Passive Insights

Equal Weighted Portfolios of ETFs

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Authors:
Vincent Denoiseux
Vincent.Denoiseux@db.com

Pierre Debru
Pierre.Debru@db.com

Bhavesh Warlyani
Bhavesh.Warlyani@db.com

Vivek Dinni
Vivek.Dinni@db.com

Deutsche Bank AG,
Deutsche Asset
& Wealth Management
London Branch
105/108 Old Broad Street
Pinners Hall
EC2N 1EN
London, United Kingdom

www.deutscheawm.com

Content

Executive Summary

Over the last few years, equal-weighted strategies have been increasingly seen as an alternative to market-cap-weighted portfolios.

In particular, investors invest in them for their perceived better diversification and lower volatility, and past performance has shown this is a sensible approach.

However, when contemplating large portfolios or less liquid investment universes like Emerging Markets, such strategies may exhibit execution constraints related to liquidity. Equal weights indeed mean that small cap (and hence less liquid) stocks get the same weights as big caps (and hence more liquid) stocks and would typically demonstrate a higher turnover compared to traditional market-cap-weighted indices.

In this paper, we revisit the construction of equal-weighted portfolios using sector or country Emerging Markets (EM) ETFs as a way to try to circumvent some of the issues related to execution with single stock-based portfolios.

- The investment universe we are contemplating is made of Emerging Countries.
- We focus on two particular strategies:
  - Equal Weight by Country: 18 EM Country indices.
  - Equal Weight by Sector: 10 EM Sector indices.

Our analysis concludes that:

- Compared with traditional Emerging Markets benchmarks, results show a better risk-return profile of the Equal-Weighted Portfolios on the basis of simulated results.
- Sector-based and country-based equal-weight portfolios exhibit similar (and sometimes even better) risk return profiles as compared to single stock based equal weight portfolios.

— Results indeed show that the ETF-based EM Equal Weighted Countries Portfolio would have demonstrated on a simulated basis a Sharpe Ratio of 0.78 versus 0.48 for the MSCI EM Index and a CAGR of 15.6% versus 11.5% for the MSCI EM Index[1].
— Furthermore, results show that the ETF-based EM Equal Weighted Sectors Portfolio would have demonstrated on a simulated basis a Sharpe Ratio of 0.58 versus 0.48 for MSCI EM Index and a CAGR of 12.3% versus 11.5% for the MSCI EM Index[1].

1 Introduction

Following client demand, we investigated several ways to improve the risk-return profile of a passive investment in Emerging Market Equities using ETFs.
In a paper published in the Journal of Index Investing ("Smart Beta: Building Low Volatility Portfolios of ETFs", Summer 2014), we looked at building Low Volatility Portfolios (for Developed and Emerging Markets) and demonstrated how to directly use Country and Sector ETFs – instead of single stocks – to try to improve the risk-adjusted returns of Equity portfolios. We now complement this analysis to equal-weighted strategies using ETFs.
Compared to a market-cap-weighted index like MSCI Emerging Markets index which would weight its constituents on the basis of their free float-adjusted capitalisation, a typical Equal-Weighted Portfolio would assign the same weights to each of the hundreds of single stocks belonging to the index.
Previous analysis and studies have demonstrated a series or benefits and challenges for equal weighted Emerging Markets indices using single stocks. Most of these challenges tend to be magnified in Emerging Markets.

1.1 Potential benefits of implementing Equal-Weighted Strategies in Emerging Markets with single stocks

— Better diversification: as equal-weight indices invest the same weight in each stock, the firms' capitalization does not affect the country weights, only the numbers of firms determine its weights in the index. Therefore countries which are well diversified will be overweighed. The same is true for sectors.
— Lower Volatility: some countries/sectors which demonstrate a high weight in the market cap EM benchmarks demonstrate a higher volatility compared with the median volatility. Relocating weights to the remaining countries/sectors can lead to a decrease in the overall volatility of the portfolio.

[1] *Please note that the performance data shown for the ETF based Equal-Weighted Portfolio is simulated and has been calculated based on the historical performance of indices used as proxies for ETFs selected according to the methodology described in the paper. These Portfolio's simulated returns do not represent historical returns of any actual product or portfolio issued or managed in the past. In simulating the past performance of this hypothetical portfolio, an estimated annual rebalancing cost further specified in page 3 was assumed.*

— Value and Small Cap Tilt: investing equally in all stocks increases the weights of stocks with a smaller market capitalization and hence is usually deemed to allow the extraction of some small cap / value premium.
— Increased returns: equal-weight indices require periodic rebalancing to maintain equal weights, which is a contrarian strategy that can exploit reversal and idiosyncratic volatility of the stock returns.

1.2 Potential challenges in implementing Equal Weighted Strategy in Emerging Markets

— Higher turnover: periodical rebalancing of the portfolio may significantly increase the turnover which translates in higher transaction costs especially with regards to Emerging Markets.
— Liquidity and execution: EM countries are heterogeneous. From one country to another, there is a marked difference in terms of free-float capitalization and daily volumes of all stocks. Hence, implementing an equal weight strategy can prove very challenging in terms of execution.

1.3 Case for using ETFs to build Equal Weighted Indices

As per the above, there seems to be a relatively strong case in using ETFs to build equal weight indices instead of investing in single stock based portfolios. Allocation into sectors and countries rather than single stocks demonstrates similar benefits as its single stock equivalent while providing additional interesting features:
— Accessibility through relatively cheap and liquid ETFs,
— Straightforward, easy to monitor portfolios of 20 to 25 ETFs (as compared with hundreds of stocks),
— Last but not least, such strategies demonstrate similar risk-return profiles to common single stock-based equal-weight strategies.

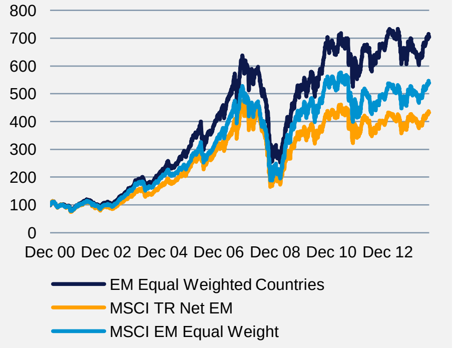
In the implementation of this strategy we give preference to physical ETFs and then use synthetic ETFs when no physical ETF is available for a particular index. Further, if a physical ETF of a country's index is unavailable but the same is available for the capped version of that country's index, the physical ETF of the capped version of that index is used.

2 ETFs Mapping

As per its wide use in the industry and the large availability of its country and sectors indices as ETFs, we used MSCI as a reference for the region/country/sector mapping. In particular we concentrated on the universe represented in the MSCI Emerging Market Index ("EM Index").

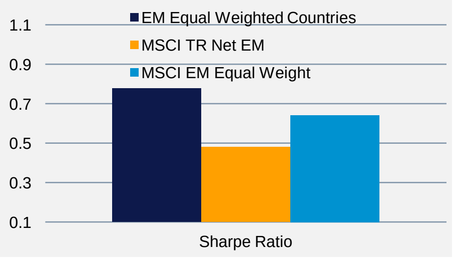
Hereafter, we look at the available country and sector indices in an ETF format. We mapped the country and sector indices to the available ETFs (we only retained ETFs with an available USD share class) in Europe and globally. For some countries the only available ETF provides exposure to a specific – capped/investible – version of the relevant Index. For the few countries where no country ETF is available, we disregarded the country in the following analysis. Please refer to the Appendix to see the results of this Country and Sector mapping.

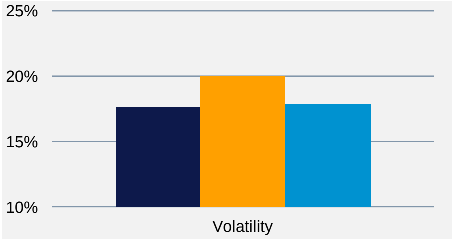
Historical Performance of the EM Equal-Weighted Countries 1



	EM Equal Weighted Countries	MSCI TR Net EM	MSCI EM Equal Weight
Returns	15.6%	11.5%	13.3%
Volatility	17.6%	20.0%	17.8%
Sharpe Ratio	0.78	0.48	0.64
Max Draw Down	60.5%	65.2%	64.5%

Sharpe Ratio and Volatility of EM Equal Weighted Countries Index 2





3 Equal-Weighted Portfolios: Main Results

3.1 Introduction

As per its name, an equal-weighted strategy assigns equal weight to all of its constituents as of each rebalancing date.
An issue we were faced with is the relatively short track-record for some of the ETFs contemplated for inclusion in the Portfolio. To overcome this issue we adopted the following approach: we approximated the ETF's returns where historical data was missing for the entire observation period by relying on the historical value of the ETF's benchmark and deducting from the benchmark performance an hypothetical index replication cost – in line with the Total Expense Ratio (TER) of the relevant ETF as well as an estimated portfolio rebalancing cost determined as described hereafter.

3.2 Emerging Markets Equal-Weighted Countries

The list of countries belonging to the Emerging Markets universe is reviewed on a quarterly basis. In the simulations below we have followed the inclusion and exclusion of the countries in that universe. Over the whole period, we have considered the following 18 emerging market countries:

Universe of Emerging Countries: Brazil, Chile, China, Colombia, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, South Africa, South Korea, Taiwan, Thailand and Turkey.

The simulations left are based on a semi-annual rebalancing and a transaction cost of 0.20%[2] is applied during rebalancing. Historical simulation period is from Dec 2000 to June 2014.

Simulated Results[3]

The historical simulation (Figure 1) shows a consistant outperformance of the EM Equal-Weighted Countries Portfolio versus the MSCI Emerging Markets Index as well as the MSCI Emerging Market Equal-Weight Index.

In order to adequately judge the benefits of this strategy, it is probably more relevant to compare the risk-adjusted return (compared to raw returns) obtained vs. benchmark indices.

Figure 2 shows a significantly better Sharpe ratio as well as a significantly lowered volatility above[4] for the EM Equal-Weighted Countries Portfolio compared to the MSCI EM Indices.

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[2] This is a deemed to be a conservative estimate of the cost of rebalancing the basket taking into account the average bid ask on each ETFs (observed as of July 2014) as well as their average weights in the portfolio.
[3] Source: Deutsche Bank, Bloomberg based on simulations performed on an observation window ranging from Dec 2000 to June 2014. Past Performance, actual or simulated, is not indicative of future results.
[4] Source: Deutsche Bank, Bloomberg. Sharpe ratio and volatility for the period: Dec 2000 to Jun 2014

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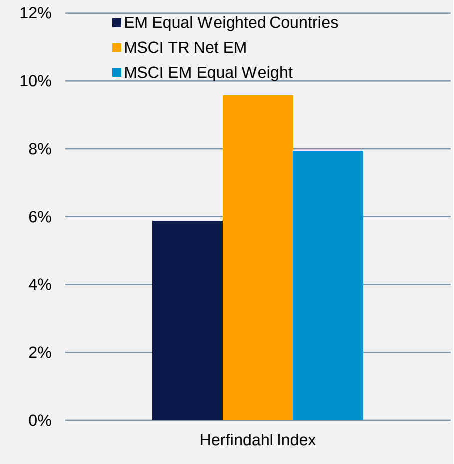
Herfindahl Index of the EM Equal Weighted Countries Strategy vs. MSCI EM indices 4



Countries volatility and Weight in Emerging Markets 5

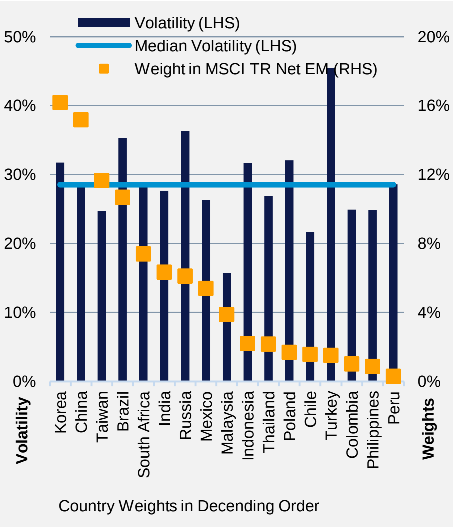


Figure 3[5] shows the country allocation in the portfolio and in MSCI Emerging Markets Index. Country diversification is indeed significantly increased compared to the MSCI EM Index but also compared to the MSCI Equal Weight Index.

Country-wise allocation of the EM Equal Weighted Countries Strategy vs. MSCI EM indices 3

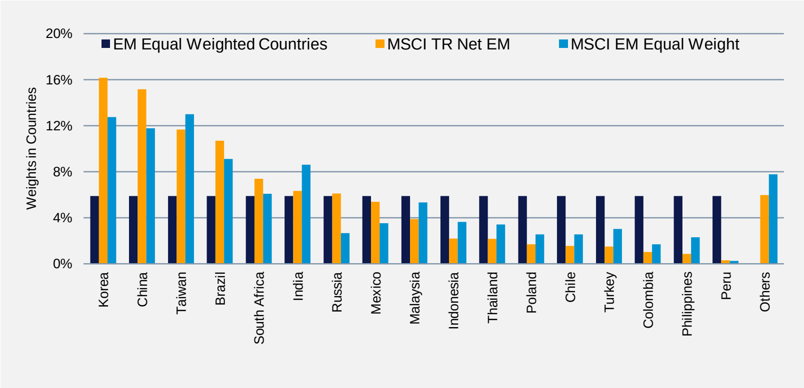


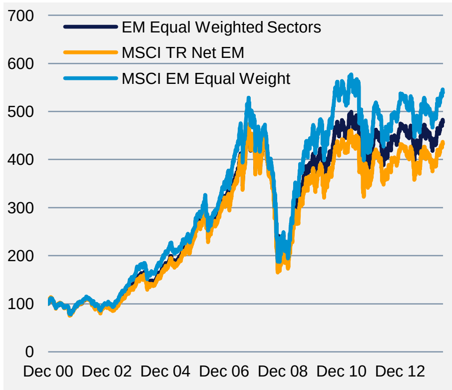
Figure 4[5] illustrates this increased country diversification using the Herfindahl index of the EM Equal-Weighted Countries Strategy and the MSCI EM Indexes. Herfindahl index is a measure of diversification, lower value depicting higher diversification. Furthermore, the MSCI TR Net EM index and MSCI EM Equal Weight index have a high country concentration risk as the first five countries in these indices weigh more than 60% and 55% respectively compared to 25% for the EM Equal Weighted Countries strategy.

Figure 5[6] illustrates that, by using an equal weighted approach, high volatility countries such as Korea and Brazil get a lower weight which subsequently lowers the volatility of the index.

[5] The results presented here are as of 31st Dec 2013 (last rebalancing date in the simulation). Source Deutsche Bank, Bloomberg.

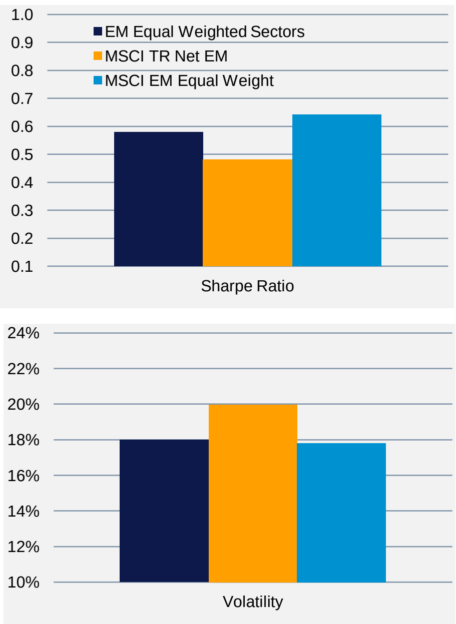
[6] Source: Deutsche Bank, Bloomberg. Realized Volatility using daily returns for the period: Dec 2000 to June 2014. Median Volatility is calculated using the volatility of the ten MSCI EM sector indices.

Historical Performance of the EM Equal-Weighted Sector Portfolio 6



	EM Equal Weighted Sectors	MSCI TR Net EM	MSCI EM Equal Weight
Returns	12.3%	11.5%	13.3%
Volatility	18.0%	20.0%	17.8%
Sharpe Ratio	0.58	0.48	0.64
Max Draw Down	59.9%	65.2%	64.5%

Sharpe Ratio and Volatility of EM Equal Weighted Sectors Index 7



3.3 Emerging Market Equal Weighted Sectors

In the universe we considered the following 10 emerging market sector indices:

Universe of Emerging Market Sectors: EM Consumer Discretionary, EM Consumer Staples, EM Energy, EM Financials, EM Healthcare, EM Industrials, EM Information and Technology, EM, Materials, EM Telecom and EM Utilities

The simulations below are based on semi-annual rebalancing and a transaction cost of 0.20%[7] is applied during rebalancing. Historical simulation period is from Dec 2000 to June 2014.

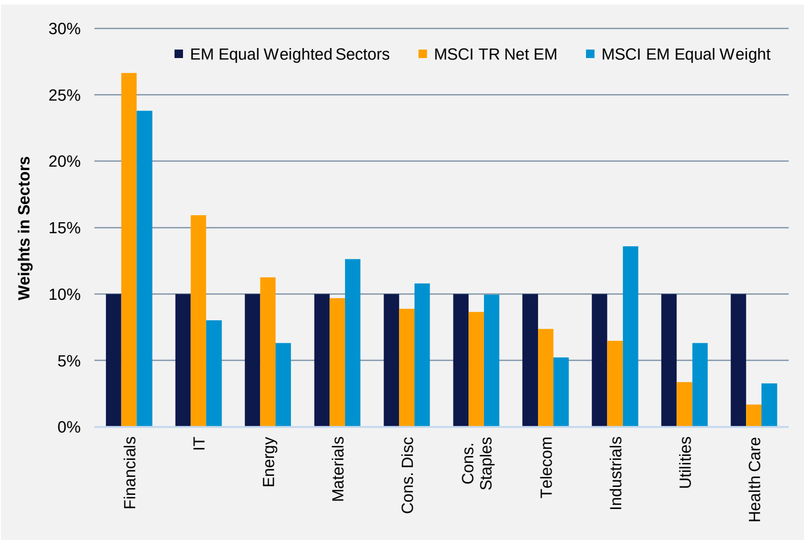
Simulated Results[8]

The historical simulation (Figure 6) shows an outperformance of the EM Equal-Weighted Sector Portfolio versus the MSCI Emerging Markets Index.

Figure 7[9] shows a significantly better Sharpe ratio as well as a lowered volatility for the EM Equal Weighted Sectors Portfolio compared to the MSCI EM Index. However, the MSCI EM Equal weight Index still demonstrates a slightly better Sharpe ratio.

Figure 8[10] shows the sector-wise allocation in the portfolio and in the MSCI Emerging Markets Index

Country-wise allocation of the EM Equal Weighted Sectors Strategy vs. MSCI EM indices 8



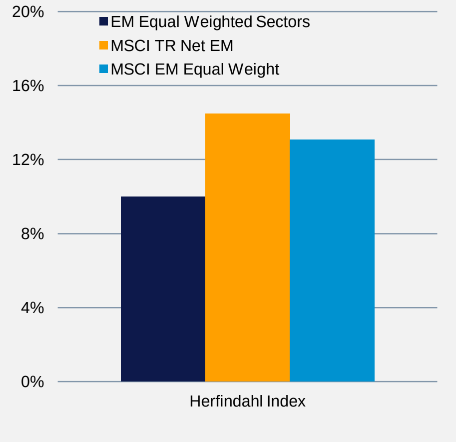
[7] Source: Deutsche Bank, Bloomberg. Realized Volatility using daily returns for the period: Dec 2000 to June 2014. Median Volatility is calculated using the volatility of the ten MSCI EM sector indices.

[8] Source: Deutsche Bank, Bloomberg based on simulations performed on an observation window ranging from Dec 2000 to June 2014. Past Performance, actual or simulated, is not indicative of future results.

[9] Source: Deutsche Bank, Bloomberg. Sharpe ratio and volatility for the period: Dec 2000 to Jun 2014

[10] The results presented here are as of 31st Dec 2013 (last rebalancing date in the simulation). Source Deutsche Bank, Bloomberg.

Herfindahl Index of the EM Equal Weighted Sectors Strategy vs. MSCI EM indices 9



Sectors Volatility and Weigths in Emerging Markets 10

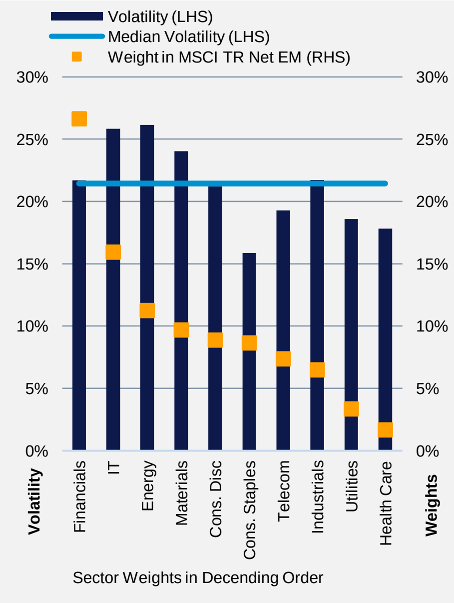


Figure 9[11] illustrates the increased sector diversification using the Herfindahl index of the EM Equal Weighted Countries Strategy and the MSCI EM Indexes. Herfindahl index is a measure of diversification, lower value depicting higher diversification. Furthermore, the MSCI TR Net EM index and MSCI EM Equal Weight index have a high sector concentration risk as the first five sectors in these indices weigh more than 70% compared to 50% for the EM Equal Weighted Countries strategy. Also the financial sector weights about 25% in both these indices versus 10% in the Strategy.

Figure 10[12] illustrates that, by using an equal-weighted approach, high volatility sectors such as IT and Energy get a lower weight which subsequently lowers the volatility of the index.

4 Conclusions

In this paper, we went through the analysis of an equal-weighted strategy using ETFs. Results of this analysis have indicated that:

— Equal Weight Indices using Country and Sector ETFs instead of single stocks exhibit improved risk-return Profiles and demonstrate numerous advantages in term of liquidity, cost and ease of implementation when compared to other implementations.

— Physical ETFs are increasingly available in the market across regions and can be used to create portfolios which demonstrate higher risk-adjusted return compared to traditional market cap weighted indices.

5 Bibliography

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Plyakha, Y., U. Raman, and G. Vilkov, “Why Does an Equal-Weighted Portfolio Outperform Value- and Price-Weighted Portfolios”, Working Paper.

[11] *The results presented here are as of 31st Dec 2013 (last rebalancing date in the simulation). Source Deutsche Bank, Bloomberg.*
[12] *The results presented here are as of 31st Dec 2013 (last rebalancing date in the simulation). Source Deutsche Bank, Bloomberg.*

Appendix: Sector and Country ETF Mapping

Emerging Markets – Sectors

Deutsche AWM's ETF range provides full coverage of both Developed and Emerging Markets Sectors as synthetically replicated ETFs. To our knowledge, and as far as physical ETFs are concerned, there is no physical ETF providing exposure to all the MSCI Emerging Market Sectors.

	Physical ETFs		Swap based ETFs	
	Global ex Europe	Europe	Global ex Europe	Europe
EM CONSUMER DISCRETIONARY	✓			✓
EM CONSUMER STAPLES				✓
EM ENERGY	✓			✓
EM FINANCIALS	✓			✓
EM HEALTH CARE				✓
EM INDUSTRIALS				✓
EM INFORMATION TECHNOLOGY				✓
EM MATERIALS	✓			✓
EM TELECOMMUNICATION SERVICES				✓
EM UTILITIES				✓

Emerging Markets – Countries

The EM Country indices which are not represented through ETFs (Specific capped Index or not) are Czech Republic, Egypt, Greece and Hungary. Further, as the reclassification of UAE and Qatar from frontier market countries to EM countries will be effective from 02-Jun-2004, they are not included in the index[13].

In a physical replication format, most of these ETFs are available both in the US and in Europe thanks in particular to DB which has started to shift its ETFs from derivative based to Stock based (for example, Brazil, China, Korea, Malaysia, Mexico, Philippines, Taiwan and Thailand in May 2014).

	Physical ETFs		Swap based ETFs	
	Global ex Europe	Europe	Global ex Europe	Europe
BRAZIL		✓		✓
BRAZIL CAPPED	✓			
CHILE		✓		✓
CHILE CAPPED	✓			
CHINA	✓			✓
COLOMBIA CAPPED	✓			
CZECH REPUBLIC				
EGYPT				
GREECE				
HUNGARY				
INDIA	✓			✓
INDONESIA	✓	✓		✓
KOREA	✓	✓		✓
MALAYSIA	✓	✓		✓
MEXICO		✓		✓
MEXICO CAPPED	✓			
PAKISTAN	✓			
PERU CAPPED	✓			✓
PHILIPPINES		✓		
POLAND	✓			
POLAND CAPPED	✓			
RUSSIA CAPPED	✓	✓		✓
SOUTH AFRICA	✓	✓		
TAIWAN	✓	✓		✓
THAILAND				✓
THAILAND CAPPED	✓			
TURKEY	✓	✓		

All the results shown below are obtained using only Indices that are available through physical ETFs globally only, except for Pakistan for which synthetic ETF is used.

[13] Source: MSCI 2013 Market Classification

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Source: Deutsche Bank unless otherwise specified in the document. Opinions included herein are those of Passive Asset Management at the time of publication and may change without notice. There can be no assurance that the future performance of the strategies discussed herein will reflect their simulated past performance.

RISK FACTORS FOR ETFs:

- ETFs are not capital protected, therefore investors should be prepared and able to sustain losses up to the total loss of the capital invested.
- The value of an investment in ETFs may go down as well as up and past performance is not a reliable indicator of future performance.
- Investment in ETFs involve numerous risks including among others, general market risks relating to the relevant underlying index, credit risks of the counterparties used by ETFs when entering into OTC derivative transactions, including credit risks on the provider of index swaps utilized in the case of swap-based ETFs, exchange rate risks, interest rate risks, inflationary risks, liquidity risks and legal and regulatory risks.
- ETFs shares may be denominated in a currency different to that of the traded currency on the stock exchange in which case exchange rate fluctuations may have a negative effect on the returns of the ETF. The value of any investment involving exposure to foreign currencies can be affected by exchange rate movements.
- There may be tracking difference between the ETF and the underlying index due to the impact of annual fund management fees. The returns on the ETF may not be directly comparable to the returns achieved by direct investment in the underlying assets of the ETF or the underlying index.
- Shares purchased on the secondary market cannot usually be sold directly back to the ETF. Investors must buy and sell shares on a secondary market with the assistance of an intermediary (e.g. a stockbroker) and may incur fees for doing so. In addition, investors may pay more than the current net asset value when buying shares and may receive less than the current net asset value when selling them.
- The price of ETFs traded on the secondary market will depend, on market supply and demand, movements in the value of the ETFs as well as other factors such as prevailing financial market, corporate, economic and political conditions. However, in certain abnormal market conditions liquidity may be affected.
- Tax treatment ETFs depends on the individual circumstances of each investor. The levels and bases of, and any applicable relief from, taxation can change.
- DB Affiliates significant holdings: Investors should be aware that Deutsche Bank or its affiliates ("DB Affiliates") may from time to time own interests in any individual db X-trackers UCITS ETF which may represent a significant amount or proportion of the overall investor holdings in the relevant db X-trackers UCITS ETF. Investors should consider what possible impact such holdings by DB Affiliates may have on them. For example, DB Affiliates may like any other Shareholder ask for the redemption of all or part of their Shares of any Class of the relevant db X-trackers UCITS ETF in accordance with the provisions of this Prospectus which could result in (a) a reduction in the Net Asset Value of the relevant db X-trackers UCITS ETF to below the Minimum Net Asset Value which might result in the Board of Directors deciding to close the db X-trackers UCITS ETF and compulsorily redeem all the Shares relating to the db X-trackers UCITS ETF or (b) an increase in the holding proportion of the other Shareholders in the db X-trackers UCITS ETF beyond those allowed by laws or internal guidelines applicable to such Shareholder
- For further information regarding risk factors, please refer to the risk factors section of the prospectus, or the Key Investor Information Document of the relevant ETF you are considering investing in.
- Please consult your financial advisor before you invest in an ETF since not all ETFs are suitable for all investors.