Borealis Global Advisory

A Global Equity Allocation Specialist

Multi-pillar Approach to Constructing Global Equity Portfolios Using Single-Country ETFs

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Abstract

The paper explores the challenges and opportunities of constructing a global equity portfolio, which Borealis Global Advisory approaches with a novel multi-pillar paradigm using single-country ETFs. The paper discusses in detail this multi-pillar approach, called the Global Country Allocation Framework (G-CAF), which has the delivery of country allocation recommendations for a global equity portfolio, called the Global Country Allocation Model (G-CAM), at its crux. It also highlights the mainstays of G-CAF by running the construction of an international equity portfolio centered on the MSCI's All Country World Index ex USA universe through the same. The framework encompasses a series of measures that range from selecting factors, which explain country returns, to formulating portfolio country weights using the selected factors and to shaping fine-tuning mechanisms that align the model's short-term forecasts with the medium-term forecasts on an ongoing and incremental basis, and they are:

- Carving of the investment universe into three tranches, namely: Upper Tranche (UT) consisting of large developed countries with market-cap weights at least 1% (of the universe), Middle Tranche (MT) consisting of large emerging countries with market-cap weights at least 1%, and the Lower Tranche (LT) consisting of developed and emerging countries with market-cap weights at most 1%.
- Exercising the data driven scientific approach enunciated by the multi-period Fama-Macbeth OLS regression method to identify a separate set of factors that drive equity returns for each set of countries residing in the tranches.
- Ranking each of the identified factors and an added volatility factor across countries in each tranche using a standardized scoring mechanism to arrive at a unified country score for each country, and then applying the mechanism again to standardize the unified country scores within each tranche to attain the portfolio country allocation weights, altogether called the double "Z"™ methodology.
- Adopting a modified version of the Shiller's CAPE framework for all the countries in the universe called the Country Yield Forecasting Mechanism (CY-FOREM) to derive a measure of country equity yield on real basis, the Medium-term Country Yield Forecast (CY-M), also called the Radha's Country Yield (RCY)™, for each country and tranche in the universe. The RCY is used to fine-tune the country weight recommendations to their corresponding medium-term country yield forecasts on an ongoing and incremental basis.
- Employing the Radha's Country Yield for each tranche and their corresponding set of countries underlying them in order to derive diffusion index called the Diffusion Index (DI) for each tranche.
- Analyzing the time-series of RCY as well as diffusion index for each tranche at the end of a given time-period on a relative basis to establish the weights of the tranches in the portfolio.

Section I of the paper explores the challenges and opportunities of constructing a global equity portfolio, and how Borealis Global Advisory countered them by developing a multi-pillar paradigm for constructing the portfolio using single-country ETFs. In section II, the paper discusses in detail this multi-pillar approach, called the Global Country Allocation Framework (G-CAF), which has the delivery of country allocation recommendations for a global equity portfolio, named the Global Country Allocation Model (G-CAM), at its crux. This section highlights the mainstays of G-CAF by running the construction of an international equity portfolio centered on the MSCI's All Country World Index ex USA universe. In section III, the paper covers a discussion on Country Yield Forecasting Mechanism (CY-FOREM), which derives a measure of country equity yield on real basis, called the Medium-term Country Yield Forecast (CY-M). The section also details the fine-tuning of the model portfolio's country weight recommendations to the corresponding medium-term country yield forecasts on an ongoing and incremental basis. Finally, in section IV, the paper introduces additional applications of the BGA's fundamental framework - Global Allocation Framework (G-AF) - in global investing. While G-CAF happens to a specific implementation the fundamental framework, G-AF offers various other means for investors to exploit opportunities globally.

I.
Introduction

Country factors vs. Industry factors

In recent decades, there has been a growing body of evidence articulating the tapering importance of country factors vis-à-vis industry (or sector)[1] factors in global equity allocations, arising from increased global market correlations following burgeoning globalization and global trade and monetary integration. In a study, using a 48-country global factor model derived from the Barra Global Equity Model (GEM2), spanning the years 1997 thru 2010, Menchero and Morozov (2011, 2012), using the measures cross- sectional volatility (CSV) and mean absolute deviation (MAD), demonstrated that the see- saw battle between country factors and industry factors in the global markets were fairly balanced. The authors further divulged that the country related factors were ahead from1997 thru 1999, while the industry factors were ahead for some years (after the internet bubble) from 1999 to 2003. Since then the balance had been even, with the country factors maintaining a slight edge (see Exhibit 1 and Exhibit 2). Menchero (2014), in another study spanning the years 1997 through June 2014, analyzed the emerging markets through the Barra Emerging Markets Equity Model (EMM1) using MAD and CSV. As can be seen in Exhibits 3 and 4, he unearthed that country factors dominated industry factors in these markets during that time-period, even though the predominance had been on the wane.

This study was consistent with the earlier referenced study by Menchero and Morzov (2012) that also analyzed the emerging markets through the lens of Barra Global Equity Model (GEM2) using the measure MAD (see Exhibit 5). The assertions of these studies are in line with academic ones by Estrada (2005) and Chen (2006), and others like Nemtchinov (2012), Baca et al. (2000) and Cavaglia et al. (2000). In another investigation,

[1] In this paper, industries or sectors are used synonymously

Karin P LaBarge of Vanguard Research established that country factors are dominant in the Pacific Rim region for both developed and emerging countries as the markets there are less integrated than they are in Europe and North America. This conclusion is right in line with that drawn from the study by Goodwin et al. (2004). The general understanding among practitioners has been that the relative importance of country versus sector influences changes over time and is contingent on numerous other factors, but clearly, investors seeking exposure globally should consider diversifying across both countries and sectors. To sum up, the studies have generally concluded that sector influences dominate country influences in North America and Europe, and vice-versa in the rest of the world. The effects of "Brexit" referendum on European integration are too early to prognosticate, but definitely, any adverse fallout would likely sway the sector vs. country debate to the country side for some time.

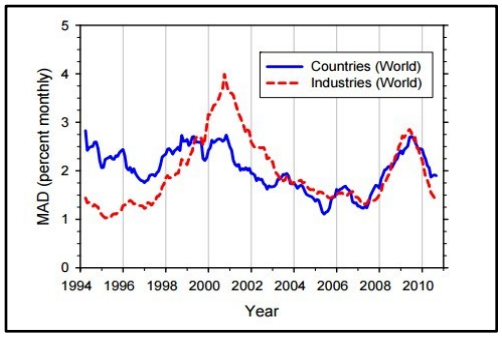

Exhibit 1: Mean absolute deviation (MAD) for the 48-country global model (GEM2). Results are based on cap-weighted regressions and cap-weighted segment averages.

Source: Menchero, Jose and Andrei Morozov (2012). *The Relative Strength of Industries Versus Countries in Global Equity Markets*. Journal of Investment Management, Volume 10, Number 3, pp. 75-87.

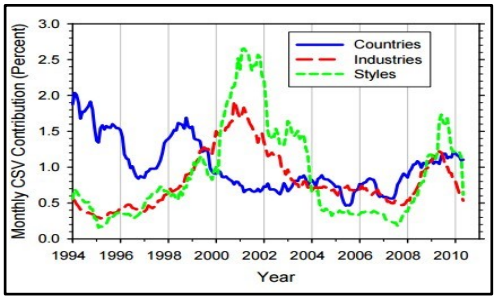

Exhibit 2: Decomposition of factor cross-sectional volatility (CSV) according to factor type for the 48-country global model (GEM2). Lines were smoothed using 12-month moving averages.

Source: Menchero, Jose and Andrei Morozov (2011). Decomposin Global Equity Cross-Sectional Volatility. Financial Analyst Journal, Volume 67, Number 5, pp. 58-66.

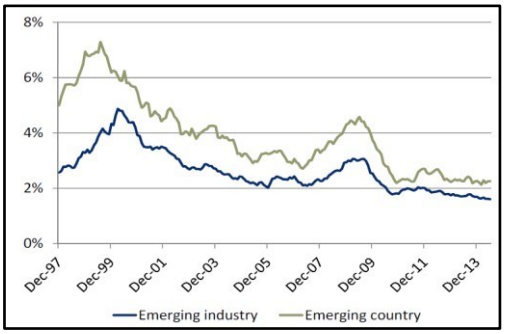

Exhibit 3: Mean absolute deviation for countries and industries, December 1997 to June 2014, EMM1 model. Lines were smoothed by using 12-month moving average.

Source: Menchero, Jose and Zoltan Nagy (2014). The Relative Strength of Industries and Countries in Emerging Markets (Global Market Report, Publication). MSCI.

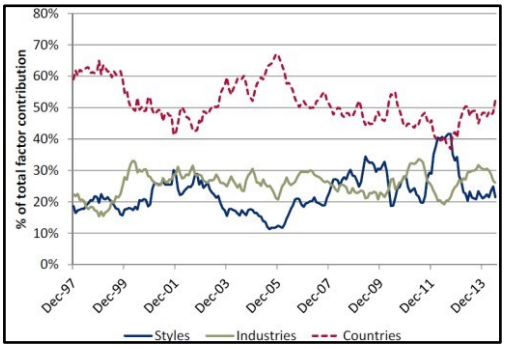

Exhibit 4: Decomposition of total factor contributions of monthly cross-sectional volatility, December 1997 to June 2014, EMM1 model. Lines were smoothed by using 12-month moving average.

Source: Menchero, Jose and Zoltan Nagy (2014). The Relative Strength of Industries and Countries in Emerging Markets (Global Market Report, Publication). MSCI.

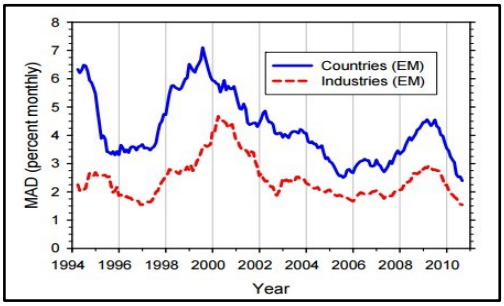

Exhibit 5: Mean absolute deviation (MAD) for the 24-country emerging-market model (GEM2). Results are based on cap weighted regressions and cap-weighted segment averages.

Source: Menchero, Jose and Andrei Morozov (2012). The Relative Strength of Industries Versus Countries in Global Equity Markets. Journal of Investment Management, Volume 10, Number 3, pp. 75-87.

Country Correlations

Exhibit 6 examines the correlation coefficients of the countries underlying the MSCI's All Country World Index ex USA[2] with respect to the U.S. equity market over the last two decades. This chart in conjunction with Exhibit 7 reveals an overall heightened correlation of the U.S. equity market in the recent years with many of the international equity markets, confirming the perception that globalization, increased financial integration, and lowering of trade barriers have given rise to global markets moving in cohorts during extreme market stress. Numerous researchers have confirmed the rising correlation between U.S. and international equity market returns including Adelson (2001), Tokat (2004), and Philips (2008). However, the chart also records a wide range of correlations – with Switzerland at the high end at 0.91 and Greece at the low end at -0.17 – and the relatively highly correlation of Western Europe in general as well. Solnik's (1974) seminal research had concluded that the risk reduction benefits of an internationally diversified portfolio strengthened when cross-country returns were less than perfectly correlated. This finance theory on international diversification reveals bright spots in the chart below, as there are some countries in there that have low correlation with the U.S. equity market. These spots signal to the domestic investors in the U.S. that their investment opportunity set can be expanded, by having a deeper look at cross-border opportunities, to enhance further the diversification of their existing portfolios for risk reduction benefits. It is however prudent to be cognizant of high correlation between markets during times of high volatility and market stress. The appearance of high correlation during these times may not be an increase in long-term correlation, but according to Loretta and English (2000), a reflection of heightened market volatility.

[2] Throughout the paper, all MSCI Indexes referred to are all standard indexes that cover 85% of the market cap of their respective domains embracing only large-cap and mid-cap securities.

Another reason being touted by researchers including Phillips (2008) for the rising correlation between the U.S. market and the international markets has been the decline of Pacific region since the decline of Japanese markets from their peaks in 1989. Historically, as discussed earlier, the Pacific Rim nations have been a great source of diversification, but since 1989, their slack in contribution towards global capitalization has been taken up by the European markets, which are highly correlated with the U.S. markets. We believe it is reasonable to say that global equity markets will continue to remain less than perfectly correlated as recent studies including that by Stock and Watson (2003) have found little or no evidence of international business cycle synchronization.

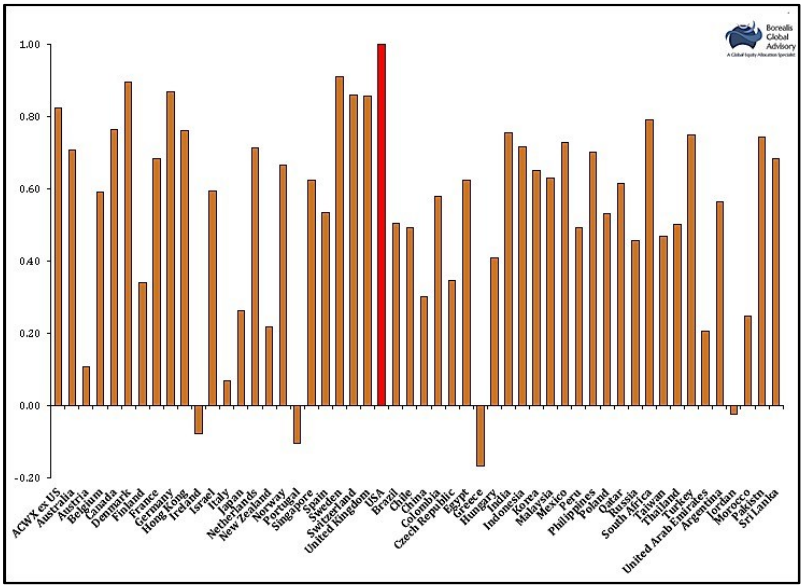

Exhibit 6: Correlation between MSCI USA Index and the countries in MSCI All Country World Index ex USA: 1996 – April 2016

Source: BGA and MSCI.

Note: Jordan, Pakistan, Argentina, Morocco, and Sri Lanka are not part of the index any more.

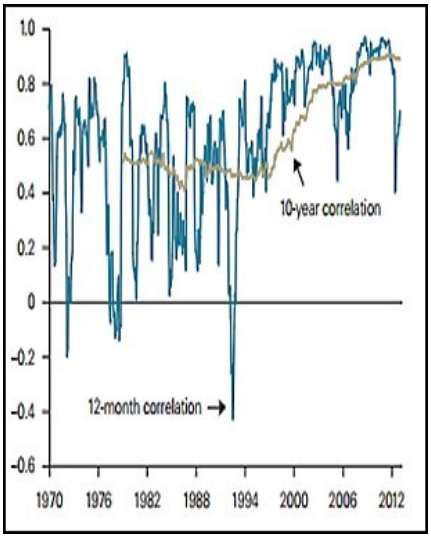

Exhibit 7: Rolling 12-month correlation between returns of U.S. and international stocks

Source: Philips, Christopher B., 2014. Global equities: Balancing home bias and diversification. Valley Forge, Pa.: Investment Counseling & Research, the Vanguard Group.

Volatility, diversification, and portfolio variance

Low or negative correlation between returns of global markets is one of the main drivers of risk reduction from global diversification for U.S. investors, but equally significant is the low relative volatility of the U.S. market with respect to international markets. The chart in Exhibit 8 reveals wide spreads between the volatilities of U.S. market and the emerging and international developed markets during 2007-11. Such high relative volatilities when combined with heightened global correlations during that period stifled the positive influences of the latter towards risk reduction to the detriment of global diversification. While there have been a few other periods of high relative volatility between the U.S. market and the international markets as a whole (as can be seen in the chart), they have not persisted indefinitely, and more often than not tend to follow each other. Ideally, for any U.S. investor to obtain optimum risk reduction assistance the correlation between the U.S. and international markets should be less than perfectly correlated, and the relative volatility between them subdued as well. We can discern from the chart that in the last three decades or so, the relative volatility of the emerging markets has been high though spiking periodically. Whereas the relative volatility of the international developed markets, while spiking periodically, has always been very much subdued compared to that of the emerging markets. More often than not, the volatility of the U.S. market has come in much lower than that of the other two market segments.

The strong form of efficient market hypothesis (EMH) recommends that U.S. investors allocate between the U.S. market and the international markets on a market capitalization basis, which would currently be 53% (based on data as of May 2016) and 47% of the portfolio respectively, in order to obtain maximum risk reduction. Philipps (2014) from Vanguard Research concluded, based on historical variance analysis, that the overall impact of a global market equity portfolio across history has been approximately 35bps in lower volatility when compared to a broadly diversified U.S. equity portfolio. Alternatively, he articulates that U.S. investors can achieve similar risk reduction even when deviating from the weights of the global market-proportional portfolio if they allocate only 10% of their portfolio for international equities. He also illustrates that a maximum risk reduction of 71 bps can be obtained by allocating 30% of the portfolio to international equities. He recommends that allocating 20% to international equities may be a reasonable starting point and adds that allocations exceeding 40% have not historically yielded significant diversification benefits. Prudence teaches that historical variance analysis should be used with caution as such optimization is backward looking and dependent on the time-period analyzed, and therefore, optimized allocations would change over time. The case in point being, showing that a U.S. equity portfolio with the addition of diversified international equities has not yielded reduction in volatility over the last few years because of high relative volatility and heightened correlation between the two. The U.S. investor would have been well off by not having any exposure to international equities when considering volatility reduction as the sole objective.

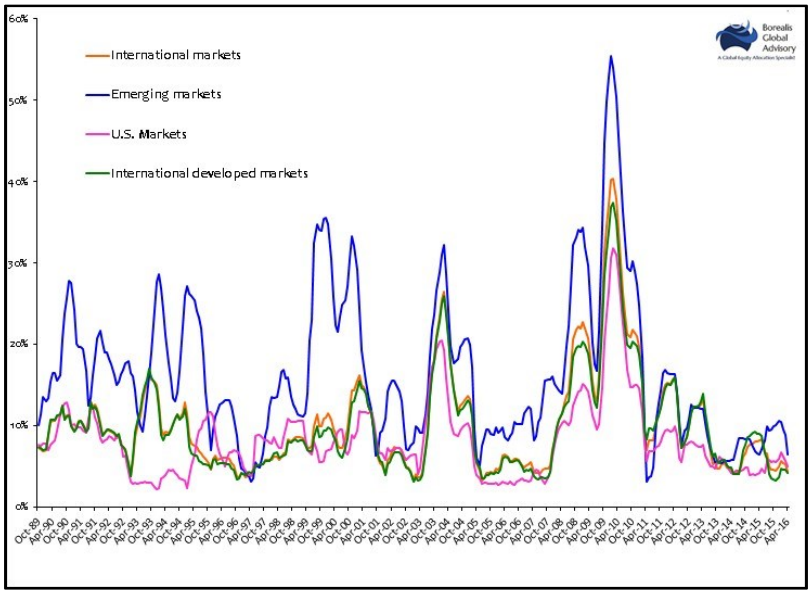

Exhibit 8: Rolling 12-month standard deviation of returns

Source: BGA calculations and MSCI.

Notes: U.S. market is represented by MSCI USA Index, international markets are represented by MSCI All Country World ex USA Index, international developed markets are represented by MSCI World ex USA Index, and emerging markets are represented by MSCI Emerging Markets Index. International markets are composed of international developed markets and emerging markets. Returns used are on a gross basis in U.S. dollar terms. Data thru May 31, 2016.

Apart from the motivation for long-term risk reduction, global diversification is also an opportunity for U.S. investors to exploit the difference in returns of U.S. equity market and international equity markets. Exhibit 9 explores the outperformance and underperformance of the U.S. market since the end of 1989, and as you can see the U.S. market's outperformance has alternated with international markets' outperformance on a recurring basis. By combining a broadly diversified U.S. equity portfolio with a broadly diversified international equity portfolio, the U.S. investor could realize returns between the returns of the U.S. equities and international equities and in the end generate superior returns.

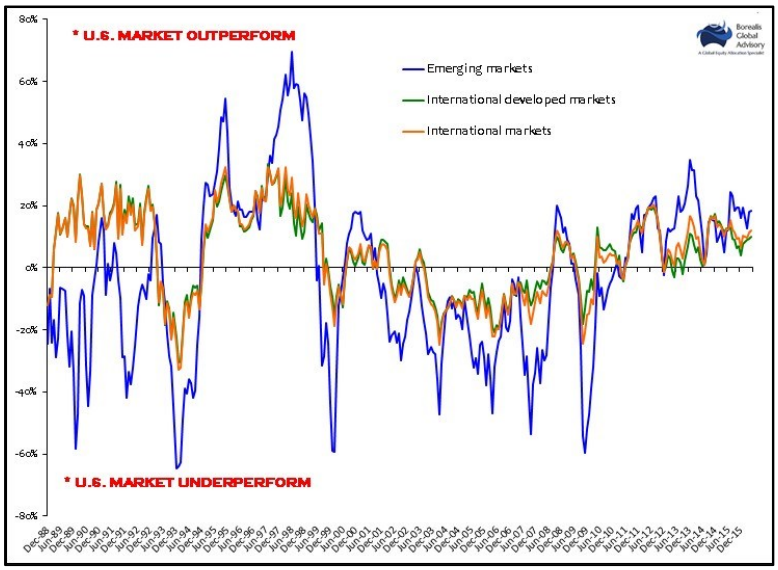

Exhibit 9: Rolling 12-month return differential between U.S. and international stocks

Source: BGA calculations and MSCI.

Notes: U.S. market is represented by MSCI USA Index, international markets are represented by MSCI All Country World ex USA Index, international developed markets are represented by MSCI World ex USA Index, and emerging markets are represented by MSCI Emerging Markets Index. International markets are composed of international developed markets and emerging markets. Returns used are on a gross basis in U.S. dollar terms. Data thru May 31, 2016.

In Exhibits 8 and 9 BGA has segmented international markets into two broadly diversified sub-set markets: international developed and emerging. Taking in to account their differences in relative volatilities and in relative short-term and long-term return

with respect to the U.S. market, these two segments present the U.S. investors with an expanded opportunity set to construct a broadly diversified international equity portfolio. As you can see in Exhibit 10A, the opportunities for the U.S. investor to create a diversified international portfolio expand with the fragmentation of the international markets. By fragmenting the international markets further into country markets, the opportunity set in terms of risk reduction and superior returns for U.S. investors expand even further. The rapid economic rise of emerging markets, since the 1990s, accompanied by their development patterns, risk profiles, and overall average correlation coefficient of about .65 (since 1985) with the developed markets have also enhanced the superior return and risk reduction prospects of the U.S. investors. Exhibits 10B thru 10E highlight some of these opportunities in terms of international country markets. Arguments could be put forth for further fragmentation of country markets into individual securities for further expansion of the opportunity set for U.S. investors. However, researching individual international securities for superior return objectives is more expensive in terms of resources than country markets and data for individual country markets are readily available when compared to individual securities. Moreover, international stock picking introduces additional layers of risks including sector and security selection risks apart from country selection risks, which are nevertheless inherent in investing in country baskets (see Exhibit 17).

Markets	since 1987	
	Average Returns	Volatility
International (as a whole)	7.9%	20.4%
International developed	7.6%	19.5%
Emerging	15.7%	34.1%
U.S.	12.0%	17.9%

Exhibit 10A: Returns and volatility since 1987

Source: BGA Calculation and MSCI.

Notes: U.S. market is represented by MSCI USA Index, international by MSCI All Country World ex USA, international developed by MSCI World ex USA, and emerging by MSCI Emerging. Returns used are on a gross basis in U.S. dollar terms. Data thru June 30, 2016.

In order to obtain optimally diversified equity portfolios, U.S. investors have to synthesize international portfolios, derived from a blend of various country markets in an ideal mix, with their broadly diversified domestic equity portfolios. These portfolios would specifically mitigate the return deficiencies of their domestic equity portfolios in the long-run, while overcoming their international diversification challenges (discussed elsewhere in this paper). They also must be robust in order to exploit the asynchronous outperformance of international markets and U.S. markets over any stretch of time.

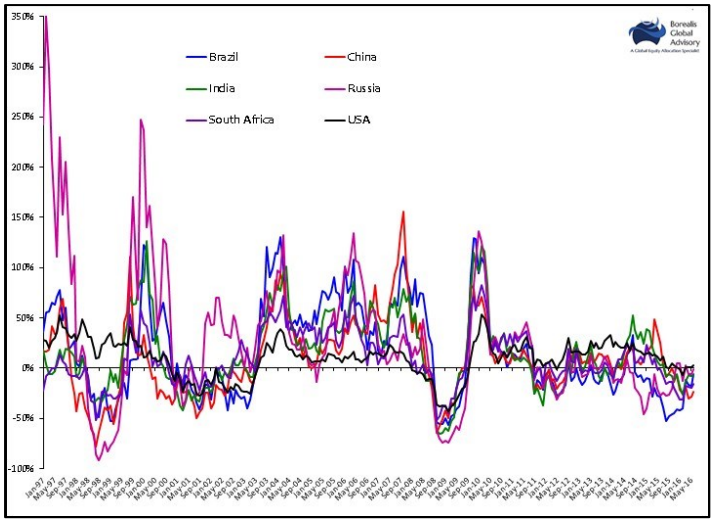

Exhibit 10B: Rolling 12-month returns of BRICS countries vs. USA

Source: BGA Calculation and MSCI.

Notes: USA, Brazil, China, India, Russia, and South Africa markets are represented by MSCI USA Index, MSCI Brazil index, MSCI China index, MSCI Russia index, and MSCI South Africa index respectively. Returns used are on a gross basis in U.S. dollar terms. Data thru June 30, 2016.

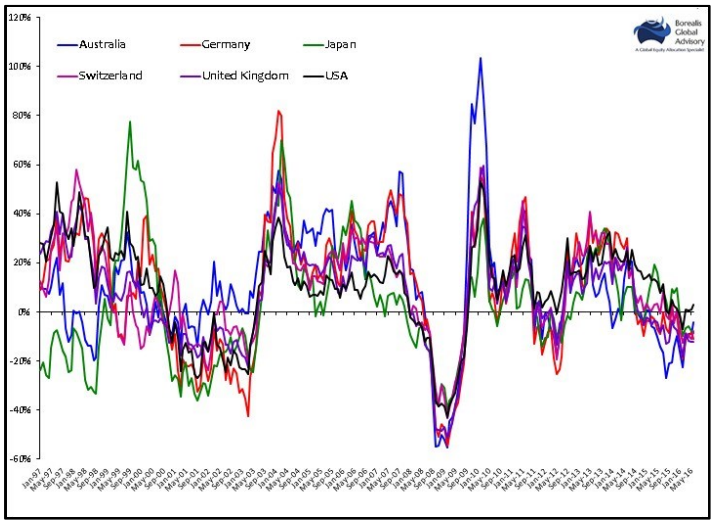

Exhibit 10C: Rolling 12-month returns of major international developed countries vs. USA

Source: BGA Calculation and MSCI.

Notes: USA, Australia, Germany, Japan, Switzerland, and United Kingdom markets are represented by MSCI USA index, MSCI Australia index, MSCI Germany index, MSCI Japan index, MSCI Switzerland index, and MSCI United Kingdom index respectively. Returns used are on a gross basis in U.S. dollar terms. Data thru June 30, 2016.

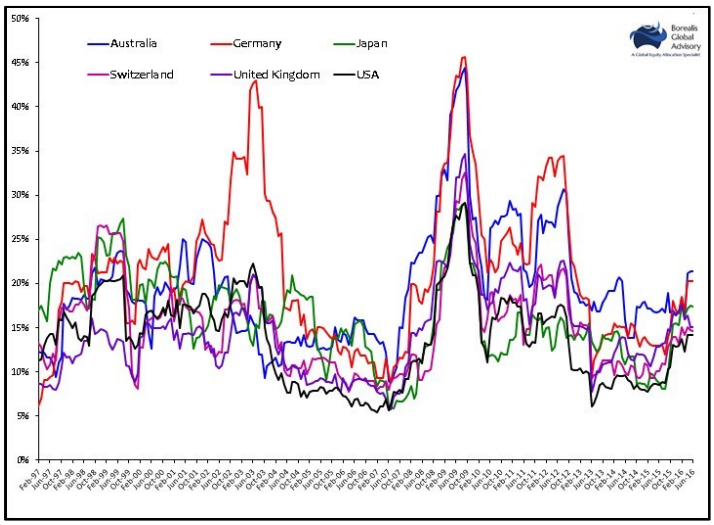

Exhibit 10D: Rolling 12-month standard deviation of major international developed countries vs. USA

Source: BGA calculation and MSCI.

Notes: USA, Australia, Germany, Japan, Switzerland, and United Kingdom markets are represented by MSCI USA index, MSCI Australia index, MSCI Germany index, MSCI Japan index, MSCI Switzerland index, and MSCI United Kingdom index respectively. Returns used are on a gross basis in U.S. dollar terms. Data thru June 30, 2016.

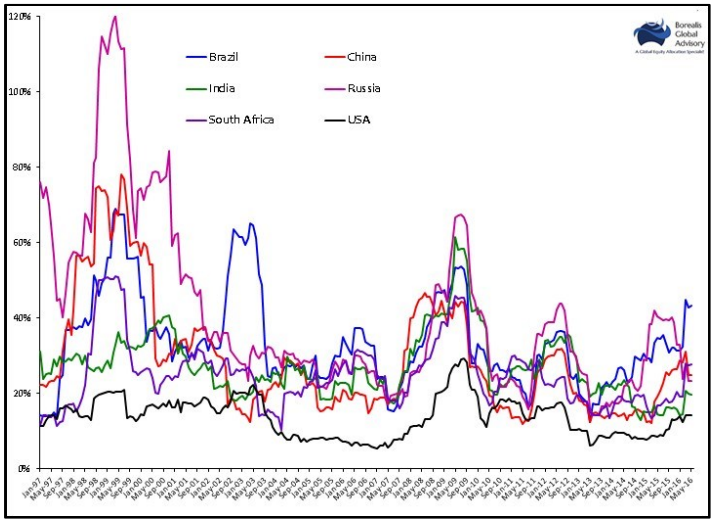

Exhibit 10E: Rolling 12-month standard deviation of BRICS countries vs. USA

Source: BGA calculation and MSCI.

Notes: USA, Brazil, China, India, Russia, and South Africa markets are represented by MSCI USA Index, MSCI Brazil index, MSCI China index, MSCI Russia index, and MSCI South Africa index respectively. Returns used are on a gross basis in U.S. dollar terms. Data thru June 30, 2016.

Solnik had demonstrated that by enlarging a portfolio of U.S. securities by random addition of international securities, the portfolio's variability dwindled below that of the overall risk of the U.S. market. LaBarge (2008), in the study referred to earlier, extended the concept of variances to investigate the advantages from diversifying by country or sector. She concluded that for developed markets diversification across sectors reduced portfolio variance to 11% of the average stock variance, as compared to 20% across countries, and for emerging markets, the risk reduction assistance was nearly even with country diversification clocking at 19% and sector at 20%. However, the greatest risk reduction was derived from diversifying across both countries and sectors for either of the markets. Accordingly, by assembling single-country ETFs – each of which is a basket of securities spread across multiple sectors tracking a country index – from various geographical regions with an appropriate weighting scheme, we can create a global equity portfolio that is fairly diversified across both sectors and countries.

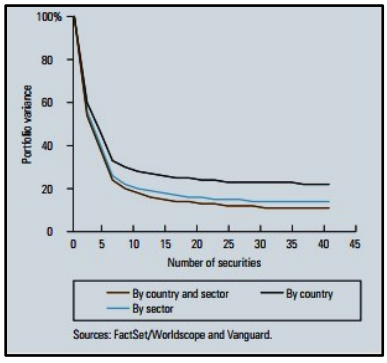

Exhibit 11: Portfolio variance as percentage of average stock variance: Developed countries

Source: LaBarge, Karin P., 2008. Diversification by Country and Global Sector: Considerations for Portfolio Construction. Valley Forge, Pa.: Investment Counseling & Research, the Vanguard Grou

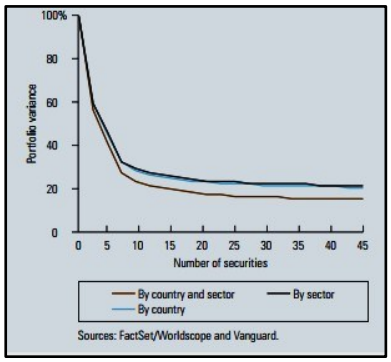

Exhibit 12: Portfolio variance as percentage of average stock variance: Emerging countries

Source: LaBarge, Karin P., 2008. Diversification by Country and Global Sector: Considerations for Portfolio Construction. Valley Forge, Pa.: Investment Counseling & Research, the Vanguard Group.

Home bias

This brings us to the issue of persistent home bias in the global asset allocation decision irrespective of investor domicile. According to the study by Philips et al. (2012) from Vanguard research, U.S. investors allocated about 1.7 times the market cap of the U.S. equity market to U.S. stocks. While the next nearest investors in terms of bias to home equity markets were those in UK, and they maintained a relative home preference of about 6.25 times the market cap of UK stocks. Assuming efficient markets, traditional financial theory states that an U.S. investor should allocate about 53% (based on data as of end of May 2016) of his/her equity portfolio to domestic securities analogous to U.S.'s weight in the global market portfolio – the MSCI All Country World Index, and the rest to international securities. However, U.S. investors' equity portfolio allocations are far from this ideal allocation. Such strong home preferences lead to significant inefficiencies in global equity markets and lead to premiums in price discovery at the country level. Despite increasing global financial integration, global markets are not seamless as costs such as expense ratios, bid-ask spreads, and frictional costs continue to be higher for markets outside United States. Added to these costs is the lack of avenues for timely and reliable price discovery information for the securities domiciled in the emerging markets. The lack of standards in accounting, corporate governance, and market supervision particularly in the emerging countries has long been a bane for the investment community. These limitations though diminished from increased global financial liberalization contribute to a strong behavioral bias of the global investor community towards domestic markets. The strong home biases result in detrimental segmentation of the global equity markets. For the U.S. investor (or investor of any nation) the segmentation of global markets would give rise to premiums in country selection and allocation when building global equity portfolios. In other words, segmentation would provide opportunities for skilled investors to identify underpriced markets based on valuation, growth, and risk attributes.

Single-country ETFs, security/sector concentration and market size

Exhibit 13 reveals in detail the number of securities that underlie the country markets. Out of the 46 countries underlying the MSCI All Country World Index (ACWI), only 30% of the countries are fairly large in terms of number of securities and they have more than 50 securities underlying each of their respective MSCI country indexes. These larger and more diversified markets include USA (625 securities), Japan (318), China (153), UK (113), South Korea (107), Canada (93), Taiwan (88), France (73), Australia (73), India (73), Brazil (61), Germany (54), and South Africa (54). The remaining countries are smaller and the number of underlying securities range from forty-four to three.

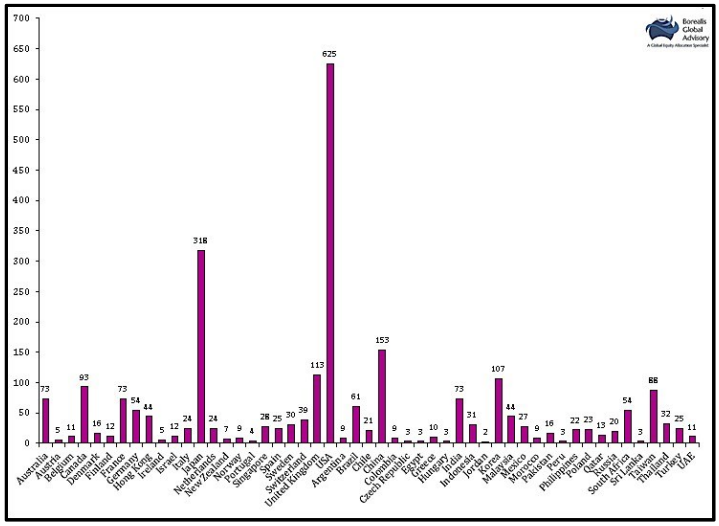

Exhibit 13: Number of securities underlying MSCI Country Indexes

Source: MSCI.

Notes: Argentina, Jordan, Pakistan, Morocco, and Sri Lanka are not part of the index anymore. Data runs through May 2016.

In terms of capitalization, U.S. leads the pack contributing 53% to the market cap of MSCI All Country World Index, followed by Japan at 7.7% and UK at 6.5%. Approximately 23% of the countries underlying the index which include Australia, Canada, China, France, Germany, Hong Kong, Netherlands, South Korea, Spain, Sweden, Switzerland, and Taiwan each contribute at least 1% and at most 5% to the overall market cap. Approximately 10% of the countries, which include Belgium, Brazil, Denmark, India, Italy, and South Africa each, contribute between .5% and 1% of the market cap. The rest of the countries each contribute less than .5% to the market cap of the index.

Due to their small size in terms of market capitalization and number of securities, our research indicates that smaller nations by themselves lack diversification across industries and have high market concentration. On the other hand, large stock markets like France, Germany, USA, and UK are fairly diversified across sectors, with the largest sector accounting for less than 20% of each country's market capitalization. For example, Hong Kong, which is about 1% of the world market cap, derives about 55% of the market capitalization from the financial sector[3]. Similarly, Russia about .4% of the global market cap, derives about 55% of its market capitalization from the energy sector.

[3] For more details on security and sector concentration see Appendix A-1 and A-2 of Zilbering et al. (2012

Moreover, it has been found that market capitalization of some stock markets are clustered around just a handful of securities resulting in high security concentration. The stock market of South Korea, for example, consists of 27 stocks, and its largest stock Samsung constitutes nearly 21% of the market cap of that country and similarly, Credicorp and Southern Copper constitute about 87% of the stock market capitalization of Peru. Such markets would not be considered broadly diversified. Based on market capitalization and number of underlying securities, the U.S. market outranks its nearest competitor Japan by many folds, and as stated earlier, it is broadly diversified. The major presence of U.S. in the ACWI skews the index as it contributes slightly more than 50% to the market capitalization of the index. If the U.S. is taken out of the mix, a broadly diversified international portfolio devoid of significant sector and security concentrations can be devised, but it will take an approach that is different from market cap weighting. For instance, if market-cap weights were used to weight the countries (see Exhibit 14) to develop an international portfolio, it would be concentrated in the financial sector with its weight constituting about 25% of the total portfolio. Alternatively, if countries are bunched into separate tranches based on one or more aspects like market size, levels of development, degrees of correlation or levels of concentration in terms of sectors and securities, then naturally there exist multiple sets of tranche weights and therefore, implicitly multiple sets of country weights, which would enable U.S. investors to construct a fairly diversified international portfolio devoid of sector and security concentrations. This is precisely the approach BGA adopts as one of the pillars for its paradigm for constructing international portfolios. Section II discusses how we classify countries into tranches, to create a fairly diversified global equity portfolio centered on benchmark MSCI All Country World Index ex USA.

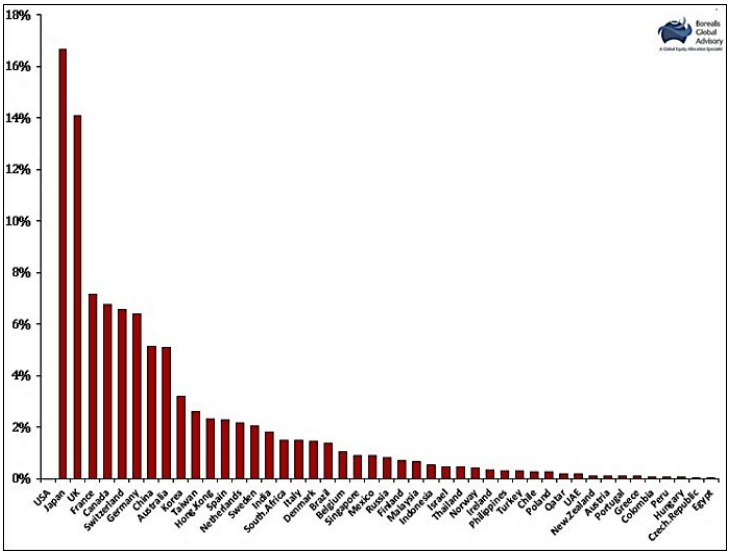

Exhibit 14: Country weights of MSCI All Country World Index ex USA

Source: MSCI.

Notes: Data runs through May 2016.

II. Global Country Allocation Framework (G-CAF)

Borealis Global Advisory (BGA) has developed a paradigm to address the various challenges and embrace the various international opportunities for a U.S. investor to diversify into, to hold an overall equity portfolio that achieves higher returns than their current U.S. equity portfolio. The challenges and opportunities addressed earlier in this paper are:

a. A dichotomous international equity market with developed markets of North America and Europe highly integrated and correlated, and sector factors dominating country factors in those markets; whereas the emerging markets and the Pacific Rim markets show less integration and correlation, with country factors dominating sector factors.
b. Rising international equity market correlations with the U.S. market resulting from the dwindled influence of the Pacific Rim countries because of the Japanese market crash of 1989 and the subsequent rise of Europe markets, which are highly correlated to the U.S. market.
c. The last three decades has seen the rise of the emerging markets, which have returned on average more than the U.S. market albeit with higher volatility, and the decline in the performance and elevation of the risk of international developed markets.
d. Outside of a few international markets such as Japan, UK, Canada, France, Germany, Australia, Switzerland, and China, the rest of the country markets are relatively small in terms of market size, with potential sector and security concentration risks, and narrow diversification.
e. A segmented international market arising from persistent home bias giving rise to premiums in country selection and allocation.
f. Greater risk reduction opportunities exist when diversifying internationally across the right balance of sectors and countries, while asynchronous return opportunities exist across the various international markets.
g. Historical variance analyses show that U.S. investors can deviate from a market-cap weighted global portfolio and still obtain reasonable diversification benefits by allocating 20% to international markets.

The paradigm BGA has developed is called the Global Country Allocation Framework, G-CAF, and is based on five pillars, which address the challenges and opportunities of international investing. G-CAF is an adaptation of BGA's all- encompassing fundamental framework for global investing, Global Allocation Framework (G-AF), the key tenets of which are outlined in Exhibit 15. The pillars of BGA's G-AF are summarized below.

GLOBAL ALLOCATION FRAMEWORK

Tranching

- Partitioning given benchmark or universe based on:
  - Size, style or both
  - Sectors
  - Regions (economic or geographic) or countries by levels of development, size or both
- Managing volatility
- Managing portfolio concentrations in terms of:
  - Size, style or both
  - Sectors
  - Regions (economic or geographic) or countries by levels of development, size or both

Enhanced Beta Approach

- Best elements of Smart Beta
  - Blend of active and passive investing
  - Transparent and rules based
  - Multi factors
    - Economic intuition and academic evidence
    - Cyclicality and low inter-factor correlation
    - Volatility adjusted
    - Determination using Fama-Macbeth OLS regression method

Double "Z" Methodology

- Ranking , Selection, and Allocation
- Z-Scoring

Yield Forecasting Mechanism

- Medium-term Yield Forecast for:
  - Regions, countries, sectors, size entities, style entities, and size-style entities
- Diffusion Index for each tranche

Investment Instruments

- Single-country ETFs, Sector ETFs, Regional ETFs, Size ETFs, Style ETFs, Size-Style ETFs
- Individual stocks

Exhibit 15: **Borealis Global Advisory (BGA) Global Allocation Framework (G-AF).**

Pillars of the BGA's Fundamental Global Allocation Framework (G-AF)

Tranching is partitioning of the chosen universe or benchmark into groups of investment entities of a given type. The universe and the type of entity are determined by the nature of the global allocation model to be created. For example, if the model to be created is an emerging market portfolio using single-country ETFs, then the universe would be MSCI Emerging Index, and the type of investment entity would be country. In addition to the universe and the investment entity, the number of tranches is also dependent on the common factors – investment, financial, and economical – that bind the entities underlying the tranches.

Tranching helps set relatively higher weights to tranches, which are expected to deliver better risk-adjusted returns than the universe, while entity selection using Double "Z" methodology helps set higher weights to entities with superior investment prospects under each tranche. The partitioning of the universe provides an opportunity to determine a separate set of drivers of entity returns for each tranche, increasing the prospects of securing better returns on a risk-adjusted basis than the universe. Apart from helping manage volatility, tranching aids the management of diversification benefits from the global allocation model by tailoring the correlation coefficients of the tranches. Further, tranching helps manage portfolio risks from concentrations in sectors, industries, and individual securities.

"Enhanced beta" approach. The term "smart beta" has experienced a rise in attention in recent years. According to industry estimates, today there are more than 350 smart beta ETFs available in the U.S. comprising over $230 billion in AUM, up from just around 200 products and $64.8 billion in 2010. The "smart beta" philosophy that extends beyond traditional active and passive investment management has certain fundamental characteristics, but in the recent years, the term has been used with different connotations. Consequently, BGA has defined its own terminology "enhanced beta", to be used as one of the pillars of its allocation framework, by distilling the intrinsic elements of the "smart beta" approach. BGA's enhanced beta investing is a blend of active and passive investment management that embraces a transparent and repeatable process, and has an appreciation of drivers of entity risk and returns as its crux (see Exhibit 16). These drivers are popularly known in investment parlance as "factors", which Shores (2015) defines as investment characteristics that help elucidate the return and risk behavior of a security.

BGA's enhanced beta approach utilizes a data driven scientific process exercising the rudimentary technique enunciated by the multi-period Fama-Macbeth OLS regression method to identify separate set of multiple factors that drive long-term equity returns for each set of entities residing in their respective tranches. The identified factors earn persistent and significant premium over extended periods, are cyclical, and have low inter-factor correlations. They are backed by sound intuition and academic evidence. The

properties of factors described here are discussed in detail by Bender et al. (2013a), Alighanbari (2014) and Bender et al. (2013b).

Double "Z"™ methodology . The methodology is BGA's basis for ranking, selecting, and allocating to the entities of the chosen type for creating a global allocation model of the chosen type. BGA ranks investment entities in each tranche across each factor from the set of factors identified through the Fama- Macbeth OLS regression method combined with a volatility factor using standardized scoring measure, Z-Score, to arrive at a unified entity score for each entity. The scoring measure is used again to standardize the unified entity scores within each tranche to attain entity allocation weights in the global allocation model.

Yield Forecasting Mechanism (Y-FOREM). BGA developed a modified version of the Shiller's CAPE framework for all the entities of a given type in the universe to derive a measure of the entity equity yield on real basis, the medium-term entity yield forecast, for each entity and tranche in the universe. Medium-term entity yield forecasts are used to fine-tune actively the corresponding periodic entity-weight recommendations discharged by the global allocation model on an ongoing and incremental basis. The medium-term yield is deployed for each tranche and for their corresponding set of entities in the tranches in order to derive, a diffusion index called the Diffusion Index (DI) for each tranche. The time-series of medium-term yield as well as DI for each tranche are analyzed at the end of a given time-period on a relative basis in order to establish the weights of each tranche.

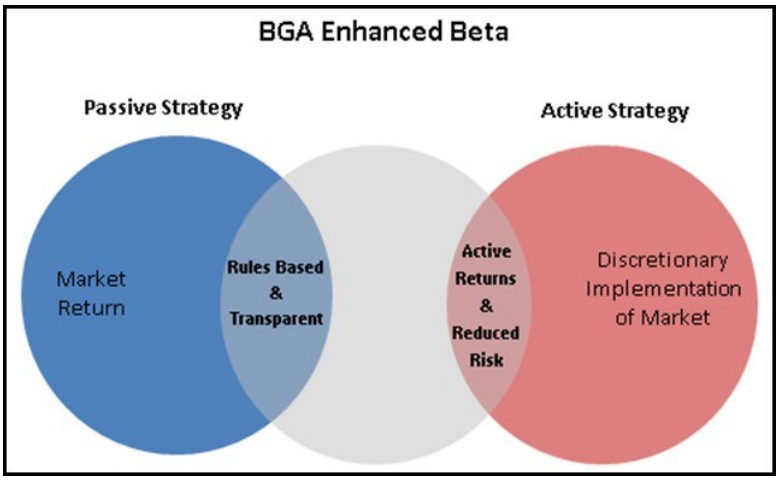

Exhibit 16: Borealis Global Advisory (BGA) Enhanced Beta Approach

Source: MSCI and BGA

Investment instruments. The instruments used for the feasible implementation of the BGA's global allocation models are ETFs and individual stocks. However, BGA's preferred instrument is ETFs tracking broad-based investable indexes as they are modular, cheap in terms of fees, and tax efficient. International stock picking tends to get very expensive in terms of fundamental research and transaction costs. Access to independent and rigorous research and data on international equities is limited as they are monopolized by the big global institutions.

Implementation of G-CAM using the embodiments of G-CAF

Global Country Allocation Model, G-CAM for short, is a list of country allocation recommendations, developed using the pillars of G-CAF, which are summarized in Exhibit 19a, and tied to a pre-determined global index universe it embraces. In other words, the list of countries disclosed in the model is also reliant on its global benchmark, which could be any of the global or regional indexes available in the marketplace. This section will explore the mainstays of G-CAF by employing the construction of an international equity portfolio G-CAM centered on MSCI's All Country World Index ex USA universe as an example. In Exhibit 18, the blue "slice" or "block" is the tangible market implementation of Global Country Allocation Model (G-CAM), benchmarked to MSCI All Country World Index ex USA, utilizing single-country equity ETFs called the BGA Dynamic International Portfolio. This international portfolio would be what an U.S. investor with a fully diversified domestic equity portfolio would adopt to create a fully diversified global equity portfolio.

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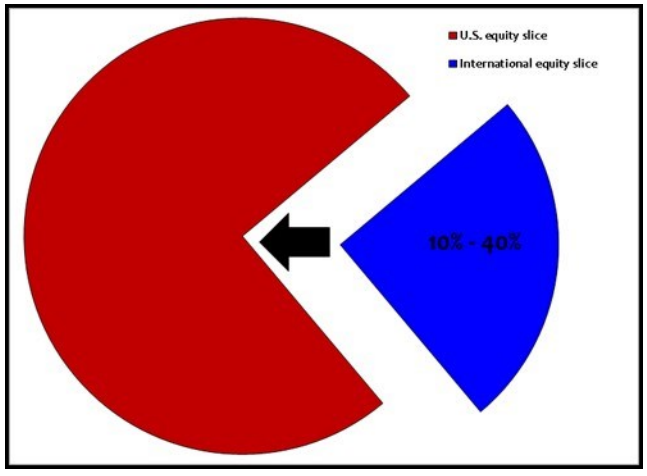


Exhibit 18: **U.S. investor's diversified equity portfolio**

Source: BGA

Exhibit 19a: Global Country Allocation Framework (G-CAF) applied to building G-CAM centered on MSCI All Country World Index ex USA.

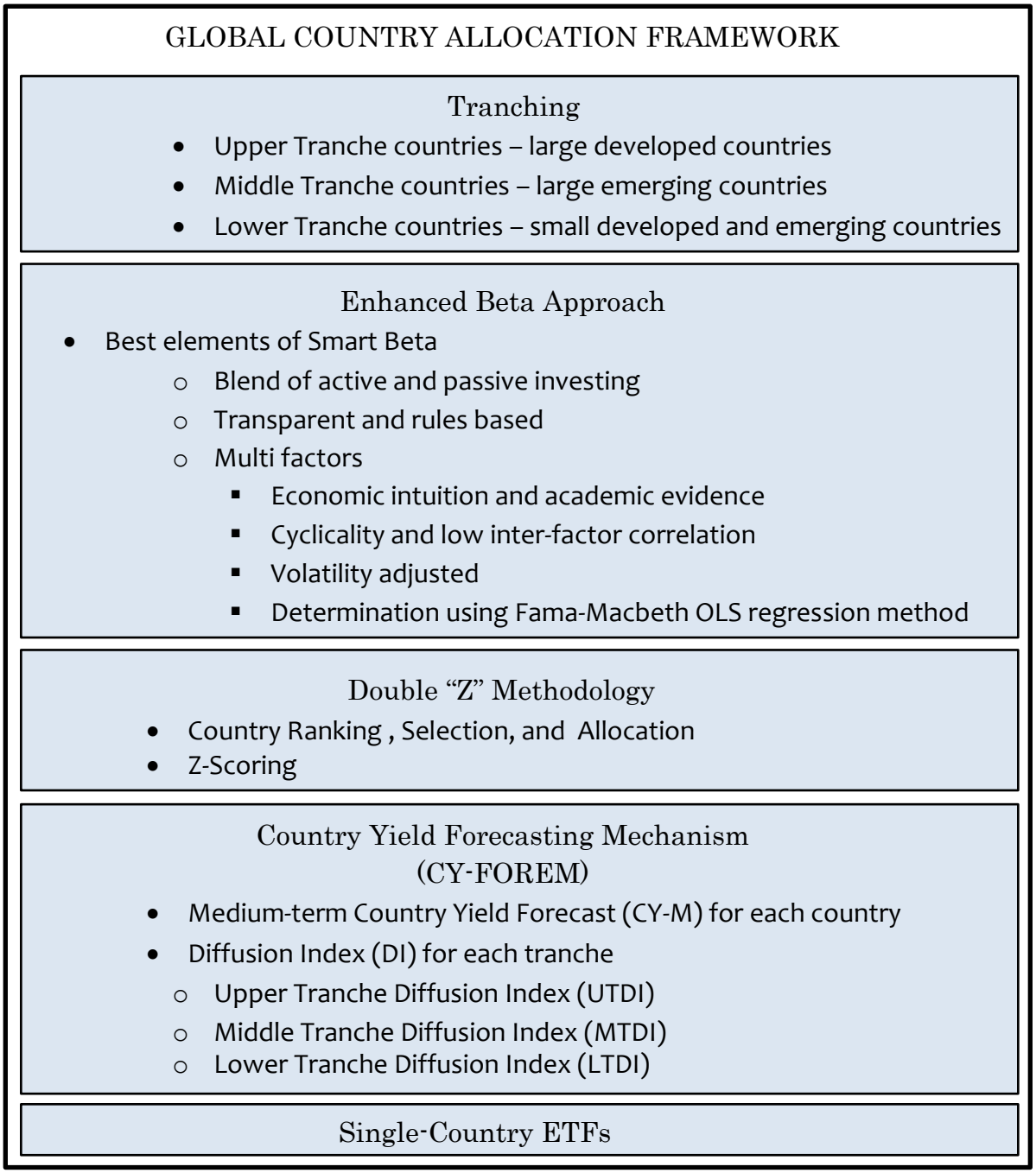


Exhibit 19b outlines the broad process flow for creating the G-CAM centered on the benchmark MSCI All Country World Index ex USA under the auspices of G-CAF. The process flow chart includes the following stages:

i. Establish tranches using norms, which are dependent on the given benchmark or universe. The number of tranches and the criteria for carving the tranches vary from one benchmark to the other. For the benchmark MSCI All Country World Index ex USA, we carve three tranches based on the level of development and market cap thresholds.

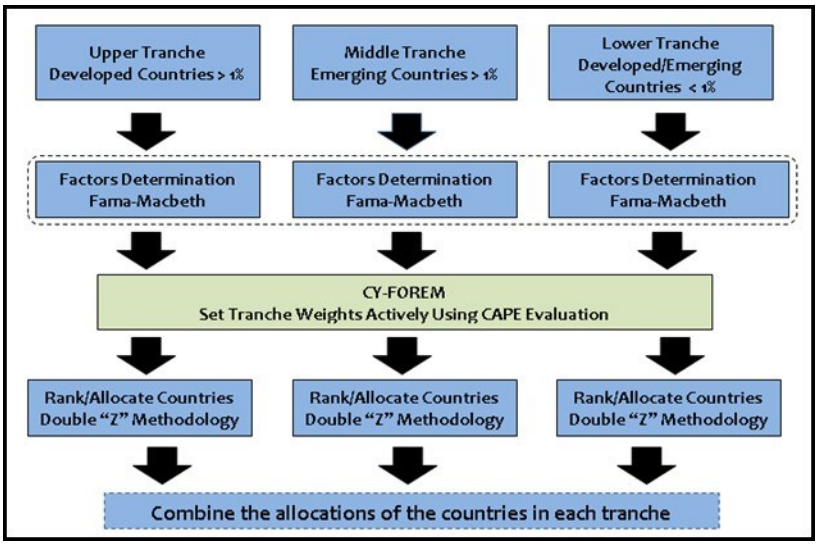
ii. Run Fama-Macbeth OLS regressions for each tranche to determine the factors that drive the returns of the countries in the tranche.

iii. Determine or change the tranche weights periodically based on prognostications from the Country Yield Forecasting Mechanism (CY FOREM).

iv. Rank and select the countries in each tranche and set allocations based on Double "Z" methodology.

v. Combine the country allocations from each tranche and then map them to their corresponding and suitable single-country ETF available in the marketplace. In choosing the single-country ETFs, we consider those with a low expense ratio, balanced sector and industry exposure, high liquidity, and track preferably MSCI country indexes.

Exhibit 19b: Process flow to develop Global Country Allocation Model (G-CAM) centered on MSCI All Country World Index ex USA



Source: MSCI and BGA

Notes: Blocks in blue are rules based and transparent, and therefore, they form the passive components of the enhanced beta approach. The block in green is the active component. The dotted outline symbolizes one-time run for the given benchmark.

Tranching (or otherwise, partitioning). BGA carves the countries underlying the MSCI All Country World Index ex USA, a market-weighted universe, into three tranches, namely: Upper Tranche (UT) consisting of large developed countries with market-cap weights of at least 1% (of the universe), Middle Tranche (MT) consisting of large emerging countries with market-cap weights of at least 1%, and the Lower Tranche (LT) consisting of developed and emerging countries with market-cap weights of at most 1%. The cap criteria for carving the

tranches is based on average trailing 7-year market-cap weights of the countries underlying the index as of March 2015 (see Exhibit 20). Based on this criterion:

i. The Upper Tranche is composed of Australia, Canada, France, Germany, Hong Kong, Italy, Japan, Netherlands, Singapore, Spain, Sweden, Switzerland, and UK;
ii. The Middle Tranche is composed of Brazil, China, India, Korea, Mexico, Russia, South Africa, and Taiwan; and
iii. The Lower Tranche[4] is composed of Austria, Belgium, Chile, Colombia, Czech Republic, Denmark, Egypt, Finland, Greece, Hungary, Indonesia, Ireland, Israel, Malaysia, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Qatar, Thailand, Turkey, UAE, and UK. Qatar and UAE are excluded from the universe for the time being for lack of sufficient data history. Hungary and Czech Republic would also be excluded from tangible market implementation of G-CAM due to lack of single-country ETFs in the market tracking them.

Partitioning countries in the universe using market cap and levels of development, though coincidental, has resulted in grouping countries by levels of correlation with the U.S. market. The sizeable presence of countries from northern and western Europe and North America in the Upper Tranche would cause the tranche to have high correlation[5] (with respect to the U.S. market) even though the presence of Hong Kong, Japan and Australia from the Pacific Rim would stifle it to some extent. The augmenting and restraining pressure of developed countries across the Atlantic Ocean and the countries in the Pacific Rim[6] respectively on international correlation with U.S markets has been documented in detail in Section I (see sub-section correlation for detailed discussion on global correlations). The countries of the Upper Tranche, which are economically integrated, have high aging populations, sub-par long-term growth expectations, and extremely high government debt burdens, and are leaders by their sheer market size. The countries in this tranche have long secular economic cycles of boom and bust and fundamentally strong currencies, and therefore drive the economic cycles of satellite countries in geographical proximity or with which they have extensive economic relationships in terms of trade and finance. Due to their sheer size, active monetary and fiscal policies circulated in the Upper Tranche countries in response to global and domestic shocks dampen the independent policies of the satellite countries. These satellite countries are mostly countries with small domestic economies, have small equity markets, and a high degrees of sector and security concentration, and most of them fall into the Lower Tranche.

[4] Argentina, Jordan, Morocco, Pakistan, Sri Lanka, and Venezuela are not part of the MSCI All Country World Index ex USA currently.

[5] Correlation refers to the correlation of returns with respect to U.S. markets, and from here on is referred to as "correlation" in short.

[6] The Pacific Rim countries in the All Country World Index ex USA are Australia, China, Hong Kong, Indonesia, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan, and Thailand.

Unlike equity markets of Upper Tranche countries, which track the secular economic cycles of their respective economies, the equity markets of the Lower Tranche countries track large regional countries and they typically experience a shorter duration – of very few years – of boom-bust equity cycles. These equity markets typically have more frequent boom-bust cycles often a result of a shock to their domestic economies, a shock to the global markets or the beginning of a new secular economic cycle in their driver nations.

The equity markets in the Lower Tranche have frequent equity performance leadership changes and their performance is largely a function of currency and equity price momentum.

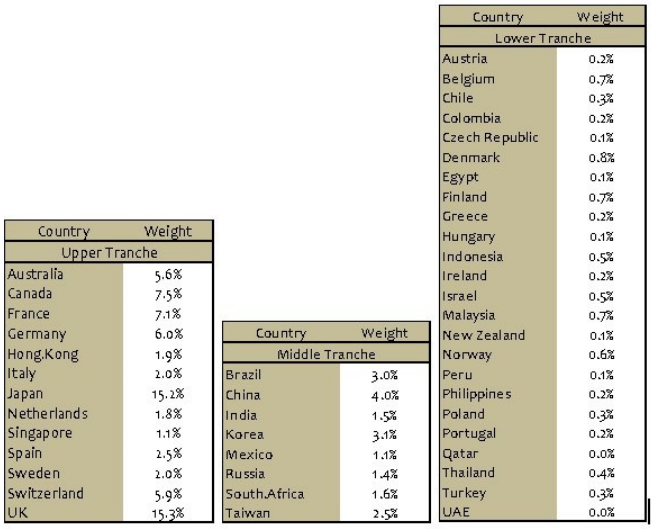
The third tranche BGA uses, groups together the largest emerging countries about whose properties of correlation we have discussed earlier in Section I. This bloc called the Middle Tranche has a lower correlation to the U.S. market than the Upper Tranche. These countries, like those in the Upper Tranche, influence the smaller economies and equity markets in their geographic region. Understandably, the satellites countries, which are influenced by the Middle Tranche countries, find a place in the Lower Tranche as well.

Another point that needs emphasizing is the significant presence of correlation stifling Pacific Rim economies in the Middle and Lower Tranches. As a result, the weights of the Middle and Lower Tranche countries in an international portfolio act as lever to control its degree of diversification and volatility.

On average, the Upper Tranche countries constitute about 74% of the market cap of MSCI All Country World Index ex USA, while the Middle Tranche countries constitute 18% of the market cap, and the Lower Tranche countries constitute the rest. Partitioning the countries in the market-weighted investment universe into tranches gives us the opportunity to control, on a periodic basis, the macro influences of various economic groups (large developed countries, large emerging countries, and smaller developed and emerging countries) on the collective return and volatility characteristics of the universe. This is done by regulating the tranche weighting using ways other than market-cap weighting. Needless to say, market-cap weighting is a byproduct of the past performance of the underlying individual components of the universe. An alternative way for controlling the influence of these various economic groupings in order for the portfolio to extract superior performance collectively from the universe is to set the tranche weights of the portfolio using their performance expectations, rather than their past performances, as outlined in the pillar CY-FOREM (detailed explanation in Section III). Likewise, partitioning allows for control of the collective volatility of the universe as well. Further evidence shows that tranching also enables us to modify the existing sector concentration risks in the universe. For example, the financial sector constitutes about 25% of the market cap of the MSCI All Country World Index ex USA. However, the BGA Dynamic International portfolio, using tranching and

implementing CY-FOREM to set tranche weights, was able to limit the concentration of financial sector to about 20%.

The country selection (to be discussed later in the sub-section Double "Z" methodology), which subordinates the tranche allocation (weighting), augments the latter and identifies countries (underlying each tranche) that will deliver superior returns than the market-weighted universe collectively. Intuitively, dividing the universe by size and levels of development has increased the opportunity for higher risk-adjusted returns (see sub-section G-CAM performance results). The tandem of tranching and country selection offers an effective option for U.S. investors to improve risk-adjusted performance of their international equity investments.



Country	Weight
Upper Tranche	
Australia	5.6%
Canada	7.5%
France	7.1%
Germany	6.0%
Hong.Kong	1.9%
Italy	2.0%
Japan	15.2%
Netherlands	1.8%
Singapore	1.1%
Spain	2.5%
Sweden	2.0%
Switzerland	5.9%
UK	15.3%

Country	Weight
Middle Tranche	
Brazil	3.0%
China	4.0%
India	1.5%
Korea	3.1%
Mexico	1.1%
Russia	1.4%
South.Africa	1.6%
Taiwan	2.5%

Country	Weight
Lower Tranche	
Austria	0.2%
Belgium	0.7%
Chile	0.3%
Colombia	0.2%
Czech Republic	0.1%
Denmark	0.8%
Egypt	0.1%
Finland	0.7%
Greece	0.2%
Hungary	0.1%
Indonesia	0.5%
Ireland	0.2%
Israel	0.5%
Malaysia	0.7%
New Zealand	0.1%
Norway	0.6%
Peru	0.1%
Philippines	0.2%
Poland	0.3%
Portugal	0.2%
Qatar	0.0%
Thailand	0.4%
Turkey	0.3%
UAE	0.0%

Exhibit 20: Average weight of countries in MSCI All Country ex USA March 2008 – March 2015

Source: MSCI and BGA.

" Enhanced beta" approach . BGA has defined its own terminology "enhanced beta", to be used as one of the pillars of its allocation framework, by distilling the intrinsic elements of the "smart beta" approach. The building blocks in Exhibit 19, which are colored in blue, are transparent and rules-based repeatable processes for constructing the G-CAM centered on benchmark MSCI All Country World Index ex USA, and they are:

1. Automated carving of tranches from the benchmark based on market-cap weights and the development levels of countries;
2. Automated run of FAMA-Macbeth OLS method to determine the factors of country returns for each tranche;
3. Automated Double "Z" methodology to rank, select, and allocate the countries in each tranche using factors determined in step 2; and.
4. Automatically roll the individual tranche-level allocations into single BGA Dynamic international portfolio-level country allocations.

The processes listed above constitute passive aspects of BGA's portfolio construction methodology. Setting weights of each tranche, highlighted Green block in Exhibit 19, using country and tranche forecasts obtained from County Yield Forecasting Mechanism (CY-FOREM) is an active aspect of investment management. In setting weights using CY-FOREM, BGA eschews rules and uses capital market expectations derived from CACY (cyclically adjusted country yield) measures of the countries in the tranches. Another active aspect of the construction is the capture of multiple drivers of country returns using Fama-Macbeth methodology in order to outperform the benchmark and secure the long-term equity risk premium. Consequently, we can say that BGA's G-CAM construction process flow embraces the first two key elements of enhanced beta approach: i) Adopt the blend of both active and passive principles of investing. ii) Adopt transparent and rules-based repeatable methods.

BGA's enhanced beta approach utilizes a data driven scientific process exercising the rudimentary approach of the Fama-Macbeth OLS (FMB) regression method. The approach is a cross-sectional regression repeated over multiple periods. BGA in isolating the factors that drive long-term equity returns for each set of countries residing in their respective tranches used the monthly time-periods between July 2003 and March 2015 (end dates inclusive). For feasibility reasons, the countries in the Upper Tranche and Middle Tranche were combined for the cross-sectional FMB regressions. Exhibit 21a is the output from the regressions, and it underscores the factors that drive the returns of the countries in Upper Tranche and Middle Tranche, while Exhibit 21b displays the factors for the Lower Tranche. The factors in the exhibits demonstrate their strengths in explaining one-month forward returns, but further analysis reveal they retain their strengths in explaining six-month forward returns as well.

Fama-MacBeth (1973) Two-Step procedure — Number of obs = 2918; Num. time periods = 140; F(6, 139) = 2.98; Prob > F = 0.0090; avg. R-squared = 0.2299

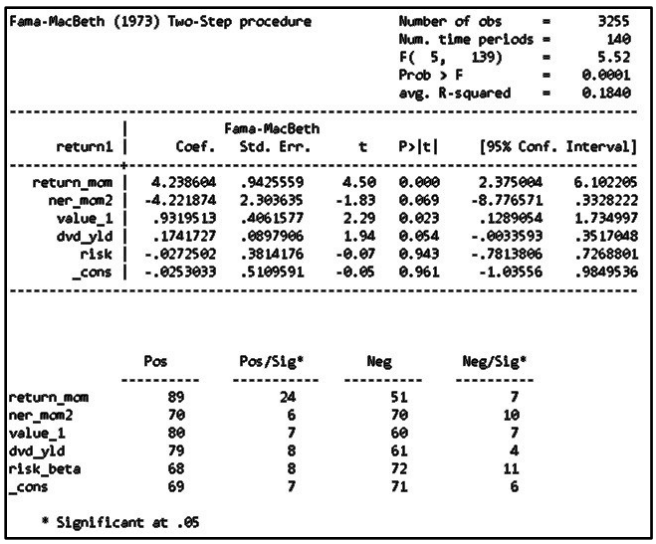
return1	Fama-MacBeth Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
value_2	-1.023322	.2843398	-3.60	0.000	-1.585512	-.4611316
value_3	-.9155863	.5236465	-1.75	0.083	-1.950928	.1197559
ner_mom1	-.8770707	1.738581	-0.50	0.615	-4.314554	2.560412
risk	.6544365	.5341109	1.23	0.223	-.4015957	1.710469
return_mom	.155796	1.297185	0.12	0.905	-2.408969	2.720561
rer_pusd	-.0001246	.0003871	-0.32	0.748	-.0008901	.0006408
_cons	2.956014	1.017886	2.90	0.004	.9434719	4.968556

	Pos	Pos/Sig*	Neg	Neg/Sig*
value_2	56	4	84	10
value_3	68	1	72	8
ner_mom1	61	6	79	5
risk	82	18	58	15
return_mom	78	11	62	13
rer_pusd	72	5	68	7
_cons	80	11	60	1

* Significant at .05

Exhibit 21a: Factors driving country returns, Upper Tranche and Middle Tranche

Source: BGA calculation and MSCI.



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Fama-MacBeth (1973) Two-Step procedure          Number of obs     =      3255
                                                Num. time periods =       140
                                                F(  5,   139)     =      5.52
                                                Prob > F          =    0.0001
                                                avg. R-squared    =    0.1840
------------------------------------------------------------------------------
             |               Fama-MacBeth
     return1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  return_mom |   4.238604   .9425559     4.50   0.000     2.375004    6.102205
    ner_mom2 |  -4.221874   2.303635    -1.83   0.069    -8.776571    .3328222
     value_1 |   .9319513   .4061577     2.29   0.023     .1289054    1.734997
     dvd_yld |   .1741727   .0897906     1.94   0.054    -.0033593    .3517048
        risk |  -.0272502   .3814176    -0.07   0.943    -.7813806    .7268801
       _cons |  -.0253033   .5109591    -0.05   0.961    -1.03556     .9849536
------------------------------------------------------------------------------
```

	Pos	Pos/Sig*	Neg	Neg/Sig*
return_mom	89	24	51	7
ner_mom2	70	6	70	10
value_1	80	7	60	7
dvd_yld	79	8	61	4
risk_beta	68	8	72	11
_cons	69	7	71	6

* Significant at .05

Exhibit 21b: Factors driving country returns, Lower Tranche

Source: BGA calculation, MSCI, USDA, and IMF.

Model/Variables	return_mom	ner_mom1	value_1	value_2	value_3	risk	rer_pusd	dvd_yld	ner_mom2
Upper Tranche & Middle Tranche	0.04	0.15		1.05	0.51	0.36	0.09		
Lower Tranche	1.32		0.67			0.02		0.57	0.54

Exhibit 22: Information ratio of the factors driving country returns

Source: BGA calculation, MSCI, USDA, and IMF.

	value_2	value_3	ner_mom1	risk	return_mom	rer_pusd
value_2	1.00					
value_3	-0.05	1.00				
ner_mom1	-0.03	-0.01	1.00			
risk	0.18	0.01	-0.03	1.00		
return_mom	0.03	-0.07	0.60	0.03	1.00	
rer_pusd	-0.04	-0.01	-0.05	0.08	0.05	1.00

Exhibit 23a: Correlation of factors that drive country returns in Upper Tranche and Middle Tranche

Source: BGA calculation, MSCI, USDA, and IMF.

	return_mom	ner_mom2	value_1	dvd_yld	risk
return_mom	1.00				
ner_mom2	0.59	1.00			
value_1	-0.18	-0.02	1.00		
dvd_yld	-0.36	-0.17	-0.06	1.00	
risk	0.02	-0.02	-0.01	-0.09	1.00

Exhibit 23b: Correlation of factors that drive country returns in Lower Tranche

Source: BGA calculation, MSCI, USDA, and IMF.

The table in Exhibit 22 displays the information ratios of the factors shaping returns of countries in G-CAM. The factor that is deemed highly significant in determining the returns for the Upper Tranche and Middle Tranche countries is value factor value_2 (mnemonic). While for the Lower Tranche, the key factors are momentum factor return_mom (mnemonic) and currency factor ner_mom2 (mnemonic). The factors are very sensitive to macro-economic and market influences, and therefore, individually they are highly cyclical and would underperform the markets for long periods. However, the tables in Exhibit 23 also demonstrate the low correlation between the factors identified through FMB. The low inter-factor correlation signifies diversification across factors, and demonstrate that factors do not peak and trough at the same time. In other words, lower inter-factor correlations increase the degree of asynchronous cyclicality of the factors. Bender et al. (2013b) concluded that diversification of factors has historically reduced significantly the spells of underperformance of factor strategies. It also strengthens the arguments for multi-factor models over single-factor models including market-cap investing, which encapsulates entire market systematic risk as a single factor. Combining factors also helps offset the cyclicality of market-cap investing. Bender also underlines that diversification of factors has historically lead to – lower volatility and higher Sharpe Ratios; higher information ratios; and lower dependency on business cycles.

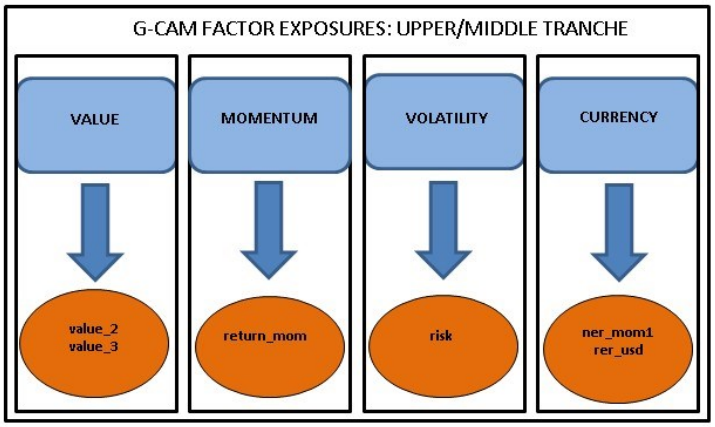


Exhibit 24a: Classification of factors, Upper Tranche and Middle Tranche

Source: BGA.

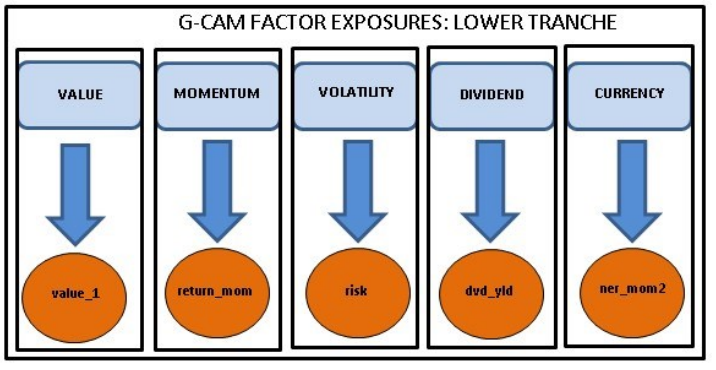


Exhibit 24b: Classification of factors, Lower Tranche

Source: BGA.

As you can see in sub-section G-CAM performance from 2003 thru July 2016, the factors BGA uses have combined to outperform the MSCI All Country World ex USA.

Therefore, we can conclude that the identified factors have been efficient in earning persistent and significant premium over extended periods. Exhibits 24a and 24b expresses the factors mostly in terms of classification proposed by MSCI in the publication by Bender et al.: Value, momentum, volatility, dividend, and currency. By emphasizing on country volatility as a distinct risk-adjustment factor rather as a driver of return (see discussion in sub-section Double "Z" methodology), BGA uses volatility to manage the risk of G-CAM rather than as an investment tool.

The factors isolated by FMB have sound economic intuition and backing of academic evidence. Appendix A of the study "Foundations of Factor Investing" by Bender et al. (2013a) lists the academic literature backing many of the categories of factors referred to in Exhibits 24a and 24b. Let us discuss briefly one driver of country returns that was expressed in Exhibit 22 as an example:

Price return momentum, which reflects the notion that past performance is bound to future performance of equity securities over certain horizons, was brought to the forefront of the investing world by a seminal study of momentum on the U.S. markets by Jegadeesh and Titaman (1993). The concept was extended by Asness (1995, 1997) in confirming its existence globally at the country level. Empirical research has concluded that the momentum effect is dominant in the 3-12 month timeframe.

Double "Z"™ methodology of country ranking, selection, and allocation. BGA ranks each of the main factors identified through the Fama- Macbeth OLS regression method and an additional volatility adjustment factor across countries in each tranche, using the standardized scoring measure, Z-Score. The individual rank scores of the main factors for each country are combined using pre-determined weights to arrive at its country score. The country scores are ranked using the Z-score measure to obtain the overall country scores. The overall country score for each country is combined with its volatility rank score, using pre-determined risk-adjustment weights, to arrive at its overall risk-adjusted country score. The overall risk-adjusted country scores are mapped on to a normalized probability distribution curve to obtain the country allocation weights. The country allocation weights in each tranche are combined together to obtain the overall portfolio country allocation weights. The double application of Z-Score lends the methodology the name double "Z"™ methodology. The methodology is the basis for ranking, selecting, and allocating the countries in the Global Country Allocation Model (G-CAM) and one of the key pillars of Global Country Allocation Framework (G-CAF). It is discussed in detail with mathematical notations in appendix I.

Country	f1	f2	f3	f4	f5	f6	Vol
Australia	-0.125	-0.132	3.028	1.101	1.160	1.349	6.887
Canada	-0.179	-0.139	2.455	1.275	0.940	1.324	5.695
France	0.042	-0.137	2.338	1.213	1.200	0.962	6.733
Germany	0.014	-0.137	2.319	1.018	1.260	0.947	7.124
Hong Kong	-0.013	0.001	3.213	1.047	0.930	6.733	5.955
Italy	0.067	-0.137	2.149	1.468	1.340	0.945	8.111
Japan	0.095	-0.018	1.859	1.214	0.640	128.854	4.473
Netherlands	0.045	-0.137	2.020	1.194	1.080	0.930	6.164
Singapore	-0.182	-0.067	2.507	1.140	1.080	1.362	6.479
Spain	-0.103	-0.137	2.297	1.465	1.350	0.946	8.474
Sweden	-0.017	-0.118	2.537	0.990	1.180	9.103	6.908
Switzerland	0.002	-0.042	2.370	1.150	0.870	1.119	5.063
UK	-0.037	-0.038	2.772	0.943	0.930	0.638	5.216

Exhibit 25a: Raw values of sample factors and volatility for the countries in the Upper Tranche, November 2015

Source: MSCI and BGA computation.

Country	z_f1	z_f2	z_f3	z_f4	z_f5	z_f6	Z_Vol
Australia	-1.04	0.68	-1.53	0.43	0.42	0.30	6.89
Canada	-1.64	0.82	-0.01	-0.64	-0.65	0.30	5.69
France	0.79	0.78	0.30	-0.26	0.61	0.31	6.73
Germany	0.49	0.78	0.35	0.94	0.91	0.31	7.12
Hong Kong	0.19	-1.79	-2.02	0.76	-0.70	0.15	5.95
Italy	1.07	0.78	0.80	-1.82	1.30	0.31	8.11
Japan	1.38	-1.44	1.57	-0.27	-2.11	-3.32	4.47
Netherlands	0.83	0.78	1.14	-0.14	0.03	0.31	6.16
Singapore	-1.68	-0.52	-0.15	0.19	0.03	0.30	6.48
Spain	-0.81	0.78	0.41	-1.80	1.35	0.31	8.47
Sweden	0.14	0.42	-0.23	1.11	0.52	0.08	6.91
Switzerland	0.36	-1.00	0.21	0.13	-0.99	0.31	5.06
UK	-0.08	-1.06	-0.85	1.40	-0.70	0.32	5.22

Exhibit 25b: Z-Scores of sample factors and volatility for the countries in the Upper Tranche, November 2015

Source: BGA computation.

Country	Combo_Factor_Score	ZZ_Score	Z_Volatility	Country_Z_Score	P_Score	Alloc
Australia	-0.49	-1.16	-0.42	-0.79	0.21	0.00%
Canada	-0.25	-0.59	0.62	0.01	0.50	0.09%
France	0.32	0.75	-0.28	0.24	0.59	3.09%
Germany	0.57	1.37	-0.62	0.37	0.65	4.87%
Hong Kong	-0.87	-2.07	0.39	-0.84	0.20	0.00%
Italy	0.30	0.71	-1.48	-0.38	0.35	0.00%
Japan	0.02	0.06	1.67	0.86	0.81	10.33%
Netherlands	0.62	1.48	0.21	0.85	0.80	10.15%
Singapore	-0.21	-0.49	-0.06	-0.28	0.39	0.00%
Spain	-0.03	-0.08	-1.79	-0.94	0.17	0.00%
Sweden	0.25	0.59	-0.43	0.08	0.53	0.96%
Switzerland	-0.02	-0.05	1.16	0.56	0.71	7.07%
UK	-0.21	-0.51	1.03	0.26	0.60	3.44%

Exhibit 25c: Tracing the path of the sample factor Z-Scores to country allocations

Source: BGA computation.

Notes: The Upper Tranche weight in this example has been set to 40% of the G-CAM.

Let us run through the methodology using countries in the Upper Tranche as example. The Table in Exhibit 25a lists the raw values of sample factors – f1, f2, f3, f4, f5, and f6 – and the volatility adjustment factor (mnemonic vol) for the countries in the tranche at the end of a given period. BGA measures its factors on a monthly basis, though weekly measurements could be used depending on data availability. Raw values of the factors and volatility of the countries are ranked using the Z-score measure. For example, Z-Scores of f1 factor values express the raw f1 factor values in terms of standard deviation from their mean. Consequently, these Z-Scores have a distribution with a mean of 0 and a standard deviation of 1. Factors that are negatively correlated with country returns are inverted in order to establish the norm that higher Z-scores are better, and lower Z-scores are worse. Let us take the example of f1 factor, which are positively correlated with country returns. Singapore has the lowest f1 value, at -0.182, and therefore, it translates to the lowest Z-Score value of -1.68 amongst the countries. Similarly, Japan with the highest raw value of .095 for factor f1 translates to the highest Z-Score of 1.38. On the other hand, let us take the example of f2 factor, which is negatively related to country returns. Canada has the lowest f2 value, at -0.139, and therefore, it translates to the highest Z-Score value of 0.82 amongst the countries. Similarly, Hong Kong with the highest raw value of .001 for factor f2 translates to the lowest Z-Score of -1.79. Table in Exhibit 25b displays the Z-scores of all main factors and volatility for all the countries in the tranche. They are represented mnemonically and column wise in the table as Z_f1, Z_f2, Z_f3, Z_f4, Z_f5, Z_f6, and Z_Vol. These main factor Z-Scores are combined using weighted average – using weights .1, .1, .4., .2, .1, and .1 respectively in this example – to arrive at the country score for each country (mnemonic Combo_Factor_Score). The country scores for the countries are ranked using Z-Score measure (hence the term Double "Z" methodology) to arrive at the overall country score for each country (mnemonic ZZ_Score) in the tranche. The risk-adjusted overall country score (mnemonic Country_Z_Score) of a country is the weighted average of its overall country score and volatility Z-Score (mnemonic Z_Vol). In this example, both scores are equal weighted, or in other words, the risk adjustment factor is set to .5. All the negative risk-adjusted overall country scores are exempted, while the positive scores are mapped out to a normalized distribution curve. The individual country probability scores (mnemonic P_Score) are translated to country weights (mnemonic Alloc), which sum to their tranche weight, which in this example is set at 40%. Likewise, the same process is applied to other countries in the other tranches. The country allocation weights are combined together to form the portfolio allocation weights. Exhibit 25c should be used to trace the path of the sample factor Z-Scores to country allocations.

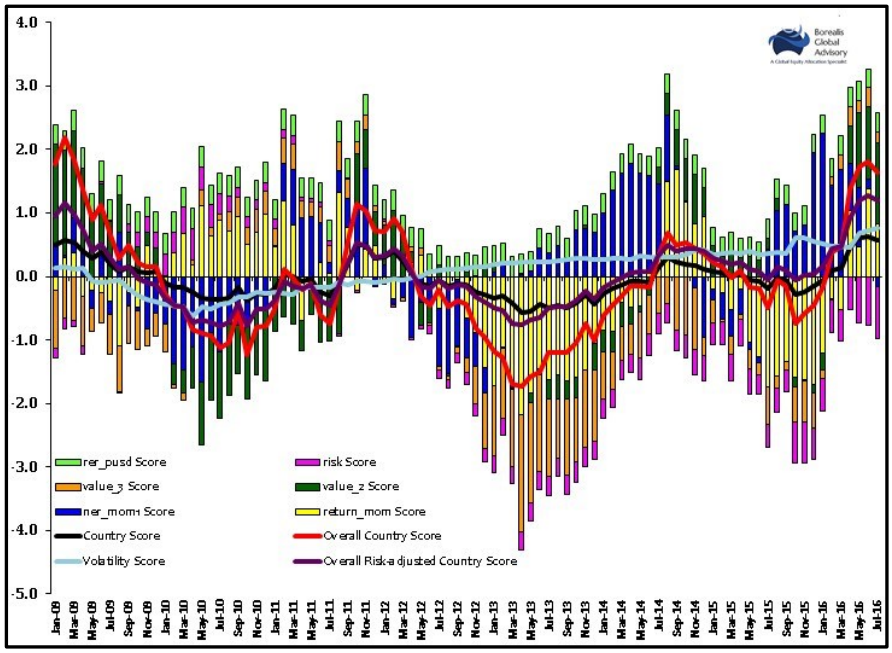


Exhibit 26: Strength of factors chart for Canada.

Source: BGA computation.

Notes: data through July 2016

BGA charts the factors for each country as shown in Exhibit 26. This is strength of factors chart for Canada, an Upper Tranche country. This stacked bar chart is an example of BGA's implementation of the factors, for Upper Tranche countries, identified in the discussion on Fama-Macbeth (FMB) methodology. Each stacked bar in this chart displays the balance of strength of various identified factors that drive the returns of Canada at a given point in time, while each sub-bar in the stack represents the strength of its corresponding factor. The chart expresses the raw values of all the factors in Z-Score measures. For example in July 2016, raw values of factors rer_pusd, value_3, value_2, and return_mom (all stacked bars above the x-axis) were poised to contribute positively to returns of Canada for the next six months, while factors ner_mom1 and risk were poised to contribute negatively to the returns (all stacked bars below the x-axis). The most significant line in the chart is the red line, which depicts the time-series of Overall Country Score and it portrays the one-to-six month forward return expectations from Canada. As you can see in the chart, between March 2015 and January 2016, the overall country score of Canada has been negative, which means there would have been no allocation to Canada during that period. The trend reversed since then, and the allocations have been positive since, while peaking in May 2016. Similarly, Exhibit 27 is the strength of factors chart for South Africa, a Middle Tranche country. Finally, Exhibit 28 is the strength of factors chart for New Zealand, a Lower Tranche country. This chart is an example of BGA's implementation of the factors for Lower Tranche countries. In this chart, in July 2016, raw values of factors dividend yield, return momentum, and country beta were poised to contribute positively to returns for the next six months, while factors normal exchange rate and FTEP ratio were poised to contribute negatively to the returns.

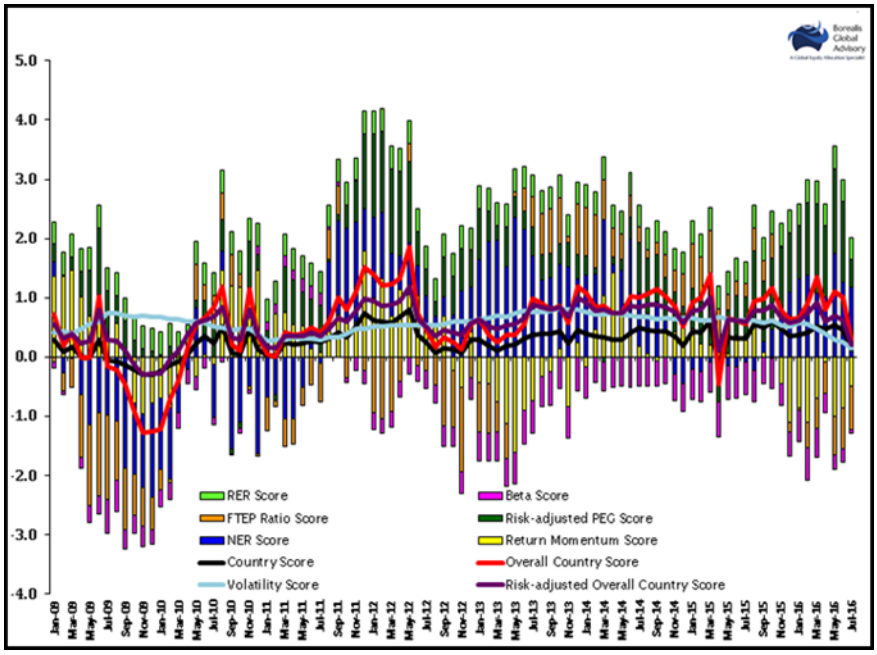


Exhibit 27: Strength of factors chart for South Africa.

Source: BGA computation.

Notes: data through July 2016

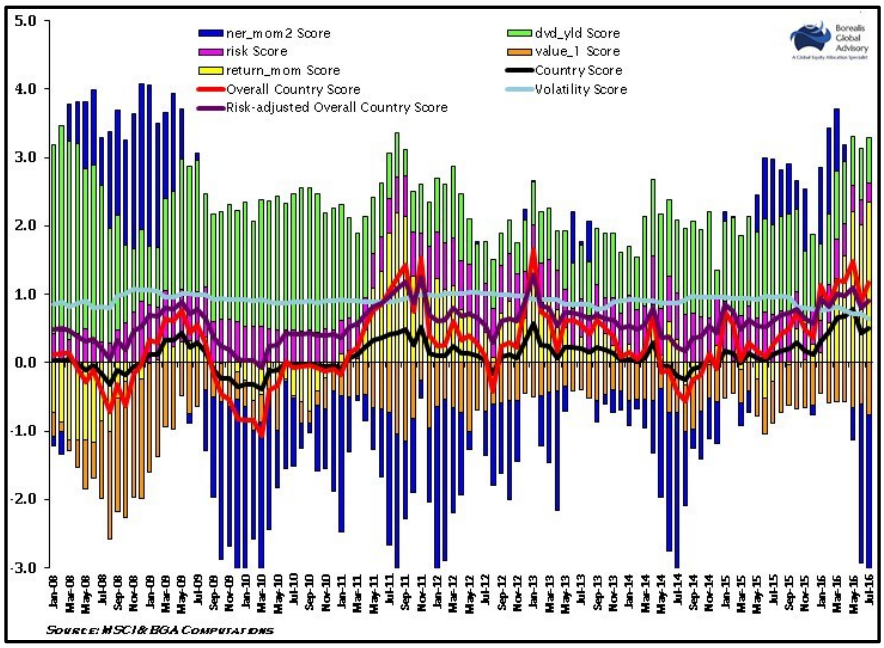


Exhibit 28: Strength of factors chart for New Zealand

Source: BGA computation.

Notes: data through July 2016.

G-CAM performance. Exhibit 29 displays the back-tested theoretical performance of G- CAM centered on MSCI benchmark All Country World Index ex USA with Upper Tranche weight set to 40%, Middle Tranche 20%, and Lower Tranche 40%. Theoretical implementation of G-CAM signifies tracking the performance of the raw country indexes, while the tangible market implementation of G-CAM would amount to replacing each country index in the model with its corresponding single-country ETF and then tracking their performances. The gross of fees performance of the tangible market implementation of G-CAM would vary slightly from the theoretical version as Czech Republic and Hungary are excluded for lack of single-country ETFs in the market. We can have multiple implementations of G-CAM by varying the tranche-weights of the model.

By reviewing the backtested performance of various implantations of G-CAM through the variation in tranche weights, one can assess the return and risk profiles of the tranches, and can help recommend suitable implementation for a given client's risk tolerance and return expectations.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	G-CAM	MSCI MXWDU*
2004	3.50	2.50	0.60	-1.50	-1.30	1.90	1.10	1.60	7.10	4.10	9.60	5.90	40.40	21.40
2005	2.00	5.90	-2.90	0.70	1.40	4.40	4.60	2.50	5.70	-3.20	4.30	3.40	32.10	17.10
2006	10.00	-1.10	3.10	6.60	-7.70	0.10	2.40	3.90	1.80	5.10	4.90	4.50	37.70	27.20
2007	2.70	-0.30	4.30	6.10	4.00	1.60	1.30	-2.20	8.60	7.00	-5.70	-0.30	29.60	17.10
2008	-7.50	4.30	-1.90	3.90	1.60	-6.40	-3.50	-4.90	-14.20	-22.50	-6.80	4.30	-44.50	-45.20
2009	-9.00	-6.80	8.30	12.20	14.10	0.50	9.40	2.20	5.00	-0.60	2.00	3.00	44.90	42.10
2010	-3.00	0.00	6.40	-0.40	-9.30	-0.70	9.20	-1.30	10.70	3.50	-3.80	7.80	18.60	11.60
2011	-0.10	1.10	1.40	4.70	-2.10	-2.10	-0.40	-7.60	-11.60	9.50	-4.20	-0.30	-12.50	-13.30
2012	5.40	5.30	0.00	-0.50	-10.30	5.90	1.00	1.60	4.10	0.80	1.10	3.40	18.20	17.40
2013	4.90	-1.10	1.20	3.40	-2.60	-3.70	4.00	-1.10	7.90	4.70	0.00	0.50	18.90	15.80
2014	-2.80	6.90	1.30	0.80	0.80	1.40	-0.90	1.30	-2.90	-1.10	1.40	-2.50	3.30	-3.40
2015	-0.10	4.10	-0.20	4.50	-1.50	-2.10	0.80	-7.20	-4.80	7.30	-1.60	-1.00	-2.80	-5.30
2016	-5.80	-1.60	9.10	1.90	-2.20	0.20	4.10	NA	NA	NA	NA	NA	5.00	4.30

Exhibit 29: Theoretical performance of G-CAM centered on the MSCI benchmark All Country World Index ex USA from 2004 – July 2016

Source: BGA computation.

Notes: data through July 2016. The returns expressed are in U.S. dollar terms on a gross basis. Sharpe ratios have been computed only for the period 2004 – 2015. " Theoretical" refers to assessing the performance of G-CAM using raw country index returns rather than the single-country ETF returns.

The pillar CY-FOREM, which is primarily used to actively set the weights of the tranches based on return expectations from the tranches, has been discussed briefly in Section I as well in detail in the entire Section III. The tranche weights, which are set based on recommendations from CY-FOREM, can be fine-tuned further based on the client's risk tolerance as each tranche has its own risk profile. Active setting of the tranche weights is aimed at establishing a fine balance between return and risk. Clients whose sole objective is returns will have their tranche weights set purely on recommendations of CY- FOREM, while those who would like a balance between risk and return will have their tranche weights established by CY-FOREM recommendations, which are treated further by conclusions drawn on tranche volatility from results of multiple backtesting utilizing different set of tranche weights.

Use of single-country ETFs. Tangible market implementation of the G-CAM can be accomplished through assigning the country allocations of the model to their respective popular single-country ETFs available in the market place, most of which are offered by iShares, the dominant player in the ETF space. Implementing a portfolio centered on the model utilizing the ETFs eschews inherent risks emanating from industry/sector selection as well as security (stock) selection (see Exhibit 30). Multiple single-country ETFs, each of which is a basket of equity securities, when combined using our framework create a global equity portfolio that is diversified across sectors and countries, while circumventing security and sector concentration risks discussed earlier. Our research indicates that nearly 20 single-country ETFs are needed to create a diversified international portfolio, whereas more than twice that number of individual international stocks is required to create the same.

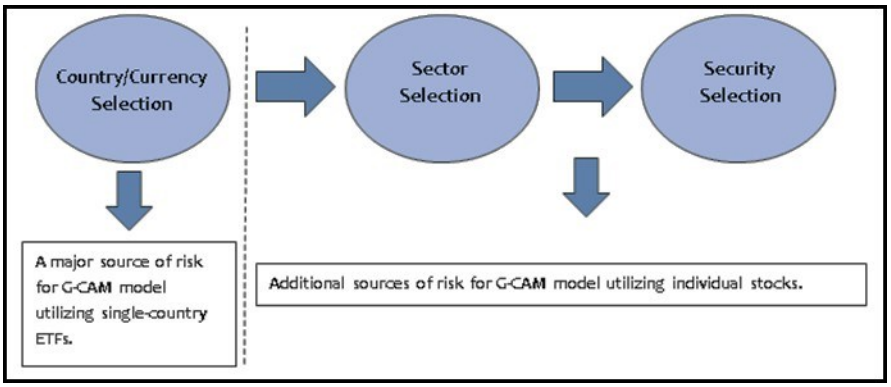


Exhibit 30: Sources of risk

Source: BGA

III. Country Yield Forecasting Mechanism (CY-FOREM)

The BGA Country Yield Forecasting Mechanism (CY-FOREM) is the application of Shiller's CAPE methodology on individual country markets outside the U.S. to develop a medium-term yield forecast measure on an inflation adjusted or real basis for each country. This measure is called the medium-term country yield forecast (CY-M) or Radha's country yield (RCY) and it expresses the medium-term equity performance expectations of a country. It is designed to align each country's weight recommendation divulged by the Global Capital Allocation Model (G-CAM) to its medium-term expectations on an ongoing and incremental basis. In the BGA G-CAF framework, the medium-term is specifically the six-to-ten year timeframe, but for CY-FOREM we use six years. The CY-M measure is used to establish the tranche weights of the G-CAM, and as a by-product fine-tunes each country's portfolio weight to its respective medium-term forecast.

The forecast mechanism draws encouragement from the cyclically adjusted price-to-earnings ratio (CAPE or PE 10) valuation measure recommended by Graham and Dodd (1934), and then developed and popularized by Robert Shiller of Yale (1988, 1998, 2000, and 2001). Shiller's PE 10 is defined as the price of U.S. S&P 500 equity market divided by its trailing 10-year average earnings, all adjusted for inflation. Research in the last two decades has indicated that PE 10 is a reliable predictor of the long-term returns of S&P 500 since 1881 for periods more than 10 years ahead. There has been a recent spate of research on CAPE and its relevance to international markets. Norbert Keimling (2005, 2016) of Star Capital has published a couple of papers in the last decade or so regarding the application of PE 10 in forecasting long-term results in developed countries outside USA and has confirmed its reliability in predicting long-term returns in those markets. Likewise, Joachim Klement (2012) investigating CAPE in both developed and emerging countries arrived at the same conclusion. The biggest takeaway from the paper about PE10, apart from its application to emerging markets, is the finding that its correlation with future real stock market returns is low for very short investment horizons, but averages around .7 for investment horizons of five years or more. Moreover, Klement has applied this finding by utilizing the metric to predict forward real returns of international equity country markets across periods of five years or more and in the process has shown the efficacy of using the metric to predict r eturns over durations shorter than 10 years or more.

BGA implementation of cyclically adjusted country yield (CACY).

BGA, in its empirical research, embraced the thesis that PE 10 can be used to predict future real returns of international equity markets for medium-term horizons, or otherwise, time periods greater than five years and less than ten years. The empirical research conducted by BGA departs from convention and uses EP 10, the inverse of PE 10, as the measure to predict returns of the countries in the MSCI All Country World Index universe, comprised of 23 emerging and 23 developed countries. EP 10 or Cyclically Adjusted Country Yield (CACY, pronounced as Kay-See) is a yield measure which in our view offers an alternative and intuitive perspective of a country's equity potential performance than that offered by PE 10[7], a price multiple. In our research, we

utilized historical monthly earnings yields of the countries from1996 thru February of 2016 to compute their historical cyclically adjusted country yields dating from 2006. In addition, we employ rolling (monthly series) six-year, seven-year, eight-year, and nine-year forward compound annual growth rates (CAGR6, CAGR7, CAGR8, and CAGR9 respectively) of real gross returns in U.S. dollars for each country in the universe[8].

For every country in the universe, each of their multiple forward returns time-series CAGR6, CAGR7, CAGR8, and CAGR9 are regressed separately against their respective EP 10 (CACY) series. Based on our research the rolling six-year CAGR (CAGR6) yielded the best R^2 values for all of the countries, and they are all on display in Exhibit 31. However, in the chart, commodity based countries such as Brazil, Chile, Columbia, Peru and the purely export oriented economy South Korea are very conspicuous for their low R^2 values. In order to improve the influence of EP 10 to forecast CAGR6 for these types of countries, we introduce an additional monthly time-series measure, cyclically adjusted real exchange rate (RER 10), like EP 10 as an explanatory variable to supplement the former's influence in the regressions. The historical real exchange rates used to compute the time-series RER 10 for the countries are expressed in per unit of U.S. dollar. As we can see from the blue bars in Exhibit 31, the variable improves the R^2 values of the country regressions, and by a significant margin for most of those countries that had very low R^2 values in the earlier regressions. The rationale for introducing the cyclically adjusted real exchange rate is intuitive – export oriented economies, both commodity and non-commodity based, are depended on the relative price of their exported goods in the international market. The relative price of an exported good is a function of its native price, and the exporting country's nominal exchange rate as well as its long-run productivity. All these elements are fairly captured in the real exchange rate (RER) of a country.

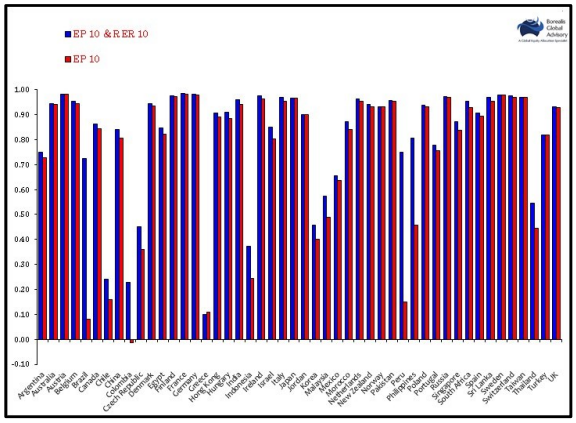


Exhibit 31: R^2 of country regressions regressing CAGR6 with a: EP 10 alone b: EP 10 and RER 10

Source: BGA, MSCI, IMF, Australia Bureau of Statistics, New Zealand Statistics, OECD, and IADB.

Notes: All countries reflected here are countries underlying MSCI's All Country World Index ex USA. Argentina, Jordan, Pakistan, Morocco,
and Sri Lanka are not part of the index anymore. Qatar and UAE have been excluded because of lack of sufficient history. The regressions run through February 2016.

The individual country regressions are the medium-term country yield forecastmodels or for short, CY-M models for the countries and they are formalized generically in the box below using mathematical notations.

[7] Negative, raw or cyclically adjusted, P/E values do not mean anything, and when you invert them, we get negative yield values, which are intuitive for elucidation purposes.

[8] Years six, seven, eight, and nine are considered medium-term horizons in BGA's GCAF.

To be specific, for a given country with the given values of EP 10, RER 10, and CAGRØ at time-period t (outside the sample time-period used to develop the model) and the constants A and B, the CY-M model for the country would generate its CY-M, the forecast compound annual growth rate of real equity returns over the next six years. While Exhibit 32 reflects the regression coefficients and constant of the individual CY-M models, Exhibit 33 features the descriptive statistics of EP 10 or CACY, the main driver of the CY-M models, for all the countries over the time-period 2006 thru February 2016. So far, we have discussed the development of medium-term country yield measure (CY-M), the lynchpin of CY-FOREM.

$$CAGR6_{it} = A_i * EP\ 10_{it} + B_i * RER\ 10_{it} + CAGR\emptyset_i$$

$CAGR6_{it}$ = Compound annual growth rate of real return over the next six years for ith country at time-period t. **In other words, the medium-term country yield forecast (CY-M) for ith country at time-period t.**

$EP\ 10_{it}$ = Trailing 120-month average yield of ith country at time-period t.

$RER\ 10_{it}$ = Trailing 120-month average real exchange rate of ith country at time-period t.

$CAGR\emptyset_i$ = Residual country yield of ith country at time-period t.

A_i = Yield co-efficient of ith country.

B_i = Real exchange rate co-efficient of ith country

n = number of countries in the investment universe

t = time-period, monthly as in end of last trading day of a month

i = ith country, $1 \leq i \leq n$

	A	B	CAGRØ	R^2 with RER10	R^2 without RER10
Argentina	3.31	0.13	**-0.36**	**0.75**	**0.73**
Australia	2.90	0.02	**-0.18**	**0.94**	**0.94**
Austria	1.99	-0.04	**-0.19**	**0.98**	**0.98**
Belgium	2.08	-0.17	**-0.07**	**0.95**	**0.94**
Brazil	0.37	0.39	**-0.36**	**0.72**	**0.08**
Canada	2.46	0.10	**-0.18**	**0.86**	**0.84**
Chile	2.89	0.18	**-0.24**	**0.24**	**0.16**
China	3.43	-0.13	**-0.03**	**0.84**	**0.81**
Colombia	2.04	0.22	**-0.19**	**0.23**	**-0.01**
Czech Republic	1.67	0.17	**-0.25**	**0.45**	**0.36**
Denmark	6.05	-0.12	**-0.06**	**0.94**	**0.94**
Egypt	3.81	0.10	**-0.32**	**0.85**	**0.82**
Finland	2.93	-0.08	**-0.18**	**0.98**	**0.97**
France	3.02	-0.06	**-0.12**	**0.99**	**0.98**
Germany	3.36	-0.06	**-0.11**	**0.98**	**0.98**
Greece	0.43	-0.07	**-0.28**	**0.10**	**0.11**
Hong Kong	3.02	0.08	**-0.24**	**0.91**	**0.89**
Hungary	1.25	0.10	**-0.25**	**0.91**	**0.89**
India	4.48	0.11	**-0.27**	**0.96**	**0.94**
Indonesia	0.77	0.39	**-0.26**	**0.37**	**0.24**
Ireland	1.51	-0.22	**-0.10**	**0.98**	**0.96**
Israel	5.85	0.09	**-0.32**	**0.85**	**0.80**
Italy	2.33	-0.13	**-0.14**	**0.97**	**0.95**
Japan	6.39	0.05	**-0.25**	**0.97**	**0.97**
Jordan	2.11	0.03	**-0.27**	**0.90**	**0.90**
Korea	2.64	-0.15	**0.02**	**0.46**	**0.40**
Malaysia	2.03	0.15	**-0.19**	**0.57**	**0.49**
Mexico	3.11	-0.09	**0.01**	**0.66**	**0.64**
Morocco	4.68	0.17	**-0.39**	**0.87**	**0.84**
Netherlands	2.70	-0.13	**-0.09**	**0.96**	**0.95**
New Zealand	2.95	-0.05	**-0.16**	**0.94**	**0.93**
Norway	1.90	0.04	**-0.16**	**0.93**	**0.93**
Pakistan	1.48	-0.11	**-0.08**	**0.96**	**0.95**
Peru	1.09	1.04	**-0.92**	**0.75**	**0.15**
Philippines	4.93	-0.33	**0.15**	**0.81**	**0.46**
Poland	2.45	-0.05	**-0.14**	**0.94**	**0.93**
Portugal	1.48	-0.08	**-0.16**	**0.78**	**0.76**
Russia	1.23	0.06	**-0.25**	**0.97**	**0.97**
Singapore	2.80	0.14	**-0.28**	**0.87**	**0.84**
South Africa	3.24	0.06	**-0.17**	**0.95**	**0.93**
Spain	2.96	-0.10	**-0.14**	**0.91**	**0.89**
Sri Lanka	1.75	-0.14	**0.01**	**0.97**	**0.95**
Sweden	3.95	-0.02	**-0.13**	**0.98**	**0.98**
Switzerland	3.90	-0.07	**-0.10**	**0.98**	**0.97**
Taiwan	3.35	-0.03	**-0.14**	**0.97**	**0.97**
Thailand	1.48	0.21	**-0.15**	**0.54**	**0.44**
Turkey	2.02	0.03	**-0.14**	**0.82**	**0.82**
UK	2.19	-0.03	**-0.12**	**0.93**	**0.93**

Exhibit 32: Table of coefficients and constants of CY-M country models

Source: BGA calculations, MSCI, IMF, Australia Bureau of Statistics, New Zealand Statistics, OECD, and IADB.

Notes: All countries reflected here are countries underlying MSCI's All Country World Index ex USA. Argentina, Jordan, Pakistan, Morocco, and Sri Lanka are not part of the index anymore. Qatar and UAE have been excluded because of lack of sufficient history. Data runs from December 2005 through February 2016.

	Mean	Median	Standard Deviation	Range	Minimum	Maximum
Australia	5.67%	5.99%	1.21%	4.26%	3.32%	7.58%
Austria	9.00%	10.41%	4.06%	12.31%	2.24%	14.55%
Belgium	9.44%	8.44%	4.10%	16.17%	4.85%	21.02%
Canada	4.73%	5.03%	0.96%	3.22%	3.08%	6.30%
Denmark	3.88%	3.80%	0.96%	4.43%	2.62%	7.05%
Finland	7.57%	7.56%	2.47%	9.12%	3.53%	12.65%
France	6.36%	6.81%	1.68%	6.10%	3.17%	9.27%
Germany	5.66%	5.89%	1.23%	5.91%	3.37%	9.28%
Hong Kong	5.28%	5.26%	0.96%	5.01%	3.21%	8.23%
Ireland	14.57%	12.85%	8.08%	25.66%	5.19%	30.84%
Israel	5.07%	4.64%	1.83%	6.29%	2.48%	8.76%
Italy	9.40%	9.92%	3.29%	12.16%	3.91%	16.07%
Japan	3.84%	4.28%	1.41%	4.96%	1.14%	6.10%
Netherlands	7.55%	7.29%	1.96%	9.04%	5.02%	14.06%
New Zealand	6.87%	6.90%	1.46%	5.07%	4.20%	9.26%
Norway	7.13%	7.80%	2.00%	7.24%	3.52%	10.75%
Portugal	10.04%	9.74%	3.19%	12.20%	5.06%	17.26%
Singapore	6.06%	6.48%	1.62%	6.40%	3.05%	9.45%
Spain	8.04%	8.26%	2.79%	11.96%	3.80%	15.76%
Sweden	5.03%	5.23%	1.09%	5.02%	2.96%	7.98%
Switzerland	4.83%	4.75%	0.96%	4.42%	3.11%	7.53%
UK	7.48%	7.82%	1.26%	5.19%	5.12%	10.31%
USA	4.98%	4.81%	0.94%	4.78%	3.84%	8.61%
Brazil	7.46%	7.25%	2.71%	11.45%	3.53%	14.99%
Chile	3.86%	3.40%	1.22%	4.27%	2.25%	6.52%
China	5.47%	5.75%	1.66%	8.12%	2.12%	10.23%
Colombia	3.33%	2.94%	1.24%	5.30%	1.77%	7.07%
Czech Republic	6.34%	5.97%	3.19%	11.35%	1.99%	13.35%
Egypt	6.51%	7.17%	3.09%	10.98%	1.56%	12.54%
Greece	26.72%	19.51%	22.84%	107.39%	3.94%	111.33%
Hungary	10.50%	11.18%	4.24%	14.58%	3.42%	18.00%
India	4.38%	4.65%	1.13%	4.22%	2.04%	6.26%
Indonesia	3.95%	4.14%	1.22%	5.20%	1.46%	6.66%
Korea	6.30%	6.31%	1.55%	5.64%	3.54%	9.18%
Malaysia	4.67%	4.80%	0.82%	3.43%	2.88%	6.30%
Mexico	4.10%	4.16%	0.74%	3.93%	2.59%	6.51%
Peru	4.69%	3.87%	2.26%	9.44%	1.73%	11.17%
Philippines	4.27%	4.20%	0.66%	3.17%	2.89%	6.06%
Poland	7.39%	7.99%	2.30%	8.58%	3.55%	12.14%
Russia	13.28%	13.77%	5.71%	18.57%	4.12%	22.69%
South Africa	5.06%	5.16%	0.71%	3.37%	3.59%	6.96%
Taiwan	5.25%	5.28%	0.99%	5.53%	3.63%	9.16%
Thailand	4.69%	5.59%	2.12%	6.83%	0.82%	7.65%
Turkey	7.55%	7.40%	1.99%	8.44%	3.93%	12.37%
Argentina	9.91%	6.30%	7.91%	25.75%	1.29%	27.04%
Jordan	7.42%	7.45%	3.50%	11.07%	1.86%	12.92%
Morocco	5.06%	4.37%	1.63%	5.46%	2.65%	8.11%
Pakistan	11.49%	12.07%	4.15%	19.49%	4.30%	23.79%
Sri Lanka	6.87%	5.97%	2.97%	16.82%	3.82%	20.64%

Exhibit 33: Descriptive statistics of EP-10 (CACY) by countries

Source: BGA, MSCI, IMF, Australia Bureau of Statistics, New Zealand Statistics, OECD, and IADB.

Notes: All countries reflected are those underlying MSCI's All Country World Index ex USA. Argentina, Jordan, Pakistan, Morocco, and Sri Lanka are not part of the index anymore. Qatar and UAE have been excluded because of lack of sufficient history. Data runs from December 2005 through February 2016.

Application of CY-M.

Now, let us discuss what the characteristics of CY-M are and what function they perform in CY-FOREM:

1. CY-M is used more as a comparative measure, and less as a specific point-in-time forecast measure, to compare its average forward six-year real returns expectations to that of the other countries in the universe at a given point in time. Therefore, the efficacy of the measure is befitting to be used to rank the countries based on their equity return expectations for the next six years.
2. The rolling monthly CY-M measure of a country is used to assess the monthly trend of average equity-return expectations of that country over six-year periods - that is if the return expectations of a country are rising, declining or flat.
3. By averaging the CY-M measures of the countries in a tranche, we can obtain the CY-M for the overall tranche. Likewise, CY-M can be derived for all the tranches in the G- CAM – Upper Tranche, Middle Tranche, and Lower Tranche.
4. By determining the number of countries in a tranche, which have positive CY-M and are greater in magnitude than the average CY-M of the tranche, we arrive at a diffusion index for the tranche. The index reveals the strength of the positive return expectations at a given point in time. Thereby, BGA would have three diffusions indexes, published monthly, one for each Tranche.

An example will help elucidate the characteristics and functions of CY-M as an element of CY-FOREM and the support it offers to the Global Allocation Framework (CCAF). Take the case of Ireland in Exhibit 34, which plots the CAGR6 returns on two x- axes – bottom x-axis listing the beginnings of forecast horizons, and the top x-axis listing their ends. The vertical grid lines in the chart link together the ends of forecast horizon periods. Any point on the line chart is the real average return forecast for the next six years starting from the date listed on the bottom of the grid line and ending on the date listed on the top of the grid line. You can see the rising trend of CY-M since the middle of June 2006 thru December 2008, which should translate in to Ireland's strong equity performance looking backwards from June 2012 thru December 2014, especially in the immediate years around that period. Even though the trend stalled since December 2008, Ireland remained in the positive territory until December 2011, and we would expect Ireland to deliver positive real returns from 2014 thru 2016. After 2011, Ireland's CY-M has hovered in the negative territory, and therefore, we can expect sub-par returns from Ireland in the next few years. As of June 30, 2016 MSCI Ireland has returned 77.39% on a gross basis in U.S. dollar terms for the trailing five years confirming the prognosis derived from the CY-M measure. To summarize, this chart depicts the rolling forward average equity-performance expectations (over six-year periods) of Ireland on an inflation-adjusted basis, giving the investors a broad strategic cue on allocation to Ireland in their international equity portfolios for the medium-term. This illustrative outline helps frame expectations through CY-M at the country level. Moreover, it aids the reconciliation of the short-term country level expectations, divulged by the periodic G-CAM country allocation recommendations, to the medium-term expectations, delivered by the CY-FOREM through CY-M measures. This reconciliation is one of the elements of active component of BGA's enhanced index approach.

Exhibit 34: Medium-term country yield forecast (CY-M), Ireland

Source: BGA calculations, MSCI, and IMF.

Notes: Data runs through February 2016. The vertical lines indicate the forecast horizons, starting from the dates listed on the bottom x- axis and ending on the dates listed on the top x-axis.

Exhibit 35 reflects each tranche's CY-M. The CY-M of a tranche is the simple average of CY-M of all the countries underlying the tranche and it depicts at a given point in time, the average performance expectations of the countries over the next six years. As you can see in the chart, CY-M of Upper Tranche predicted the robust years of 2012 and 2013 since the debt crises and predicts some poor performing years as we wind down this decade. This illustrative outline of the tranches help frame expectations at the tranche level and it aids establishing the tranche weights, which is a critical input component that feeds into the G-CAM. Establishing the tranche weights is another element of the active component of BGA's enhanced index approach.

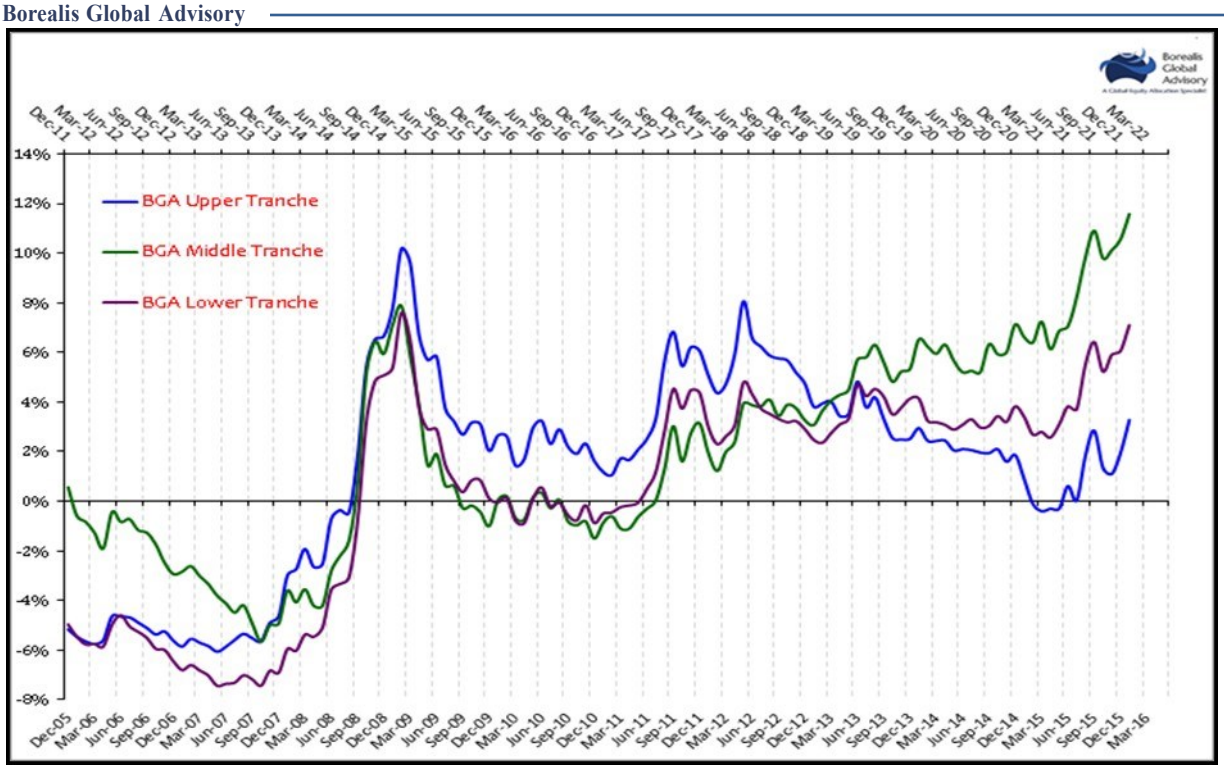


Exhibit 35: Medium-term country yield forecast (CY-M) of Upper Tranche, Middle Tranche, and Lower Tranche

Source: BGA calculations, MSCI, IMF, Australia Bureau of Statistics, New Zealand Statistics, OECD, and IADB. Notes: Data runs through February 2016.

The final step of CY-FOREM is to determine the number of countries within a tranche whose CY-M values are positive and above the CY-M of the tranche, to arrive at a diffusion index for this tranche. This diffusion index emphasizes the strength of the above- average positive return expectations of each tranche over the next six years at a given point in time. As you would expect, CY-FOREM has three diffusion indexes at its disposal, one each for the three of the tranches – Upper Tranche Diffusion Index (UTDI), Middle Tranche Diffusion Index, and Lower Tranche Diffusion Index (LTDI). These indexes are reflected in Exhibits 36, 37, and 38 respectively. Let us take the example of upper tranche chart in Exhibit 36: the purple line is the actual diffusion index and the green line is the 3-month moving average trend of the index. The thick blue line is the trailing 120-months average spread across 10 full calendar years, while the dotted blue lines are +1/-1σ band lines, with σ being the trailing 120-months (non-annualized) volatility of the index spread across 10 full calendar years. If you compare the three exhibits, clearly you can discern that the diffusion indexes did point to a relatively better performance of the Upper Tranche from 2014 thru 2016. Comparative analysis of the diffusion indexes is another mechanism for establishing tranche weights of the G-CAM.

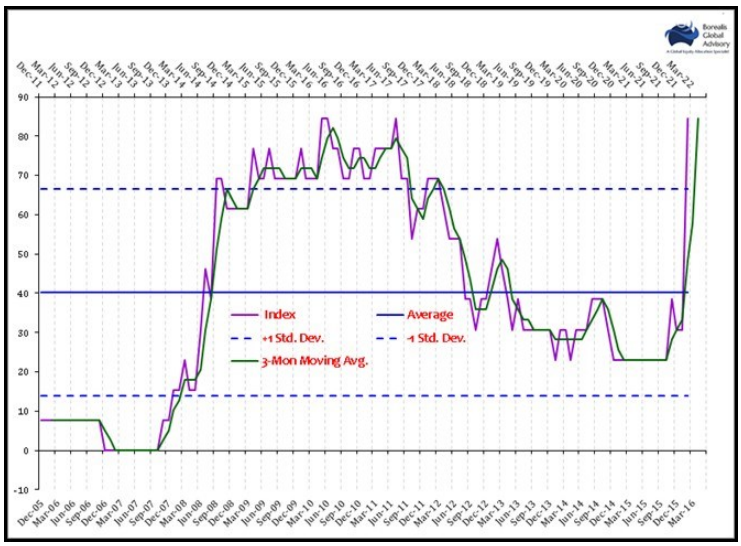


Exhibit 36: Diffusion index, Upper Tranche

Source: BGA calculations, MSCI, IMF, Australia Bureau of Statistics, and OECD.

Notes: Data runs through February 2016.

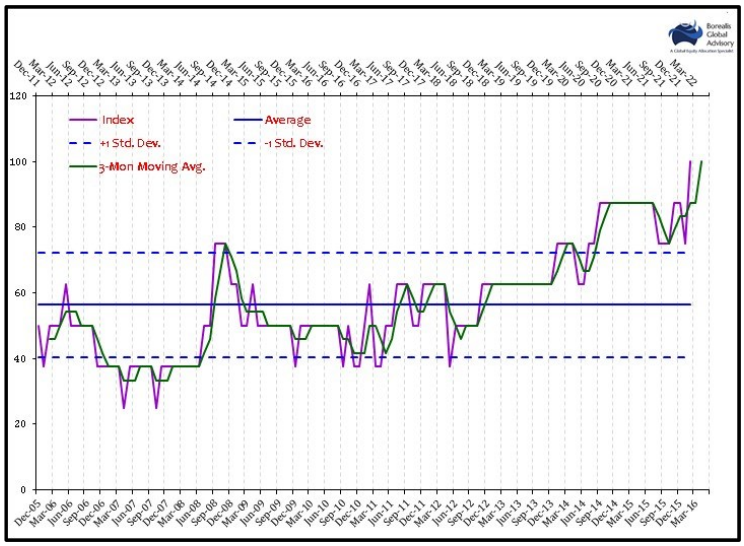


Exhibit 37: Diffusion index, Middle Tranche

Source: BGA calculations, MSCI, IMF, and OECD.

Notes: Data runs through February 2016.

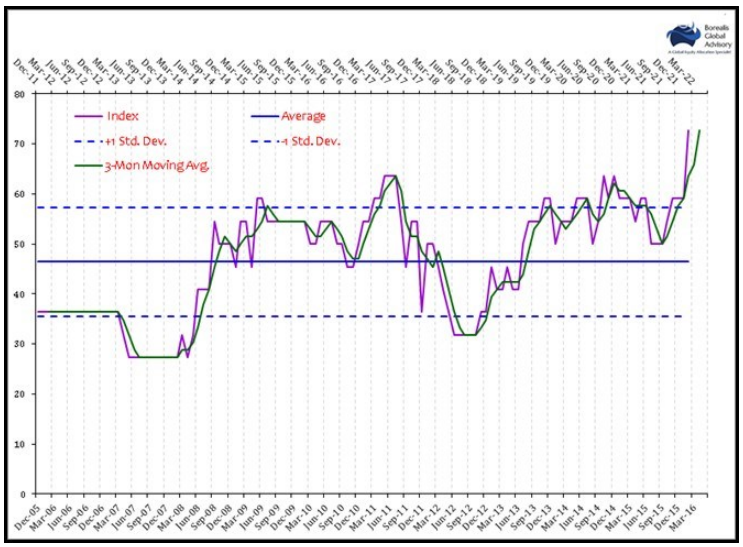


Exhibit 38: Diffusion index, Lower Tranche

Source: BGA, MSCI, IMF, New Zealand Statistics, OECD, and IADB.

Notes: Data runs through February 2016.

Exhibit 39 is a snapshot of the CY-M values of the countries in the G-CAM as of the end of 2015, ranked by their performance expectations over the next six years. As you can see, more countries from the Middle and Lower tranches are in the upper half of the table, pointing decisively to better performance expectations from these tranches in the next six years. The previously mentioned implementations of CY-M and the diffusion indexes, which together form the Country Yield Forecasting Mechanism (CY-FOREM), shape the active component of BGA's enhanced index approach.

As on 12/31/2015	CACY	2016-21 CAGR Forecast Real Returns	2016-21 CAGR Forecast Real Returns %tile	Tranche
Peru	11.2%	32.3%	100%	Lower
Colombia	7.1%	25.1%	97%	Lower
Brazil	14.0%	25.1%	95%	Middle
Indonesia	6.0%	21.1%	92%	Lower
Thailand	7.6%	18.3%	90%	Lower
Chile	6.5%	15.8%	87%	Lower
Egypt	10.0%	14.4%	85%	Lower
China	8.5%	13.6%	82%	Middle
Turkey	11.3%	12.0%	79%	Lower
Israel	6.0%	12.0%	77%	Lower
Malaysia	6.0%	11.7%	74%	Lower
Russia	21.8%	11.0%	72%	Middle
Korea	8.8%	9.8%	69%	Middle
Singapore	8.6%	9.7%	67%	Upper
Canada	6.0%	9.2%	64%	Upper
South Africa	5.3%	8.4%	62%	Middle
Poland	11.7%	8.3%	59%	Lower
India	5.5%	8.2%	56%	Middle
Norway	9.7%	8.1%	54%	Lower
Japan	4.0%	7.4%	51%	Upper
Sweden	5.4%	6.0%	49%	Upper
Mexico	4.8%	5.6%	46%	Middle
Philippines	4.2%	5.1%	44%	Lower
Australia	6.7%	4.1%	41%	Upper
Hong Kong	6.5%	3.7%	38%	Upper
United Kingdom	8.5%	2.8%	36%	Upper
Taiwan	5.8%	2.8%	33%	Middle
Germany	5.8%	1.7%	31%	Upper
Spain	9.3%	0.7%	28%	Upper
Switzerland	4.5%	-0.2%	26%	Upper
France	6.4%	-0.4%	23%	Upper
Austria	11.5%	-1.0%	21%	Lower
Greece	82.9%	-1.1%	18%	Lower
Portugal	15.1%	-2.7%	15%	Lower
New Zealand	6.1%	-3.7%	13%	Lower
Denmark	2.7%	-4.4%	10%	Lower
Italy	9.1%	-8.8%	8%	Upper
Netherlands	5.4%	-10.6%	5%	Upper
Belgium	5.0%	-16.8%	3%	Lower
Ireland	5.5%	-30.4%	0%	Lower

Exhibit 39: Forecast for 2016-21 using CY-M country models sorted by forecast returns

Source: BGA, MSCI, IMF, Australia Bureau of Statistics, New Zealand Statistics, OECD, and IADB.

Notes: All countries in the G-CAM model as of December 2015 have been included. Finland, Hungary, and Czech Republic have been excluded due to lack of availability of single-country ETFs in the market tracking them. Qatar and UAE have been excluded for l

IV. Additional Applications of G-AF

Earlier sections of the paper exclusively covered the construction of G-CAM using the various embodiments of G-CAF, which is a specific implementation of BGA's fundamental framework G-AF. This section is devoted to survey the various additional applications and extensions of the fundamental framework.

Implementing global/international portfolios using sector ETFs. G-AF can be tailored to build a Global Sector Allocation Model (G-SAM) using the Global Sector Allocation Framework (G-SAF) adapted from G-AF. G-SAM could embrace any of the broad-based benchmarks available like MSCI All Country World Index (global universe), MSCI All Country World Index ex USA (international universe), MSCI World Index (international developed universe), MSCI World Index ex USA (international developed ex USA universe), or MSCI Emerging Index (emerging universe). It could adopt regional indexes like MSCI Asia Index, MSCI All Country Asia Index, MSCI Emerging Asia Index, MSCI All Country Europe Index, MSCI Europe Index, or MSCI Emerging Europe Index as well. In this implementation, the number of tranches may be say two: with one tranche holding all the defensive sectors out of the 11 GICS sectors, and the other holding the remaining sectors. The drivers of the sector returns in each tranche would be determined by the Fama- Macbeth OLS method. Thereafter, the Double "Z" methodology would be applied to the sectors in each tranche to rank and select them to attain the global/international sector allocation recommendations. As expected, the Sector Yield Forecasting Mechanism (SY- FOREM) could be employed on the sectors to derive their returns expectations for six years forward. These sector expectations would aid establish the tranche weights.

Implementing emerging portfolio using single-country ETFs. G-CAF, a derivative of G-AF, can be tailored to build an emerging version of the G-CAM. This implementation is an extension of G-CAM and G-CAF. The only departure in this implementation is the way we carve the universe, which in this case is MSCI Emerging Markets Index. Using long-term demographics trends, the universe may be carved into four tranches – LATAM Tranche, Emerging Europe Tranche, Emerging Asia Tranche, and Africa Tranche. The rest of the steps in this version of G-CAM are similar to those identified in Figure 19b.

BGA's fundamental framework, G-AF, could also be used for investing in the following domains using ETFs or individual equities:

i. Size – Large-Cap, Mid-Cap, and Small-Cap over a given broad-based benchmark: global, U.S., international, regional (economic or geographic), or any country in the MSCI universe.
ii. Style – Value and Growth over a given broad-based benchmark: global, U.S., international, regional (economic or geographic), or any country in the MSCI universe.
iii. Size-style – Large-Cap Value, Large-Cap Growth, Mid-Cap Value, Mid-Cap Growth, Small-Cap Value, and Small-Cap Growth over a given broad-based benchmark: global, U.S., international, regional (economic or geographic), or any country in the MSCI universe.
iv. Sectors –GICS sectors over a given broad-based benchmark: global, U.S., international, regional (economic or geographic), or any country in the MSCI universe.
v. Economic regions – of the MSCI universe developed, emerging, and frontier.
vi. Geographic regions – of the MSCI universe North America, South America, Europe, Africa, Asia, and Oceania.

Appendix I
Double "Z" Methodology

p = number of factors

n = number of countries

t = time-period, monthly as in end of last trading day of a month

i = ith BGA factor, $1 \leq i \leq p$

c = cth country in the BGA Universe, $2 \leq c \leq n$

w_i = weight of the ith BGA factor, $0 \leq w_i \leq 1$

rw = risk-adjustment weight

(t) = ith BGA factor raw value for the cth country in the BGA universe at time-period t

$\bar{F}(t)$ = average of the ith BGA factor raw values at time-period t across all the countries in the BGA universe, and is defined as:

$$\bar{F}(t) = \frac{\sum_{c=1}^{n} Fic(t)}{n} \quad \forall\, i = 1\ thru\ p$$

FSD_i (t) = standard deviation of the ith BGA factor raw values at time-period t across all the countries in the BGA universe, and is defined as:

$$FSD_i\ (\mathrm{t}) = \sqrt{\frac{\sum_{c=1}^{n} (Fic(t) - \bar{F}i(t))2}{n-1}} \quad \forall\, i = 1\ thru\ p$$

FZ_{ic} (t) = Z-Score of the ith BGA factor raw value for the cth country in the BGA universe at timeperiod t is defined as:

$$FZ_{ic}\ (\mathrm{t}) = \frac{Fic(t) - \bar{F}_i(t))}{FSD_i\ (t)} \quad \forall\, i = 1\ thru\ p, c = 1\ thru\ n$$

$CZ_c\ (t)$ = country Z-Score for the cth country in the BGA Universe at time-period t is defined as:

$$(t) = \sum_{i=1}^{p} wi\ FZic\ (t)\ \forall\, c = 1\ thru\ n$$

Sum of the weights all the BGA factors should add up to 1.

$$\sum_{i=1}^{p} w_i = 1$$

$\overline{CZ}(t)$ = mean of the country Z-Scores in the BGA Universe at time-period t is defined as:

$$\overline{CZ}\ (t) = \frac{\sum_{c=1}^{n} CZc\ (t)}{n}$$

$CZS(t)$ = standard deviation of the country Z-Scores in the BGA Universe at time-period t is defined as:

$$CZSD(t) = \sqrt{\frac{\sum_{c=1}^{n} (CZc(t) - \overline{CZ}(t))2}{n-1}}$$

OCZ_c (t) = overall country Z-Score of the cth country in the BGA Universe at time-period t is:

$$OCZ_c \text{ (t)} = \frac{CZc(t) - \overline{CZ}(t)}{CZSD(t)} \forall\ c = 1\ thru\ n$$

V_c (t) = volatility for the cth country in the BGA Universe at time-period t

$\bar{V}(t)$ = average of the volatility values at time-period t across all the countries in the BGA Universe and is defined as:

$$\bar{V}(t) = \frac{\sum_{c=1}^{n} Vc(t)}{n}$$

$VS(t)$ = standard deviation of volatility values at time-period t across all the countries in the BGA universe, and is defined as:

$$VSD(t) = \sqrt{\frac{\sum_{c=1}^{n} (Vc(t) - \bar{V}(t))2}{n-1}}$$

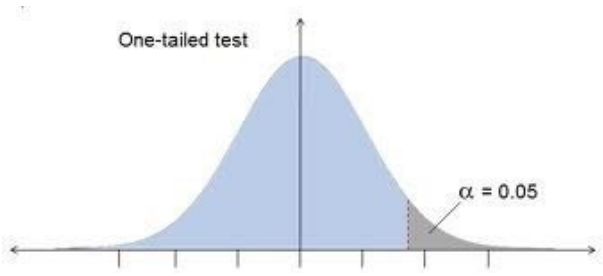
VZ(t) = volatility Z-Score of the cth country in the BGA Universe at time-period t is:

$$VZ_c \text{ (t)} = \frac{Vc(t) - \bar{V}(t)}{VSD(t)} \forall\ c = 1\ thru\ n$$

RCZ(t) = overall risk-adjusted country Z-Score of the cth country in the BGA Universe at time period t is:

$$RCZ_c(t) = rw \times VZ_c(t) + (1 - rw) \times OCZ(\text{t}) \forall\ c = 1\ thru\ n$$

PS(t) = probability score of the cth country in the BGA Universe at time-period t when its overall risk-adjusted country Z-Score at time-period t is mapped on to a normal distribution curve in addition, is the area under normal distribution pertaining to a single-tailed test – the Blue area to the left in the chart below:



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General assumptions include: Borealis Global Advisory LLC., would have been able to purchase the securities recommended by the G-CAM Model and the markets were sufficiently liquid to permit all trading. Changes in these assumptions may have a material impact on the Backtested returns presented. Certain assumptions, including quarterly rebalancing, have been made for modeling purposes and are unlikely to be realized. No representations and warranties are made as to the reasonableness of the assumptions. This information is provided for illustrative purposes only.. Backtested performance is developed with the benefit of hindsight and has inherent limitations. Specifically, in the backtested results, BGA figures include assumed Advisor fees, platform and trading costs totaling 1.37% each year, they do not include the impact of dividends that may be payable for securities held. Results do not reflect other effects which may impact the decision making process such as material economic and market factors. Since trades have not actually been executed, results may have under– or over– compensated for the impact, if any, of certain market factors, such as lack of liquidity, and may not reflect the impact that certain economic or market factors may have had on the decision-making process. Further, backtesting allows the security selection methodology to be adjusted until past returns are maximized. Actual performance may differ significantly from backtested performance. No cash balance or cash flow is included in the calculation.

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