight has been growing significantly faster than the market capitalization weight.

Risk and Return

The different weight distribution has led to long-term performance differentials between GDP-weighted indices and their market capitalization weighted counterparts. Exhibit 14 shows the performance of three GDP weighted indices (MSCI World, MSCI EM, and MSCI ACWI GDP Weighted Indices) relative to their market capitalization weighted benchmarks.

Exhibit 14: Relative performance of the MSCI World, MSCI EM, and MSCI ACWI GDP-Weighted Indices



Source: MSCI. Monthly data as of December 31, 2011 in USD. MSCI EM and MSCI ACWI GDP Weighted Indices are simulated before 2005. The MSCI World GDP Weighted Index is simulated before 1988.

Over the history, all three GDP weighted indices have outperformed their market capitalization weighted counterparts. The effect of the Japanese asset price bubble is particularly striking at the end of the 80s: the GDP-weighted variant of the MSCI World Index underperforms and then sharply outperforms its market capitalization weighted counterpart. Also, the impact of adding emerging markets is striking.

Exhibit 15 shows performance measures by sub period. The only decade where the GDP-weighting scheme underperforms the market-cap-scheme is in the 1980s. Even then, the return-to-risk ratio remains higher.

Exhibit 15: Performance of Global GDP-Weighted and Market Cap-Weighted Indices (January 1970 to December 2011)

	Market-Cap Weighted Index	GDP-Weighted Index
Annualised Return	9.3%	10.5%
Annualised Risk	15.3%	15.4%
Return-to-Risk	0.61	0.68
1970-1979		
Annualised Return	7.0%	8.3%
Annualised Risk	14.1%	13.4%
Return-to-Risk	0.50	0.62
1980-1989		
Annualised Return	20.0%	19.8%
Annualised Risk	14.7%	14.4%
Return-to-Risk	1.36	1.38
1990-1999		
Annualised Return	11.7%	13.2%
Annualised Risk	14.1%	13.4%
Return-to-Risk	0.83	0.99
2000-December 2011		
Annualised Return	1.2%	2.8%
Annualised Risk	17.4%	18.9%
Return-to-Risk	0.07	0.15

The MSCI ACWI GDP-Weighted Index and MSCI ACWI are shown here. Performance is in USD. Prior to December 1987, the MSCI World Index is used in place of the MSCI ACWI. Prior to July 2000, the MSCI World GDP Index is used in place of the MSCI ACWI GDP Index. Geometric average annualized returns are shown. Source: MSCI.

In evaluating alternative weighting schemes, investors may also be interested in characteristics such as downside tail risk, betas, and correlation to the market. As seen in Exhibit 16, a beta and correlation close to 1 suggests that the GDP-weighted index behaves very similarly in these respects to the MSCI ACWI. Moreover, the measures of extreme risk, both empirical conditional Value-at-Risk (VaR)[10] and the average returns during the crises periods shown are also quite comparable.

[10] Conditional Value-at-Risk is also known as Expected Shortfall. We calculate this empirically as the average monthly loss (not annualized) once the VaR threshold of 95% or 99% has been exceeded.

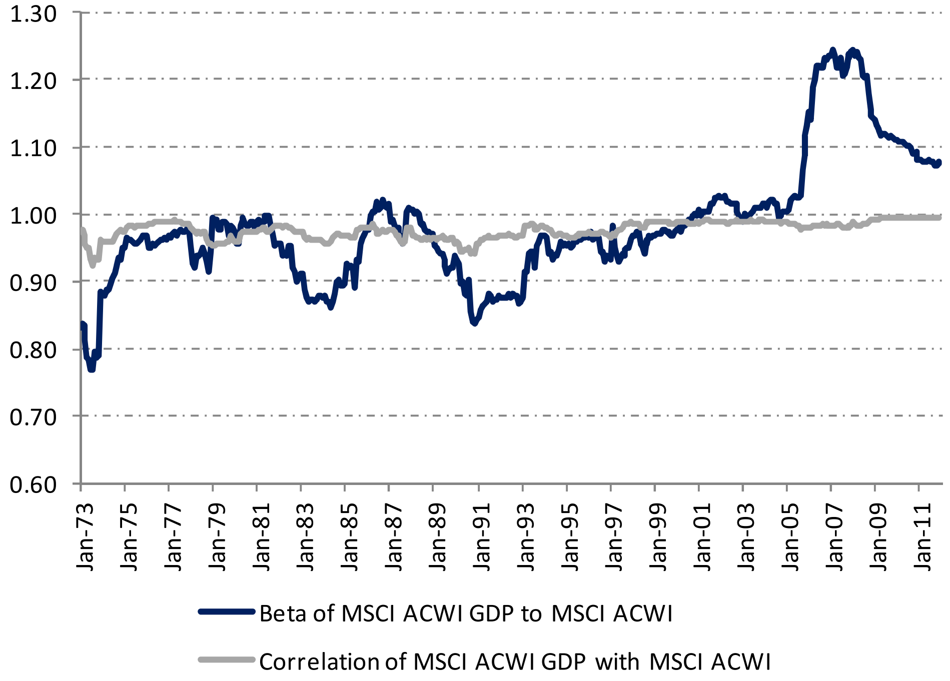
Exhibit 16: Extreme Risk, Betas, and Correlations

	Market-Cap Weighted Index	GDP-Weighted Index
Average Monthly Return	1.0%	1.0%
Standard Deviation	4.2%	4.0%
Skewness	-0.3	-0.5
Kurtosis	1.6	2.3
VaR (95%)	-5.9%	-5.4%
VaR (99%)	-10.5%	-10.3%
Conditional VaR (95%)	-9.0%	-9.3%
Conditional VaR (99%)	-13.5%	-13.8%
Average Negative Return	-3.0%	-2.7%
Average Positive Return	3.5%	3.4%

Note: Geometric average monthly return in USD, is shown above. The MSCI ACWI GDP-Weighted Index and MSCI ACWI are shown here. Prior to December 1987, the MSCI World Index is used in place of the MSCI ACWI. Prior to July 2000, the MSCI World GDP Index is used in place of the MSCI ACWI GDP Index. Geometric average monthly return is shown above. Average monthly return is the unannualized geometric avearge of monthly returns. Standard deviation is that of monthly returns, also unannualized. Both skewness and kurtosis are defined in the standard way; kurtosis is excess kurtosis here. Value-at-Risk is the realized monthly percentile loss at the relevant threshold. Conditional Value-at-Risk is the average loss once the threshold has been exceeded. Average negative and positive returns are simple averages conditional on the returns being negative or positive respectively. Source: MSCI

The beta and correlation can of course change over time. In Exhibit 17, we plot rolling three-year trailing beta of the MSCI ACWI GDP-Weighted index relative to the parent ACWI index. We also plot rolling three-year correlations. The beta of the MSCI ACWI GDP has ranged roughly between 0.8 and 1.2, peaking during the 2008 Financial Crisis. The correlation between MSCI ACWI GDP and MSCI ACWI has historically been well above 0.9. Since 1999, it has been above 0.99.

Exhibit 17: Historical Betas and Correlations of the GDP-Weighted Index to Market-Cap Weighted Index (Monthly Returns in USD)



The MSCI ACWI GDP-Weighted Index and MSCI ACWI are shown in the exhibit above. Prior to December 1987, the MSCI World Index is used in place of the MSCI ACWI. Prior to July 2000, the MSCI World GDP Index is used in place of the MSCI ACWI GDP Index. Source: MSCI

Attributing Returns

Next we explore which countries contributed the most to the outperformance of the GDP-weighted index over the long run. To do so, we use the Barra Global Equity Model (GEM2) to attribute returns across the various countries. The model defines 134 factors – a World factor, 55 country factors, 8 style factors, 34 industry factors, and 55 currency factors – which capture systematic return globally. These factors are net of each other, estimated in a multivariate cross-sectional regression. The return contributions thus sum to the overall portfolio return. (Appendix B provides more detailed descriptions of the model.)

Exhibit 18 first looks at the country tilts which contributed the most to the outperformance of the MSCI ACWI GDP-Weighted Index over the MSCI ACWI Index. Since 1988, the largest contributor to return was the overweight to Emerging Markets.

Exhibit 18: Countries That Drove Performance (January 1997 to December 2011)

	US	Europe	Pacific	EM
1988 to 2011				
Average Weight Difference (%)	-13.39%	9.65%	-1.05%	12.22%
Annualized Average Returns*	9.56%	10.18%	9.36%	12.60%
January 1988 to December 1999				
Average Weight Difference	-9.57%	11.96%	-1.03%	9.42%
Annualized Average Returns*	19.73%	13.78%	13.42%	17.06%
January 2000 to December 2011				
Average Weight Difference	-17.89%	6.92%	-1.06%	15.52%
Annualized Average Returns*	0.20%	1.60%	-0.22%	8.29%

* The returns shown are geometric average returns to the MSCI indices, in USD. Source: MSCI

Note that the country contributions to return have not been the same in every time period. For instance, in the 1990s, the US underweight dragged down the performance of the MSCI ACWI GDP-Weighted Index. During the 2000s, the overweight to Europe dragged performance down.

Alongside countries, the impact of relative tilts towards sectors and risk premia or styles can also help or hinder return. Exhibit 19 summarizes the contribution to return from the eight risk premia or style factors from the model as well as from the 10 GICS sectors. As with the country factors, these factors capture the return to stocks in a particular industry or with certain fundamental characteristics, net of the other factors in the model. Thus for instance, the return from the Value factor is the return to the index arising from a tilt towards stocks with high book-to-price, after accounting for the stocks' industries, country memberships, and other style characteristics. Note that with the exception of the Momentum and Volatility style factors, stock-level exposures to factors are standardized locally within the company's country of membership. This allows direct comparison of large cap performance in the US versus large cap performance in a smaller emerging market where market cap size is lower on average.

A few factors stand out in Exhibit 19. The MSCI ACWI GDP on average underweighted momentum stocks more than the MSCI ACWI which helped its performance. The GDP-weighted index was also overweight value stocks which also improved returns.

Exhibit 19: The Effect of Risk Premia and Sectors on Returns (January 1997 to December 2011)

	Average Active Exposure	Contribution to Return		Average Active Exposure	Contribution to Return
Style Factors (Risk Premia)			**Industries**		
Momentum	-0.05	0.18%	Energy	0.50	0.05%
Volatility	0.05	-0.02%	Materials	0.95	-0.02%
Value	0.04	0.20%	Industrials	0.31	-0.02%
Size	-0.05	0.02%	Consumer Discretionary	0.17	-0.07%
Size Nonlinearity	0.03	0.03%	Consumer Staples	-1.22	-0.03%
Growth	0.00	-0.02%	Health Care	-2.70	-0.08%
Liquidity	0.04	0.01%	Financials	0.87	-0.08%
Financial Leverage	0.03	-0.05%	Information Technology	-1.84	-0.16%
			Telecommunication Services	2.07	-0.06%
			Utilities	0.90	-0.02%

Source: MSCI. Performance is in USD.

However in general, the return impact of risk premia and sectors is considerably lower than the country effects discussed earlier. The relative importance of these different sources of return is summarized in Exhibit 20. Overall, GDP weighting seems to be an active bet on the country factors with much less impact coming from risk premia or industry tilts. In other words, the outperformance of the GDP-weighted index has historically not come from overweighting small caps or high book-to-price stocks (defined as small caps or high book-to-price within their own markets) so much as it has arisen from differences between the countries themselves.

Exhibit 20: Country Overweights and Underweights Are the Main Drivers of Systematic Returns (January 1997 to December 2011)

Source of Return	Return Contribution
Portfolio Return (MSCI ACWI GDP)	6.68%
Benchmark (MSCI ACWI)	4.07%
Active Return	2.61%
Country Factors	1.19%
Style Factors (Risk Premia)	0.35%
Industry Factors	-0.49%
Specific	1.41%

Source: MSCI

The results discussed in Exhibits 19 and 20 are of course dependent on the modeling assumptions. In particular, the fact that Size and Value characteristics are standardized within countries raises the question of whether GDP weighting results in under- or over-weighting countries that are themselves on average smaller or have better valuations. In Exhibit 21, we show the countries with the main countries/regions along with their average price-to-book-value and market capitalization over various periods. We find that countries which are over-weighted in the GDP scheme tend to have lower price-to-book-value and smaller market cap compared to those that are under-weighted. Thus, it may be that the country factors in part have captured the differences in valuation and size. Alternatively, the return not attributed to any of the factors (i.e., Specific Return in Exhibit 20) may have partly captured these differences.

Exhibit 21: GDP Weights, Price-to-Book Value, and Market Capitalization (Monthly Averages, January 1997 to December 2011)

	Whole Period		1987-1995		1996-2000		2001-2005		2006-2010	
	Average Active Weight	Average P/B	Average Active Weight	Average P/B	Average Active Weight	Average P/B	Average Active Weight	Average P/B	Average Active Weight	Average P/B
USA	-13.4%	2.88	-6.2%	2.25	-17.1%	4.42	-19.8%	3.03	-16.2%	2.44
UK	-4.6%	2.31	-4.4%	2.01	-4.6%	3.31	-5.3%	2.15	-4.1%	2.11
JAPAN	-2.5%	2.22	-11.0%	3.14	4.1%	2.05	3.4%	1.65	0.4%	1.54
DEV. PACIFIC ex JAPAN	-1.0%	1.89	-1.3%	1.76	-0.4%	1.93	-0.6%	1.87	-1.7%	2.13
CANADA	-0.2%	2.00	0.4%	1.60	0.0%	2.28	-0.2%	2.08	-1.5%	2.35
DEV. EUROPE ex UK	9.7%	2.11	15.0%	1.66	4.7%	3.12	7.4%	2.25	7.4%	1.90
EMERGING MARKETS	12.2%	1.89	7.8%	1.84	13.2%	1.69	15.3%	1.80	16.0%	2.22

	Whole Period		1987-1995		1996-2000		2001-2005		2006-2010	
	Average Active Weight	Average Market Capitalization (USD Bill.)	Average Active Weight	Average Market Capitalization (USD Bill.)	Average Active Weight	Average Market Capitalization (USD Bill.)	Average Active Weight	Average Market Capitalization (USD Bill.)	Average Active Weight	Average Market Capitalization (USD Bill.)
USA	-13.4%	6,765.2	-6.2%	2,133.2	-17.1%	7,102.4	-19.8%	9,157.9	-16.2%	11,295.2
UK	-4.6%	1,443.8	-4.4%	571.0	-4.6%	1,451.1	-5.3%	1,823.3	-4.1%	2,444.7
JAPAN	-2.5%	1,956.5	-11.0%	1,821.7	4.1%	1,970.4	3.4%	1,627.5	0.4%	2,452.9
DEV. PACIFIC ex JAPAN	-1.0%	582.2	-1.3%	254.9	-0.4%	518.9	-0.6%	541.5	-1.7%	1,105.6
CANADA	-0.2%	458.6	0.4%	146.7	0.0%	334.6	-0.2%	445.3	-1.5%	989.6
DEV. EUROPE ex UK	9.7%	2,826.6	15.0%	964.7	4.7%	3,221.5	7.4%	3,295.8	7.4%	4,945.8
EMERGING MARKETS	12.2%	1,172.6	7.8%	259.3	13.2%	876.2	15.3%	883.8	16.0%	2,714.2

Source: MSCI

A Discussion of GDP Weighting

A variety of reasons have been proposed as to why GDP weighting has historically resulted in higher returns. Proponents of GDP weighting first argue that GDP weights serve as a better proxy of the natural country weight in the CAPM total market portfolio. According to the CAPM, investors should own the market portfolio which includes all holdings by investors, listed and unlisted. Holding countries in proportion of GDP may bring the weights of countries in the portfolio closer to the natural country weight as it incorporates the non-listed portion of the economy.[11]

Second, GDP weighting is not dependent on stock prices which means countries which experience a temporary bubble will not be as heavily weighted as they would be in a market-cap-weighting scheme. Recall that the MSCI World GDP-Weighted Index was originally created in response to the significant asset bubble in Japan in the 1980s.

Third, GDP weighting has historically provided increased exposure to emerging markets thus benefiting from a significant emerging market risk premium. Advocates of this line of reasoning argue that as these markets progressively open up, their equities will attract inflows that may result in a virtuous cycle. As a result, the market capitalization to GDP ratio of these countries would increase, in part due to above average returns. This implies that GDP weighting could imply a tactical tilt towards these countries in expectation of higher returns.

For detractors of GDP-weighting, several counterarguments exist. First, it is not true that all countries with room to grow their market size end up realizing their potential. Not all countries with relatively larger economies compared to the size of their markets successfully experience strong market growth. Moreover, not all emerging markets for instance have had an easy time liberalizing, take for instance the case of Argentina. As countries seek to expand, political forces and unexpected shifts in consumer demand and production supply have been known to disrupt the process.

Overall, there does appear to be a relationship between GDP growth and equity returns. Dimson, Elroy, and Marsh (2010) for instance find a positive correlation of 0.41 between real GDP growth rates and real equity returns (for developed markets).[12] However, it is important to note that historically the relationship has not been one-for-one. As Arnott and Bernstein (2003) pointed out, the growth of listed

[11] It is important to note that the MSCI indices uses free float market capitalization in constructing market capitalization based weights. This raises the question of how similar GDP-weighted indices are to indices constructed using the full market capitalization for each country. A detailed discussion appears in Appendix C. In all, the correlation between full market cap-derived weights and GDP-weights is not one-for-one. Note however that the free float adjustment impacts the emerging markets much more than developed markets, implying larger weights in emerging markets if a full market capitalization scheme is used. This is qualitatively similar to the results of GDP weighting.

[12] On the other hand, they find a negative correlation between real GDP per capita growth and real equity returns.

companies contributes only a part of a nation's increase in GDP. Strong GDP growth may translate into new enterprises, the raising of additional capital, or state or private shareholders selling their stakes, not necessarily market returns.

A final point is that additional consideration should be paid to instances where a country is in the early phases of liberalization. In these cases, implementing the relatively larger weight implied by GDP may run into foreign investability constraints and/or being limited to a narrow slice of the economy. Early investors in China for instance were limited to a small set of stocks. In such cases, investors may bear a large amount of concentration risk as well as stock-specific risk. These cases highlight the point that the GDP-weighting scheme assumes the market is sufficiently representative of the larger economy.

Summary

One of the oldest alternative weighting schemes is one that allocates countries by their Gross Domestic Product (GDP). Within developed markets, the largest overweights are to Japan, Germany, and Italy. Meanwhile the largest underweights are to the USA, UK, and Switzerland. When emerging markets are added to the developed markets universe, the largest overweight becomes China, with India, Russia, Brazil, and Mexico all appearing in the top 10 overweights. Overall, GDP weighting seems to be an active bet on country factors, allocating more to emerging markets and less to developed markets.

Proponents of GDP-weighting highlight several advantages. First, it weights countries based on their economic size, not on the size of their markets, which can sometimes reflect a narrower view of the economy particularly in emerging markets. Second, GDP weighting is not dependent on stock prices which means countries which experience a temporary bubble will not be as heavily weighted as they would be in a market-cap-weighting scheme. Third, GDP weighting has historically provided increased exposure to emerging markets thus benefiting from a significant emerging market risk premium. The main risk however to GDP-weighting is if growth comes not in the form of market growth but is confined to the closed part of the economy.

Section III: An Examination of Concentration Risk with a Focus on the US and Europe

Different weighting schemes result in various levels of geographical concentration risk. In this section, we discuss concentration risk with a focus on US and European markets.

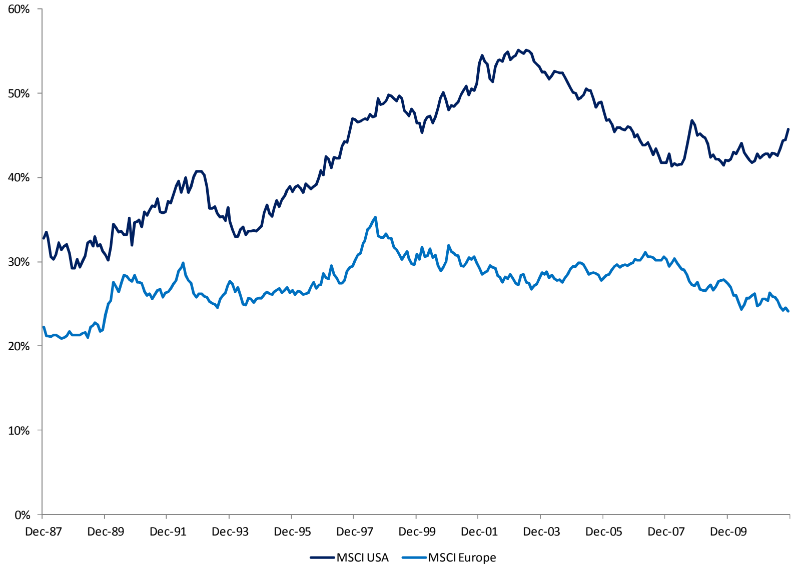
The Issue of Geographical Concentration Risk

Market capitalization weighted indices serve as efficient tools to capture the broad equity market beta through an objective representation of the entire opportunity set, macro consistency, automatic rebalancing, low transaction costs, high trading liquidity, and maximum investment capacity. Per design, market cap indices reflect the size of its constituent companies and/or countries. One potential disadvantage of market-cap-weighting is that in some cases, a single or small group of stocks can represent a large share of the index. For example, a security that has experienced a large run-up in price will have a much larger weight in a market-cap-weighted index. In such cases, changes in this security's price will have a necessarily large impact on the index's return and risk profile. Indices with a large number of names tend to dampen this issue. Hence, the most widely used institutional benchmarks for the US for instance contain upwards of 1,000 names.

At the global level, a similar situation can occur for various countries or regions. A geographically concentrated index will wax and wane with the largest country or countries in the index. The extent to which an index is subject to this dominance can be thought of as geographic concentration risk.

Exhibit 22 shows the ratio of market cap of the MSCI USA Index and the MSCI Europe Index to the global opportunity set (MSCI ACWI). US equity market cap has historically been larger than Europe's. Currently, the US represents about 45% of MSCI ACWI raising the question of whether this represents a great deal of geographical concentration risk.

Exhibit 22: MSCI USA and MSCI Europe as a Share of ACWI (Market Capitalization, USD)



Source: MSCI

The notion of concentration risk in the US or Europe is hard to define and encompasses many different aspects. First, we can look at historical volatility and performance of those markets during past crises. We can further examine the drivers of risk and simulate the impact on performance by decreasing and increasing the weight to US and Europe historically. Second, we can also look at the profile of US and European equities today. To what extent are these markets fairly broad and diversified and/or depend on foreign sources of return?

Note in this section we treat Europe as one unit given its integrated economy. While there remains a risk to the continuation of the Euro bloc, at least in its current form, for this analysis we assume that the countries that make up Europe will continue to have close economic ties.

Return and Risk of US and European Equities

Exhibit 23 summarizes the return and risk of US and European equities over the last forty years. Returns in both USD and NOK are shown. Europe posted somewhat higher returns (in both currencies) over this period. In USD, the volatility of European equities was higher and the risk-adjusted return lower. In NOK, the volatility of European equities was lower and the risk-adjusted return higher. Performance varied from decade to decade with Europe experiencing the largest gains relative to the US in the 1980s and 2000s (up until recently).

Exhibit 23: Summary of Historical US and Europe Performance (Monthly Returns in USD and NOK, January 1970 to December 2011)

	MSCI USA (USD)	MSCI Europe (USD)	MSCI USA (NOK)	MSCI Europe (NOK)
Average Annualized Returns				
1970 - 2011	9.5%	10.1%	9.0%	9.6%
1970-1979	4.6%	8.6%	0.8%	4.6%
1980-1989	17.1%	18.5%	20.6%	22.0%
1990-1999	19.0%	14.5%	21.4%	16.8%
2000-2009	-1.3%	2.4%	-4.5%	-0.9%
2010-2011	8.5%	-3.3%	10.3%	-1.7%
Annualized Standard Deviation				
1970 - 2011	15.7%	17.8%	17.5%	15.7%
1970-1979	15.9%	17.0%	17.2%	15.4%
1980-1989	16.2%	18.0%	19.1%	14.7%
1990-1999	13.4%	14.6%	16.9%	15.4%
2000-2009	16.2%	19.4%	17.0%	17.0%
2010-2011	17.5%	24.6%	11.2%	13.3%
Risk-Adjusted Annualized Return				
1970 - 2011	0.60	0.57	0.51	0.61
1970-1979	0.29	0.51	0.05	0.30
1980-1989	1.05	1.02	1.08	1.49
1990-1999	1.42	0.99	1.27	1.09
2000-2009	-0.08	0.13	-0.26	-0.05
2010-2011	0.49	-0.13	0.92	-0.13

Note: Geometric average is used for average annualized returns above. Source: MSCI

A few measures of downside risk and tail risk are shown in Exhibit 24. Along all measures, European equities have historically had slightly greater downside risk and tail risk. The differences between Europe and US however are relatively small.

Exhibit 24: Downside and Tail Risk Measures (Monthly Returns in USD, January 1970 to December 2011)

	MSCI USA (USD)	MSCI Europe (USD)	MSCI USA (NOK)	MSCI Europe (NOK)
Average Monthly Return	0.8%	0.8%	0.7%	0.8%
Standard Deviation	4.5%	5.1%	5.1%	4.5%
Skewness	-0.4	-0.4	-0.2	-0.5
Kurtosis	1.8	1.9	1.5	1.8
VaR (95%)	-7.2%	-8.3%	-7.1%	-7.2%
VaR (99%)	-10.5%	-13.1%	-11.4%	-11.2%
Conditional VaR (95%)	-9.7%	-10.5%	-10.3%	-10.1%
Conditional VaR (99%)	-14.3%	-16.3%	-15.1%	-14.1%
Average Negative Return	-3.4%	-4.0%	-3.9%	-3.6%
Average Positive Return	3.6%	3.9%	4.0%	3.6%

Note: Geometric average monthly return is shown above. Average monthly return is the geometric average of monthly returns not annualized. Standard deviation is that of monthly returns, also not annualized. Both skewness and kurtosis are defined in the standard way; kurtosis is excess kurtosis here. Value-at-Risk is the realized monthly percentile loss at the relevant threshold. Conditional Value-at-Risk is the average loss once the threshold has been exceeded. Average negative and positive returns are simple averages conditional on the returns being negative or positive respectively. Source: MSCI

If we look next at performance in major crises, again the differences between the US and Europe are relatively minor. As shown in Exhibit 25, the Japan crash, Dot com crash and Subprime crisis had effects across markets.[13] In contrast, the effects of the Sovereign Debt Crisis in Europe have been unprecedented historically over the period and have affected European equity markets much more so than other regions.

Exhibit 25: Performance in Past Periods of Market Stress (Cumulative Return During Period, in Percentages)

A. USD

Market Stress Episodes 1988 to 2011	MSCI USA	MSCI Europe	MSCI Japan	MSCI EM
Japan Crash	-10.3	-10.6	-44.1	-7.7
Asian Crisis/ LTCM	25.3	28.0	-4.5	-22.4
Dot Com Crash	-43.3	-45.1	-58.2	-41.5
Subprime Crisis	-50.6	-59.0	-45.4	-61.4
Europe Sovereign Crisis	20.9	0.9	-3.5	4.5

[13] The Asian/LTCM period shows positive returns for the MSCI USA and MSCI Europe because the period encompasses the rebound.

B. NOK

Market Stress Episodes 1988 to 2011	MSCI USA	MSCI Europe	MSCI Japan	MSCI EM
Japan Crash	-17.7	-17.9	-48.7	-15.3
Asian Crisis/ LTCM	30.0	32.9	-0.9	-19.5
Dot Com Crash	-51.2	-52.8	-64.1	-49.8
Subprime Crisis	-35.5	-46.4	-28.6	-49.6
Europe Sovereign Crisis	18.3	-1.2	-5.5	2.3

The periods are defined as follows: (1) Japan Crash: 12/1989 to 9/1990, (2) Asian Crisis: 11/1997 to 11/1998, (3) Dot Com Crash: 3/2000 to 3/2003, (4) Subprime Crisis: 10/2007 to 2/2009, (5) Europe Sovereign Crisis 1/2010 to 11/2011. Source: MSCI

We next evaluated performance across different types of macroeconomic and market regimes: (1) recession; (2) market volatility (high and low); and (3) asset price bubbles (high and low). Appendix D contains detailed results of this analysis. To highlight some of our findings, we find that historical performance in recession periods has been relatively close; for Europe, average (simple) returns using USD monthly data were 0.01 bps during recessions compared to -0.21 bps for the US. In high volatility regimes (when the level of the VIX is rapidly rising), we find average returns to the US and Europe of -1.9% and -2.4% respectively. Moreover, the historical spread in returns between high and low volatility regimes is relatively close for the two markets.

Simulating Over- and Under-weights to the US and Europe

An intuitive way to study the impact of changing the allocation to US and Europe is to simulate historical performance under different weighting schemes. For instance, we can directly test the results had the global equity portfolio historically pulled back the significant market cap weight to the US. Here we consider two cases, the first case being the simpler of the two approaches.

- Case 1: Each month, we take the North American market cap weight and subtract 10 percentage points and add 10 percentage points to Europe
- Case 2: Each month, we apply a factor of 1.5 to the Europe market cap weight and a factor of 1.0 to North America market cap weight. The new weight in each month is:

$$w_{Europe,new} = w_{Europe,old} * 1.5 * \frac{w_{Europe,old} + w_{NorthAm,old}}{w_{Europe,old} * 1.5 + w_{NorthAm,old} * 1.0} \qquad (3.1)$$

$$w_{NorthAm,new} = w_{NorthAm,old} * 1.0 * \frac{w_{Europe,old} + w_{NorthAm,old}}{w_{Europe,old} * 1.5 + w_{NorthAm,old} * 1.0} \qquad (3.2)$$

In both cases we fix the weight of the Pacific region (developed Pacific and Asia countries) as well as all emerging markets. Exhibit 26 shows the results of the simulations and compares them to the market cap weighted global index (MSCI ACWI) as well as the MSCI ACWI GDP-weighted index from Section II. First, we note that Case 1 and Case 2 deliver very similar returns. Second, we see that both simulations outperform MSCI ACWI historically but neither outperform the MSCI ACWI GDP-weighted index.[14]

[14] Recall that from Exhibit 2, European equities outperformed US equities from 2000 to 2009 but underperformed during the 1990s and 2010-2011 so it is unclear a priori what the effect of giving a higher weight to European equities would have been.

Exhibit 26: Simulation Results (Global Portfolios with Varying North American and European Weights, January 1988 to December 2011, Monthly Returns)

A. USD

	Market Cap Weight (ACWI)	GDP Weight (ACWI)	Simulation Results (Case 1)	Simulation Results (Case 2)
Average Annualized Return				
1988-2011	7.0%	8.7%	7.7%	7.7%
- January 1988 to December 2000	10.8%	12.0%	11.6%	11.7%
- January 2001 to December 2011	2.7%	4.9%	3.2%	3.2%
Average Standard Deviation				
1988-2011	15.7%	16.3%	16.0%	16.0%
- January 1988 to December 2000	14.0%	13.4%	14.2%	14.1%
- January 2001 to December 2011	17.6%	19.3%	18.0%	18.0%
Risk-Adjusted Annualized Return				
1988-2011	0.45	0.53	0.48	0.49
- January 1988 to December 2000	0.77	0.89	0.82	0.83
- January 2001 to December 2011	0.15	0.25	0.18	0.18
Average Weight to North America	45.4%	32.1%	35.4%	38.2%
Average Weight to Europe	27.5%	32.4%	37.5%	34.7%
Average Weight to Pacific	20.9%	17.3%	20.9%	20.9%
Average Weight to Emerging Markets	6.2%	18.2%	6.2%	6.2%

B. NOK

	Market Cap Weight (ACWI)	GDP Weight (ACWI)	Simulation Results (Case 1)	Simulation Results (Case 2)
Average Annualized Return				
1988-2011	6.8%	8.3%	7.5%	7.5%
- January 1988 to December 2000	13.8%	15.0%	14.6%	14.7%
- January 2001 to December 2011	-1.2%	0.9%	-0.7%	-0.7%
Average Standard Deviation				
1988-2011	15.5%	15.6%	15.4%	15.4%
- January 1988 to December 2000	15.4%	14.6%	15.2%	15.2%
- January 2001 to December 2011	15.5%	16.6%	15.6%	15.5%
Risk-Adjusted Annualized Return				
1988-2011	0.44	0.53	0.48	0.49
- January 1988 to December 2000	0.90	1.03	0.96	0.97
- January 2001 to December 2011	-0.08	0.05	-0.05	-0.05
Average Weight to North America	45.4%	32.1%	35.4%	38.2%
Average Weight to Europe	27.5%	32.4%	37.5%	34.7%
Average Weight to Pacific	20.9%	17.3%	20.9%	20.9%
Average Weight to Emerging Markets	6.2%	18.2%	6.2%	6.2%

Source: MSCI

Attributing Return and Risk

Overall return and risk characteristics between the US and Europe have been historically similar, but are there differences in the drivers of returns? Next, we use the Barra Global Equity Model (GEM2) to attribute historical returns and risk. There are four main categories for attribution: Currencies, Countries, Styles (or risk premia) and Industries. A separate World factor reflects a "market" factor. The model estimates factors that reflect the pure return to these categories and can be used to attribute the performance of any index or portfolio. All factors represent systematic sources of return (akin to beta) and are non-diversifiable. (Appendix B describes the model in detail.) Exhibit 27 shows the return and risk from each category over the period January 1997 to December 2011. The single largest contributor to return and risk has been the World factor. The risk from the World factor – 17% and 15.4% for Europe and US, respectively—makes up the majority of risk of the two entities. In other words, the bulk of risk was completely non-diversifiable even if country weights were varied; the US and Europe share a significant joint source of systematic risk.

Exhibit 27: Attribution of Return for US and Europe (January 1997 to December 2011, Barra Global Equity Model, Local Returns)

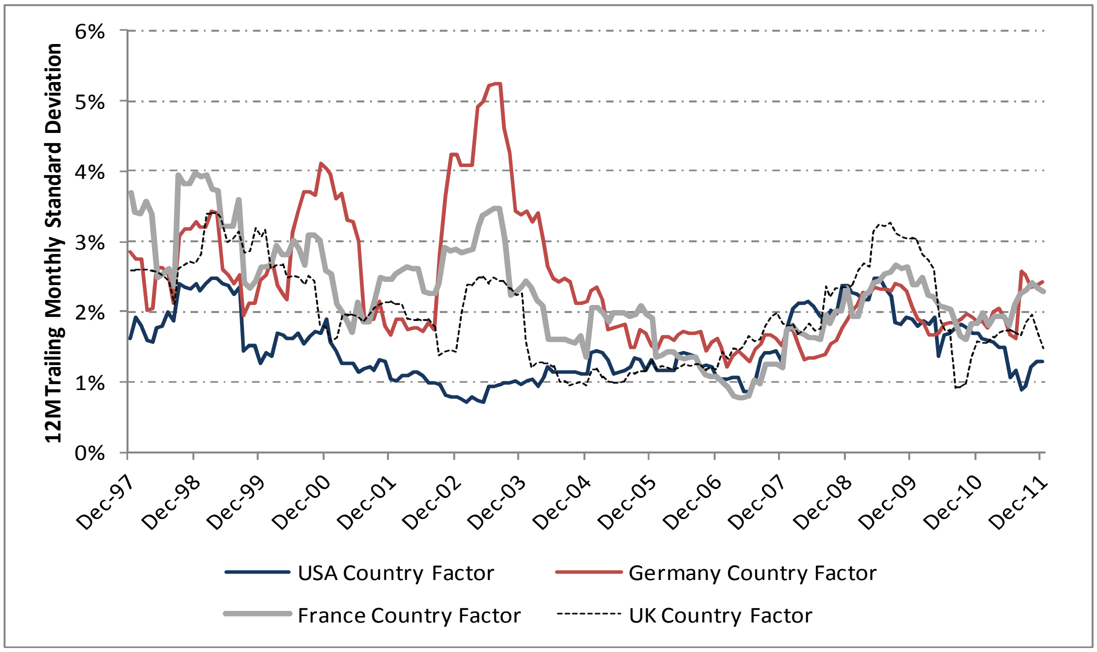
	Contribution to Return		Contribution to Risk	
	Europe	**US**	**Europe**	**US**
Cash	2.8%	2.8%	0.0%	0.0%
Systematic Factors				
World Factor	2.6%	2.8%	17.0%	15.4%
Country Factors	-0.7%	2.4%	5.9%	5.4%
Style Factors	1.4%	-0.6%	1.7%	1.2%
Industry Factors	0.0%	0.6%	1.6%	1.2%
Asset Selection (Specific)	-0.9%	-2.6%	2.1%	2.1%
Total	5.3%	5.4%	18.2%	16.5%

Source: MSCI

After the World factor, it is Country factors that next dominate risk (at 5.9% and 5.4% annualized contributions respectively for Europe and the US).[15] Country risk for Europe is an aggregation of the 20 country factors representing the markets that make up the European market. By far the most volatile European country factors over this period were the UK country factor followed by France and Germany. The trailing 12-month standard deviation of these factors is plotted alongside that of the US country factor in Exhibit 28.

[15] Country risk was highest over this time period but note that the return from style and industry factors was not far off from country factors. This conforms to our discussion in Section I in which we pointed out that country membership no longer dominates the cross-section of stock returns in developed markets the way they did in the 1970s and 1980s.

Exhibit 28: How Risky is Country Risk? (Realized Volatility of Select Country Factors from the Barra Global Equity Model, Monthly Local Returns)



Source: MSCI

Next, the US and Europe's historical sector decomposition and exposure to the style factors are shown in Exhibit 29. With the exception of Information Technology (more prominent in US) and Financials (more prominent in Europe), sector weights were relatively similar between the US and Europe. Style exposures were also generally close with the exception of the Size factor. (As mentioned in Section II, all the style factors with the exception of Momentum and Volatility are standardized country-by-country. Thus, even though Europe appears to have larger stocks, via its 0.26 exposure to the Size exposure, it has in fact a smaller average market cap compared to the US.)

Exhibit 29: Sector Weights and Risk Premia (Style) Exposures for MSCI USA and MSCI Europe (Average, January 1997 to December 2011)

Average Sector Weights (%)			Average Sensitivity to Risk Premia (Relative to MSCI ACWI)		
	US	Europe		US	Europe
Energy	8.5	10.3	Momentum	0.01	-0.06
Materials	3.1	6.7	Volatility	0.02	-0.06
Industrials	10.4	8.6	Value	0.00	0.03
Consumer Discretionary	10.8	9.6	Size	0.06	0.26
Consumer Staples	10.7	10.0	Size Nonlinearity	-0.04	-0.07
Health Care	13.2	10.3	Growth	-0.02	-0.02
Financials	17.4	25.6	Liquidity	-0.09	0.11
Information Technology	18.2	4.6	Financial Leverage	-0.03	0.00
Telecommunication Services	4.5	8.8			
Utilities	3.3	5.7			

Source: MSCI

What can be taken away from Exhibit 29 is that during the observed period the US and European market were relatively similar in terms of sector composition (with two exceptions) and exposure to various risk premia. Since the latter have become more important sources of return (as discussed in Section II), the case can be made that the two markets have converged significantly.

Given the findings so far, it may not be surprising then that the proportion of systematic or non-diversifiable risk is similar in the US and Europe. Exhibit 30 shows the proportion of the standard deviation of cross-sectional returns at each month in time coming from systematic sources (the same factors we have looked at so far).[16] The overall factor share of cross sectional volatility is 22% on average for MSCI USA and 28% on average for MSCI Europe. It is interesting that the share of systematic risk is lower for the US, meaning there is slightly more stock-level diversification there.

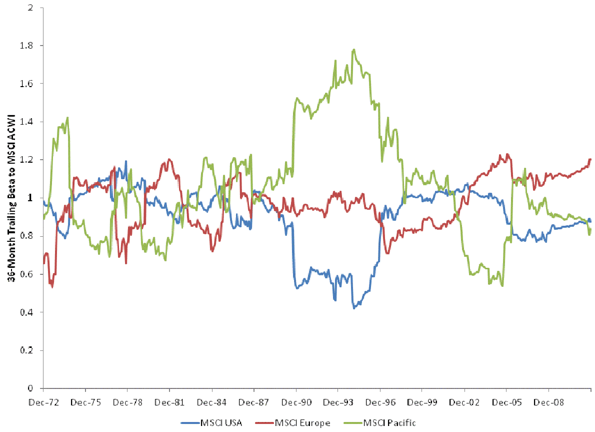
Exhibit III.30: Factor Share of Cross Sectional Volatility (GEM2)

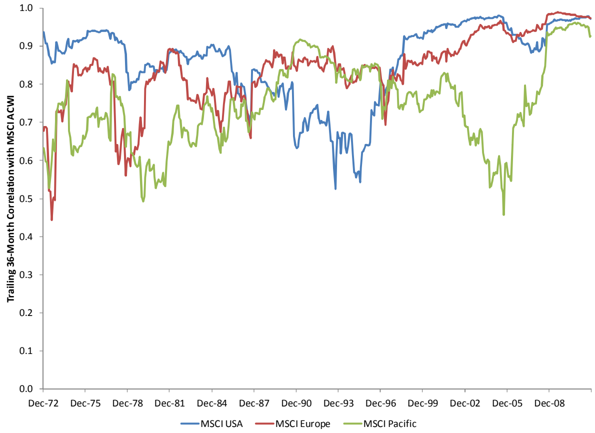
Source: MSCI

In the same fashion, we see that betas and correlations (other measures of systematic risk) are also in the same range for US and Europe. In recent years, particularly compared to the Pacific region, correlations have been above 90% mostly as a result of the Global Financial Crisis and Recession.

[16] Standard deviations are computed with a weighting scheme based on market capitalization of the individual stocks. The ratio is smoothed by taking the average over the past 12 months.

Exhibit 31: MSCI USA and MSCI Europe Betas to the MSCI ACWI (December 1972 to December 2011, Monthly Returns in USD)





Source: MSCI

Foreign Exposure of US and European Equities

As a result of these fundamental transformations in the world economy and in the way companies operate in it, it is today difficult to disentangle companies from their global footprint. Further, it may be perilous to assume that a company's business will always be more reflective of the economy of its country of domicile than of the economy in another part of the world. As an illustration of the above, Exhibit 32 shows the percentage of foreign sales against total sales, as well as the percentage of foreign assets compared to countries in the MSCI World Index in 2001, 2006 and 2011.[17] Note that in this exhibit for European countries, sales to other European countries are not counted as foreign. In sum, by buying domestic equities in many of the countries with high foreign sales or assets, an investor may have taken on significant international exposure.

Exhibit 32: Foreign Sales and Assets by Country

Foreign Sales as % of Total Sales				Foreign Assets as % of Total Assets			
Country	**2001**	**2006**	**2011**	**Country**	**2001**	**2006**	**2011**
New Zealand	11%	11%	6%	New Zealand	3%	6%	4%
Portugal	5%	18%	24%	Portugal	0%	15%	17%
Hong Kong	21%	28%	26%	Spain	0%	17%	17%
Italy	20%	13%	28%	Japan	12%	20%	18%
Norway	33%	30%	30%	Italy	18%	9%	20%
Australia	23%	29%	32%	Pacific	13%	21%	20%
Pacific	16%	27%	32%	Singapore	13%	25%	22%
Japan	15%	26%	33%	Australia	22%	22%	23%
Singapore	14%	27%	33%	Austria	10%	33%	24%
Austria	33%	31%	35%	France	4%	12%	24%
United States	19%	32%	40%	Hong Kong	6%	27%	28%
Spain	25%	25%	40%	Sweden	1%	25%	29%
Finland	6%	43%	43%	United States	14%	21%	29%
Sweden	32%	37%	44%	Finland	0%	30%	30%
Canada	36%	43%	45%	Netherlands	12%	34%	35%
France	33%	35%	45%	Germany	22%	28%	36%
Germany	34%	37%	48%	Norway	25%	29%	36%
Greece	4%	11%	50%	Denmark	4%	26%	38%
Europe	27%	38%	51%	Europe	15%	30%	38%
UK	19%	42%	54%	Canada	24%	33%	40%
Israel			56%	Israel			42%
Denmark	34%	43%	56%	Greece	0%	5%	42%
Netherlands	27%	44%	58%	UK	17%	38%	45%
Belgium	17%	20%	59%	Switzerland	36%	53%	53%
Switzerland	55%	56%	64%	Ireland	21%	20%	56%
Ireland	21%	22%	68%	Belgium	3%	21%	60%

Source: MSCI, FactSet, Worldscope. We use simple averages in aggregating foreign sales and assets at the country level.

[17] Note that growth may be distorted due to changes in disclosure regulations or changes in the universe.

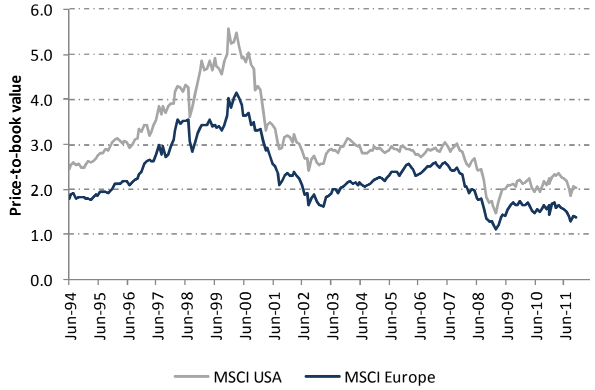
Valuations

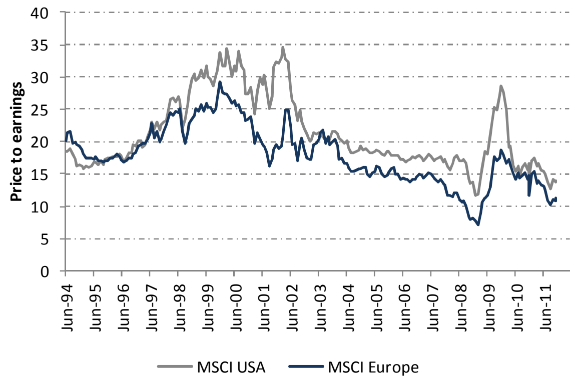
Differences in valuation ratios and growth metrics may also be informative when assessing potential risks to the US and European equity markets. We show the following set of metrics in Exhibit 33:

- Price-to-book value calculated as the current security price divided by the latest reported book value
- Price-to-earnings calculated as the current security price divided by trailing 12-month earnings per share
- Forward price-to-earnings calculated in the same way as P/E only 12-month forward EPS estimates are used. Estimates are derived on a rolling basis from the consensus of analysts' earnings estimates for the current fiscal year and the next fiscal year.
- 12 month trailing earnings-per-share (EPS)[18] calculated as trailing earnings divided by the company's number of shares outstanding and the year-over-year change in this metric
- Dividend yield calculated as the annualized dividend per share figure[19] divided by the current security price
- Dividend per share (as provided by the company) and the year-over-year change in this metric
- Return-on-equity (ROE) calculated as trailing 12-month earnings per share divided by the latest book value per share

On average, the ratios are very similar across the US and Europe. In fact the correlations between US and Europe price-to-book value and price-to-earnings are 0.97 and 0.96 respectively. Correlation in 12-month trailing EPS growth is 0.61. Europe has historically had lower valuation ratios than the US; the spread between the ratios has not changed much over the last 15 years. In recent years, growth in Europe has declined as seen in year-over-year EPS growth.

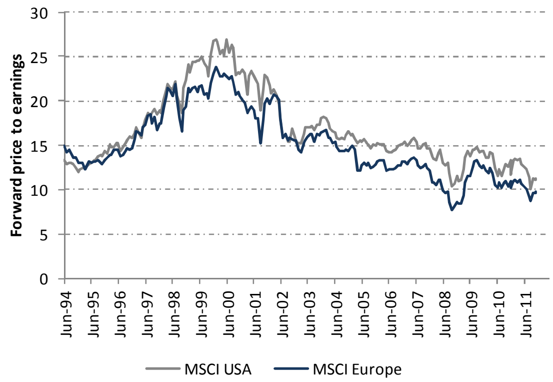
Exhibit 33: Valuation and Growth Characteristics for the US and Europe (June 1994 to December 2011)

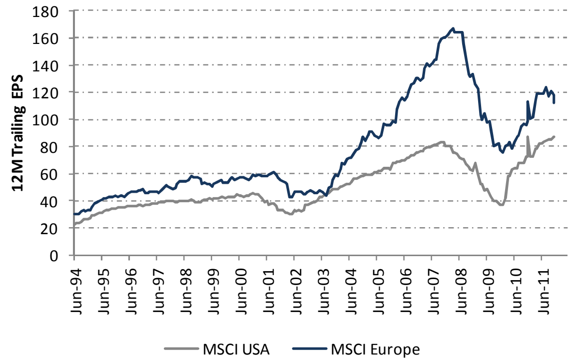


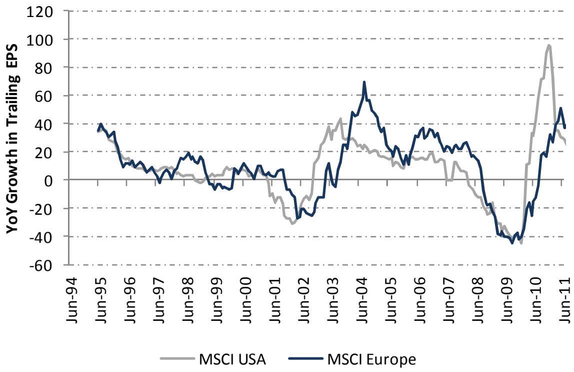


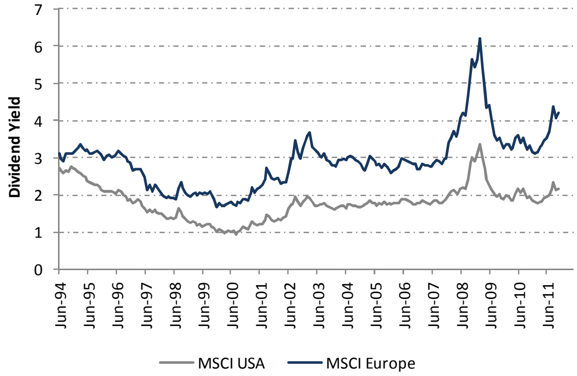
[18] Trailing 12-month earnings per share is divided by the number of shares outstanding at a company level where the trailing 12-month figure is calculated as fiscal period earnings for the last reported period + (3 month earnings for the current interim figure minus 3 month earnings for the comparative interim figure).

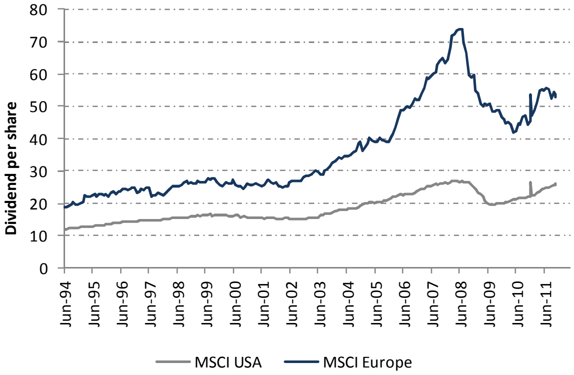
[19] To estimate the current annualized dividend, MSCI takes the sum of all the regular cash distributions (dividends or capital repayments) announced in the last 12 months. In the US and Canada, however, regular cash distributions are annualized by multiplying the latest cash distributions by the frequency of the regular cash distributions' payments. This is done to capitalize on the regularity of the regular cash distributions' information in providing a forward-looking approach for the US and Canada.

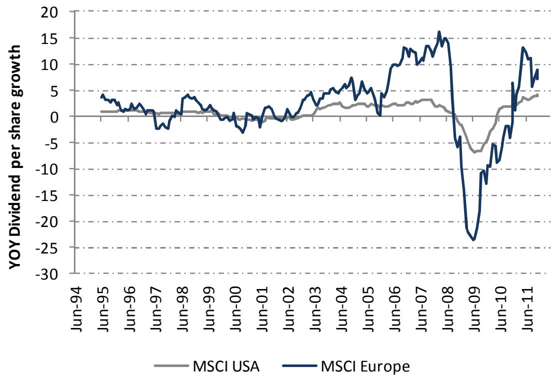

Forward price to earnings
MSCI USA
MSCI Europe

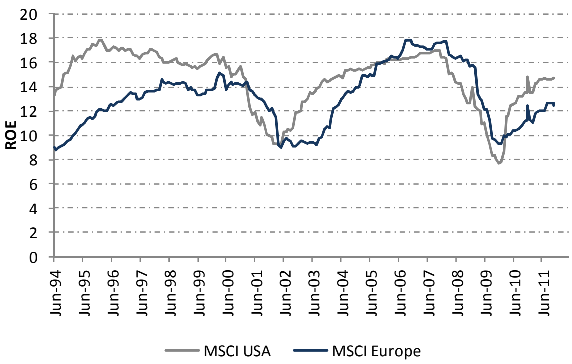

12M Trailing EPS
MSCI USA
MSCI Europe


YoY Growth in Trailing EPS
MSCI USA
MSCI Europe


Dividend Yield
MSCI USA
MSCI Europe


Dividend per share
MSCI USA
MSCI Europe


YOY Dividend per share growth
MSCI USA
MSCI Europe


ROE
MSCI USA
MSCI Europe

Source: MSCI

Summary

Geographical concentration risk can arise when a significant amount of weight is given to a country or region in the portfolio. In this section, we focused on the issue of whether having a large weight in the US presents a source of significant concentration risk. US equities comprise approximately 45% of global market cap currently, raising the issue of whether it is a source of significant concentration risk. In parallel, we also looked at the case for Europe, which typically has received high allocations in European institutional portfolios.

We find that both the US and European equity markets are relatively broad and diverse and exhibit more similarities than they do differences. The convergence of the two markets over the last few decades makes sense in light of the global integration discussed in Section I and the rising importance of industry membership and risk premia characteristics in explaining returns rather than country membership. Over the long run, both markets have also been among the least volatile globally. Europe has earned slightly higher returns in the long run but lower risk-adjusted returns. Moreover, performance in past crises has generally been on par, the exception being the latest period surrounding Europe's sovereign debt challenges.

This raises the question of sovereign risk (or country risk) which is undiversifiable. Historically we have seen that US country risk has been slightly lower than Europe's but they have largely been of the same magnitude. However, an investor concerned about sovereign risk may consider an alternative weighting scheme such as the GDP-weighting scheme discussed in Section II, which has the effect of reducing the weight to the US from 45% to 28% today.

Finally, as both the US and European markets have become more global and thus more integrated, the consequence is that contagion risks are important for both markets.

In sum, the risks to having a relatively large weight to the US and/or Europe in an allocation include:

- Sovereign risk or macroeconomic risk specific to the US and/or Europe
- A high degree of foreign exposure which implies the risk of contagion across regions

On the other hand, reasons in support for a large allocation to these markets include the fact they are:

- Broad, diversified and historically, the least volatile markets
- The largest and most established markets

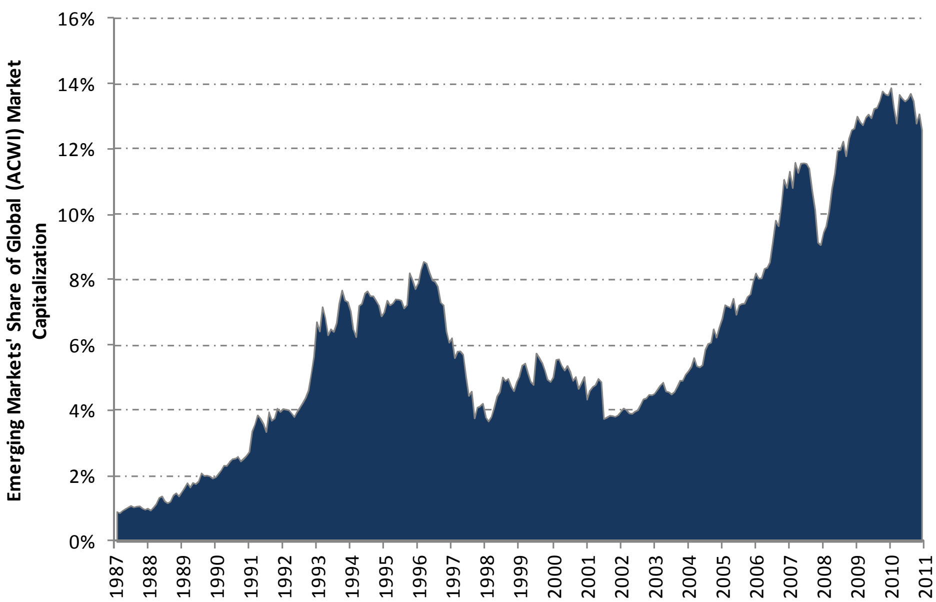
Section IV: Emerging Markets

This section focuses on understanding the risk and return characteristics of Emerging Markets, and in particular, the question of the link of long term economic growth and emerging markets returns.

The Rise of Emerging Markets Since the 1980s

Since the MSCI Emerging Markets Index was introduced in 1988, the weight of emerging markets in the MSCI All Country World Index (ACWI) has grown from less than 1% to over 12% as depicted in Exhibit 34. This has lead to a radical change in the opportunity set available to international investors. During this period, strong economic growth combined with the development of financial markets has dramatically increased the opportunity set available to international investors. As also evidenced in Exhibit 1, this trend of increased weight has been anything but a linear evolution. The dramatic impact of the 1998 crisis is clearly visible, the weight of emerging markets dropping from 8% to 4% in a year's time. Risk and crises are a critical part of the emerging market story. The road to emerging riches has been bumpy, featuring regular and meaningful crises.

Exhibit 34: Emerging Markets Are an Important Component of the Global Equities Opportunity Set



Source: MSCI

Early investors in emerging markets had a very simple yet powerful rationale for investing in these markets. They postulated that they would benefit from rapid economic growth if they invested in markets at early stage of development and with big potential for development. They anticipated that developing countries would progressively adopt market-oriented policies in a globalizing world and that they could invest in companies at low valuation, as these markets were under researched and undiscovered. Indeed, the last twenty years have seen a continuously expanding universe due to the opening of previously closed markets or markets reaching sufficient size and liquidity to become investable.

In the last two decades, several major geopolitical events have triggered the process of adoption of free market reforms resulting in the opening up of many markets. For example, the demise of the Soviet Union, the collapse of apartheid in South Africa, and the adoption of more liberal economic policies in China and India have contributed to the development of freer markets.

These developments have been recognized by the inclusion of these markets in international equity indices. The timeline in Exhibit 35 illustrates the growth of the opportunity set with new countries being added to the MSCI International Equity Indices every few years. Along the way, some of these countries have become classified as Developed Markets (Greece and Portugal) while others, such as Venezuela, have reversed course and have exited the MSCI International Equity Indices.

Exhibit 35: Historical Timeline of the creation of new MSCI Country Indices

1988	1989	1992	1993	1995	1996	1997	2001	2006	2007	2008	2009	2010
Argentina	Indonesia	Korea	Colombia	Israel	China	Russia	Egypt	Bahrain	Bulgaria	Lithuania	Trinidad &	Bangladesh
Brazil	Turkey		India	Poland	Czech Rep.	Portugal	Morocco	Kuwait	Croatia	Serbia	Tobago*	
Chile			Pakistan	South Africa	Hungary			Oman	Estonia			
Greece			Peru		Taiwan			Qatar	Kazakhstan			
Jordan			Sri Lanka					U.A.E.	Kenya			
Malaysia			Venezuela						Lebanon			
Mexico									Mauritius			
Philippines									Nigeria			
Portugal									Romania			
Thailand									Slovenia			
									Tunisia			
									Ukraine			
									Vietnam			

Country introduced as Emerging Market/Frontier Market

Note: *Trinidad and Tobago was removed from the MSCI Frontier Markets Index in May 2011

Source: MSCI

The combination of the desire for and achievement of economic growth and the willingness to open the investment opportunities to non-locals to attract capital has led to more markets joining the international investment opportunity set. The latest entrants are markets from countries in the Persian Gulf, the Balkans, and sub-Saharan Africa, among others. On the demand side, investors continue to seek new investment opportunities and show interest in investing in these ‘frontier’ markets, which are typically smaller, and have fewer and smaller companies that are less liquid. This has led to the creation of the MSCI Frontier Market Indices in 2007.

The classification of markets as developed, emerging, or frontier is a detailed process. MSCI conducts an annual market classification review in the June of each year. The approach used by MSCI aims to reflect the views and practices of the international investment community by striking a balance between a country’s economic development and the accessibility of its market while preserving index stability. The MSCI Market Classification Framework consists of following three criteria: economic development, size and liquidity as well as market accessibility. In order to be classified in a given investment universe, a country must meet the requirements of all three criteria as described in the table below.

Exhibit 36: MSCI Market Classification Framework (June 2011)

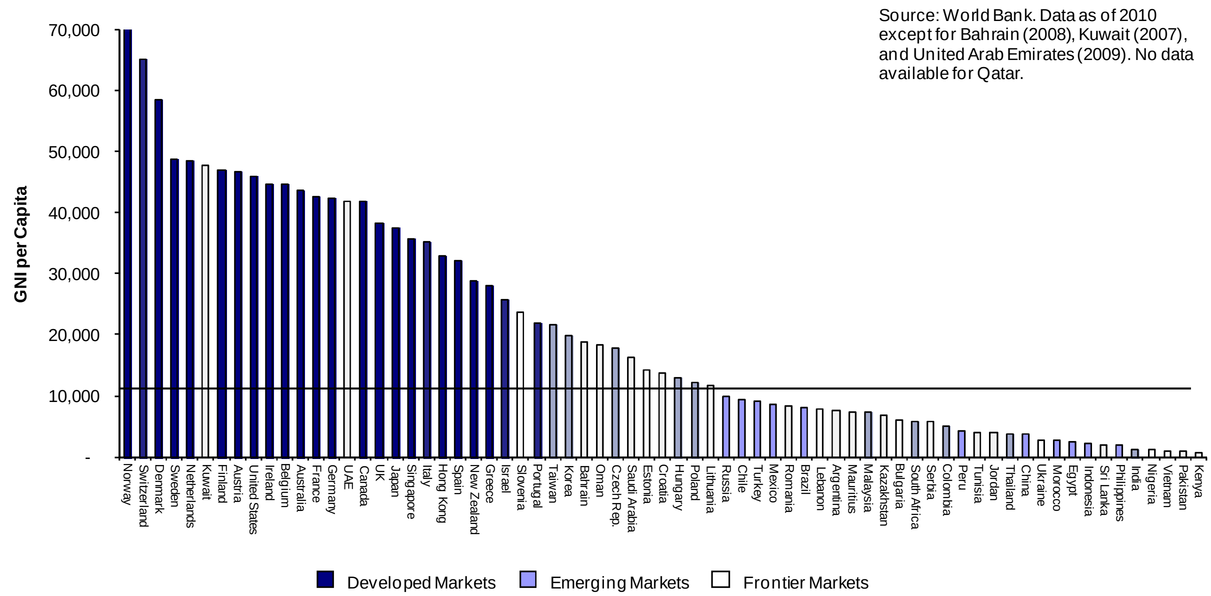
Criteria	Frontier	Emerging	Developed
A Economic Development			
A.1 Sustainability of economic development	No requirement	No requirement	Country GNI per capita 25% above the World Bank high income threshold* for 3 consecutive
B Size and Liquidity Requirements			
B.1 Number of companies meeting the following Standard Index criteria	2	3	5
Company size (full market cap) **	USD 423 mm	USD 846 mm	USD 1692 mm
Security size (float market cap) **	USD 30 mm	USD 423 mm	USD 846 mm
Security liquidity	2.5% ATVR	15% ATVR	20% ATVR
C Market Accessibility Criteria			
C.1 Openness to foreign ownership	At least some	Significant	Very high
C.2 Ease of capital inflows / outflows	At least partial	Significant	Very high
C.3 Efficiency of the operational framework	Modest	Good and tested	Very high
C.4 Stability of the institutional framework	Modest	Modest	Very high

*High income threshold for 2010: GNI per capita of USD 12,276 (World Bank, Atlas method). **Minimum in use for the November 2011 Semi-Annual Index Review updated on a semi-annual basis. Source: MSCI

The economic development criterion is only used in determining the classification of Developed Markets while that distinction is not relevant between Emerging and Frontier Markets given the very wide variety of development levels within each of these two universes. The size and liquidity requirements are based on the minimum investability requirements for the MSCI Global Standard Indices; see MSCI Global Investable Market Indices Methodology (August 2011).

GDP or GNI per capita is one of the most widely used criteria for categorizing markets as “developed” versus “developing” (emerging). Exhibit 37 depicts the investment universe covering the 70 countries for which MSCI calculates an index ranked by GDP per capita. In this group, thirty-seven countries have a GNI per capita below the World Bank threshold of high/middle income country. These countries represent 15% of world GDP and 80% of the world population.

Exhibit 37: MSCI Country Universe Ranked by GNI Per Capita (2010)



Source: World Bank, MSCI

In the aggregate, emerging markets have experienced higher economic growth rates than developed markets. The average economic growth rate has been a full percentage point higher for emerging markets – 6% annually over the last 20 years compared to 5% for developed markets. However, the aggregate number alone does not provide the full picture. Growth has not been uniform across all emerging markets. Exhibit 38 highlights the highest and lowest growing countries over the last 20 years as measured by GDP per capita. In 1987, Korea and South Africa had similar GDP per capita at around USD 3,000. By 2010, Korea's GDP per capita was three times that of South Africa.

Exhibit 38: Highest and Lowest Growth Countries in MSCI ACWI (GDP Per Capita in Current USD)

Country	1987	1990	1995	2000	2005	2010	CAGR (1987 to 2010)
Highest Growth							
China	249	314	604	949	1,731	4,428	12.73%
Chile	1,670	2,393	4,952	4,878	7,254	12,431	8.72%
Poland	1,696	1,693	3,604	4,454	7,963	12,293	8.60%
Indonesia	434	621	1,014	773	1,258	2,946	8.30%
Korea, Rep.	3,368	6,153	11,468	11,347	17,551	20,757	7.87%
Lowest Growth							
Finland	18,254	27,855	25,608	23,530	37,319	44,512	3.78%
United States	19,394	23,038	27,559	35,081	42,534	47,199	3.78%
Sweden	20,421	28,556	28,726	27,879	41,066	48,936	3.71%
South Africa	3,159	3,182	3,863	3,020	5,235	7,275	3.54%
Japan	20,056	24,754	41,968	36,789	35,627	42,831	3.21%

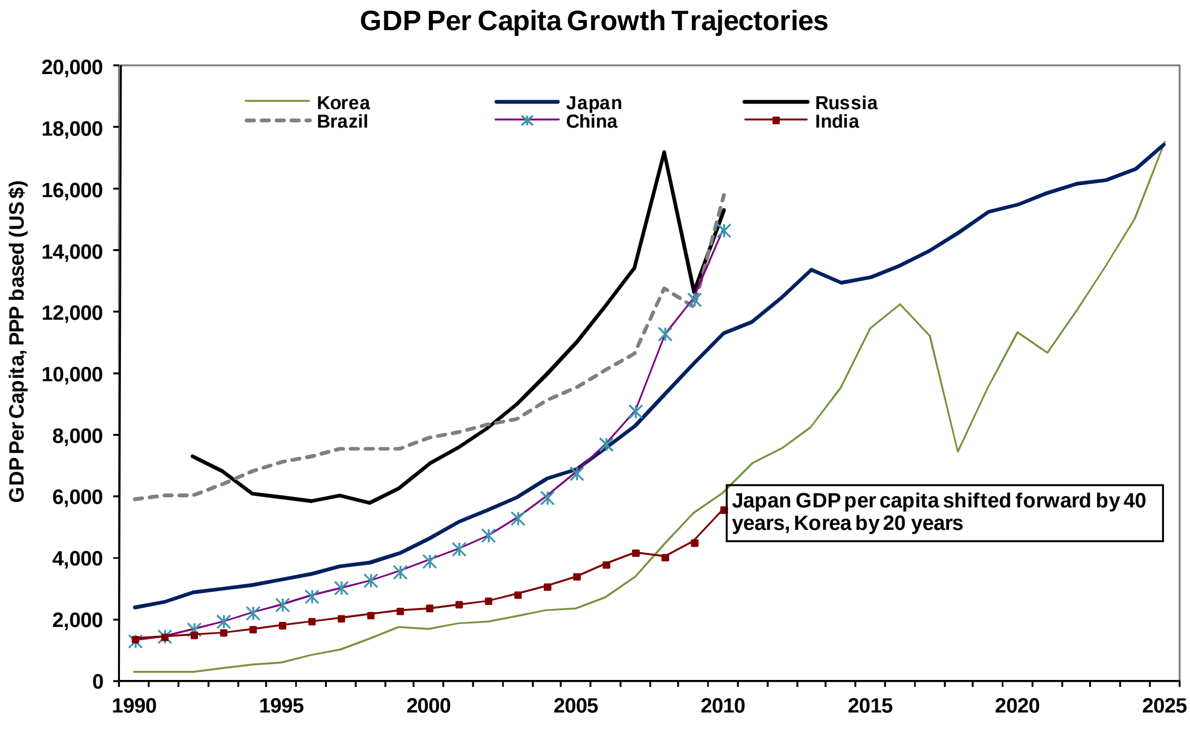
Source: World Bank. GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

How do Economies Grow?

It is not clear that there is a beaten path to achieving economic growth. One model that appears to have produced sustainable levels of development is based on manufacturing. Most of the current developed economies of the world grew through industrialization and manufacturing growth. The development of Japan post WWII was based on manufacturing excellence. Korea applied a similar model roughly 20 years later. China's recent growth has been based on the same roadmap. As highlighted by Spence and El Erian (2008), these countries have policies explicitly targeting growth and have built strong political and social consensus around the necessity to support growth. Very often, high levels of investments needed to support this growth are funded by large domestic savings and complemented by select Foreign Direct Investments.

Exhibit 39 shows the growth trajectories of the BRIC countries over the last 15 years along with that of Korea and Japan to illustrate this observation. Japan's GDP per capita series has been moved forward by 40 years and Korea's by 20 years in this chart. It is striking to see how closely Korea has been tracking the time-shifted growth path of Japan and how China may be able to achieve similar or stronger rates of growth.

Exhibit 39: GDP Per Capita Growth Trajectories for Select Emerging Market and Developed Market Countries



Source: Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, Morgan Stanley Research, IMF World Outlook

The development model of the other BRIC countries seems to have different drivers, much more influenced by natural resources: energy for Russia and agri-business for Brazil. India is testing its own version of economic development with a strong component of outsourced services. This new dimension of growth in services rather than manufacturing has been made possible by the advent of the internet and the huge reduction in communication costs linked to it. These new models for growth have been untested over long periods but may prove to be other pathways for achieving growth.

Over time, market size has typically increased with economic development as families and entrepreneurs float their holdings on the stock market to raise capital, or as state companies are privatized. It should be noted that sometimes, the influence of state ownership has resulted in surprising equity market biases. For example, economies in the Persian Gulf region, such as those of Kuwait, UAE or Saudi Arabia, are obviously heavily dependent on energy. However, their stock markets fail to capture this directly, as all energy companies are nationalized. It is also important to note that development can be reversed by other factors such as political disruption. Venezuela has been gradually exiting the international equity opportunity set. In the late 1970s, Iran left the capitalist world. Earlier in the 20th century, Russia exited in 1917 before returning in the 1990s.

Overall, we can distinguish a common pattern of a multi stage model of economic and financial development.

Stage 1: Emergence. In this category, countries typically would have low levels of GDP per capita. Their economies are heavily influenced by government or are dominated by family controlled conglomerates that benefit from political connections. The stock market is narrow, composed typically of banks, conglomerates and local utilities, mostly telecommunications. Many of the small countries in the Emerging and Frontier Markets are still at this stage.

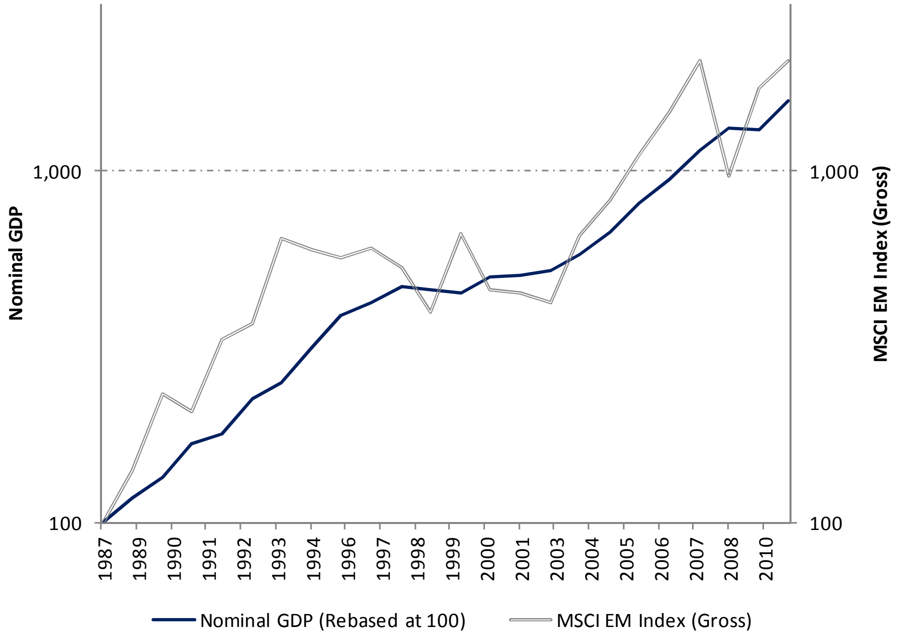
Stage 2: Expansion. The economy has specialized along its natural competencies; companies are starting to address markets outside their country of domicile. The export drivers can be natural resource and manufacturing. To finance their expansion, companies need capital, want to diversify their investor base and seek international investors. The stock market starts to broaden and newly listed companies reshape the profile of the market. India, Mexico, Korea, Taiwan currently fit into this category.

At this stage, countries have also improved their legal and regulatory framework and incorporated laws that seek to protect the common interests of international investors, facilitating access to foreign capital.

Stage 3: Maturity. The country enjoys high GDP per capita and is completely integrated in the global economy. Global stocks dominate the stock market, which captures more than the domestic economy. The stock markets of Switzerland, dominated by global stocks in the food, pharmaceuticals or banking sectors, or the United Kingdom with its global resources companies are good examples of markets that extend beyond the local economy. Most developed markets are in this category.

For emerging markets, market growth and GDP growth have paralleled each other. Exhibit 40 shows the growth in both GDP and equity returns over the long run in emerging markets.

Exhibit 40: GDP Growth and Emerging Market Returns (Annual, 1987 to 2010, Log Scale)



Source: World Bank, MSCI

Return and Risk of Emerging Markets

Exhibit 41 shows the three major MSCI indices along with their risk-adjusted returns. Over the entire period, January 1988 to December 2011, the MSCI EM Index has earned significantly higher total returns and risk-adjusted returns compared to the MSCI World Index.

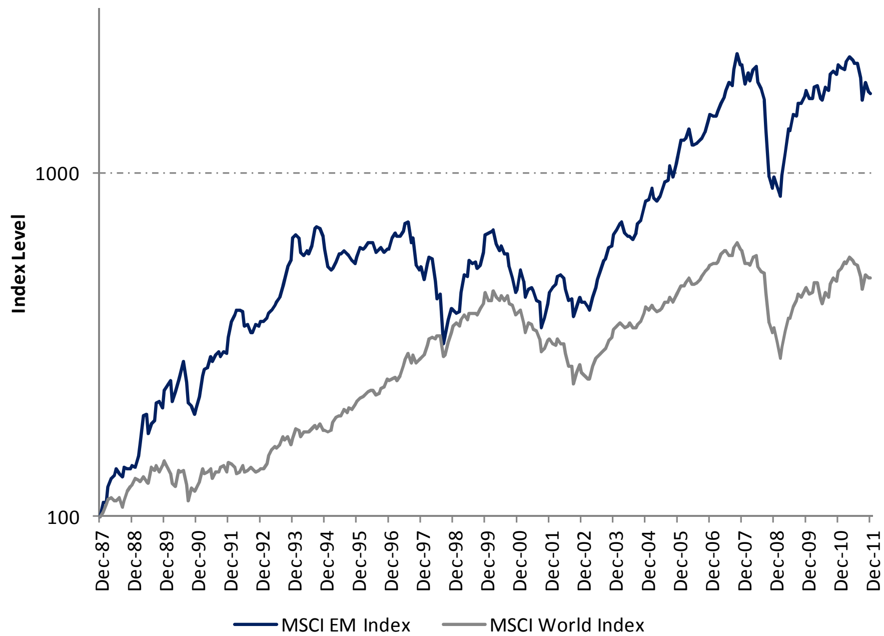
Exhibit 41: Comparing the Performance Between Developed and Emerging Markets (January 1988 to December 2011)

	MSCI ACWI	MSCI World	MSCI EM
Average Annualized Returns			
1988-2011	7.01%	6.85%	12.50%
- January 1988 to December 2000	10.81%	11.07%	12.43%
- January 2001 to December 2011	2.69%	2.08%	12.58%
Annualized Standard Deviation			
1988-2011	15.75%	15.48%	24.21%
- January 1988 to December 2000	13.99%	13.91%	23.76%
- January 2001 to December 2011	17.59%	17.11%	24.83%
Risk-Adjusted Annualized Return			
1988-2011	0.45	0.44	0.52
- January 1988 to December 2000	0.77	0.80	0.52
- January 2001 to December 2011	0.15	0.12	0.51

Note: Geometric average is used for average annualized returns above. Performance is in USD. Source: MSCI

Cumulative returns (gross index levels) are shown in Exhibit 42, highlighting the very different behavior of developed and emerging markets prior to 2001. During the Asian crisis of 1997, for instance, developed markets were relatively resilient. Later when the Dot-Com Crash occurred in 2000, emerging markets were much less impacted than developed markets. However, over the last decade, the behavior of the two indices has been more strikingly similar.

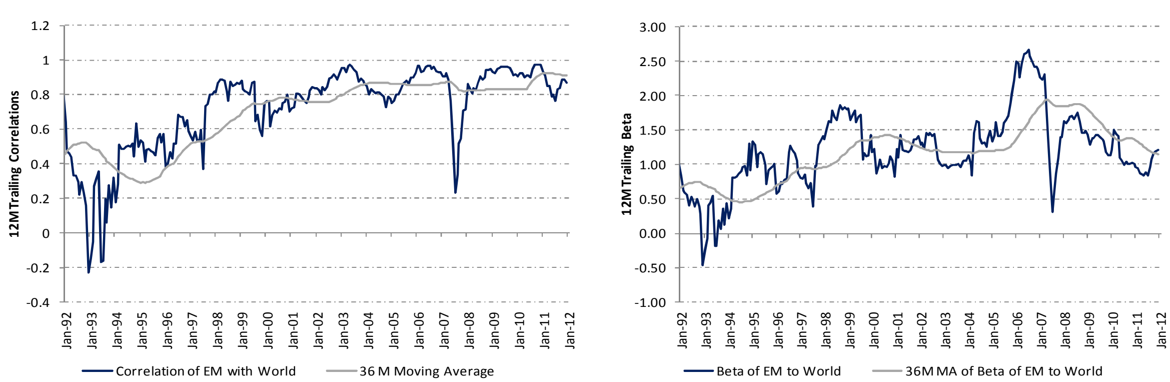
Exhibit 42: Emerging Markets and Developed Markets Performance (January 1988 to December 2011, Log Scale, in USD)



Source: MSCI

The convergence of developed and emerging markets in the last decade appears in much higher correlations shown in Exhibit 43. Twelve-month correlations of the MSCI EM Index with the MSCI World Index have risen from near zero-lows in the late 1980s to highs above 0.85 today. Higher correlations have driven higher beta which are around 1.2 today.

Exhibit 43: Emerging Markets Have Become More Correlated with Developed Markets



Source: MSCI

As previously highlighted in Section I, country membership dominates emerging market returns much more so than industry membership or risk premia. A natural question arises over why the country factor continues to dominate emerging markets even though correlations between emerging markets and developed markets have risen so markedly. The answer is that country factors continue to explain the cross-section of stock returns but these country factors have become more correlated with each other and with developed markets over time.

A discussion of emerging market return and risk would not be complete without highlighting the well-known crises that have occurred in the last twenty years. The emergence of developing economies has been punctuated with economic crises, as seen with the Tequila Crisis in 1995, the Asian Crisis in 1997, the Russian Debt default in 1998, and the Argentina currency crisis in 2002. Most of these crises were accompanied by currency devaluations and were often triggered by macroeconomic instabilities coupled with excessive burden of short-term foreign debt. Notably, the Asian Crisis and Russian Debt default had a significant impact on developed market returns given the large investments by developed market investors and the subsequent ripple-through effects.

Thus the notion of tail risk is an important one for emerging markets but one that investors should put into perspective. Exhibit 44 shows various metrics of downside risk and tail risk for both developed and emerging markets. Given that the volatility for the MSCI Emerging Markets Index is roughly 1.5 times that of the MSCI World Index, the Value-at-Risk (VaR) and Conditional VaR are not out of range of what would be expected. Historically realized conditional VaR at the 99% level shows a significantly higher downside risk for emerging markets than developed markets.[20]

Exhibit 44: Downside and Tail Risk (Monthly Returns, in USD, January 1988 to December 2011)

	MSCI World	MSCI EM
Average Monthly Return	0.7%	1.2%
Standard Deviation	4.5%	7.0%
Skewness	-0.6	-0.6
Kurtosis	1.3	1.6
VaR (95%)	-7.4%	-10.6%
VaR (99%)	-11.1%	-16.5%
Conditional VaR (95%)	-10.2%	-11.7%
Conditional VaR (99%)	-14.7%	-24.6%
Average Negative Return	-3.5%	-5.5%
Average Positive Return	3.5%	5.4%

Note: Geometric average monthly return is shown above. Average monthly return is the geometric average of monthly returns not annualized. Standard deviation is that of monthly returns, also not annualized. Both skewness and kurtosis are defined in the standard way; kurtosis is excess kurtosis here. Value-at-Risk is the realized monthly percentile loss at the relevant threshold. Conditional Value-at-Risk is the average loss once the threshold has been exceeded. Average negative and positive returns are simple averages conditional on the returns being negative or positive respectively. Source: MSCI

While Exhibit 44 focuses on downside risk, we do show average positive return which in both cases (World and EM) balances out average negative returns. Emerging markets have staged significant rebounds in some cases historically. In the most recent 2008 crisis, countries like Russia and Brazil suffered immense losses at first but were among the fastest and strongest to rebound. In other periods, however, such as the Asian crisis of 1997, the recovery was much slower.

[20] Note it has been established that emerging market returns are non-normal; see Bekaert, Erb, Harvey, and Viskanta (1998) for example. A more thorough discussion of the tail risk properties of developed and emerging market properties can be found in that paper.

A final point regarding emerging market risk is one that has to do with country governance. In contrast to developed markets, emerging markets have historically had less robust governance structures. The World Bank for instance publishes Worldwide Governance Indicators (WGI) including: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. MSCI uses these and other metrics in its research on Environmental, Social, and Governance (ESG) to construct Country Governance indicators. Other important metrics which are used are public debt, foreign debt, metrics of democracy and press freedom, enforcement of contracts, political rights, and government governance. Exhibit 45 shows select indicators collected by MSCI. Emerging markets on average tend to score lower on indicators of country governance.

Exhibit 45: Select Country Governance Indicators for Select Countries (2011)

		Enforcing Contracts	Rule of Law	Regulatory quality	Voice and accountability	Property rights	Political Stability	Control of corruption
Developed Markets								
Australia	DM	High	High	High	High	High	High	High
France	DM	High	High	High	High	High	High	High
Germany	DM	High	High	High	High	High	High	High
Hong Kong	DM	High	High	High	Medium	High	High	High
Japan	DM	High	High	High	High	High	High	High
Norway	DM	High	High	High	High	High	High	High
United Kingdom	DM	High	High	High	High	High	High	High
United States	DM	High	High	High	High	High	High	Medium
Emerging Markets								
Brazil	EM	Medium	Medium	Medium	Medium	Medium	Medium	Medium
China	EM	High	Medium	Medium	Low	Low	Medium	Low
Czech Republic	EM	Medium	High	High	High	Medium	High	Medium
Hungary	EM	High	Medium	High	High	Medium	High	Medium
India	EM	Low	Medium	Medium	Medium	Medium	Medium	Low
Mexico	EM	Medium	Low	Medium	Medium	Medium	Medium	Low
Korea, South	EM	High	High	High	High	High	Medium	Medium
Russia	EM	High	Low	Medium	Low	Low	Medium	Low

Source: MSCI, World Bank (2010 WGI), Rank "Doing Business 2011", Heritage Foundation. Countries are assigned a rank of "High" if they have an MSCI ESG score below 3.0 for Government Risk Exposures (the first three columns) or above 7.0 for Governance Risk Management (the second four columns). A rank of "Low" is assigned for scores above 7.0 for Government Risk Exposures and below 3.0 for Governance Risk Management. Scores between 3.0 and 7.0 inclusive are assigned a rank of "Medium."

Fundamental Characteristics of Emerging Markets

Next, we look at how the fundamental characteristics of emerging markets compare to developed markets. First, Exhibit 46 shows average sector weights over the last two decades. Emerging markets have historically had a larger weight in Energy, Materials, and Telecom stocks; and a smaller weight in Health Care, Industrials, and Consumer sectors stocks.

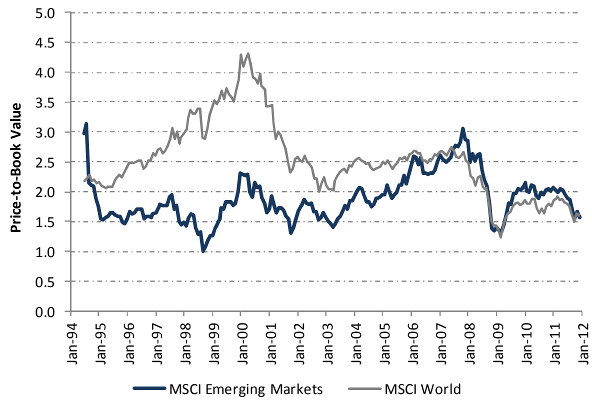
Exhibit 46: Emerging Market Sector Weights (December 31, 2011)

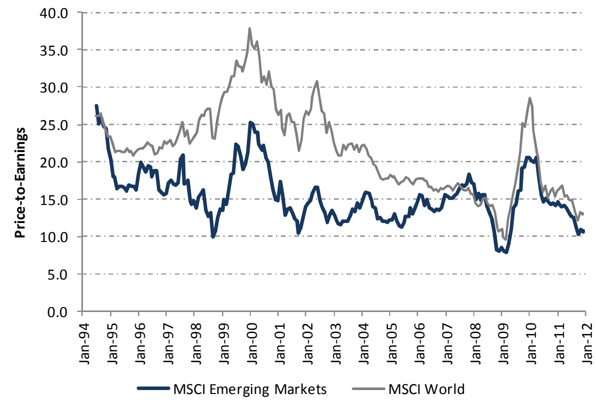
	MSCI EM Index	MSCI World Index
Energy	14.0	11.8
Materials	13.3	7.2
Industrials	6.4	11.1
Consumer Discretionary	8.1	10.3
Consumer Staples	8.1	11.0
Health Care	1.0	10.5
Financials	23.8	17.6
Information Technology	13.1	12.0
Telecommunication Services	8.5	4.4
Utilities	3.7	4.0

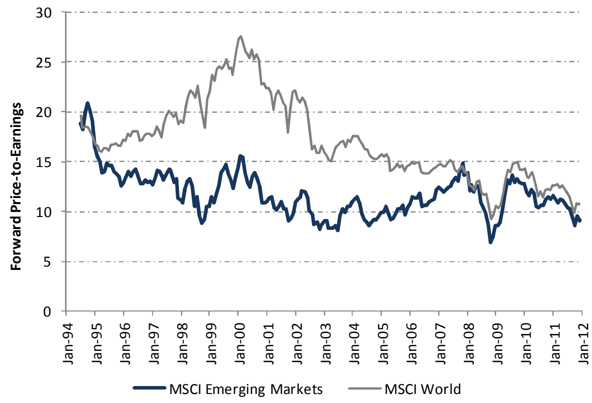
Source: MSCI

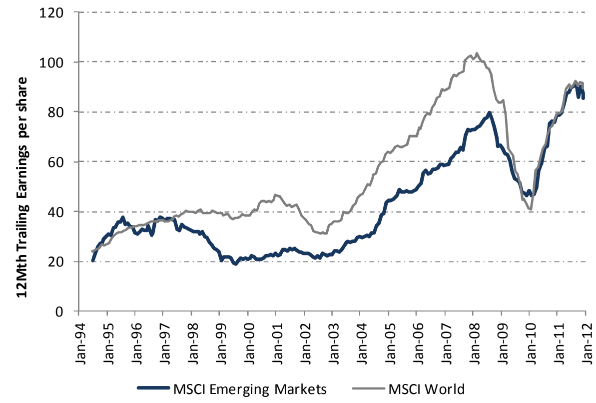
Second, we look at valuation ratios. (Descriptions of the valuation ratios appear on p. 37.) Stocks in emerging markets have exhibited attractive valuations for most of the last fifteen years. However there was a clear shift around 2000 when valuation ratios began to converge towards developed markets' ratios. Notably, historical earnings growth has been relatively similar to that of developed markets, compared to GDP growth, which has been quite higher (as discussed earlier in this section). This disconnect reflects the differences in fundamentals between the investable universe captured in the MSCI Emerging Markets Index and the full set of listed and unlisted companies that contribute to GDP. Moreover, a country's GDP includes earnings from non-domestic factors of production (such as foreign direct investment), which are not captured in company earnings.

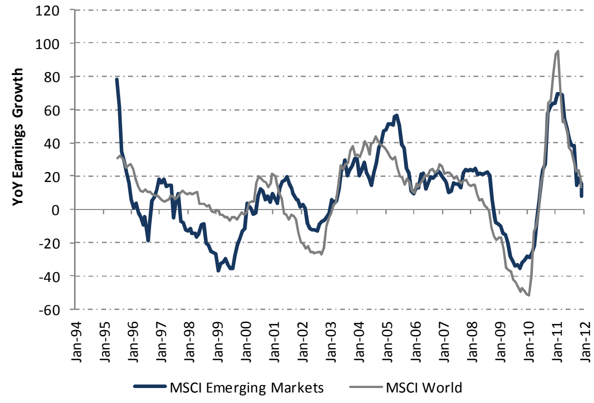
Exhibit 47: Valuation Ratios for Developed vs. Emerging Markets (June 1994 to December 2011)

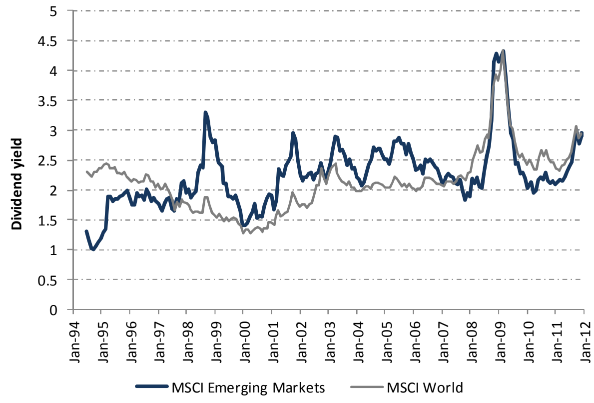


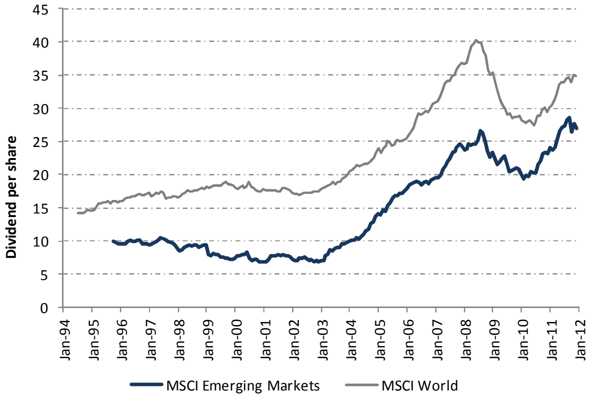


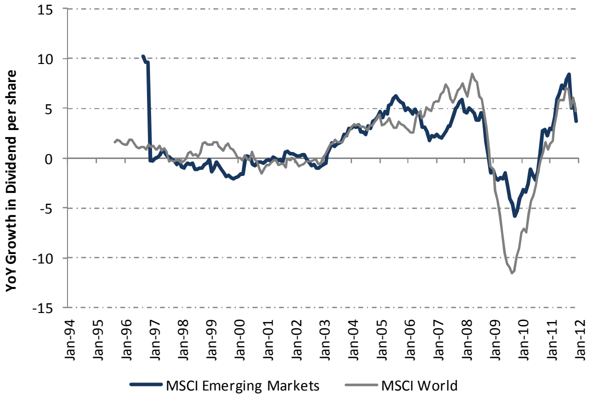


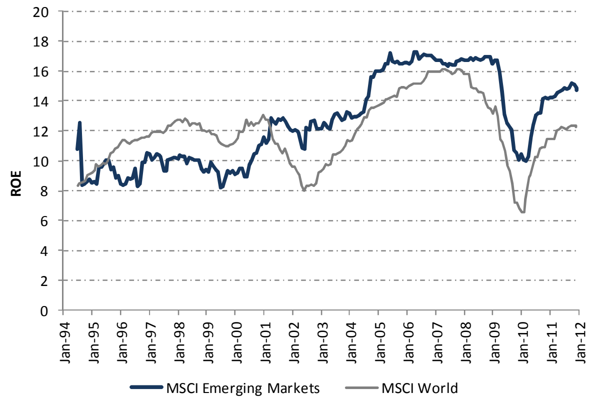












Another consideration for investors in emerging markets is the issue of investability. As shown in Exhibit 48, investability is lower in emerging markets as gauged by free float[21] but it is still above 50%. Another measure of investability is liquidity measured by the Annual Traded Value Ratio (ATVR) that MSCI applies on the free float to screen out extreme daily trading volumes.[22] Lower ATVR means the security is less liquid. In fact, the average ATVR for stocks in the MSCI EM Index is actually higher. In sum, while there are fewer shares actually available, those that are trade more often.

[21] Liquidity can be measured in a variety of ways including trading volume, bid-ask spreads, etc. Sometimes free float is used to reflect liquidity as well.

[22] ATVR is computed as follows. First, monthly median traded values are computed as the median daily traded value multiplied by the number of days inthe month that the security traded. The daily traded value of a security is equal to the number of shares traded during the day multiplied by the closing price of that security. Second, the monthly median traded value of a security is dividedby its free float-adjusted security market capitalization at the end of the month, giving the monthly median traded value ratio. Finally, the 12-month ATVR is obtained by taking the average of the monthly median traded value ratios of the previous 12 months – or the number of months for which this data is available (previous 6 months, 3 months or 1 month) – and annualizing it by multiplying it by 12.

Exhibit 48: Free Float and ATVR (Average Percentage Across Stocks in Universe)

	Free Float (%)
ACWI	73
World	82
EM	56
Developed Markets	
USA	94
Europe incl Israel	73
Japan	76
Pacific ex Japan	72
Emerging Markets	
EM Asia	57
EM EMEA	53
EM Latin America	57

	ATVR (%)
ACWI	130
World	113
EM	164
Developed Markets	
USA	81
Europe incl Israel	133
Japan	156
Pacific ex Japan	117
Emerging Markets	
EM Asia	180
EM EMEA	145
EM Latin America	117

Source: MSCI

Foreign sales similar to those shown in Sections I and III appear in Exhibit 49. Emerging markets on average have a lower percentage of sales to foreign consumers. Thus, emerging market companies are much more likely to reflect "local" economies and their sources of return and risk.

Exhibit 49: Foreign Sales Percentage (Market Cap Weighted, As of June of each year)

Year	North America	Europe	Pacific	Emerging Markets
2002	29	68	35	30
2010	41	77	42	31

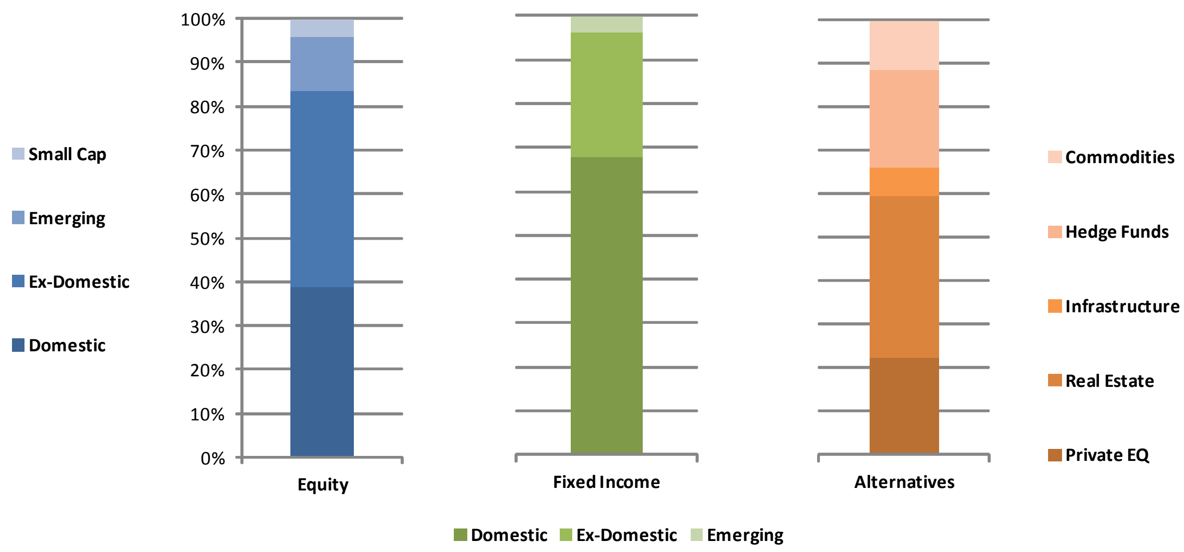
Source: Worldscope, MSCI

Institutional Trends in Emerging Market Allocations

Finally, we briefly discuss the evolving landscape for institutional participation in emerging markets. In 2011, MSCI conducted a survey of asset allocation and risk management practices across the world for institutional investors. Among the 85 participants, there were 35 public plans, 16 corporate plans, 10 endowments/foundations/sovereign wealth funds, and 24 unclassified institutions.

Exhibit 50 shows the average allocations within the major asset class buckets. The survey findings revealed that all regions decreased their allocation to domestic and developed ex-domestic equities while increasing exposures to emerging markets equities. These trends were also apparent across AUM brackets and all fund types. On average, the major asset class allocation breaks down to 43% equity, 37% fixed income, and 20% alternatives split.

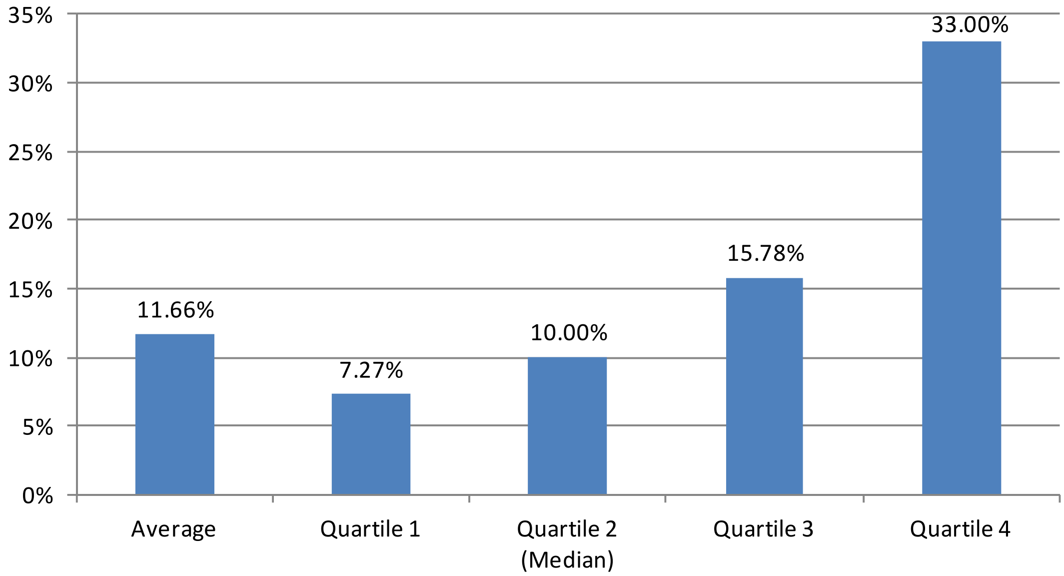
Exhibit 50: Summary of Current Asset Class Allocations



Source: MSCI

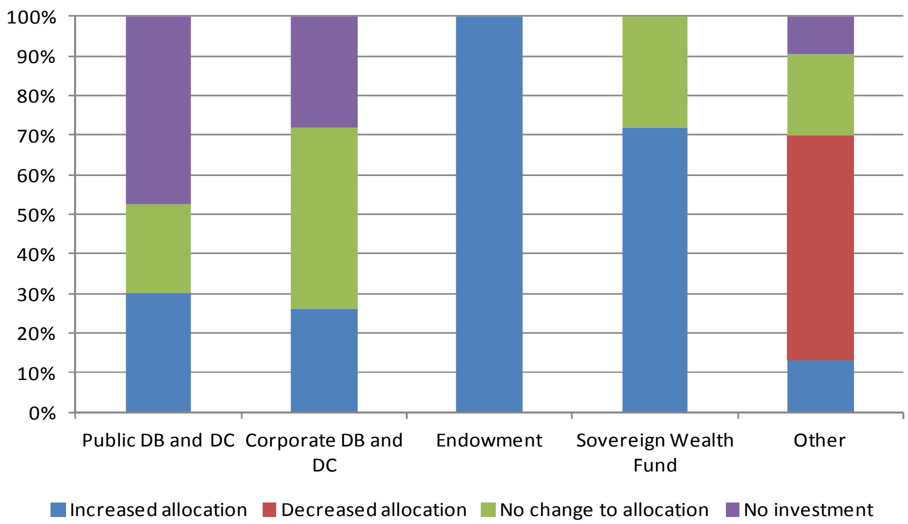
Exhibit 51 shows the substantial variation in emerging market allocations across participants while Exhibit 52 reveals the clear increasing trend towards emerging markets. Please note that the sample used in the survey may not be representative of the global institutional investor base. It reflects, in particular, a bias towards larger institutions.

Exhibit 51: Current Asset Class Exposures: Emerging Equity



Source: MSCI

Exhibit 52: Current Asset Class Exposures by Fund Type: Emerging Equities



Source: MSCI

Summary

Emerging markets today constitute a non-negligible part of the opportunity set for global investors. They have historically allowed investors to take advantage of the relatively greater set of economic growth opportunities in the developing world. In fact, because forecasts of economic growth do not take into account increases in free float through the effect of market liberalization on ownership structure, they may underestimate the actual growth potential.

In the aggregate, emerging markets have experienced higher economic growth rates than developed markets. The average economic growth rate has been a full percentage point higher for emerging markets – 6% annually over the last 20 years compared to 5% for developed markets. At the same time, stock returns have been higher as well. Over the period January 1988 to December 2011, the MSCI EM Index had annualized returns of 12.5% compared to the MSCI World Index which had annualized returns of 7.0%. Risk-adjusted returns were higher for the MSCI EM Index as well, at 0.52 compared to 0.15 for the MSCI World Index. Proponents of emerging markets argue that emerging markets allows investors to take advantage of higher growth rates in emerging markets. Moreover, there are potential diversification benefits since overall, emerging markets remain less correlated with developed markets.

The main long-term risk to emerging market investing remains the possibility that the previous trend of globalization may reverse. In the short-term, there is the concern that the rapid levels of growth in recent years may ease. Short-term investors may also worry about excessive volatility in emerging markets and potential periods of disruption similar to the late 1990s (Russian Ruble and Asian crises). Finally, governance dimensions such as investor protection and shareholder rights are generally less established relative to their developed market counterparts.

In sum, emerging markets are a critical part of the global opportunity set comprising 12% of global market capitalization currently. Even higher allocations to emerging markets may be considered for investors who are less sensitive to short-term volatility and desire greater exposure to potential long-term economic growth.

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Appendix A: Currency Impact on International Investments

The last 40 years have seen important changes in the international monetary system. Just about the same time as the inception of the MSCI indices, the Bretton Woods system, based on a gold standard and fixed exchange rates, was breaking up. Exchange rate fluctuations, almost nonexistent in the 1960s and early 1970s, started to play a role in international investing.

The table below shows the exchange rate evolution of major currencies. We present two measures: the nominal exchange rate reported here shows the value of a currency against the US dollar. The second measure, the real effective exchange rate, evaluates a currency against a basket of foreign currencies, each weighted according to its importance in the country's trade balance. It is also adjusted by the relative price level changes.

Exhibit 53: Nominal and real effective exchange rate returns for selected currencies, 1970 – 2010*

	1970 - 2009		1970 - 1979		1980 - 1989		1990 - 1999		2000 - 2009		2001 - 2010	
	nominal	real effective	nominal	real effective	nominal	real effective	nominal	real effective	nominal	real effective	nominal	real effective
Swiss franc	3.6%	0.9%	10.5%	2.8%	0.3%	-0.3%	-0.4%	0.4%	4.5%	0.6%	5.7%	1.1%
Japanese yen	3.4%	1.5%	4.2%	3.0%	5.2%	3.1%	3.5%	2.5%	1.0%	-2.4%	3.5%	-1.1%
Deutsche mark / Euro	2.5%	0.1%	7.8%	1.0%	0.2%	-1.4%	-1.4%	-0.3%	3.7%	0.9%	3.6%	0.7%
Danish krone	0.9%	0.4%	3.4%	0.5%	-2.1%	0.2%	-1.2%	-0.2%	3.7%	1.1%	3.6%	1.0%
Norwegian krone	0.5%	0.3%	3.8%	0.0%	-2.9%	1.0%	-2.0%	-0.8%	3.4%	1.0%	4.3%	1.0%
Canadian dollar	0.1%	-0.3%	-0.8%	-1.9%	0.1%	1.2%	-2.2%	-3.1%	3.3%	2.7%	4.2%	3.4%
Australian dollar	-0.5%	-0.2%	-0.1%	-0.9%	-3.3%	-0.6%	-1.9%	-2.2%	3.2%	3.3%	6.3%	4.8%
Swedish krona	-0.8%	-1.2%	2.2%	-1.2%	-3.9%	-0.7%	-3.2%	-1.7%	1.8%	-1.4%	3.4%	-0.1%
British pound	-1.0%	-0.6%	-0.7%	-0.3%	-3.2%	-0.9%	-0.01%	1.7%	0.02%	-2.7%	0.5%	-2.2%
US dollar	0.0%	-1.0%	0.0%	-3.4%	0.0%	-0.1%	0.0%	0.7%	0.0%	-1.1%	0.0%	-2.1%

Source: MSCI, WM/Reuters, BIS (real effective exchange rates)
* Nominal rate is measured in USD per 1 currency unit: a positive change means appreciation of the currency against the US Dollar.
** DEM is used instead of EUR prior to January 1, 1999

When looking only at nominal returns, it might seem that exchange rate fluctuations can be very important. To take an extreme example, the Swiss Franc (CHF) had an annualized appreciation of 10.5% in nominal terms versus the US Dollar in the 1970s. Although this is an impressive performance, what should matter most for international investors in equities are the real currency returns and not nominal returns as capital is not invested in currency alone but in local equities: indeed, if a currency depreciation or appreciation is purely due to a change in the relative purchasing power, the local price of equities should adjust in inverse proportion, at least over the long term. For example, the currency of a country with high inflation will typically depreciate, but the local price of a stock will appreciate (this is especially true if the company in question is operating globally). Furthermore, if we assume that an average currency exposure of a company approximately corresponds to its country's share of trade in that currency, a more suitable metric to measure the impact of currency movement on international investing is the real effective exchange rate. Coming back to our example, in real effective terms the Swiss Franc had appreciated by only 2.8% annually during the same period.

Over the very long term (since 1970), the real effective exchange rate changes are even smaller, exceeding 1% annualized in absolute terms only for the Japanese Yen and the Swedish Krona.

We can infer from this analysis that currency fluctuations, both in nominal and real terms, have a more important impact on international investments in the short term than in the long term. Over the very long term, exchange rates have tended to revert to the mean. Moreover, when investing in global companies, exchange rates should not play a significant role as these companies are generally exposed to a wide range of currencies and thus the exchange risk is more diversified.

Appendix B: The Barra Global Equity Model

Introduction to Equity Factor Models and the Barra Global Equity Model

The first mainstream model which sought to explain what drives stock returns was the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965). By making certain assumptions (e.g., that all investors followed mean-variance preferences and agreed on the expected returns and covariances of all assets), Sharpe was able to show that the super-efficient portfolio was the market portfolio itself. Sharpe's theory, known as the Capital Asset Pricing Model, predicts that the expected return of an asset depends only on the expected return of the market and the beta of the asset relative to the market. In other words, within CAPM, the only "priced" factor is the market factor.

Multi-factor pricing models followed the CAPM. The first was Ross (1976)'s model based on Arbitrage Pricing Theory which captured the idea that an asset's returns can be predicted using its relationship with many common risk factors. Chen, Roll, and Ross (1986) used this framework to document the importance of various macroeconomic variables. Later came the work of Fama and French (1992) which highlighted the importance of firm size and valuation in the form of book-to-price and earnings-to-price in explaining stock returns. At the same time, Rosenberg (1974) developed a model which similarly focused on explaining the cross-section of stock returns.[23]

Despite differences in how the models are estimated (for example, the use of time-series econometric techniques versus cross-sectional regression techniques), all such factor models have in common that they capture systematic sources of risk and return and that investors should be compensated for their exposures to such risk factors. The importance of various risk factors may change over time of course. Some may be persistent and others may be reflective of shorter term market inefficiencies that are ultimately arbitraged away.

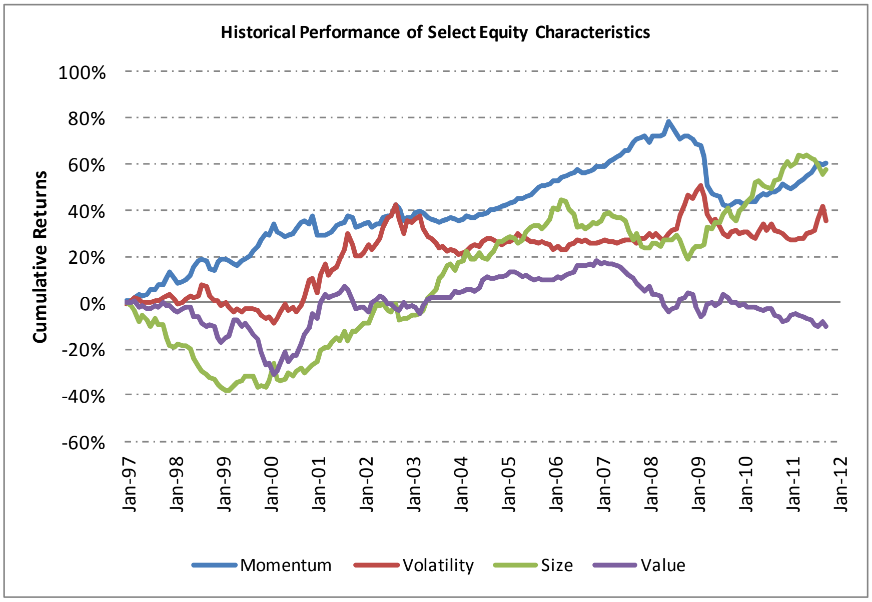
The most well-known drivers of stock return (risk premia) are listed below. Some have been documented over the long-run while others appear to appear in cycles.

- Value: Stocks with relatively high book-to-price or earnings-to-price earn a premium relative to their low book-to-price or earnings-to-price counterparts
- Size: Stocks with smaller market cap earn a premium relative to larger cap stocks
- Momentum: Stocks with higher momentum earn a premium relative to lower momentum stocks
- Volatility: Stocks with low total or idiosyncratic risk (volatility) earn a premium relative to those with high total or idiosyncratic risk
- Growth: Stocks with stronger historical and forecast growth estimates earn a premium relative to those with lower growth estimates
- Liquidity is one interesting characteristics where some have found the premium to exist for higher liquidity stocks and others have found the premium to exist for lower liquidity stocks.

Exhibit 54 shows the cumulative returns to four of the most well-known risk premia.

[23] Barra was founded on this approach and became the industry standard in developing multi-factor risk models for practitioners. The first multi-factor risk model for the US market, dubbed the Barra USE1 Model, was released in 1975.

Exhibit 54: Important Risk Premia Include Value, Size, Volatility, and Momentum



The return to value stocks (“Value”) is the return to the MSCI World Value Index minus the return to the MSCI World Growth Index. The return to small cap stocks relative to large caps (“Size”) is the return to the MSCI World Large Cap Index minus the return to the MSCI World Small Cap Index. The return to Momentum is the return to the Barra Global Equity Model (GEM2) Momentum factor. The return to the Volatility factor is the return to the Barra Global Equity Model (GEM2) Volatility factor with the sign reversed. The returns to the indices are in USD while the Momentum and Volatility factor returns are locally priced. Source: MSCI

In addition to the risk premia above, macroeconomic variables have been seen to drive returns at the country or market level. These include currency characteristics, debt levels, and inflation levels. Sectors and industries can also have a meaningful impact of returns particularly in different parts of the business cycle. What remains is stock-specific (also called undiversifiable, non-systematic, and idiosyncratic) return which in theory should diversify across a large portfolio of stocks.

Sections II, III, and IV of our report make use of the Barra Global Equity Model (GEM2), a pioneer in global equity risk models. The first version of the model (GEM) was originally released in 1989. The most recent model was launched in 2008 on the heels of a multi-year research effort. The Global Equity Model includes 134 factors identified as the most important systematic sources of return for global equities including a World (or market) factor, 55 country factors, 34 industry factors, 8 style (or risk premia) factors, and 55 currency factors.

The GEM2 model, following the traditional fundamental factor approach at Barra, estimates returns to factors cross-sectionally at each point in time using a vast universe of stock returns and stock-level fundamental and technical data. The factors are chosen with the goal of maximizing explanatory power of the factors for explaining cross-sectional returns. Thus, while the end goal of the model is to forecast risk, the factor structure is specified with the same goal of the Fama-French methodology—to explain returns. The factor returns that are estimated from these multivariate regressions are then used as time series inputs into the construction of an exponentially-weighted covariance matrix with a specified half-life. In combination with stock-level exposures to the factors, the end result is a stock-level covariance matrix capturing the systematic sources of risk. This is supplemented in a final step with stock-level specific risk forecasts to form the final risk covariance matrix.

Note that for the return attribution results shown in this report, the factors in the GEM2 model represent the pure return to these sources. In contrast to the Fama-French methodology, where the objective is to test the statistical significance of different stock characteristics, the Barra methodology explicitly estimates returns to these factors. These factor returns can be thought of as the return to (long-short) portfolios reflecting the return net of the other factors. For the purposes of return attribution, distinguishing pure sources of return is essential, and why the factor-based attribution is preferred by many investors over more simple attribution schemes. Contributions to return from each factor are net of each other and thus can be simply summed up to get the overall portfolio return. For further reading on the benefits of factor-based attribution, see Christopherson, Carino, and Ferson (2009).

In the sections that follow, details on the construction of the Barra Global Equity Model (GEM2) are presented. These sections are a subset of "The Barra Global Equity Model (GEM2): Methodology Notes" by Jose Menchero, Andrei Morozov, and Peter Shepard, published by MSCI in 2008. Please see that reference for the full text.

Forecasting Global Equity Portfolio Risk

Global investors derive return from two basic sources: price appreciation in the local currency of the asset, and repatriation of the asset value back to the base currency (numeraire) of the investor.

For concreteness, consider an investment from the perspective of a US portfolio manager. Let $C(n)$ denote the local currency of stock n, and let $r_{FX}^{C(n),\$}$ be the return of currency $C(n)$ due to exchange-rate fluctuations against the dollar. The return of stock n in US dollars, denoted $\hat{R}_n^{\$}$, is given by the usual expression

$$\hat{R}_n^{\$} = \hat{r}_n + r_{FX}^{C(n),\$} + \hat{r}_n r_{FX}^{C(n),\$} , \tag{2.1}$$

where $\hat{r}_n$ is the local return of the asset. The cross term, $\hat{r}_n r_{FX}^{C(n),\$}$, is typically minute, and can be safely ignored for risk purposes.[24]

Our primary interest is to forecast the volatility of *excess* returns (i.e., above the risk-free rate). If $r_f^{\$}$ denotes the risk-free rate of US dollars, then $R_n^{\$} = \hat{R}_n^{\$} - r_f^{\$}$ is the excess return of stock n measured in US dollars.

Suppressing the cross term, and utilizing Equation 2.1, we decompose the excess return into an equity component r_n and a currency component $q_n^{\$}$:

$$R_n^{\$} = r_n + q_n^{\$} . \tag{2.2}$$

The equity component is the *local excess return* of the stock,

$$r_n = \hat{r}_n - r_f^{C(n)} , \tag{2.3}$$

where $r_f^{C(n)}$ denotes the local risk-free rate for stock n. Note that r_n is independent of numeraire, so that it is the same for all global investors.

[24] A notable exception to this is during times of extreme inflation, when the cross term can become significant.

The currency component in Equation 2.2 is given by

$$q_n^{\$} = r_f^{C(n)} + r_{FX}^{C(n),\$} - r_f^{\$}. \tag{2.4}$$

This term represents the excess return in US dollars due to holding cash denominated in the local currency of the stock.

We adopt a multi-factor framework to explain the local excess returns. This approach yields valuable insight into the underlying sources of portfolio return by separating systematic effects from the purely stock-specific component that can be diversified away. More specifically, we posit that the local excess returns are driven by a relatively small number, K_E, of global equity factors, plus an idiosyncratic component unique to the particular stock,

$$r_n = \sum_{k=1}^{K_E} X_{nk} f_k + u_n. \tag{2.5}$$

Here, X_{nk} $(k \le K_E)$ is the exposure of stock n to equity factor k, f_k is the factor return, and u_n is the specific return of the stock. The specific returns u_n are assumed to be uncorrelated with the factor returns. The factor exposures are known at the start of each period, and the factor returns are estimated via cross-sectional regression.

Suppose that there are K_C currencies in the model. Ordering the currencies after the equity factors, we can express the excess currency returns as

$$q_n^{\$} = \sum_{k=K_E+1}^{K_E+K_C} X_{nk} f_k^{\$}, \tag{2.6}$$

where $X_{nk}\,(k > K_E)$ is the exposure of stock n to currency k, and $f_k^{\$}$ is the excess return of the currency with respect to US dollars (which we calculate from risk-free rates and exchange rates, as in Equation 2.4). We take the currency exposures X_{nk} to be equal to 1 if k corresponds to the local currency of stock n, and 0 otherwise.

Equations 2.2-2.6 can be combined to obtain

$$R_n^{\$} = \sum_{k=1}^{K} X_{nk} f_k^{\$} + u_n, \tag{2.7}$$

where $K = K_E + K_C$ is the total number of combined equity and currency factors. The elements of X_{nk} define the $N \times K$ factor exposure matrix, where N is the total number of stocks. Note that the factor exposure matrix is independent of numeraire.

Our treatment thus far has considered only a single asset. Investors, however, are more concerned with portfolio risk. The portfolio excess return (in US dollars) is given by

$$R_P^{\$} = \sum_{n=1}^{N} h_n^P R_n^{\$}, \tag{2.8}$$

where h_n^P is the portfolio weight of asset n. Note that, in general, the assets include both stocks and cash. The portfolio exposure to factor k is given by the weighted average of the asset exposures,

$$X_k^P = \sum_{n=1}^{N} h_n^P X_{nk}. \tag{2.9}$$

In order to estimate portfolio risk, we also require the factor covariance matrix and the specific risk forecasts. The elements of the factor covariance matrix are

$$F_{kl}^{\$} = \mathrm{cov}\left(f_k^{\$}, f_l^{\$}\right), \tag{2.10}$$

where the dollar superscript indicates that at least some of the matrix elements depend on the base currency of the investor. Note, however, that the $K_E \times K_E$ block of the factor covariance matrix corresponding to equity factors is independent of numeraire.

The covariance of specific returns is

$$\Delta_{mn} = \mathrm{cov}\left(u_m, u_n\right). \tag{2.11}$$

For most stocks, we assume that the specific returns are uncorrelated, so that the off-diagonal elements of Δ_{mn} are zero. However, Equation 2.11 represents the generalized case in which the specific returns of some securities are linked.[25]

The portfolio risk in US dollars can now be obtained as the square root of the variance,

$$\sigma(R_P^{\$}) = \left[\sum_{kl} X_k^P F_{kl}^{\$} X_l^P + \sum_{mn} h_m^P \Delta_{mn} h_n^P\right]^{1/2}. \tag{2.12}$$

Although Equation 2.12 is written for portfolio risk, it is equally valid for tracking error by replacing portfolio weights and exposures with their active counterparts.

Many global investors, of course, are interested in risk forecasts from different numeraire perspectives. The only term on the right-hand-side of Equation 2.12 that depends on base currency is the factor covariance element, $F_{kl}^{\$}$. These elements, however, can be transformed to some other numeraire, γ. Substituting these transformed factor covariances F_{kl}^{γ} into Equation 2.12 yields risk forecasts with respect to the new base currency γ.

Estimation Universe

The coverage universe is the set of all securities for which the model provides risk forecasts. The estimation universe, by contrast, is the subset of stocks that is used to estimate the model. Judicious selection of the estimation universe is a critical component to building a sound risk model. The estimation universe must be sufficiently broad to accurately represent the investment opportunity set of global investors, without being so broad as to include illiquid stocks that may introduce spurious return relationships into the model. Furthermore, the estimation universe should be reasonably stable to ensure that factor exposures are well behaved across time. *Representation, liquidity* and *stability*, therefore, represent the three primary goals that must be attained when selecting a risk model estimation universe.

A well-constructed equity index must address and overcome these very issues, and therefore serves as an excellent foundation for the estimation universe. The GEM2 estimation universe utilizes the MSCI *All Country World Investable Market Index* (ACWI IMI), part of the MSCI Global Investable Market Indices family which represents the latest in MSCI index-construction methodology. MSCI ACWI IMI aims to

[25] We relax the assumption of uncorrelated specific returns for different share classes of the same stock.

reflect the full breadth of global investment opportunities by targeting 99 percent of the float-adjusted market capitalization in 48 developed and emerging markets. The index-construction methodology applies innovative rules designed to achieve index stability, while reflecting the evolving equity markets in a timely fashion. Moreover, liquidity screening rules are applied to ensure that only investable stocks with reliable pricing are included for index membership.

GEM2 Factor Structure

The equity factor set in GEM2 includes a World factor (w), countries (c), industries (i), and styles (s). Every stock is assigned an exposure of 1 to the World factor. Hence, the local excess returns in Equation 2.5 can be rewritten as

$$r_n = f_w + \sum_c X_{nc} f_c + \sum_i X_{ni} f_i + \sum_s X_{ns} f_s + u_n . \tag{3.1}$$

Mathematically, the World factor represents the intercept term in the cross-sectional regression. Economically, it describes the aggregate up-and-down movement of the global equity market. Typically, the World factor is the dominant source of total risk for a diversified long-only portfolio.

For most institutional investors, however, the primary concern is the risk of *active* long/short portfolios. If both the portfolio and benchmark are fully invested – as is typically the case – then the active exposure to the World factor is zero. Similarly, if the long and short positions of a long/short portfolio are of equal absolute value, the net exposure to the World factor is zero. Thus, we must look beyond the World factor to other sources of risk.

Country and Currency Factors

Country factors play a critical role in global equity risk modeling. One reason is that they are powerful indicator variables for explaining the cross section of global equity returns. A second, related, reason is that the country allocation decision is central to many global investment strategies, and portfolio managers often must carefully monitor their exposures to these factors. We therefore include explicit country factors for all markets covered.

In the following table, we present a list of the 55 countries covered by GEM2, together with their corresponding currencies. The country exposures X_{nc} in GEM2 are set equal to 1 if stock n is in country c, and set equal to 0 otherwise. We assign country exposures based on country membership within the MSCI ACWI IMI, MSCI China A Index and MSCI GCC Countries Index. Note that depository receipts and cross-listed assets are assigned factor exposures for the underlying or primary asset, as defined by the MSCI Equity Indices.

Exhibit 55: GEM2 Country Factors and Currencies

Country Code	Country Name	Currency Name	Average Weight	Jan-08 Weight
ARG	Argentina	Argentine Peso	0.09	0.08
AUS	Australia	Australian Dollar	1.58	2.27
AUT	Austria	Euro	0.16	0.34
BHR	Bahrain	Bahraini Dinar	0.01	0.02
BEL	Belgium	Euro	0.62	0.63
BRA	Brazil	Brazilian Real	0.64	1.69
CAN	Canada	Canadian Dollar	2.53	3.14
CHL	Chile	Chilean Peso	0.17	0.24
CHN	China Domestic	Chinese Yuan	1.86	7.97
CHX	China International	Hong Kong Dollar	0.66	2.74
COL	Colombia	Colombian Peso	0.03	0.06
CZE	Czech Republic	Czech Koruna	0.06	0.14
DNK	Denmark	Danish Krone	0.38	0.42
EGY	Egypt	Egyptian Pound	0.05	0.15
FIN	Finland	Euro	0.58	0.64
FRA	France	Euro	4.08	4.80
DEU	Germany	Euro	3.23	3.41
GRC	Greece	Euro	0.27	0.41
HKG	Hong Kong	Hong Kong Dollar	1.05	1.47
HUN	Hungary	Hungarian Forint	0.06	0.08
IND	India	Indian Rupee	0.53	2.22
IDN	Indonesia	Indonesian Rupiah	0.13	0.31
IRE	Ireland	Euro	0.25	0.25
ISR	Israel	Israeli Shekel	0.19	0.29
ITA	Italy	Euro	2.00	1.91
JPN	Japan	Japanese Yen	11.24	8.23

Exhibit 55: GEM2 Country Factors and Currencies (continued)

Country Code	Country Name	Currency Name	Average Weight	Jan-08 Weight
JOR	Jordan	Jordanian Dinar	0.03	0.04
KOR	Korea	Korean Won	1.00	1.89
KWT	Kuwait	Kuwaiti Dinar	0.13	0.31
MYS	Malaysia	Malaysian Ringgit	0.42	0.48
MEX	Mexico	Mexican Peso	0.42	0.54
MAR	Morocco	Moroccan Dirham	0.03	0.08
NLD	Netherland	Euro	1.44	1.00
NZL	New Zealand	New Zealand Dollar	0.09	0.06
NOR	Norway	Norwegian Krone	0.33	0.65
OMN	Oman	Omani Rial	0.01	0.03
PAK	Pakistan	Pakistan Rupee	0.03	0.06
PER	Peru	Peruvian Sol	0.04	0.10
PHL	Philippines	Philippine Peso	0.06	0.13
POL	Poland	Polish Zloty	0.10	0.30
PRT	Portugal	Euro	0.19	0.22
QAT	Qatar	Qatari Rial	0.05	0.16
RUS	Russia	Russian Ruble	0.48	1.60
SAU	Saudi Arabia	Saudi Rial	0.31	0.82
SGP	Singapore	Singapore Dollar	0.47	0.66
ZAF	South Africa	South African Rand	0.62	0.79
ESP	Spain	Euro	1.38	1.76
SWE	Sweden	Swedish Krone	1.03	0.96
CHE	Switzerland	Swiss Franc	2.48	2.21
TWN	Taiwan	Taiwan Dollar	1.22	1.23
THA	Thailand	Thailand Bhat	0.18	0.33
TUR	Turkey	New Turkish Lira	0.17	0.41
GBR	UK	U.K. Pound	8.44	6.98
ARE	UAE	Emirati Dirham	0.06	0.28
USA	US	US Dollar	46.37	31.99

Note: Weights are computed within the GEM2 estimation universe using total market capitalization. Average is taken over the period from January 1997 to January 2008. Source: MSCI

Industry Factors

Industries are also important variables in explaining the sources of global equity return co-movement. One of the major strengths of GEM2 is to employ the Global Industry Classification Standard (GICS®) for the industry factor structure. The GICS scheme is hierarchical, with 10 top-level sectors, which are then divided into 24 industry groups, 68 industries, and 154 sub-industries. GICS applies a consistent global methodology to classify stocks based on careful evaluation of the firm's business model and economic operating environment. The GICS structure is reviewed annually by MSCI Barra and Standard & Poor's to ensure it remains timely and accurate.

Identifying which industry factors to include in the model involves a combination of judgment and empirical analysis. At one extreme, we could use the 10 GICS sectors as industry factors. Such broad groupings, however, would certainly fail to capture much of the cross-sectional variation in stock returns. At the other extreme, we could use all 154 sub-industries as the factor structure. Besides the obvious difficulties associated with the unwieldy numbers of factors (e.g., risk reporting, thin industries), such an approach would present a more serious problem for risk forecasting: although adding more factors always increases the in-sample R^2 of the cross-sectional regressions, many of the factor returns would not be statistically significant. Allowing noise-dominated "factors" into the model defeats the very purpose of a factor risk model.

In GEM2, selection of the industry factor structure begins at the second level of the GICS hierarchy, with each of the 24 industry groups automatically qualifying as a factor. This provides a reasonable level of granularity, without introducing an excessive number of factors. We then analyze each industry group, carefully examining the industries and sub-industries contained therein to determine if a more granular factor structure is warranted. The basic criteria we use to guide industry factor selection are: (a) the groupings of industries into factors must be economically intuitive, (b) the industry factors should have a strong degree of statistical significance, (c) incorporating an additional industry factor should significantly increase the explanatory power of the model, and (d) thin industries (those with few assets) should be avoided.

The result of this process is the set of 34 GEM2 industry factors, presented in Exhibit 56. Industries that qualify as factors tend to exhibit volatile returns and have significant weight. We find that this relatively parsimonious set of factors captures most of the in-sample R^2 explained by the 154 sub-industries, but with a much higher degree of statistical significance. Also reported in Table A2 are the average and end-of-period industry weights from January 1997 to January 2008. The weights were computed using the entire GEM2 estimation universe (i.e., including China Domestic and GCC countries). Only five industries have end-of-period weights less than 100 bps, and these tend to be highly volatile, thus making them useful risk factors.

Exhibit 56: GEM2 Industry Factors

GICS Sector	GEM2 Code	GEM2 Industry Factor Name	Average Weight	Jan-08 Weight
Energy	1	Energy Equipment & Services	0.75	1.29
	2	Oil, Gas & Consumable Fuels	4.88	9.32
	3	Oil & Gas Exploration & Production	1.00	1.72
Materials	4	Chemicals	2.36	2.84
	5	Construction, Containers, Paper	1.38	1.24
	6	Aluminum, Diversified Metals	1.05	2.41
	7	Gold, Precious Metals	0.37	0.58
	8	Steel	0.79	1.83
Industrials	9	Capital Goods	7.33	8.60
	10	Commercial & Professional Services	1.43	0.77
	11	Transportation Non-Airline	1.82	2.32
	12	Airlines	0.37	0.45
Consumer Discretionary	13	Automobiles & Components	2.52	2.29
	14	Consumer Durables & Apparel	2.33	1.93
	15	Consumer Services	1.35	1.39
	16	Media	3.24	2.11
	17	Retailing	3.42	2.08
Consumer Staples	18	Food & Staples Retailing	1.82	1.76
	19	Food, Beverage & Tobacco	4.56	4.37
	20	Household & Personal Products	1.43	1.20
Health Care	21	Health Care Equipment & Services	2.13	1.93
	22	Biotechnology	0.78	0.68
	23	Pharmaceuticals, Life Sciences	6.17	3.82
Financials	24	Banks	10.52	10.83
	25	Diversified Financials	5.63	5.06
	26	Insurance	4.61	4.14
	27	Real Estate	2.08	3.07
Information Technology	28	Internet Software & Services	0.62	0.74
	29	IT Services, Software	3.24	2.56
	30	Communications Equipment	2.46	1.41
	31	Computers, Electronics	3.69	2.81
	32	Semiconductors	2.47	1.52
Telecom	33	Telecommunication Services	7.11	5.84
Utilities	34	Utilities	4.31	5.08

Notes: Weights are computed within the GEM2 estimation universe using total market capitalization. Average is taken over the period from January 1997 to January 2008. Source: MSCI

Style Factors

Investment style represents another major source of systematic risk. Style factors, also known as *risk indices*, are designed to capture these sources of risk. They are constructed from financially intuitive stock attributes called *descriptors,* which serve as effective predictors of equity return covariance. Since the descriptors within a particular style factor are meant to capture the same underlying driver of returns, these descriptors tend to be significantly collinear. For instance, price-to-book ratio, dividend yield, and earnings yield are all attributes used to identify value stocks, and they tend to exhibit significant cross-sectional correlation. Although these descriptors have significant explanatory power on their own, naively including them as separate factors in the model may lead to serious multi-collinearity problems. Combining these descriptors into a single style factor overcomes this difficulty, and also leads to a more parsimonious factor structure.

Unlike country and industry factors, which are assigned exposures of either 0 or 1, style factor exposures are continuously distributed. To facilitate comparison across style factors, they are standardized to have a mean of 0 and a standard deviation of 1. In other words, if d_{nl}^{Raw} is the raw value of stock n for descriptor l, then the standardized descriptor value is given by

$$d_{nl} = \frac{d_{nl}^{Raw} - \mu_l}{\sigma_l}, \tag{3.2}$$

where μ_l is the cap-weighted mean of the descriptor (within the estimation universe), and σ_l is the equal-weighted standard deviation. We adopt the convention of standardizing using the cap-weighted mean so that a well-diversified cap-weighted global portfolio, such as MSCI ACWI IMI, has approximately zero exposure to all style factors. For the standard deviation, however, we use the equal-weighted mean to prevent large-cap stocks from having an undue influence on the overall scale of the exposures.

Some of the style factors are standardized on a *global-relative* basis, others on a *country-relative* basis. In the former case, the mean and standard deviation in Equation 3.2 are computed using the entire global cross section. In the latter case, the factors have mean 0 and standard deviation 1 within each country. When deciding which standardization convention to adopt, we consider both the intuitive meaning of the factor and its explanatory power.

Formally, descriptors are combined into risk indices as follows

$$X_{nk} = \sum_{l \in k} w_l \, d_{nl}, \tag{3.3}$$

where w_l is the descriptor weight, and the sum takes place over all descriptors within a particular risk index. Descriptor weights are determined using an optimization algorithm to maximize the explanatory power of the model.

One of the major advances of GEM2 is its refined and expanded set of style factors. GEM2 uses eight style factors, compared to four in its predecessor. Below, we provide a qualitative description of each of the style factors:

- The *Volatility* factor is typically the most important style factor. In essence, it captures market risk that cannot be explained by the World factor. The most significant descriptor within the Volatility index is historical beta relative to the World portfolio (as proxied by the estimation universe). To better understand this factor, consider a fully invested long-only portfolio that is strongly tilted toward high-beta stocks. Intuitively, this portfolio has greater market risk than a portfolio with beta equal to one. This additional market risk is captured through positive exposure to the Volatility factor. Note that the time-series correlation between the World factor and the Volatility factor is typically very high, so that these two sources of risk reinforce one another in this example. If, by contrast, the portfolio is invested in low-beta stocks, then the risk from the Volatility and the World factors is partially cancelled, as intuitively expected. We standardize the Volatility factor on a global-relative basis. As a result, the mean exposure to Volatility within a country can deviate significantly from zero. This standardization convention is a natural one for a global model, as most investors regard stocks in highly volatile markets as having more exposure to the factor than those in low-volatility markets. This view is reflected in the data, as we find that the explanatory power of the factor is greater using the global-relative standardization.

- The *Momentum* factor often ranks second in importance after Volatility. Momentum differentiates stocks based on recent relative performance. Descriptors within Momentum include historical alpha from a 104-week regression and relative strength (over trailing six and 12 months) with a one-month lag. Similarly to Volatility, Momentum is standardized on a global-relative basis. This is also an intuitive convention for a global model. From the perspective of a global investor, a stock that strongly outperforms the World portfolio is likely to be considered a positive momentum stock, even if it slightly underperforms its country peers. The empirical results support this view, as the Momentum factor standardized globally has greater explanatory power than one standardized on a country-relative basis.
- The *Size* factor represents another well-known source of return covariance. It captures the effect of large-cap stocks moving differently from small-cap stocks. We measure Size by a single descriptor: log of market capitalization. The explanatory power of the model is quite similar whether Size is standardized globally or on a country-by-country basis. We adopt the country-relative standardization, however, since it is more intuitive and consistent with investors' perception of the markets. For instance, major global equity indices, such as the MSCI Global Investable Market Indices, segment each country according to size, with the largest stocks inside each country always being classified as large-cap stocks. Moreover, standardizing the Size factor on a global-relative basis would serve as an unintended proxy for developed markets versus emerging markets, and increases collinearity with the country factors.
- The *Value* factor describes a major investment style which seeks to identify stocks that are priced low relative to fundamentals. We standardize Value on a country-relative basis. This again is consistent with the way major indices segment each market, with each country divided roughly equally into value and growth sub-indices. This convention also circumvents the difficulty of comparing fundamental data across countries with different accounting standards. GEM2 utilizes

official MSCI data items for Value factor descriptors, as described in the *MSCI Barra Fundamental Data Methodology* handbook.[26]

- *Growth* differentiates stocks based on their prospects for sales or earnings growth. It is standardized on a country-relative basis, consistent with the construction of the MSCI Value and Growth Indices. Therefore, each country has approximately half the weight in stocks with positive Growth exposure, and half with negative exposure. The GEM2 Growth descriptors also utilize official MSCI data items, as described in the *MSCI Barra Fundamental Data Methodology* handbook.
- The *Non-Linear Size (NLS)* factor captures non-linearities in the payoff to the size factor across the market-cap spectrum. NLS is based on a single raw descriptor: the cube of the log of market capitalization. Since this raw descriptor is highly collinear with the Size factor, we orthogonalize it to the Size factor. This procedure does not affect the fit of the model, but does mitigate the confounding effects of collinearity, and thus preserves an intuitive meaning for the Size factor. The NLS factor is represented by a portfolio that goes long mid-cap stocks, and shorts large-cap and small-cap stocks.
- The *Liquidity* factor describes return patterns to stocks based on relative trading activity. Stocks with high turnover have positive exposure to Liquidity, whereas low-turnover stocks have negative exposure. Liquidity is standardized on a country-relative basis.
- *Leverage* captures the return difference between high-leverage and low-leverage stocks. The descriptors within Leverage include market leverage, book leverage, and debt-to-assets ratio. This factor is standardized on a country-relative basis.

Estimation of GEM2 Factor Returns

The equity factor returns f_k in GEM2 are estimated by regressing the local excess returns r_n against the factor exposures X_{nk},

$$r_n = \sum_{k=1}^{K_E} X_{nk} f_k + u_n . \tag{4.1}$$

GEM2 uses weighted least squares, assuming that the variance of specific returns is inversely proportional to the square root of total market capitalization.

As described earlier, the GEM2 equity factors include the World factor, countries, industries, and styles. Every stock in GEM2 has unit exposure to the World factor, and indicator variable exposures of 0 or 1 to countries and industries. As a result, the sum of all country factors equals the World factor, and similarly for industries, i.e.,

$$\sum_c X_{nc} = 1, \quad \text{and} \quad \sum_i X_{ni} = 1 , \tag{4.2}$$

[26] http://www.msci.com/methodology/meth_docs/MSCI_Sep08_Fundamental_Data.pdf

for all stocks n. In other words, the sum of all country columns in the factor exposure matrix gives a column with 1 in every entry, which corresponds to the World factor. The same holds for industry factors. The GEM2 factor structure, therefore, exhibits exact two-fold collinearity. Constraints must be applied to obtain a unique solution.

In GEM2 we adopt an intuitive set of constraints that require the cap-weighted country and industry factor returns to sum to zero,

$$\sum_c w_c f_c = 0, \quad \text{and} \quad \sum_i w_i f_i = 0, \tag{4.3}$$

where w_c is the weight of the estimation universe in country c, and w_i is the corresponding weight in industry i. These constraints remove the exact collinearities from the factor exposure matrix, without reducing the explanatory power of the model.

We can now give a more precise interpretation to the factors. Consider the cap-weighted estimation universe, with holdings h_n^E. The return of this portfolio R_E can be attributed using the GEM2 factors,

$$R_E = f_w + \sum_c w_c f_c + \sum_i w_i f_i + \sum_s X_s^E f_s + \sum_n h_n^E u_n . \tag{4.4}$$

The constraints imply that the first two sums in Equation 4.4 are equal to zero. The third sum is also zero since the style factors are standardized to be cap-weighted mean zero; i.e., $X_s^E = 0$, for all styles s. The final sum in Equation 4.4 corresponds to the specific return of a broadly diversified portfolio, and is *approximately* zero (note it would be *exactly* zero if we used regression weights instead of capitalization weights). Thus, to an excellent approximation, Equation 4.4 reduces to

$$R_E \approx f_w . \tag{4.5}$$

In other words, the return of the World factor is essentially the cap-weighted return of the estimation universe.

To better understand the meaning of the pure factor portfolios, we report in Table 4.1 the long and short weights (January 2008) of the World portfolio and several pure factor portfolios in various market segments. The World portfolio is represented by the cap-weighted GEM2 estimation universe. The pure World factor is 100 percent net long and the net weights closely match those of the World portfolio in each segment. The other pure factors all have net weight of zero, and therefore represent long/short portfolios.

As a first approximation, the pure country factors can be regarded as going long 100 percent the particular country, and going short 100 percent the World portfolio. For instance, going long 100 percent Japan and short 100 percent the World results in a portfolio with roughly 91 percent weight in Japan, and -91 percent in all other countries. The pure country factors, however, have zero exposure to industry factors. This is accomplished by taking appropriate long/short combinations in other countries. For instance, the Japanese market is over-represented in the segment corresponding to the Automobile factor. To partially hedge this exposure, the pure Japan factor takes a net short position of -1.08 percent in the US Automobile segment. A similar short position would be found in the German Automobile segment.

The pure Automobile factor can be thought, as a first approximation, to be formed by going 100 percent long the Automobile industry and 100 percent short the World portfolio. A more refined view of the factor takes into account that the net weight in each country is zero. The pure Automobile factor naturally takes a large long position in Japanese automobiles, but hedges the Japan exposure by taking short positions in other Japanese segments.

The pure Volatility factor is perhaps the easiest to understand, as it takes offsetting long and short positions within all segments corresponding to GEM2 factors (e.g., Japan, US, and Automobiles). Note that the weights are not equal to zero for segments that do not correspond to GEM2 factors, such as Japanese automobiles.

For a further discussion of the quantitative characteristics of the GEM2 factors, see Menchero, Morozov, and Shepard (2008). There, they present the degree of collinearity among the factor exposures, and report on the statistical significance, performance and volatility of the factor returns.

Formation of the GEM2 Factor Covariance Matrix

The GEM2 factor covariance matrix is built from the time series of weekly factor returns, f_{kt}. Weekly observations reduce sampling error and provide more responsive risk forecasts than monthly observations. Daily factor returns are not used for computing global covariances due to asynchronous trading effects, but they are computed for performance attribution purposes.

We use exponentially weighted moving averages (EWMA) to estimate the factor covariance matrix for both equity and currency blocks. This approach gives more weight to recent observations and is a simple, yet robust, method for dealing with data non-stationarity. An alternative approach would be to use generalized auto-regressive conditional heteroskedasticity, or GARCH. We find that EWMA estimators are typically more robust to changing market dynamics and produce more accurate risk forecasts than their GARCH counterparts.

In GEM2, we must also account for the possibility of serial correlation in factor returns, which can affect risk forecasts over a longer horizon. Suppose, for instance, that high-frequency returns are negatively correlated. In this case, long-horizon risk forecasts estimated on high-frequency data will be lower than that implied using simple square-root-of-time scaling, since returns one period tend to be partially offset by opposing returns the following period.

The prediction horizon in Barra risk models is typically one month. Models that are estimated on daily or weekly returns, therefore, must adjust for serial correlation. Note that models estimated on monthly observations, such as GEM, need not adjust for serial correlation, since the observation frequency coincides with the prediction horizon.

Full treatment of serial correlation must account for not only the correlation of one factor with itself across time, but also for the correlation of two factors with each other across different time periods. In GEM2, we model serial correlation using the Newey-West methodology[27] with two lags. This assumes that the return of any factor may be correlated with the return of any other factor up to two weeks prior.

It is useful to think of the factor covariance matrix as being composed of a correlation matrix, which is scaled by the factor volatilities. Volatilities and correlations can then be estimated separately using EWMA with different half-life parameters.

The volatility half-life determines the overall responsiveness of the model. Selecting the proper volatility half-life involves analyzing the trade-off between accuracy and responsiveness on the one hand, and stability on the other. If the volatility half-life is too long, the model gives undue weight to distant observations that have little to do with current market conditions. This leads to stable risk forecasts, but at the cost of reduced accuracy. By contrast, a short volatility half-life makes the model

[27] Newey, W., and K. West, 1987. "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica*, Vol. 55, No. 3: 703-708.

more responsive, generally improving the bias statistics, but at the cost of jumpier risk forecasts. Of course, the volatility half-life cannot be lowered without bound; if the half-life is too short, then sampling error can become so large that the risk forecasts are not only less stable, but also less accurate.

We measure the accuracy of the risk forecasts using bias statistics, which essentially represent the ratio of realized risk to forecast risk. A bias statistic of 1 is considered ideal, but sampling error ensures that realized bias statistics will deviate from 1, even for perfect risk forecasts. Menchero, Morozov, and Shepard (2008) discuss the use of bias statistic testing for assessing the accuracy of GEM2 risk forecasts.

The GEM2 Specific Risk Model

GEM2 uses a structural model to estimate specific risk. This methodology is similar to that used in other Barra risk models, but employs weekly rather than monthly observations. These higher-frequency observations allow us to make the forecasts more responsive while also reducing estimation error.

Mathematically, the specific risk forecast of a stock is given as the product of three components

$$\sigma_n = \hat{S}\left(1+\hat{V}_n\right)K_M , \tag{6.1}$$

where $\hat{S}$ is the forecast mean absolute specific return of stocks in the estimation universe, $\hat{V}_n$ is the forecast relative absolute specific return, and K_M is a multiplicative scalar which depends on the market-cap segment M of the stock. The overall responsiveness of the model is dominated by $\hat{S}$, whereas $\hat{V}_n$ determines the cross-sectional variation in specific risk. The role of K_M is to convert from weekly absolute specific returns to monthly standard deviation. The motivation for modeling specific risk in terms of absolute specific returns is that the estimation process is less prone to outliers.

The *realized* mean absolute specific return for a given period t is computed as the cap-weighted average,

$$S_t = \sum_n w_{nt}\left|u_{nt}\right| , \tag{6.2}$$

where u_{nt} is the realized specific return for stock n. We use the cap-weighted average because large-cap assets are less prone to extreme outliers. The forecast mean absolute specific return is given by the exponentially weighted average of the realized values,

$$\hat{S} = \sum_t \gamma_t S_t . \tag{6.3}$$

For GEM2S, we use a half-life parameter of 9 weeks for γ_t, versus 24 weeks for GEM2L. To determine these half-life parameters, we constructed a group of active portfolios, and then computed their average forecast variability. We then selected the half-life parameters γ_t so that the specific risk forecast variability of these portfolios roughly matched the variability in forecasts of the factors, while also taking into account model performance. This results in highly accurate specific risk forecasts and greater stability in the proportion of risk coming from factors and stock-specific components.

We use a factor model to forecast the relative absolute specific return, whose *realized* values are given by

$$\varepsilon_{nt} = \frac{\left|u_{nt}\right| - S_t}{S_t} . \tag{6.4}$$

GEM2 factors already provide a sound basis for explaining ε_{nt}, since the level of relative absolute specific risk depends on the country, industry, and style exposures of the individual stocks. For instance, large-cap utility stocks tend to have lower specific returns than, say, small-cap internet stocks.

While the model factors are well suited to forecast specific risk, the most powerful explanatory variable is simply the trailing realized specific volatility. We therefore augment the GEM2 factor exposure matrix with this additional factor for the purpose of forecasting the relative absolute specific returns.

To estimate the relationship between factor exposures and relative absolute specific returns, we perform a 104-week pooled cross-sectional regression,

$$\varepsilon_{nt} = \sum_k \tilde{X}_{nk}^{t} g_k + \lambda_{nt}, \tag{6.5}$$

where $\tilde{X}_{nk}^{t}$ represents the augmented factor exposure matrix element. We use capitalization weights in the regression to reduce the impact of high-kurtosis small-cap stocks, and apply exponential weights of 26 weeks for the short model and 52 weeks for the long model. The forecast relative absolute specific return is given by

$$\hat{V}_n = \sum_k \tilde{X}_{nk} g_k, \tag{6.6}$$

where $\tilde{X}_{nk}$ is the most recent factor exposure, and g_k is the slope coefficient estimated over the trailing 104 weeks.

The product $\hat{S}(1+\hat{V}_n)$ is the weekly forecast absolute specific return for the stock. We need to convert this to a monthly standard deviation. If the specific returns were normally distributed (temporally), then the time-series standard deviation of the ratio

$$\frac{u_{nt}}{S_t(1+\hat{V}_{nt})} \tag{6.7}$$

would be $\sqrt{\pi/2}$, where $\hat{V}_{nt}$ is the forecast relative absolute specific return at time t. However, since the specific returns exhibit kurtosis, the standard deviation is usually slightly greater than this theoretical value. For this reason, the multiplicative scalar K_M is sometimes called the *kurtosis correction*.

There is one final adjustment that must be applied to the kurtosis correction. The prediction horizon of the risk model is one month. We observe, on average, a small but persistent negative serial correlation in weekly specific returns. As a result, the monthly specific volatility will be slightly less than that suggested by simple square root of time scaling. If we rank stocks by degree of serial correlation, however, we find no relationship between the rank of stocks over non-overlapping periods. We therefore define the standardized return with two-lag autocorrelation,

$$b_{nt} = \frac{u_{n,t} + u_{n,t-1} + u_{n,t-2}}{\sqrt{3} S_t (1+\hat{V}_{nt})}. \tag{6.8}$$

The kurtosis correction is given by the realized standard deviation of b_{nt},

$$K_M = \sigma(b_{nt}), \tag{6.9}$$

where the standard deviation is computed over all observations within a particular market-cap segment M over the trailing 104 weeks.

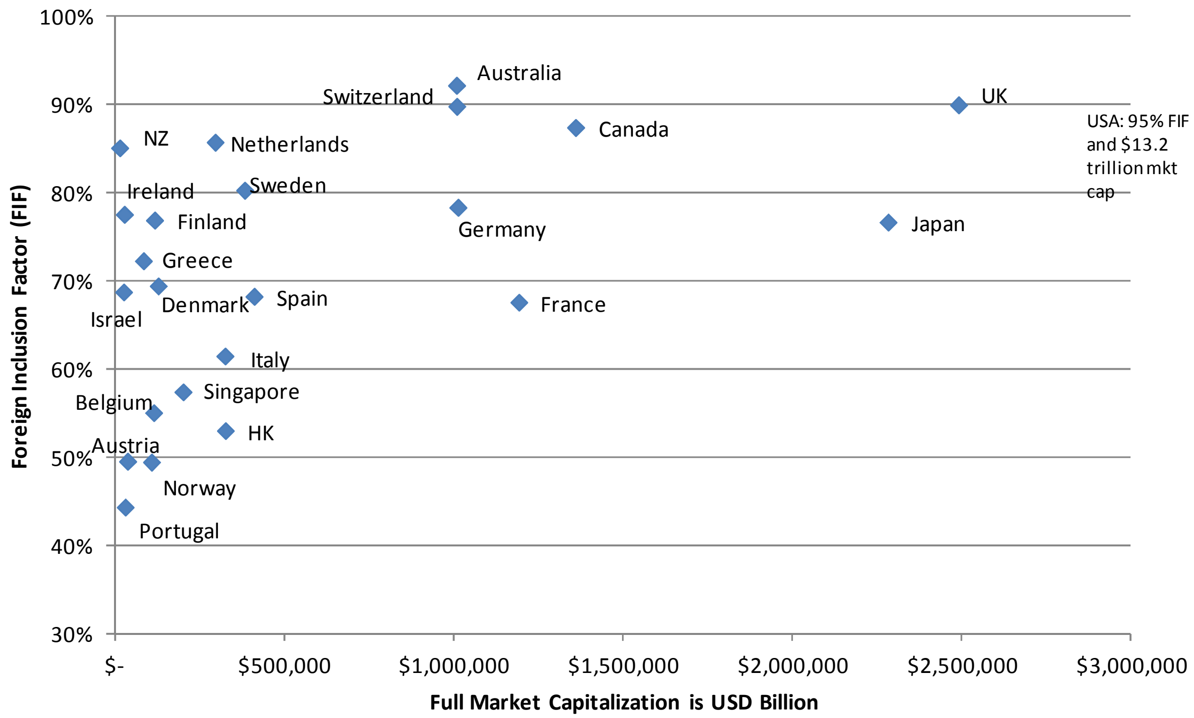
Appendix C: A Discussion of Full Market Cap Weights

In Section II of the report, we noted that the MSCI indices use free float market capitalization in constructing market capitalization based weights. This raises the question of how similar GDP-weighted indices are to indices constructed using the full market capitalization for each country.

Today, free-float adjustments to market capitalization are the industry standard, reflecting the realities of investability limitations. The free float of a company can be defined as the percentage of its shares that are deemed to be available for purchase on the market. Therefore, free float excludes strategic investments in a company, such as stakes held by governments, controlling shareholders and their families, the company's management or another company. This begs the question of whether using full market cap weights (based on market cap which has not been adjusted for free float) would compare similarly to GDP weights.

Exhibit 57 shows full market capitalization for the developed countries in the MSCI World Index plotted against their Foreign Inclusion Factor. The FIF of a security is defined as the proportion of shares outstanding that is available for purchase in the public equity markets by international investors. This proportion accounts for the available free float of and/or the foreign ownership limits applicable to a specific security (or company). In the calculation of MSCI indices, each constituent's weight is free float adjusted by application of the security's Foreign Inclusion Factor (FIF) to security's full market capitalization weight.

Exhibit 57: Full Market Capitalization versus Foreign Inclusion Factor (Developed Markets), May 2010

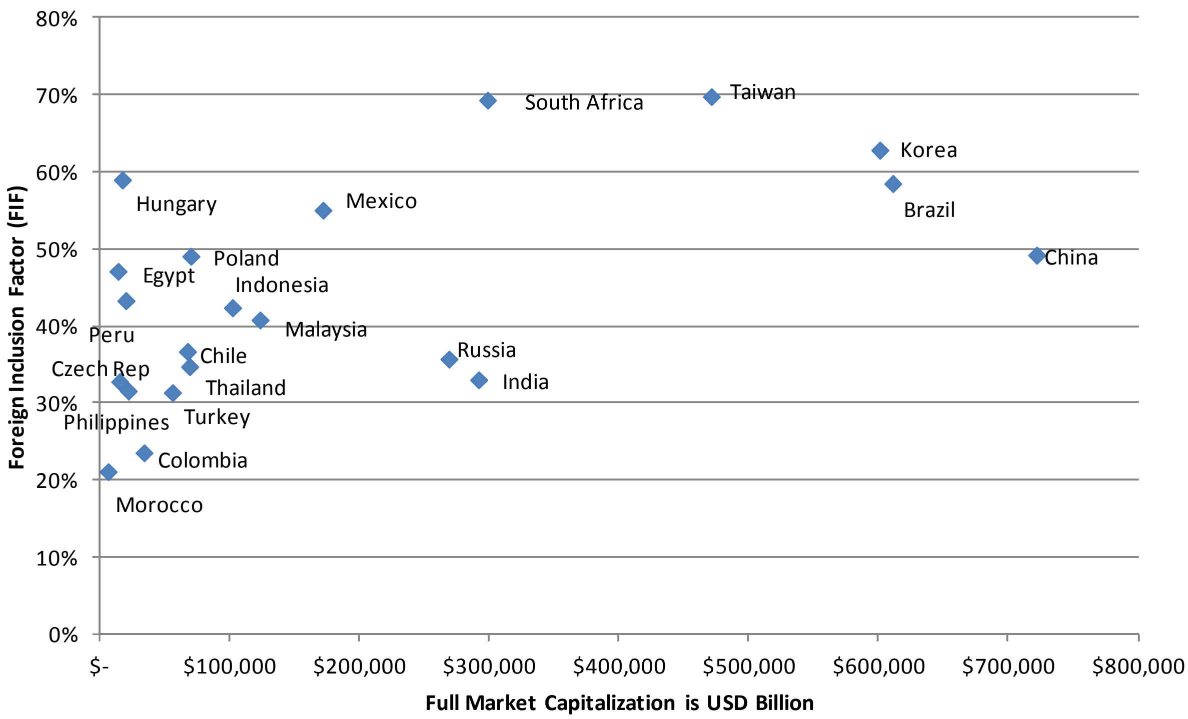


Note: MSCI World constituents shown above. Source: MSCI

In general, the Foreign Inclusion Factor (FIF) is typically quite high for developed markets. The aggregate Foreign Inclusion Factor for Europe is 80% while the US FIF is 95%. At the broad ACWI level the weighted average FIF is close to 78%.

Exhibit 58 shows the same chart for emerging markets. In these markets, the FIF is on average much lower than for developed markets, around 50%. Overall, the weight differences resulting from using free float versus full market capitalization are primarily confined to emerging markets.

Exhibit 58: Full Market Capitalization versus Foreign Inclusion Factor (Emerging Markets), May 2010



Note: MSCI MSCI Emerging Markets constituents shown above. Source: MSCI

Over the years, the investability of securities with limited free float and/or with foreign ownership restrictions has become an increasingly important issue as the amount of domestic and cross-border equity investments have raised dramatically. This issue has been highlighted as a large number of initial public offerings and partial privatizations of large companies with low free float have taken place, especially in Emerging Markets. In view of these trends, the increased focus on controlling the risk of portfolios relative to benchmarks and the growth in passive investing, MSCI implemented the free float adjustment to market capitalization under it global equity index methodology in May 2002, to ensure that its indices continue to appropriately represent the investable universe, both in terms of target market representation and constituent weights.

It should be noted however that MSCI has been aware of free float issues as they relate to inclusion weights in indices for many years. A possible effect of including large companies with low free float at full market capitalization weight is to lead to inadequate investibility of these companies given their weight in the benchmark. MSCI designed the Market Capitalization Factor (MCF) to address these cases in 1996, allowing the inclusion of large companies at a fraction of their market capitalization. Due to low free float, these companies would have traditionally been excluded from the indices or included at their full weight.

Appendix D: Regime Analysis for US and Europe

One aspect of concentration risk is the performance of different markets under various regimes. Here we consider three types of regimes:

(1) Recessions

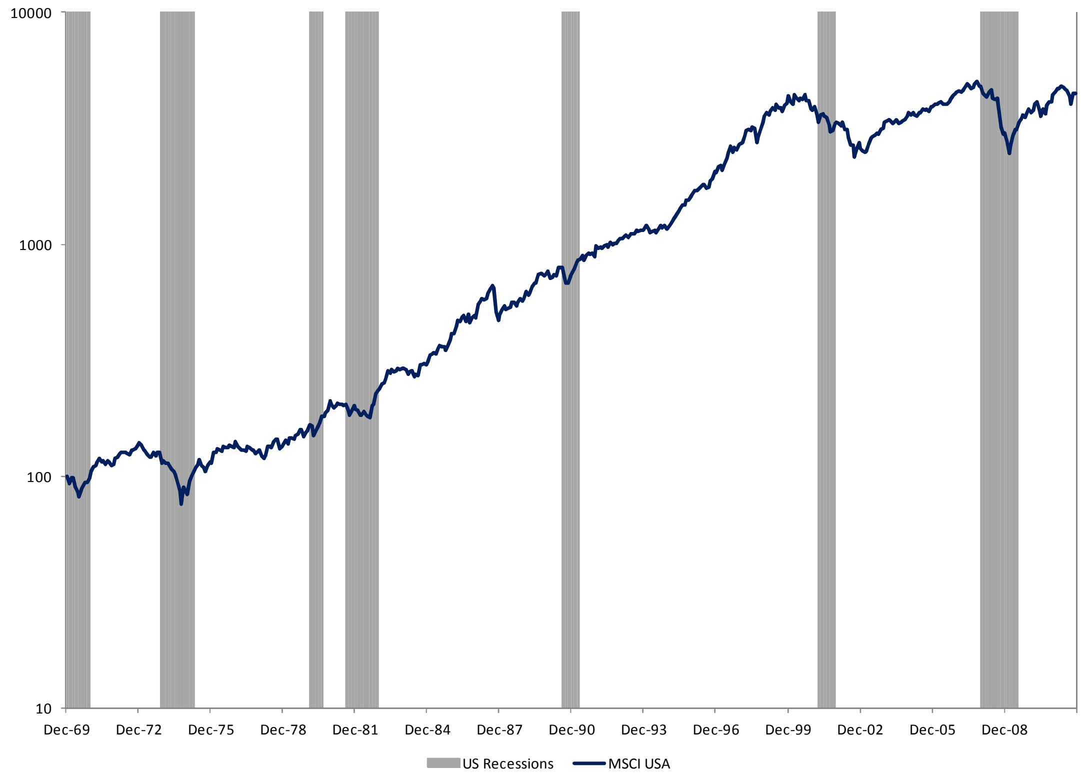
(2) High and Low Market volatility regimes

(3) High and Low Asset Price Bubble regimes

Recessions

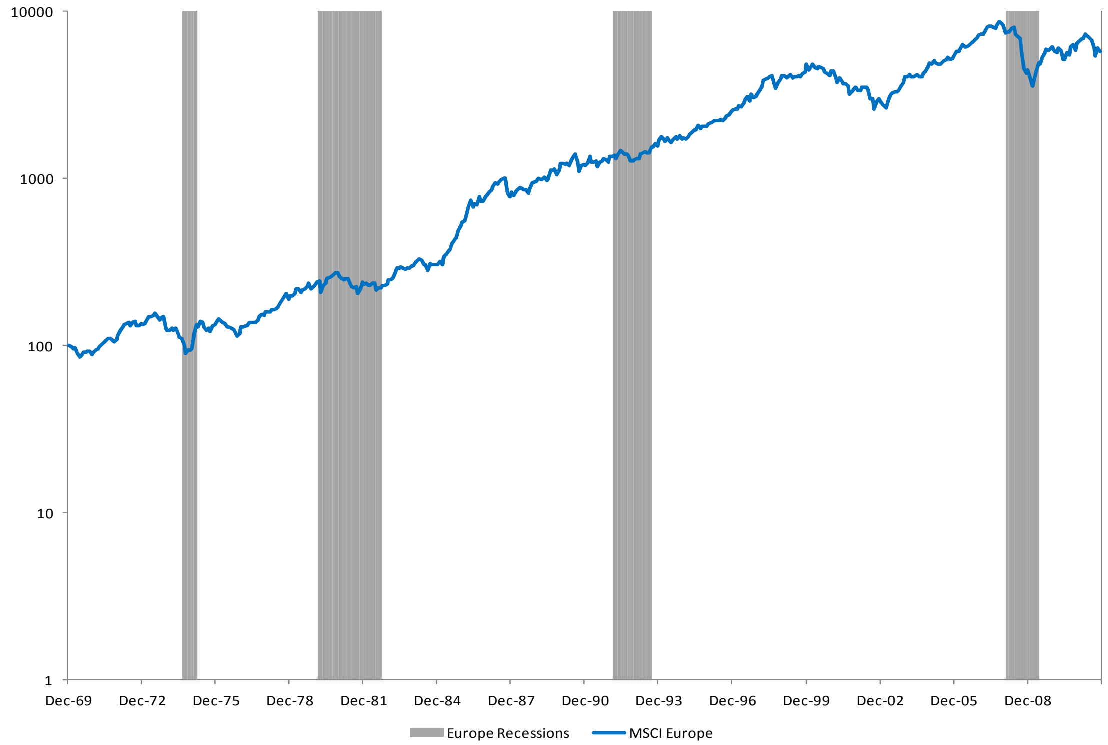
Recessions are classified using the National Bureau of Economic Research (NBER) definitions for the US and Center of Economic Policy Research (CEPR) definitions for the Europe. Exhibits 59 and 60 graph the (gross) cumulative returns to the MSCI USA and MSCI Europe Indices along with recession periods.

Exhibit 59: Recessionary Periods in the US



Source: MSCI, NBER

Exhibit 60: Recessionary Periods in Europe



Source: MSCI, CEPR

The performance of the two indices averaged over recessionary periods is shown in Exhibit 61. As expected, equity markets fall or perform weakly during recessions.

Exhibit 61: Average (Simple) Monthly Returns During Recessions (Basis Points)

Average returns	MSCI USA	MSCI Europe
1970-2011	0.76	0.81
Recession	-0.21	0.01
Non recession	1.09	1.10

Source: MSCI

Market Volatility

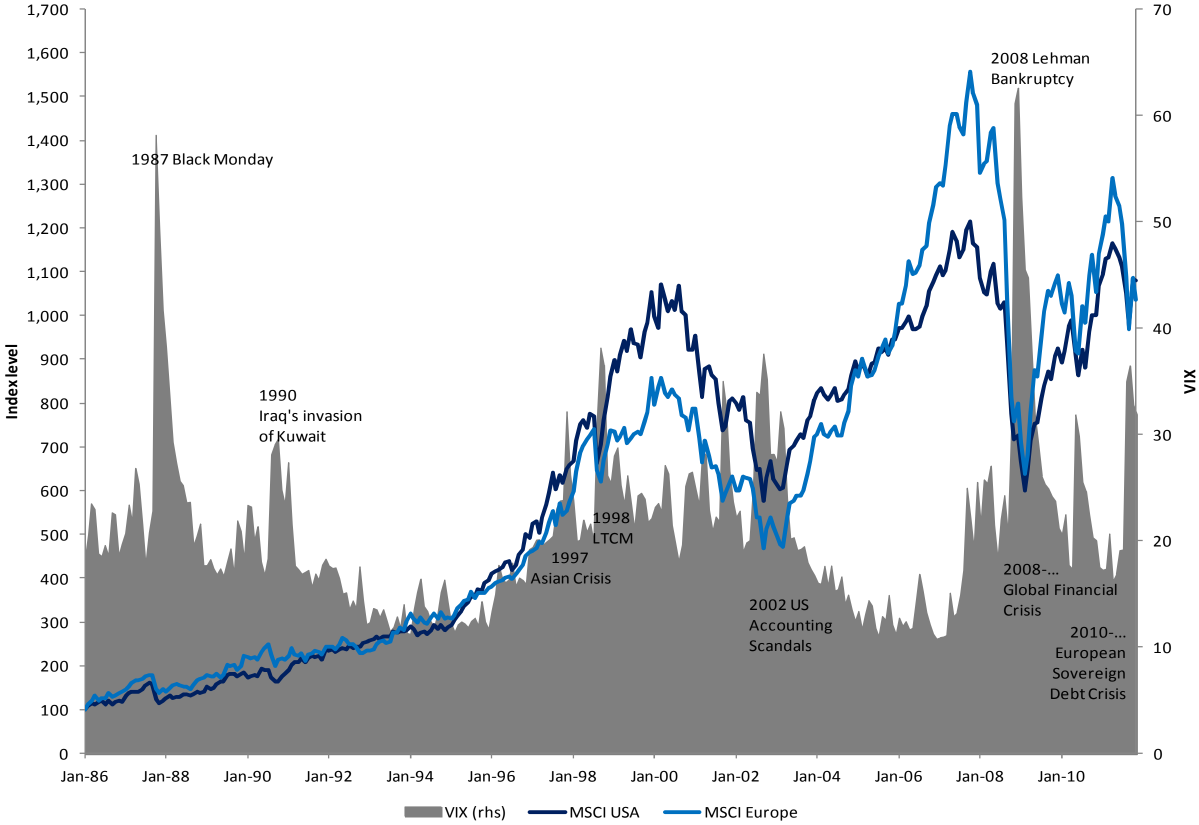
Market volatility regimes are identified by looking at changes in the CBOE Volatility Index (VIX).[28] The VIX index is commonly used as a barometer of global investor sentiment and market volatility. It decreases with investor sentiment (high VIX indicates fear) and increases with market volatility (high VIX indicates high volatility). Although it is based on US equities, it is highly correlated to similar measures globally.

[28] VIX is an options-based near term (1 month) market implied volatility. For the methodology used to calculate VIX see http://www.cboe.com/micro/VIX/vixintro.aspx.

We grouped data into five quintiles based on the change in VIX level, from rapid decrease to rapid increase. The analysis starts in 1986 which is the first year for which the VIX is available. Each quintile (or group) contains 20% of the observations (about 60 observations in this case).

Exhibit 62 provides the cumulative returns to the MSCI USA and MSCI Europe Indices overlaid on the VIX level. The most dramatic episodes of increase in VIX are labeled; these types of episodes are captured in the “rapid increase” quintile. Once the data is grouped, we calculate average returns over each quintile and assess if there are any differences across the different quintiles.

Exhibit 62: MSCI USA, MSCI Europe and VIX



Source: MSCI, CBOE

Exhibit 63 presents the results of the analysis. On the left column we describe the regime, from “rapid decrease” in market volatility to “rapid increase”. A rapid decrease in volatility implies a sudden shift in investor sentiment, favoring a more bullish view. A rapid increase in volatility implies a sudden shift in sentiment, towards fear. The second column gives a quantitative indication of the magnitude of change in VIX in each of the quintiles. For example, the average change in VIX in the “rapid decrease” quintile is -16%. The next two columns present the average returns to the MSCI USA and MSCI Europe indices that correspond to each regime.

The results are similar across the markets and confirm in addition a well-documented effect of investor sentiment and market volatility over equity returns. The average returns to the indices are monotonically decreasing on market volatility. The spread between the rapid decrease (i.e. an environment turning very bullish) in volatility and rapid increase (i.e. an environment turning very bearish) is 4% in MSCI USA and 4.4% in MSCI Europe.

Exhibit 63: MSCI USA and MSCI Europe as a Share of ACWI

Market Volatility Regime	Average change in VIX (%)	Average returns (%)	
		MSCI USA	MSCI Europe
Rapid decrease	-16	2.17	2.05
Decrease	-7	2.24	2.58
Stable	-1	1.30	1.07
Increase	5	0.56	1.13
Rapid increase	27	-1.92	-2.37

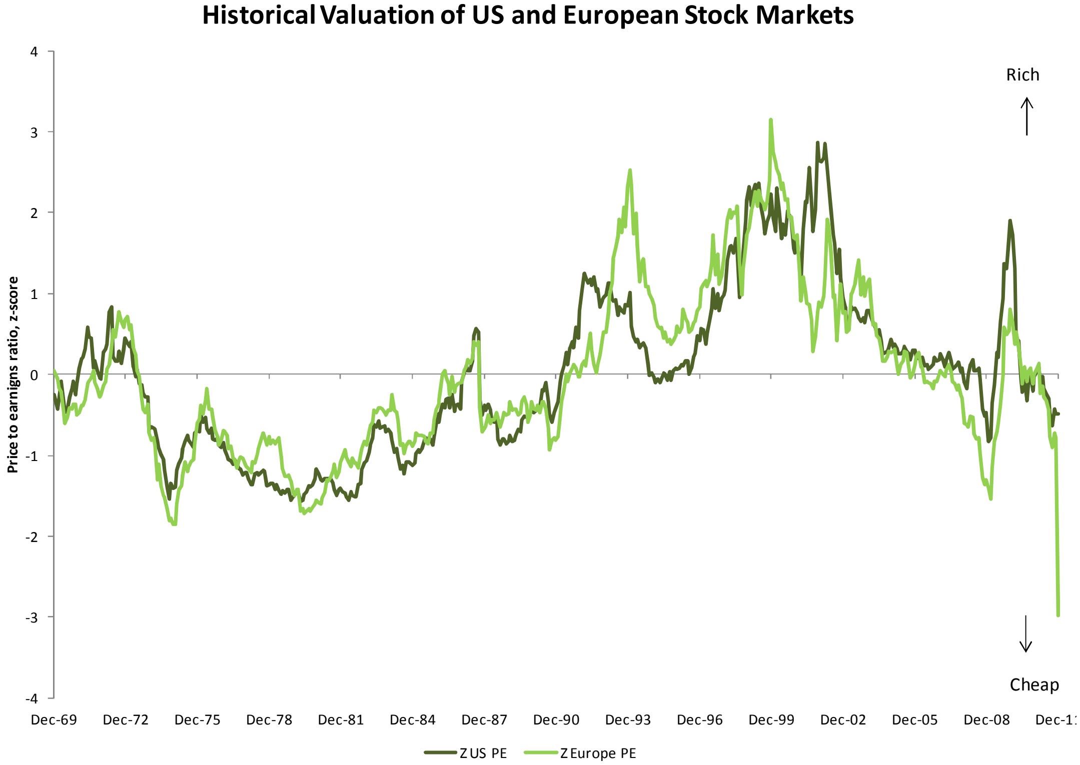
Source: MSCI

Asset Price Bubbles

Next we apply a similar methodology to analyze performance during periods of asset price bubbles. The variable used to determine these regimes is price-to-earnings. Price-to-earnings generally increases as markets trend upwards and will typically be highest when these markets are in a bubble or “over-bought”. In this case we calculate regimes for USA and Europe independently, using the valuation ratios appropriate for each index. The analysis starts in 1970. Each quintile (or group) contains 20% of the observations (about 100 observations in this case).

Exhibit 64 provides a comparison of the normalized time series of price to earnings for the US and Europe. When the plotted lines are in the positive (negative) quadrant, the market is above (below) the average price-to-earnings. The series track each other fairly closely except for certain periods such as the 1990s where European valuations are more extreme and 2001 with the Tech Bubble where valuations in the US are more stretched.

Exhibit 64: Price-to-Earnings Ratios for the MSCI USA and MSCI Europe Indices (Normalized as a Share of MSCI ACWI)



Source: MSCI

Exhibit 65 presents the results of the analysis. On the left column we describe the regime, from "cheapest" earnings to "richest" earnings. Asset price bubbles are captured by the "richest" regime, and periods of market undervaluation are captured in the "cheapest" regime. The second column gives a quantitative indication of the average earnings to price for that quintile in the US. For example, the average earnings to price ratio in the "richest" quintile is 26.4. The fourth column shows the same information for Europe. The third and last columns display the average 12 month forward returns to the MSCI USA and MSCI Europe indices that correspond to each regime. The reason why the returns are calculated 12 months forward is to mimic investors' strategy. The results are similar across the markets and confirm the well-documented value risk premia. The average returns to the indices are monotonically decreasing on the earnings to price ratio. The spread between the cheapest and richest markets is 1% in MSCI USA and 0.9% in Europe. That is, investors that bought the index when it was cheap per the earnings to price ratio and held on to the index for 12 months experienced an average monthly return if 1%.

Exhibit 65: MSCI USA and MSCI Europe as a Share of ACWI

Valuation Regimes	MSCI USA		MSCI Europe	
	Average PE ratio	Average returns	Average PE ratio	Average returns
Cheapest (Lowest P/E Quintile)	8.91	1.51	8.59	1.65
Cheap	12.87	0.98	11.66	1.16
Average	16.43	0.34	13.95	0.03
Rich	19.26	0.95	16.75	1.23
Richest (Highest P/E/ Quintile)	26.39	0.49	22.44	0.73

Source: MSCI

In sum, both the MSCI USA and MSCI Europe Indices exhibited the same sensitivity to environments with high market volatility and asset price bubbles. The effects were in the same direction and similar magnitude. Index returns suffered in times of rapid increase in market volatility. Index returns were higher twelve months after valuation ratios bottomed.

Appendix F: Stock-Level Concentration Risk

This section contains information on the stock-level concentration risk for the US and European equity markets as defined by the MSCI USA and Europe Indices.

The MSCI USA Index is composed by close to 600 stocks that comprise the largest 85% stocks in the market. The MSCI Europe Index is composed by slightly over 900 stocks that cover the largest 85% stocks in the market. The distribution of stocks by size is currently quite similar across both benchmarks. As shown in Exhibit 66, the largest 10 stocks in each index comprise 20% of the index weight. Note that this share has varied over time. In the case of the MSCI USA Index there has been a dramatic decrease in the influence of the top 10 stocks in the index, which in 1975 stood in the neighborhood of 40%. This is in part due to changes in methodology for this country index (changes in methodology had a marginal effect on Europe).

Exhibit 66: Weight of the Top 10 stocks in MSCI USA and MSCI Europe Indices

Source: MSCI

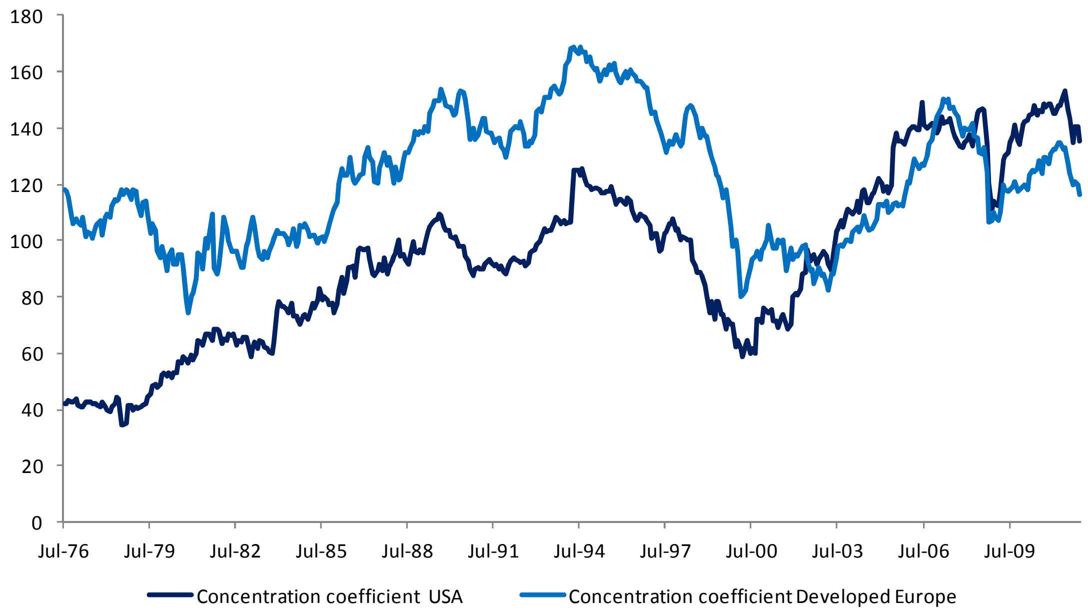
Note that as of 2002 when the GIMI methodology was implemented and the 85% coverage and minimum size reference criteria implemented across countries, the divergence between MSCI USA and MSCI Europe became more muted. Additionally, changes in the share of the top stocks also vary as a result of market developments. In addition, we highlight that during the Dot Com bubble in the late 1990's this share increased in both countries and then decreased as a result of the crash.

Another useful measure of concentration is the concentration coefficient, which provides a more nuanced view of how the number of stocks in an index and their relative size affect concentration risk. The concentration coefficient depends both on the number of stocks and their relative sizes. The higher the number of stocks in the index and the more equal the distribution of weights is across constituents (i.e. how close the index is to an equal weighted index), the less concentrated the index is. The concentration coefficient is measured as the inverse of the sum of squared weights of an index's constituents. For an equal-weighted index, the concentration coefficient is equal to the number of securities. For a non equal-weighted index, the concentration coefficient indicates the number of equal weighted stocks that the non-equal weighted index represents. Typically, the concentration coefficient for a non equal weighted index will be a lower number than the total number of stocks in that index. A lower concentration coefficient means a higher index concentration.

Exhibit 67 shows the evolution of the concentration coefficient for the MSCI USA and MSCI Europe Indices. Both indices appear very similar from this perspective, with values of 135 for the US and 115 for Europe. The concentration in the MSCI USA index is equivalent to the concentration in a portfolio formed by 135 equal weighted stocks. The concentration in the MSCI Europe index is equivalent to the concentration in a portfolio formed by 115 equal weighted stocks. This number is in both cases smaller than the total number of stocks in the market cap weighted index, but still considerably large. This implies that no single company, small group of companies or sectors is dominant, resulting in fairly diversified indices.

Note that this measure does fluctuate over time, reflecting methodological changes (discussed above) as well as specific market developments. For instance, the coefficient dropped, i.e. concentration increased, as a result of the Dot Com bubble in both countries. What should be highlighted is that over time the concentration coefficient for the US has converged with Europe.

Exhibit 67: Concentration coefficient in MSCI USA and MSCI Europe



Source: MSCI

Appendix G: Additional Detail on Sections III and IV

Local Currency Results

Section III in the main report discusses the notion of concentration risk in the US or Europe. One important aspect is the historical volatility and performance of these markets over the long term and during crises. Exhibit 68 replaces USD returns with local currency returns for Exhibit 23 in the main report. (Note that indices based on local currency returns are not replicable in practice; currency-hedged indices are more appropriate for understanding actual realizable performance.) As in the main report, the returns to the MSCI Europe Index were higher over the 1970-2011period. However, in local returns, the difference is much less stark. With the exception of the 1980-1989 period, all subperiod returns are closer between the US and Europe when viewed in local returns.

Exhibit 68: Summary of Historical US and Europe Performance (Monthly Returns in Local Currency Returns and NOK Returns, January 1970 to December 2011)

	MSCI USA (Local)	MSCI Europe (Local)	MSCI USA (NOK)	MSCI Europe (NOK)
Average Annualized Returns				
1970 - 2011	9.5%	9.6%	9.0%	9.6%
1970-1979	4.6%	5.0%	0.8%	4.6%
1980-1989	17.1%	20.9%	20.6%	22.0%
1990-1999	19.0%	15.9%	21.4%	16.8%
2000-2009	-1.3%	0.0%	-4.5%	-0.9%
2010-2011	8.5%	-1.0%	10.3%	-1.7%
Annualized Standard Deviation				
1970 - 2011	15.7%	15.5%	17.5%	15.7%
1970-1979	15.9%	14.3%	17.2%	15.4%
1980-1989	16.2%	15.1%	19.1%	14.7%
1990-1999	13.4%	15.2%	16.9%	15.4%
2000-2009	16.2%	17.1%	17.0%	17.0%
2010-2011	17.5%	15.2%	11.2%	13.3%
Risk-Adjusted Annualized Return				
1970 - 2011	0.60	0.62	0.51	0.61
1970-1979	0.29	0.35	0.05	0.30
1980-1989	1.05	1.39	1.08	1.49
1990-1999	1.42	1.04	1.27	1.09
2000-2009	-0.08	0.00	-0.26	-0.05
2010-2011	0.49	-0.07	0.92	-0.13

Exhibits 69 and 70 similarly replaced USD returns with local currency returns for Exhibits 24 and 25A in the main report.

Exhibit 69: Downside and Tail Risk Measures (Monthly Returns in Local Currency Returns and NOK Returns, January 1970 to December 2011)

	MSCI USA (Local)	MSCI Europe (Local)	MSCI USA (NOK)	MSCI Europe (NOK)
Average Monthly Return	0.8%	0.8%	0.7%	0.8%
Standard Deviation	4.5%	4.5%	5.1%	4.5%
Skewness	-0.4	-0.6	-0.2	-0.5
Kurtosis	1.8	2.9	1.5	1.8
VaR (95%)	-7.2%	-7.2%	-7.1%	-7.2%
VaR (99%)	-10.5%	-11.6%	-11.4%	-11.2%
Conditional VaR (95%)	-9.7%	-10.5%	-10.3%	-10.1%
Conditional VaR (99%)	-14.3%	-14.7%	-15.1%	-14.1%
Average Negative Return	-3.4%	-3.6%	-3.9%	-3.6%
Average Positive Return	3.6%	3.4%	4.0%	3.6%

Exhibit 70 shows similar results to Exhibits 25A and 25B with the exception of the Japan Crash. Without currency effects, the differences between the US and Europe are actually quite stark for the Japan Crash. The results are now more similar for US versus Europe for the Subprime Crisis in contrast.

Exhibit 70: Performance in Past Periods of Market Stress (Cumulative Return During Period, in Percentages, Local Currency Returns)

Market Stress Episodes 1988 to 2011	MSCI USA	MSCI Europe	MSCI Japan	MSCI EM
Japan Crash	-10.3	-20.2	-46.4	32.4
Asian Crisis/ LTCM	25.3	26.0	-8.0	-13.8
Dot Com Crash	-43.2	-49.6	-51.7	-31.4
Subprime Crisis	-50.6	-49.7	-53.7	-51.7
Europe Sovereign Crisis	20.9	0.9	-17.3	4.7

Simulating Over- and Under-weights to the US and Europe

Here, we replicate the simulation results in Section III of the main report using local currency returns. In addition, we replace the GDP-weighted allocation with a hypothetical portfolio which approximates the Government Pension Fund of Norway (Global). The portfolio we use to approximate the fund is given by:

- 50% allocation to MSCI All Country (AC) Europe which includes both developed and emerging markets
- 15% allocation to MSCI All Country (AC) Asia Pacific which includes both developed and emerging markets
- 35% allocation to a blend of MSCI All Country (AC) Americas, which includes both developed and emerging markets, and the Middle East plus Africa (all emerging markets). The two "regions" are blended according to their market capitalization weight every month.

Exhibits 71A and 71B are the same as Exhibits 26A and 26B in the main report with one difference--the Current Allocation replaces the GDP-weighted allocation. The current allocation for the Government Pension Fund (Global) has earned higher returns over the 1988-2011 timeframe with commensurate higher risk-adjusted returns as well. (In the main report, GDP-weighting produced similarly better performance in the same range.) Note that performance of the current allocation was much stronger in the 1990s in contrast to the 2001 to 2011 period shown below. This results from being relatively overweighted to Europe, underweighted to the US, Pacific (developed Pacific region), and Emerging Markets.

Exhibit 71: Simulation Results (Global Portfolios with Varying North American and European Weights, January 1988 to December 2011, Monthly Returns)

A. Local Currency

	Market Cap Weight (ACWI)	Current Allocation	Simulation Results (Case 1)	Simulation Results (Case 2)
Average Annualized Return				
1988-2011	7.3%	8.4%	7.7%	7.8%
- January 1988 to December 2000	12.5%	14.8%	13.3%	13.3%
- January 2001 to December 2011	1.3%	1.2%	1.4%	1.5%
Average Standard Deviation				
1988-2011	14.5%	14.5%	14.6%	14.6%
- January 1988 to December 2000	13.3%	12.9%	13.4%	13.3%
- January 2001 to December 2011	15.7%	16.0%	15.8%	15.9%
Risk-Adjusted Annualized Return				
1988-2011	0.50	0.58	0.53	0.53
- January 1988 to December 2000	0.94	1.14	1.00	1.00
- January 2001 to December 2011	0.09	0.07	0.09	0.09
Average Weight to North America	45.4%	33.3%	35.4%	38.2%
Average Weight to Europe	27.5%	48.9%	37.5%	34.7%
Average Weight to Pacific	20.9%	12.6%	20.9%	20.9%
Average Weight to Emerging Markets	6.2%	5.2%	6.2%	6.2%

B. NOK

	Market Cap Weight (ACWI)	Current Allocation	Simulation Results (Case 1)	Simulation Results (Case 2)
Average Annualized Return				
1988-2011	6.8%	8.0%	7.5%	7.5%
- January 1988 to December 2000	13.8%	15.8%	14.6%	14.7%
- January 2001 to December 2011	-1.2%	-0.7%	-0.7%	-0.7%
Average Standard Deviation				
1988-2011	15.5%	15.1%	15.4%	15.4%
- January 1988 to December 2000	15.4%	14.5%	15.2%	15.2%
- January 2001 to December 2011	15.5%	15.6%	15.6%	15.5%
Risk-Adjusted Annualized Return				
1988-2011	0.44	0.53	0.48	0.49
- January 1988 to December 2000	0.90	1.09	0.96	0.97
- January 2001 to December 2011	-0.08	-0.04	-0.05	-0.05
Average Weight to North America	45.4%	33.3%	35.4%	38.2%
Average Weight to Europe	27.5%	48.9%	37.5%	34.7%
Average Weight to Pacific	20.9%	12.6%	20.9%	20.9%
Average Weight to Emerging Markets	6.2%	5.2%	6.2%	6.2%

Exhibits 72 and 73 replicate Exhibits 24 and 25 in the main report, this time for the simulated portfolios in place of the US and Europe.

Exhibit 72: Summary of Historical Performance of Current Allocation and Simulated Portfolios (Monthly Returns, January 1988 to December 2011)

A. Local Currency

	Market Cap Weighted	Current Allocation	Case 1	Case 2
Average Annualized Returns				
1988-2011	7.3%	8.4%	7.8%	7.8%
1988-1989	27.0%	27.9%	28.7%	28.4%
1990-1999	12.3%	14.9%	13.0%	13.0%
2000-2009	-0.1%	0.2%	0.3%	0.3%
2010-2011	2.2%	1.3%	1.4%	1.6%
Annualized Standard Deviation				
1988-2011	14.5%	14.5%	14.6%	14.6%
1988-1989	10.0%	10.4%	9.9%	9.9%
1990-1999	13.7%	13.4%	14.0%	13.9%
2000-2009	15.6%	15.9%	15.7%	15.7%
2010-2011	15.1%	15.0%	14.9%	15.0%
Risk-Adjusted Annualized Return				
1988-2011	0.50	0.58	0.53	0.53
1988-1989	2.71	2.69	2.89	2.86
1990-1999	0.89	1.12	0.93	0.94
2000-2009	0.00	0.01	0.02	0.02
2010-2011	0.15	0.09	0.09	0.11

B. NOK

	Market Cap Weighted	Current Allocation	Case 1	Case 2
Average Annualized Returns				
1988-2011	6.8%	8.0%	7.5%	7.5%
1988-1989	24.2%	26.2%	25.4%	25.5%
1990-1999	13.8%	16.1%	14.6%	14.7%
2000-2009	-2.4%	-1.7%	-1.7%	-1.7%
2010-2011	4.4%	2.5%	3.7%	4.1%
Annualized Standard Deviation				
1988-2011	15.5%	15.2%	15.5%	15.5%
1988-1989	10.2%	10.4%	10.0%	10.0%
1990-1999	16.3%	15.3%	16.2%	16.2%
2000-2009	16.2%	16.2%	16.2%	16.2%
2010-2011	10.2%	10.7%	10.3%	10.2%
Risk-Adjusted Annualized Return				
1988-2011	0.44	0.53	0.48	0.49
1988-1989	2.38	2.51	2.55	2.54
1990-1999	0.85	1.05	0.90	0.91
2000-2009	-0.15	-0.10	-0.10	-0.11
2010-2011	0.43	0.24	0.37	0.40

Exhibit 73 shows downside and tail risk measures for Norway's current allocation and the simulated portfolios. The results are nearly identical across the board.

Exhibit 73: Downside and Tail Risk Measures (Monthly Returns in USD, January 1988 to December 2011)

A. Local Currency

	Market Cap Weighted	Current Allocation	Case 1	Case 2
Average Monthly Return	0.7%	0.8%	0.7%	0.7%
Standard Deviation	4.2%	4.2%	4.2%	4.2%
Skewness	-0.8	-0.8	-0.8	-0.8
Kurtosis	1.4	1.4	1.4	1.4
VaR (95%)	-6.8%	-6.9%	-7.0%	-7.0%
VaR (99%)	-11.0%	-11.3%	-11.3%	-11.2%
Conditional VaR (95%)	-9.8%	-10.0%	-10.0%	-9.9%
Conditional VaR (99%)	-14.3%	-14.0%	-14.3%	-14.2%
Average Negative Return	-3.5%	-3.4%	-3.4%	-3.5%
Average Positive Return	3.2%	3.3%	3.3%	3.3%

B. NOK

	Market Cap Weighted	Current Allocation	Case 1	Case 2
Average Monthly Return	0.7%	0.7%	0.7%	0.7%
Standard Deviation	4.5%	4.4%	4.5%	4.5%
Skewness	-0.3	-0.4	-0.4	-0.4
Kurtosis	0.0	0.2	0.1	0.1
VaR (95%)	-7.9%	-7.6%	-7.7%	-7.7%
VaR (99%)	-10.6%	-10.5%	-10.9%	-10.9%
Conditional VaR (95%)	-9.5%	-9.6%	-9.6%	-9.6%
Conditional VaR (99%)	-11.7%	-11.6%	-11.8%	-11.8%
Average Negative Return	-3.4%	-3.4%	-3.4%	-3.4%
Average Positive Return	3.8%	3.7%	3.9%	3.8%

Exhibit 74 shows downside and tail risk measures for Norway's current allocation and the simulated portfolios. The results are quite similar between the three portfolios. The Japan Crash was the only episode where there was more than 2 percentage points difference between the current allocation and the two simulated portfolios.

Exhibit 74: Performance in Past Periods of Market Stress (Cumulative Return During Period, in Percentages)

A. Local Currency

Market Stress Episodes 1988 to 2011	Market Cap Weighted	Current Allocation	Case 1	Case 2
Japan Crash	-17.9	-13.1	-17.3	-17.0
Asian Crisis/ LTCM	18.9	18.6	19.3	19.3
Dot Com Crash	-38.7	-40.1	-38.7	-38.6
Subprime Crisis	-44.7	-45.2	-44.7	-44.6
Europe Sovereign Crisis	6.6	5.1	5.1	5.6

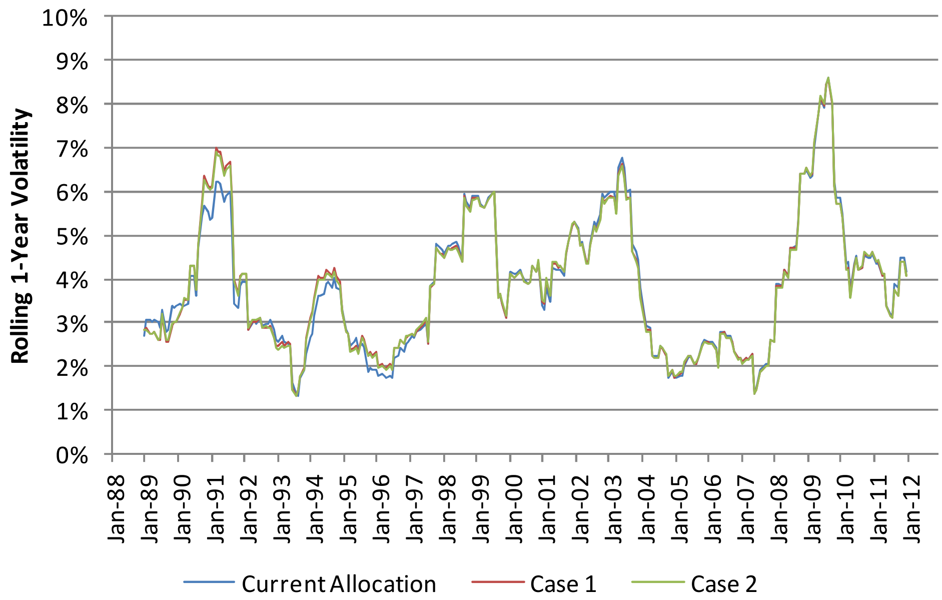
B. NOK

Market Stress Episodes 1988 to 2011	Market Cap Weighted	Current Allocation	Case 1	Case 2
Japan Crash	-20.7	-15.0	-18.6	-18.7
Asian Crisis/ LTCM	26.0	27.0	27.1	27.1
Dot Com Crash	-50.9	-50.3	-50.0	-50.0
Subprime Crisis	-37.4	-39.9	-38.2	-37.9
Europe Sovereign Crisis	9.8	7.5	9.2	9.7

Exhibit 75 graphs historical realized volatility using a one-year trailing window. The results are strikingly similar and are consistent with the volatility figures shown in Exhibit 73.

Exhibit 75: Historical Volatility of Current Allocation and Simulated Portfolios (12 Month Trailing Standard Deviation Computed with Monthly Returns)

A. Local Currency



B. NOK

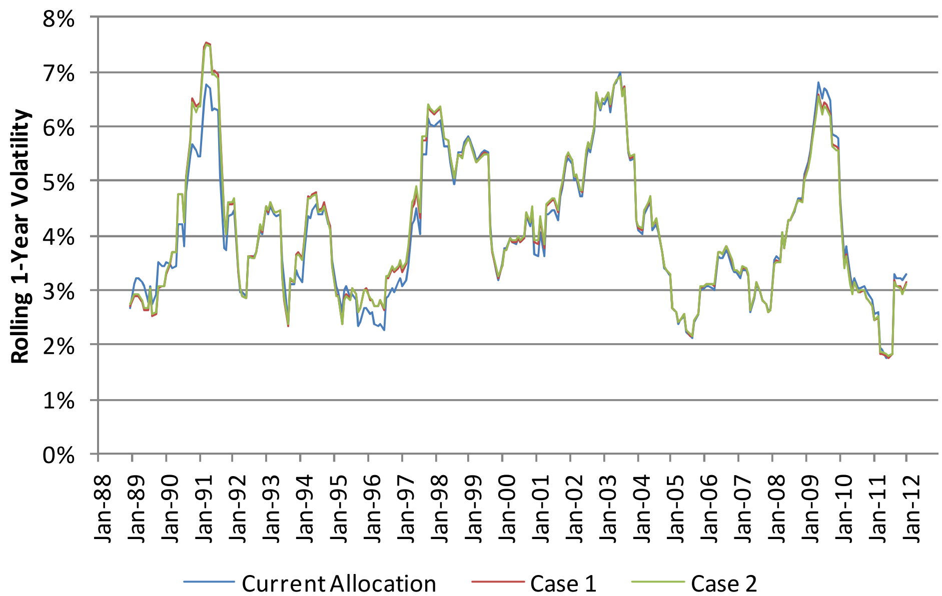


Exhibit 76 shows the historical sector decomposition and exposure to the style factors, similar to Exhibit 29 in the main report. The sectors are GICS 2-digit sectors and the style factors are those in the Barra Global Equity Model (GEM2). Given the differences in sector exposure between the MSCI US and MSCI Europe in Exhibit 29, it is not surprising that the Case 2 simulated portfolio which has a slightly higher weight in the US has a higher exposure to Information Technology. For the other sectors, however, the differences are quite small.

Exhibit 76: Sector Weights and Risk Premia (Style) Exposures for Current Allocation and Simulated Portfolios (Average, January 1997 to December 2011)

Average Sector Weights (%)				Average Sensitivity to Risk Premia (Relative to MSCI ACWI)			
	Current Allocation	Case 1	Case 2		Current Allocation	Case 1	Case 2
Energy	9.0	8.7	8.6	Momentum	-0.05	-0.04	-0.04
Materials	6.4	6.6	6.5	Volatility	-0.05	-0.05	-0.05
Industrials	10.0	10.3	10.3	Value	0.02	0.01	0.01
Consumer Discretionary	11.2	11.4	11.4	Size	0.31	0.32	0.32
Consumer Staples	8.9	8.8	8.7	Size Nonlinearity	-0.10	-0.11	-0.11
Health Care	9.8	9.7	9.8	Growth	-0.04	-0.04	-0.04
Financials	22.8	22.4	22.2	Liquidity	0.06	0.05	0.05
Information Technology	10.1	11.1	11.4	Financial Leverage	0.01	0.01	0.01
Telecommunication Services	7.1	6.7	6.7				
Utilities	4.7	4.5	4.4				

Decomposition of Returns Into Long-Term Components

Exhibits 77 through 79 show the return decomposition of the MSCI World and Emerging Market Indices into their long run components. Long-term equity returns are widely acknowledged to be driven by earnings growth, changes in P/E (which captures price appreciation), and dividend income. (Note that earnings growth plus changes in P/E is capital gains growth, and sometimes inflation is separated out so that it is real earnings growth shown below.)

$$R_{total} = \Delta Earnings + \Delta P/E + \Delta DividendYield$$

Changes in valuation tended to smooth out in the long run, but historically had a greater impact on equity performance in the short run. We note that for emerging markets, changes in P/E have had a greater impact on the long run return of the index.

Exhibit 77: Decomposition of Returns for MSCI Emerging Markets Index (December 1996 – December 2011)

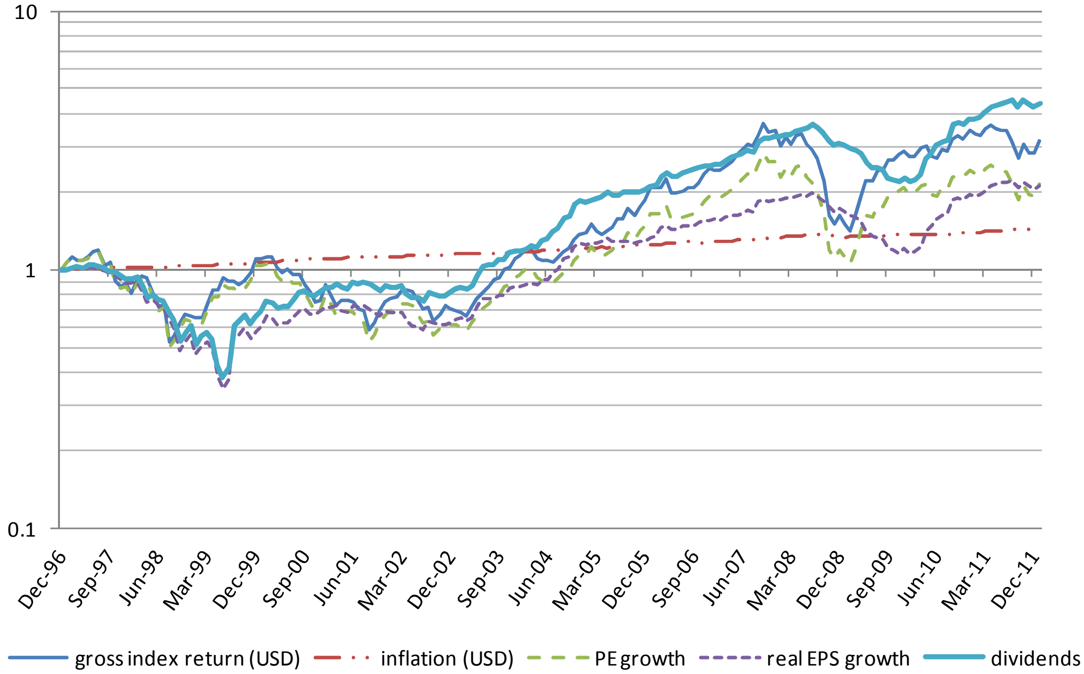


Exhibit 78: Decomposition of Returns for MSCI World Index (December 1996 – December 2011)

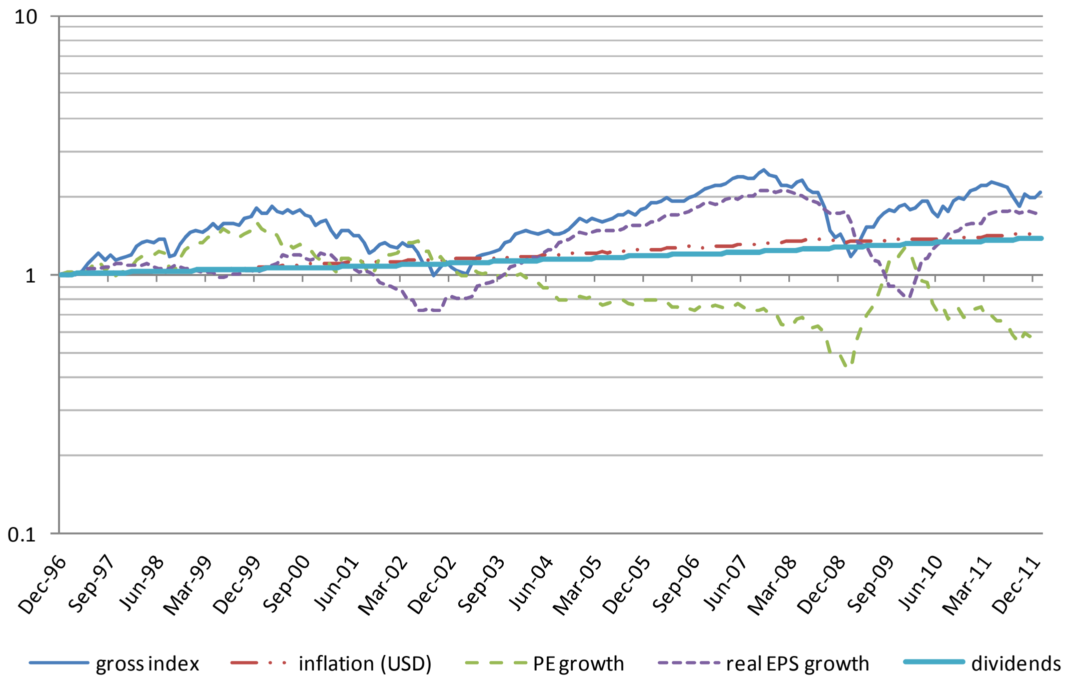


Exhibit 79: Comparison of Decomposition of Returns Across Developed and Emerging Markets (December 1996 – December 2011)

	Cumulative changes		Annualized changes	
	MSCI EM Index	MSCI World Index	MSCI EM Index	MSCI World Index
Total return	281%	199%	7%	5%
Inflation	143%	143%	2%	2%
P/E growth	66%	59%	-3%	-3%
Real earnings per share growth	204%	172%	5%	4%
Dividend income	146%	138%	3%	2%
Difference	0.00%	0.00%	0.03%	-0.07%

Simulation Results: The Impact of Allocating More Towards Emerging Markets

Similar to Section III, we conduct a simulation where more weight is given to emerging markets. The simulation applies a factor of 1.5 to Emerging Markets and factors of 1.0 to the rest of the world. Specifically, the weights are calculated each month as:

$$w_{EM,new} = w_{EM,old} *1.5* \frac{w_{EM,old} + w_{World,old}}{w_{EM,old} *1.5 + w_{World,old} *1.0} \quad (1)$$

$$w_{World,new} = w_{World,old} *1.0* \frac{w_{EM,old} + w_{World,old}}{w_{EM,old} *1.5 + w_{World,old} *1.0} \quad (2)$$

Exhibit 80 shows the results of the simulations and compares them to the market cap weighted global index (MSCI ACWI) as well as the MSCI ACWI GDP-weighted index from Section II. The simulated portfolio outperforms the MSCI ACWI historically but not the MSCI ACWI GDP-weighted index.

Exhibit 80: Simulation Results – Varying the Emerging Market Weight

	MSCI ACWI	MSCI ACWI GDP	EM Overweight (Factor EM = 1.5)
Average Annualized Return			
1988-2011	6.9%	8.4%	7.4%
- January 1988 to December 2000	10.7%	11.9%	11.0%
- January 2001 to December 2011	2.7%	4.9%	3.3%
Average Standard Deviation			
1988-2011	15.8%	16.3%	15.9%
- January 1988 to December 2000	14.0%	13.4%	14.0%
- January 2001 to December 2011	17.7%	19.3%	17.9%
Risk-Adjusted Annualized Return			
1988-2011	0.44	0.52	0.47
- January 1988 to December 2000	0.77	0.89	0.79
- January 2001 to December 2011	0.15	0.25	0.19
Average Weight to North America	45.7%	32.1%	44.0%
Average Weight to Europe	17.8%	27.4%	26.8%
Average Weight to Pacific	20.7%	17.2%	20.3%
Average Weight to EM	6.2%	18.4%	8.9%

Source: MSCI

Client Service Information is Available 24 Hours a Day

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The company’s flagship product offerings are: the MSCI indices with approximately USD 7 trillion estimated to be benchmarked to them on a worldwide basis[1]; Barra multi-asset class factor models, portfolio risk and performance analytics; RiskMetrics multi-asset class market and credit risk analytics; MSCI ESG (environmental, social and governance) Research screening, analysis and ratings; ISS governance research and outsourced proxy voting and reporting services; FEA valuation models and risk management software for the energy and commodities markets; and CFRA forensic accounting risk research, legal/regulatory risk assessment, and due-diligence. MSCI is headquartered in New York, with research and commercial offices around the world.

[1] *As of June 30, 2011, based on eVestment, Lipper and Bloomberg data.*