On the Performance of Active Emerging Markets Funds

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Abstract

In this thesis the performance of Emerging Markets equity funds is investigated. The research uses the returns of nine Robeco Emerging Markets funds between February 1994 and May 2017. The returns of these funds are compared with the chosen benchmark by Robeco, four alternative indices and the four-factor model of Carhart. After regressing the returns of the funds on these indices, it is observed that most of the funds are able to replicate the returns of the indices with only a mild tracking error. Naturally, the objective of Robeco, being an active asset manager, is to achieve outperformance apart from index replication. The results show that some of the funds are indeed able to deliver significant outperformance with respect to the various indices. When regressing the fund returns on the Carhart four-factor model, it can be seen that a large proportion of the variance in fund returns can be explained by common market anomalies. At least for the Quant funds, this can be expected given the 'factor-based' investment philosophy of Robeco. In conclusion, most of the active Emerging Markets funds show good risk-adjusted returns, with some funds achieving significant outperformance with respect to the tracked benchmark over the investigated samples. Given the recent popularity of passive investment solutions, this thesis provides evidence that the Emerging Markets funds of Robeco can provide a competitive advantage before costs. It remains an open question whether this conclusion also holds when transaction costs are taken into account.

Contents

Section 1: Introduction

After five bad years for investors in emerging markets, equities are finally becoming attractive again (Bhanu & et al, 2016). Emerging Market Equities are currently achieving better results than the MSCI World index, outperforming the developed markets every quarter. Another trend that is happening, is that investors are focussing more on passive investment solutions like ETFs, opposed to the active funds under control of asset managers (Bhanu & et al, 2016). This movement is seen worldwide, putting pressure on asset managers to deliver outperformance. With this competitive environment it is important for asset managers to realize good performances in combination with low risk for their clients. Active funds are also more expensive than passive funds, which puts even more pressure on asset managers to outperform the benchmark in order to justify their higher costs.

In this thesis, I want to research if active Emerging Markets funds realize outperformance against the chosen benchmark, several indices and the four-factor model of Carhart. From now on, the terms 'alpha' and 'outperformance' are used interchangeably. The research question of this thesis is as follows:

Do Robeco Emerging Markets funds provide significant alpha?

To investigate the research question I test three hypotheses. The three hypotheses are created to subdivide the research question in different subareas. After the three hypotheses are investigated, the conclusion of this thesis combines the results in order to answer the main research question.

Hypothesis 1
H_0: There is no positive alpha of the Emerging Markets funds against the indices
H_1: There is a positive alpha of the Emerging Markets funds against the indices

First the Emerging Markets funds are compared with four different indices. The four indices for comparing with the Emerging Markets funds are: the benchmark that Robeco choses for a fund, MSCI Emerging Markets IMI Index, MSCI World Index and the MSCI Emerging Markets Index. The introduction and explanation of these indices can be found in section 3. The methodology used to investigate the alpha of the funds against the four indices is explained in section 4.

Hypothesis 2
H_0: There is no positive alpha of the Emerging Markets funds against the four-factor model of Carhart
H_1: There is a positive alpha of the Emerging Markets funds against the four-factor model of Carhart

Secondly, the Emerging Markets funds are investigated to find if there is a significant positive alpha against the four-factors of the Carhart Model (Carhart, 1997). The Carhart Model is a well-known factor model in the finance industry. The four-factors are: the market factor, the book-to-market factor (HML), the size factor (SMB) and the momentum factor (UMD). The Carhart four-factor model is further explained in section 3.

Hypothesis 3
H_0: Generally, there is no positive alpha of the Emerging Markets funds
H_1: Generally, there is a positive alpha of the Emerging Markets funds

In order to answer the main research question, all the results from the first two hypotheses are analysed together and discussed to see if there is significant outperformance of the Emerging Markets funds against the several indices and factors.

The remainder of this thesis is organized as follows: section 2 is the theoretical framework describing the relating literature and theoretical background of this study. The third section is about the dataset of this thesis. Section 4 is the empirical framework, this section explain the methodology used in this thesis to research the performance of the Emerging Markets funds. Section 5 is the section where results are discussed based on their significance and implications. Finally, section 6 concludes the thesis.

Section 2: Theoretical framework

In the first section it appears that the focus of this thesis is on emerging markets. These markets are progressing to become developed markets, but have a lack of market efficiency and regulations. Investors are interested in investing in the emerging markets because of the high economic growth that give high returns on their investments. On the other side, emerging markets are riskier to invest in because of the political instability and the volatility of the local currency. Morgan Stanley Capital International (MSCI) has appointed 24 countries as Emerging Markets, which are listed in Figure 1 (MSCI, 2017).

Figure 1: MSCI Emerging Markets Index Allocation

Emerging Markets				
Americas	**Europe, Middle East & Africa**		**Asia**	
Brazil	Czech Republic	South Africa	China	Pakistan
Chile	Egypt	Turkey	India	Philippines
Colombia	Greece	Poland	Indonesia	Taiwan
Mexico	Hungary	United Arab Emirates	Korea	Thailand
			Malaysia	

Most of the scientific research is done about equity funds in developed countries like the United States and Europe. The results of the academic research is not directly applicable to emerging markets (Huij & Post, 2011). Investing in one specific market with the same characteristics like the emerging markets yields higher returns, because more concentrated funds give a better performance than global diversified funds (Kacperczyk, Sialm, & Zheng, 2005). For analysing the outperformance of funds, Active Share is presented, which represents the differences between the portfolio and the benchmark index. Funds with the highest Active Share significantly outperform their benchmark (Cremers & Petajisto, 2009).

Earlier mentioned in section 1, the recent focus of investors is more on passive than active investing. Index Funds and Exchange Traded Funds (ETFs) are getting a bigger part of assets under management, since their start in the United States in 1975 (Index Funds) and 1990 (ETFs). The share of assets allocated to ETFs and Index Funds has increased from 11% in 2000 to 43% in 2015 (Winter & al, 2017). The stock market will always be comprised of active and passive investors. This is because markets are not completely efficient and encourage investors to gather and analyse information (Grossmann & Stiglitz, 1980). A study of Blitz and Huij is in favour of active investing in Emerging Markets funds. They conclude, based on their findings, that the Emerging Markets funds show a better performance than equity funds located in the United States. Even with a simple selection process of Emerging Markets Equities only based on the past performance of the equities, it is possible to outperform the benchmark (Blitz & Huij, 2011).

In this thesis the focus is on the active equity fund performance against the benchmark and four other indices and the factor model with four-factors. These active funds are equity funds with a portfolio of equities to outperform an underlying benchmark through sector, style and geographic tilts. Active equity mutual funds provide concentrated market exposure. The funds have higher operating expenses and higher turnover. The specifics of these Emerging Markets funds are explained in a broader sense in section 3.

The Emerging Markets funds have been researched by first comparing the performance of the fund with the benchmark. The benchmark of a fund is used to compare to the performance of the investment fund to see if the asset manager is doing a good job and creating outperformance. In other words, a benchmark of an equity fund is simply the market it is most related to. In this thesis the fund performance is not only compared with the benchmark, but also three other indices. An index is a hypothetical portfolio that represents some basket of stocks. The indices created by credit rating agency Standard & Poor's (S&P 500) and investment

bank Morgan Stanley (MSCI) are usually used as a benchmark for equity funds around the world.

The Capital Asset Pricing Model (CAPM) shows the relationship between risk and return for assets (Markowitz, 1952). This relationship is important to evaluate the performance of a fund because risk and return are both essential dimensions in finance. First it is important to evaluate the ability of the asset manager to increase returns of the fund through a good prediction of future security prices and second it is important to minimize the risk for the asset holders (Jensen, 1968). The CAPM is used to investigate if funds have outperformance against the market. The formula of CAPM is as follows:

$$R_a - R_f = \alpha + \beta_m (R_m - R_f) + \varepsilon$$

R_a is the return of the portfolio. R_f is the risk-free rate and R_m is the risk on the market portfolio.

In the CAPM the returns of the funds are only compared with one factor: the market. In 1993, Fama and Kenneth French designed a model not only using the market factor but two other factors: SMB (Small minus Big) and HML (High minus Low). The SMB factor is about the small firms and the large firms in size targeting the difference in returns. There is a 'small-firm effect', which is a theory that the returns of small firms tend to outperform the large firms. The HML factor is focused on the book-to-market value of a firm. When this value is high, theory show the specific company has potential growth in future what makes it interesting to invest in now (Fama & French, 1993). The formula of the three factor model of Fama and French is as follows:

$$R_a - R_f = \alpha + \beta_m (R_m - R_f) + \beta_{SMB} \times SMB + \beta_{HML} \times HML + \varepsilon$$

In 1997, Mark Carhart designed a four-factor model. A fourth factor is added on the Fama and Fench model: the momentum factor (MOM). The factor is about a trend in the buying and selling of equities and see a pattern or a trend line at a short term of a maximum of two years (Carhart, 1997). The formula of the four-factor model of Carhart is the following:

$$R_a - R_f = \alpha + \beta_m (R_m - R_f) + \beta_{SMB} \times SMB + \beta_{HML} \times HML + \beta_{MOM} \times MOM + \varepsilon$$

In this thesis it is about the performance of the fund, that is measured with alpha (α). A positive alpha means outperformance of the Emerging Markets fund against the benchmark, or another index or the four-factor model of Carhart. An alpha of zero implies that the performance of the fund exactly to market expectations. A negative alpha implies that the index in research has a better performance than the specific Emerging Markets fund (Jensen, 1968).

Another important variable is the market risk factor beta (β). This variable is used to compare the risk of the specific Emerging Markets fund with the benchmark. When the beta is one, the fund moves exactly the same as the benchmark. This means that the fund takes the same risk as the benchmark. When the beta is higher than one, the fund is riskier, also called more volatile. A beta of a fund that is lower than one, can also be called 'low-volatility', which means that the fund is taking less risk than the benchmark (Fama & French, 1992).

To research if the fund performance is the result of smart investment decisions or taking too much risk can be measured with the Sharpe ratio. The greater the Sharpe ratio of the fund, the better its risk-adjusted performance (Sharpe, 1964). The formula of the Sharpe ratio is as follows:

$$\text{Sharpe ratio} = \frac{\text{Average (Rp – Rf)}}{\text{Standard Deviation (Rp)}}$$

R_p is the return of the portfolio and R_f is the risk-free rate.

The second ratio this thesis uses to interpret the performance of the Emerging Markets funds is the Information ratio. The Information ratio is similar to the Sharpe ratio. Both measure the risk-adjusted returns. The difference between the ratios is that the Information ratio aims to measure the risk-adjusted returns in relation to the benchmark. This means the Information ratio focus more on the consistency of the fund performance instead of the focus on the outperformance of the fund (Goodwin, 1998).

The formula of the Information ratio is as follows (using the notation from before):

$$\text{Information ratio:} \frac{\text{Average (Rp – Rm)}}{\text{Standard Deviation (Rp – Rm)}}$$

When there is a low level of risk, there will also be low level of returns. The other way around, high risks will mean high potential outcomes. This Risk-Return trade-off theory is also used to explain the difference in returns for equity funds in the past (van der Sar, 2008). But in the last decade there is a lot of research done about low-volatility investing. Low-volatility investors select stocks with low beta and high alpha. A previous research paper finds a negative alpha with high volatility (Ang & al, 2006). Also empirical evidence concludes that low-volatility stocks earn high risk-adjusted returns (Blitz & van Vliet, 2007). The Robeco QI Emerging Markets Enhanced Index Equities is the Emerging Markets fund with the lowest volatility in this thesis.

Section 3: Data

The dataset consists of the returns on the portfolios of nine Robeco Emerging Markets funds, seen below in Figure 2. Robeco is an international asset manager, founded in Rotterdam in 1929. The company has 148 million euro assets under management. A bit more than 9 billion euros is invested in Emerging Markets funds, which are investigated in this thesis (Robeco, 2017).

Figure 2: Descriptive statistics Robeco Emerging Markets Funds

					Robeco Emerging Markets Funds			
Fund	Year of inception	Sample size	Fund size (€ mln)	Gross Returns (%)	Gross volatility (%)	Information Ratio (IR)	Sharpe ratio (SR)	Purpose of the fund
Robeco Emerging Markets Equities	1994	269	867	1.72	3.93	0.54	0.35	Relative Return
Robeco Emerging Opportunities Equities	2015	25	3	2.60	3.75	0.70	0.22	Relative Return
Robeco Emerging Stars Equities	2006	125	814	3.63	5.99	0.69	0.50	Relative Return
Robeco Institutional Emerging Markets Fund	1994	280	1225	1.41	3.89	0.42	0.29	Relative Return
Robeco Institutional Emerging Markets Quant Fund	2007	120	1393	1.55	1.41	1.20	0.36	Relative Return
Robeco QI Emerging Conservative Equities	2011	75	4265	5.48	6.09	0.66	0.85	Total return
Robeco QI Emerging Markets Active Equities	2008	111	500	2.65	3.36	0.93	0.46	Relative Return
Robeco QI Emerging Markets Active Large Cap Equities	2015	29	3	0.72	2.20	0.46	0.59	Total return
Robeco QI Emerging Markets Enhanced Index Equities	2012	62	49	0.88	0.92	1.01	0.21	Relative Return

Robeco Emerging Markets Equities and Robeco Institutional Emerging Markets Fund are the funds of Robeco that have a long history of return series. These funds have a lot of observations to research. This is in contrast to the Robeco Emerging Opportunities Equities and Robeco QI Emerging Markets Active Large Cap Equities, these are relatively new funds with a few observations. These funds are also relatively small compared with the other Robeco Emerging Markets funds. Interesting to analyse is the Robeco QI Emerging Conservative Equities, which is also a relatively new fund. It is the largest fund on assets under management.

The returns and the volatility of the funds are extensive analysed in section 5. The Information ratio and the Sharpe ratio can be both seen in Figure 2. Interesting to see is that most of the fund has a higher Information ratio than a Sharpe ratio. This implicates that most of the Emerging Markets funds focus on the outperformance against the benchmark (relative return) than overall outperformance (total return).

The returns of the Emerging Markets funds used in this thesis are all gross excess returns on a monthly basis. This means that the costs of fund management are not extracted from the returns of the fund. The net returns, the gross returns extracted the costs, are the outcomes for the client. The reason gross excess returns are used to do the research is the following: the four indices and the four Carhart factors are all returns without a cost reduction. I will now simply use 'returns' instead of 'gross excess returns' in the remainder of thesis.

To research the performance of the nine Robeco Emerging Markets funds, the returns are compared with an established benchmark, called the 'Robeco Benchmark'. Below the graphs of the performance of the nine funds in section 5, the indices followed by the benchmark are presented. Since the start of the Emerging Markets funds, the S&P/IFC Investable Composite Index (Gross return) is used as benchmark for the Robeco

Emerging Markets funds. Since the beginning of 2000 date to the end of 2007 the net return of the S&P/IFC Investable Composite Index is used as benchmark for the funds. Since 2008 to the present time the Net return of the MSCI Emerging Markets Index is used as a benchmark by Robeco for analysing the performance of the Emerging Markets funds.

Besides the comparison with the Robeco Benchmark, the nine Robeco Emerging Markets are also compared with three MSCI indices: MSCI Emerging Markets IMI index, MSCI World Index and MSCI Emerging Markets Index. The monthly gross returns are obtained from the official database of MSCI. The MSCI Emerging Markets IMI Index covers more than 2600 securities of the 24 countries belonging to the Emerging Markets, seen in figure 1. These securities are divided over different segments like: large, mid and small-cap size, style and sector segments. The MSCI Emerging Markets Index covers 800 securities in the 24 emerging markets, divided under several segments (MSCI, 2017). Finally, the returns of the funds are compared with the MSCI World Index. The index is a broad global benchmark, focussing on 23 developed market countries. The MSCI World index is the leader in equity indices (Bloomberg, 2016). Because of the familiarity of the Index and the worldwide use of the index for analysing fund performance, in this thesis the funds are also compared with the MSCI World Index. The MSCI World Index is only focused on developed market countries and not on the emerging markets. This means the benchmark does not offer exposure to emerging markets (World, 2017).

The second hypothesis in the introduction is about the comparison with the four-factor model of Carhart. The returns of these factors are obtained from the database of Kenneth French. This thesis uses the Fama/French 3 factors and the momentum factors for developed markets, also on a monthly basis (French, 2017). The results of the investigation by comparing the Robeco Emerging Markets returns with the four-factors of the Carhart model are discussed at part 2 of section 5, the results section.

Section 4: Empirical framework

To investigate the performance of alpha of the nine Emerging Markets funds, the monthly gross returns of the funds in percentage are used. In this section the methodology this thesis used for testing the hypotheses and finding an answer on the research question is showed. First, the research method how to create the returns comparison between the funds and the indices in a chart. Secondly, an explanation about the methodology of the regression model that is used to investigate the performance of alpha against the indices. Finally, also an explanation of the regression model with multiple variables to research the outperformance of the Emerging Markets funds against the four-factor model of Carhart.

All these returns of the nine funds are compared with the indices like: Robeco Benchmark, MSCI Emerging Markets IMI Index, MSCI World Index and the MSCI Emerging Markets Index. The first step for the comparison in a figure is the creation of a starting point 100 at the start of the fund. Than multiply the starting point 100 with the average monthly returns, from the start of the fund up to and including May 2017. The second step, is obtaining returns of the several indices with as well a baseline value of 100. Than the last step of the comparison is adding the returns series with baseline number 100 in a chart with the year of inception of the fund until May 2017 as an independent horizontal value of the chart. The charts are shown in section 5 and in the Appendix of this thesis.

The significance of the results is difficult to measure by using only charts. Therefore, the research secondly uses a regression model to investigate if there is significance outperformance against the indices and the factors. By the comparison with the four different indices, the regression model is based on the CAPM Model. The formula of the CAPM is (Jensen, 1968):

$$R_p - R_f = \alpha + \beta_m (R_m - R_f) + \varepsilon$$

The dependent variable R_p in this research is the monthly returns of one of the nine specific Robeco Emerging Markets funds. The independent variable R_m, in the CAPM the market factor, is in our research the monthly returns of the compared index. For analysing the data, the two inputs in the formula, this thesis models a regression. The alpha and beta outcomes of the model, like the coefficient, the standard error and the p-value are tabulated for all the nine Robeco funds specifying on Emerging Markets and also extensively discussed.

In the research of this thesis, not only a single variable regression model is used but also a multiple variables regression model. The model with multiple variables is based on the model of Carhart, also called the four-factor model (Carhart, 1997):

$$R_p - R_f = \alpha + \beta_m (R_m - R_f) + \beta_{SMB} \text{ x } SMB + \beta_{HML} \text{ x } HML + \beta_{MOM} \text{ x } MOM + \varepsilon$$

The dependent variable R_p has the same meaning as in the CAPM model, the monthly returns of the Emerging Markets Funds. The independent variable R_m is the return on a region's value-weight market portfolio. The R_f is the U.S. one-month T-Bill rate which is the risk-free rate in the model and is subtracted from the returns of the funds and also the returns of the market portfolio (French, 2017). The other three independent variables are the SMB (Small minus Big), HML (High minus Low) and the MOM (momentum) factor. These factors are extensively explained in section 3. The data from the Kenneth French Data Library were all in percentages (for example 1.0 = 1%), so with dividing this data, creates the same unit of account as the returns of the Robeco fund (0.01 = 1%). After running the multiple variable regression, this thesis research above all the positive significant outcomes. Those are outcomes with a positive value of the alpha coefficient and with a p-value equal of smaller than 0.01 for 1% significance and a p-value equal of smaller than 0.05 for 5% significance (Moore & Mcabe, 2011).

Section 5: Results

For the research to test the hypothesis various regression analyses are done of the nine Emerging Markets funds of Robeco. The four investment funds that show most of the times significant outperformance with respect to both Robeco's benchmarks as well as other indices: Robeco Emerging Markets Equities, Robeco Emerging Stars Equities, Robeco QI Emerging Conservative Equities and Robeco QI Emerging Markets Active Equities. In the first section, the results for these funds are further extensively discussed. The alphas and betas of all the funds are analysed in the other two sections. The extensive results of the five funds, that are not extensively discussed in part 1, are included in the Appendix part of this thesis.

This section is subdivided into three parts. First, the returns of the funds are compared to several benchmark indices. These consists of the indices that Robeco has chosen the funds to be benchmarked against, as well as the MSCI World, MSCI Emerging Markets and MSCI Emerging Markets IMI indices. In the second part the fund's returns are compared against the Carhart (1995) model, to see if their returns can be explained by common market anomalies. Lastly, the outperformance results of the fund's returns versus the indices and versus the Carhart (1995) model are tabulated and discussed.

Part 1: Performing against the indices

The analysis of the results starts with the oldest Robeco Emerging Markets fund for the retail market, The Robeco Emerging Markets Equities. The fund started in 1994, what gives a long dataset to research and to compare with the benchmark and different indices. The figure below gives a comparison of the fund with the four indices. Even though the figure gives a general picture of the returns throughout time, it is less informative with respect to outperformance characteristics. As can be seen from figure 1, The indices related to emerging markets are relatively correlated to each other. As expected, only MSCI World seems to deviate from the Emerging Markets indices in the beginning of the period.

Figure 3: Robeco Emerging Markets Equities compared with indices
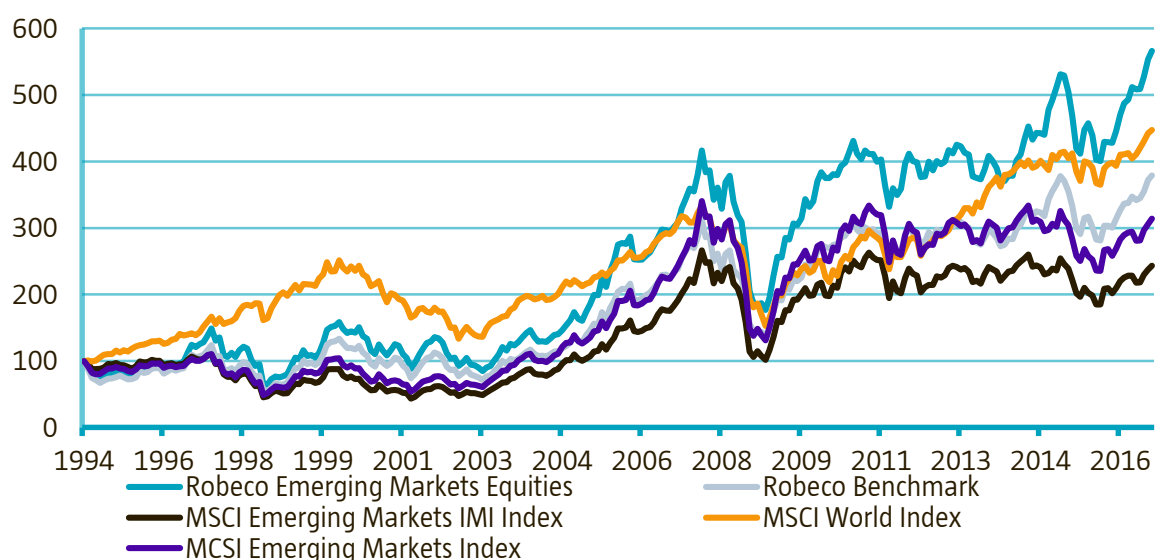
Robeco Benchmark: Since start - 31/12/2000 S&P/IFC Investable Composite (Gross Return) 1/1/2001 - 31/12/2007 S&P/IFC Investable Composite (Net Return) 1/1/2008 - now MSCI Emerging Markets Index (Net Return)

To test the hypothesis if the returns of the fund give outperformance against the indices, the representation of the fund results in the figure is not enough to make meaningful inferences. Therefore, the gross excess returns of the fund are regressed against the benchmark chosen by Robeco, the MSCI Emerging Markets IMI Index, the MSCI World Index and the MSCI Emerging Markets Index.

Figure 4: Regression Analysis Robeco Emerging Markets Equities

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	1.72%	4.35%	1.85%	3.25%
	Standard Error	0.001	0.002	0.003	0.002
	P-value	0.034	0.048	0.609	0.131
Beta (β)	Coefficient	1.046	0.925	1.112	0.930
	Standard Error	0.010	0.028	0.069	0.027
	P-value	0.000	0.000	0.000	0.000
R-squared		0.974	0.809	0.490	0.818

The baseline number for alpha is zero, when the investment fund performed exactly as the index. To test the first hypothesis, I need to investigate the significance and sign of the alpha coefficient. In Figure 4 the coefficient alpha is positive against all indices, with the highest alpha against the MSCI Emerging Markets IMI Index, what gives an annual alpha of 4.35%. The alpha resulting from the essions against the MSCI World Index and the MSCI Emerging Markets Index are not significant, that can be seen from the p-values of 0.609 and 0.131. Both regressions have a high R-squared, which implies that the movements of the fund returns can be largely explained by the movements of the benchmark index. The outperformance of the Robeco Emerging Markets Equities is higher against the MSCI Emerging Markets IMI index than the Robeco Benchmark. On top of that the beta coefficient of the fund regressed against the MSCI Emerging Markets IMI is significantly smaller than the beta coefficient of the fund regressed against the Robeco Benchmark. The standard errors of alpha and beta are higher at the regression against the MSCI Emerging Markets IMI Index than the Robeco Benchmark. That implicates more variance in the returns than the Robeco Benchmark. This can be expected because the strategy will more closely follow the benchmark that is chosen by Robeco, compared to another benchmark. Conclusively, the Robeco Emerging Markets Equities is able to replicate the returns of the indices. Beside replication, there is also prelimary evidence that the fund offers diversification benefits and higher risk-adjusted performance.

Figure 5: Robeco Emerging Stars Equities with indices
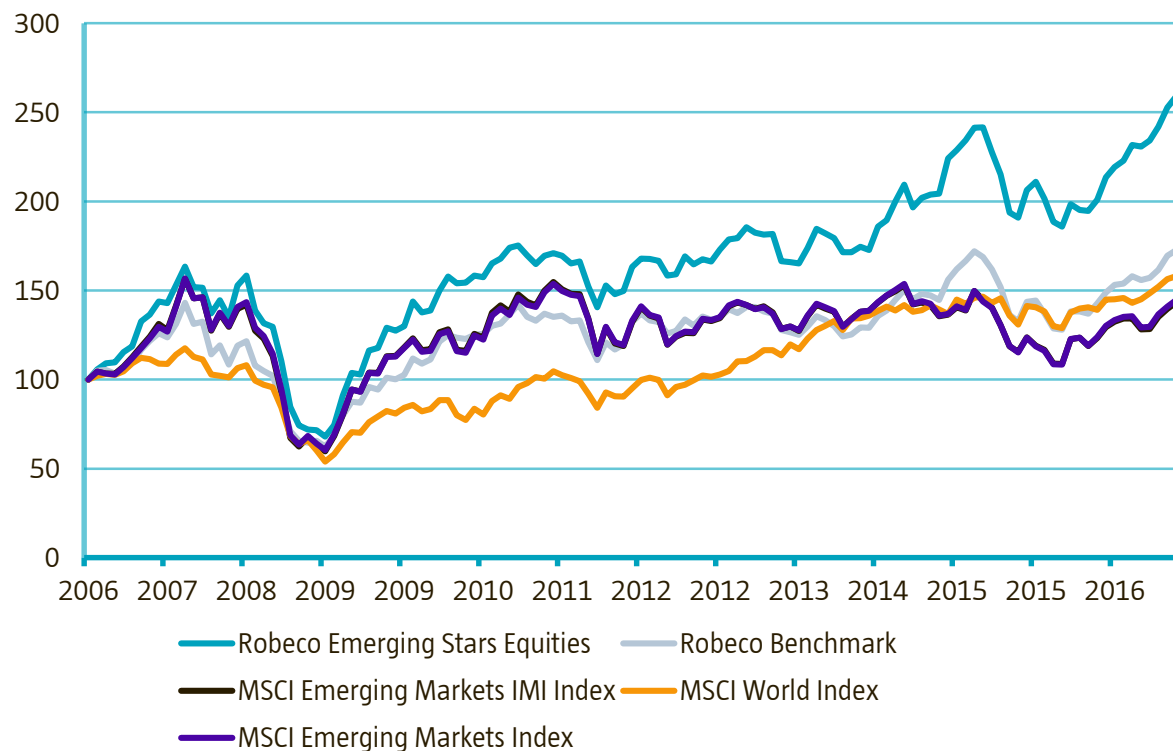
Robeco Benchmark: Since start - 30/6/2008 S&P/IFC Investable Composite (Net Return) 1/7/2008 - now MSCI Emerging Markets Index (Net Return)
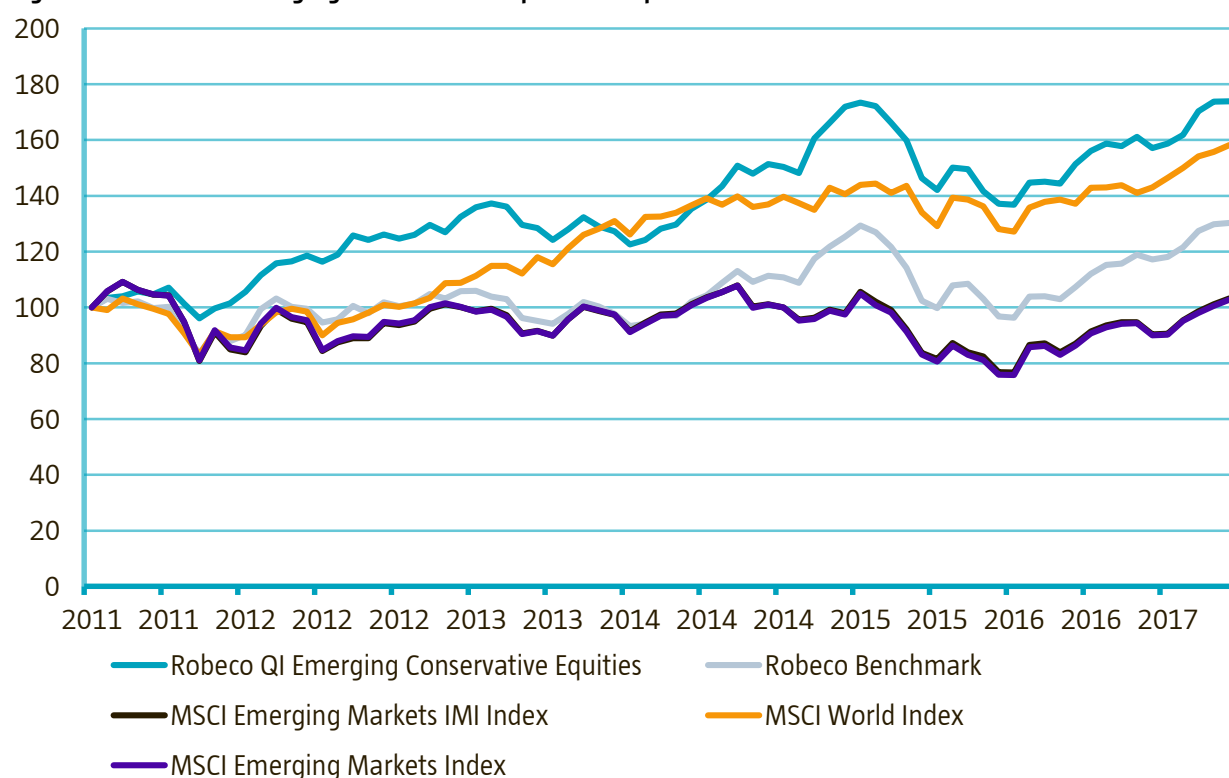
The Robeco Emerging Stars Equities fund is started in 2006. The fund has 35 to 50 holdings in their portfolio on average. In the figure above the conclusion can be made that there is a big outperformance against the benchmark and the other three indices, namely the blue line, of the performance of the fund, is always on top. The index level ends in 2017 around the 250 points against 170-150 points of the four indices.

Figure 6: Regression Analysis Robeco Emerging Stars Equities

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	3.63%	6.21%	5.54%	6.15%
	Standard Error	0.002	0.003	0.004	0.003
	P-value	0.049	0.059	0.202	0.064
Beta (β)	Coefficient	1.069	0.775	0.957	0.775
	Standard Error	0.028	0.041	0.077	0.041
	P-value	0.000	0.000	0.000	0.000
R-squared		0.921	0.747	0.558	0.743

Looking to the comparisons with the MSCI indices, there is no significant outperformance. Only the regression against the Robeco Benchmark gives a significant alpha. The result combined with the high R-squared and the low standard errors makes it a more interesting result. The Robeco Emerging Stars Equities Fund create an outperformance of 3.63% annual alpha, which coincides with a higher volatility (1.069) than the benchmark. Judging from the volatility it seems that the fund offers no extra diversification benefits compared to the benchmark, there is only some preliminary evidence for outperformance.

Figure 7 Robeco QI Emerging Conservative Equities compared with indices

Robeco Benchmark: Since start - MSCI Emerging Markets (Net Return)

The third fund to analyse is the Robeco QI Emerging Conservative Equities fund. The fund is using a quantitative model to invest in low-volatile stocks in emerging markets. It has the largest fund size of all the Robeco Emerging Markets funds. It is a relatively short dataset because the fund is started in 2011. The MSCI

EM Index and the MSCI EM IMI Index have both almost the same performance and that is why only the blue line is visible in the figure and the grey line is behind it.

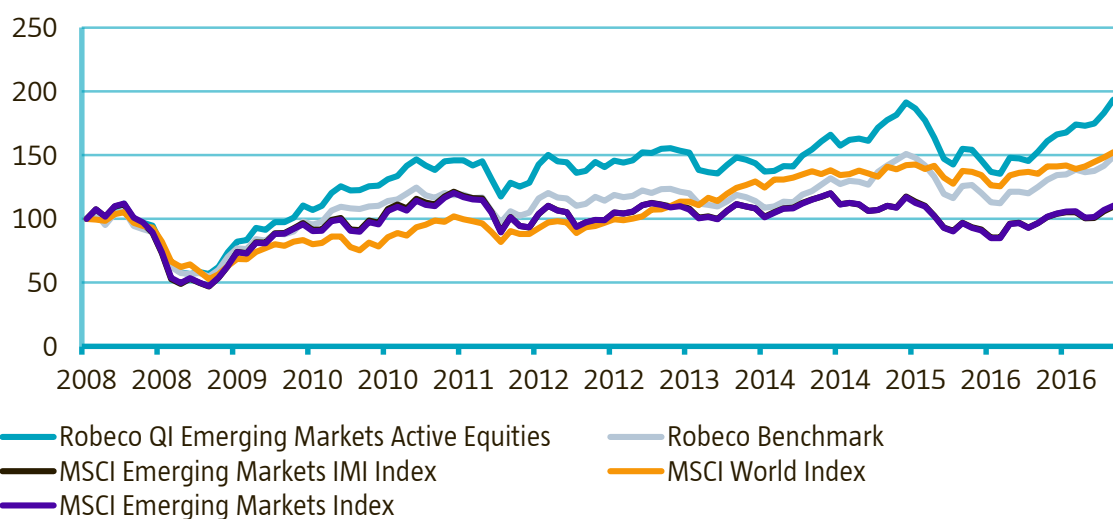**Figure 8: Regression Analysis Robeco QI Emerging Conservative Equities**

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	5.48%	8.10%	5.11%	8.11%
	Standard Error	0.002	0.003	0.003	0.003
	P-value	0.004	0.013	0.191	0.013
Beta (β)	Coefficient	0.715	0.452	0.485	0.446
	Standard Error	0.038	0.053	0.091	0.052
	P-value	0.000	0.000	0.000	0.000
R-squared		0.832	0.500	0.281	0.497

The outperformance of the fund against the four indices is high, more than 5% per year. Only the alpha coefficient of the fund regressed to the MSCI World Index is not significant (0.191 > 0.05). The beta is low compared to the other Emerging Markets funds. This is in line with the conservative low-volatility focus of the fund. It is not all about the alpha, a low volatility is also an important characteristic of a fund.

But the difficulty of interpreting the regression results is in the r-squared outcomes of the indices. Only the Robeco Benchmark has a high r-squared above the 0.70, what means that a high part of the fund performance can be explained by the movements of the benchmark. The other indices have a R-squared of 0.50 or lower. This means that the fund does not act much like the index. Therefore, it is difficult to compare the Robeco QI Emerging Conservative Equities fund with the MSCI Emerging Markets IMI Index, MSCI World Index and the MSI Emerging Markets Index and draw conclusions from the regression analysis. Only the comparison with the Robeco Benchmark give a significant result where outperformance of the fund can be seen.

The Robeco QI Emerging Markets Active Equities fund uses also a quantitative stock selection model. This model uses valuation and momentum factors to find stocks with positive expected future performance. Since 2008 the fund is running and it has good performance, seen at the below figure.

Figure 9: Robeco QI Emerging Markets Active Equities compared with indices

Robeco Benchmark: Since start - 30/6/2008 S&P/IFC Investable Composite (Net Return) 1/7/2008 - now MSCI Emerging Markets (Net Return)

The remaining research question to be answered is: does the fund provide significant outperformance? Analysing the regression figure below, most of the results are significant. Only the regression analysis with the MSCI World Index gives an insignificant alpha (0.394 > 0.05). The R-squared of the fund regressions with the Robeco Benchmark, the MSCI Emerging Markets IMI Index and the MSCI Emerging Markets Index is high, which means that the performance of the Robeco QI Emerging Markets Active Equities has a pattern in line with the three indices.

Figure 10: Regression Analysis Robeco QI Emerging Markets Active Equities

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	2.65%	6.10%	3.84%	6.06%
	Standard Error	0.001	0.003	0.004	0.038
	P-value	0.010	0.045	0.394	0.000
Beta (β)	Coefficient	1.077	0.766	0.884	0.768
	Standard Error	0.016	0.037	0.077	0.038
	P-value	0.000	0.000	0.000	0.000
R-squared		0.977	0.891	0.738	0.890

Part 2: Performing against the four-factor model of Carhart

After analysing several funds on regressions with the four indices, in this part the regression analyses with the 4-Factor Model of Carhart are investigated. The returns of the nine Robeco Funds are regressed on a multivariable regression with the four-factors of Carhart, namely the market rate minus the risk free rate, Small Minus Big (SMB), High Minus Low (HML) and the momentum factor.

Figure 11: Regression Analysis against the four-factor model of Carhart

Fund	Annual alpha %	P-value Alpha	Beta wrt MKt-Rf (p-value)	Beta wrt SMB (p-value)	Beta wrt HML (p-value)	Beta wrt Momentum (p-value)	R-squared
Robeco Emerging Markets Equities	2.65%	0.468	1.083 (0.000)	0.331 (0.021)	-0.213 (0.103)	-0.060 (0.429)	0.521
Robeco Emerging Opportunities Equities	-3.75%	0.635	1.224 (0.000)	-0.180 (0.699)	0.512 (0.277)	0.378 (0.298)	0.647
Robeco Emerging Stars Equities	5.72%	0.179	0.902 (0.000)	0.278 (0.251)	-0.461 (0.039)	-0.238 (0.030)	0.592
Robeco Institutional Emerging Markets Fund	2.00%	0.572	1.060 (0.000)	0.330 (0.020)	-0.250 (0.053)	-0.063 (0.406)	0.511
Robeco Institutional Emerging Markets Quant Fund	6.85%	0.260	0.172 (0.129)	-0.138 (0.687)	-0.142 (0.652)	-0.293 (0.059)	0.076
Robeco QI Emerging Conservative Equities	4.68%	0.258	0.492 (0.000)	-0.175 (0.488)	-0.126 (0.577)	0.090 (0.552)	0.291
Robeco QI Emerging Markets Active Equities	3.49%	0.421	0.824 (0.000)	0.393 (0.120)	-0.526 (0.0178)	-0.270 (0.014)	0.599
Robeco QI Emerging Markets Active Large Cap Equities	7.28%	0.538	0.063 (0.860)	0.455 (0.524)	0.209 (0.775)	0.040 (0.944)	0.023
Robeco QI Emerging Markets Enhanced Index Equities	-6.59%	0.204	1.027 (0.000)	0.197 (0.499)	0.202 (0.480)	-0.095 (0.643)	0.582

In line for testing the hypothesis, it is interesting to look in Figure 11 at the annual alphas of the fund against the four Carhart factors. Seven of the funds has a positive annual alpha to the Carhart factors. Two funds, the Robeco Emerging Opportunities Equities and the Robeco QI Emerging Markets Enhanced Index Equities have a negative annual alpha. This means the Carhart model performs better than these two funds. Important to notice is that none of the annual alphas from the regressions are significant, what means that it is not possible to make significant conclusions from the results of this regression analysis. On top of that is there a low r-squared at all the regressions, smaller than 0.60. From this can be concluded that the nine Robeco Emerging Markets funds do not act much like the Carhart 4-factor model.

Analysing the betas of the four-factor model, it begins with the market factor minus the risk free rate. This is also the factor that has the most significant outcomes when compares with the other three factors. Most of the significant outcomes are a little bit above the market risk of one, funds like Robeco Emerging Markets Equities, Robeco Institutional Emerging Markets Fund and Robeco QI Emerging Markets Enhanced Index

Equities. Interesting to see is a few funds with a lower market risk, below one, which have good positive annual alphas. Two funds have a negative annual alpha and a significant beta market factor that is higher than the market risk of one: Robeco Emerging Opportunities Equities and Robeco QI Emerging Markets Enhanced Index Equities. The beta of SMB factor is only significant at two funds: Robeco Emerging Markets Equities and Robeco Institutional Emerging Markets. What can be seen as evidence of exposure to small-sized companies, what play also a negative role in the outperformance of the Emerging Markets fund. The other two factors of the four-factor model of Carhart are HML and momentum. Robeco Emerging Stars Equities and Robeco QI Emerging Markets Active Equities are the only funds which shows significant beta's. Both these betas are negative, what means a diversified fund portfolio with growth stocks which follows a certain trend. This give a boost at the outperformance of the fund.

Part 3: The overall outperformance of the Robeco Emerging Funds

The last part of the results is about the alpha of all the researched Emerging Markets funds of Robeco. Nine funds are researched and compared with four indices and the four-factor model of Carhart. In Figure 12a the results can be seen. 45 regressions are made which gave 41 positive alphas, what means outperformance. Robeco Emerging Opportunities Equities fund and Robeco QI Emerging Markets Enhanced Index Equities fund are the two funds which give negative alphas against the MSCI World Index and the four-factor model of Carhart. But important to notice is that the four negative outcomes of alpha are not significant. In total 12 alphas are significant and gave all positive outperformance against the indices or benchmark. The highest significant outperformance of a fund is performed by the Robeco QI Emerging Conservative Equities fund with annual 8.11% outperformance against the MSCI Emerging Markets index. This Robeco QI Emerging Conservative Equities fund with the other QI fund, the Robeco QI Emerging Markets Active Equities, are both standing out with the high alpha of around the 8% and the 6%. This outperformance is nog realized against the benchmark chosen by Robeco, but against the two Emerging Markets indices of MSCI: the MSCI Emerging Markets IMI index and the MSCI Emerging Markets Index. Interesting to see that the funds using a quantitative stock model are the ones with the highest outperformance.

Figure 12a: Overview outperformance Robeco Emerging Markets funds with p-values

Fund	Annual Alpha (p-value) Robeco Benchmark	Annual Alpha (p-value) MSCI Emerging Markets IMI Index	Annual Alpha (p-value) MSCI World Index	Annual Alpha (p-value) MSCI Emerging Markets Index	Annual Alpha (p-value) Carhart 4-Factor Model
Robeco Emerging Markets Equities	1.72% (0.034)	4.35% (0.048)	1.85% (0.609)	3.25% (0.131)	2.65% (0.468)
Robeco Emerging Opportunities Equities	2.60% (0.338)	2.76% (0.654)	-2.77% (0.694)	2.57% (0.684)	-3.75% (0.635)
Robeco Emerging Stars Equities	3.63% (0.049)	6.21% (0.059)	5.54% (0.202)	6.15% (0.064)	5.72% (0.179)
Robeco Institutional Emerging Markets Fund	1.41% (0.078)	3.36% (0.129)	0.95% (0.786)	2.38% (0.987)	2.00% (0.572)
Robeco Institutional Emerging Markets Quant Fund	1.55% (0.000)	3.69% (0.191)	3.04% (0.469)	3.78% (0.182)	6.85% (0.260)
Robeco QI Emerging Conservative Equities	5.48% (0.004)	8.10% (0.013)	5.11% (0.191)	8.11% (0.013)	4.68% (0.258)
Robeco QI Emerging Markets Active Equities	2.65% (0.010)	6.10% (0.045)	3.84% (0.394)	6.06% (0.000)	3.49% (0.421)
Robeco QI Emerging Markets Active Large Cap Equities	0.72% (0.616)	4.95% (0.371)	2.89% (0.722)	4.94% (0.376)	7.28% (0.538)
Robeco QI Emerging Markets Enhanced Index Equities	0.88% (0.030)	0.72% (0.167)	-6.82% (0.151)	0.88% (0.030)	-6.59% (0.204)

Figure 12b: Outperformance Robeco Emerging Markets funds with p-values

Fund	Total size of fund (€ mln)	Gross Returns (%)
Robeco QI Emerging Markets Active Large Cap Equities	3	0.72% (0.616)
Robeco Emerging Opportunities Equities	3	2.60% (0.338)
Robeco QI Emerging Markets Enhanced Index Equities	49	0.88% (0.030)
Robeco QI Emerging Markets Active Equities	500	2.65% (0.010)
Robeco Emerging Stars Equities	814	3.63% (0.049)
Robeco Emerging Markets Equities	867	1.72% (0.034)
Robeco Institutional Emerging Markets Fund	1225	1.41% (0.078)
Robeco Institutional Emerging Markets Quant Fund	1393	1.55% (0.000)
Robeco QI Emerging Conservative Equities	4265	5.48% (0.004)
Average	1013	2.29%

In Figure 12b the returns of the funds are represented in order of fund size. The average fund size of the Robeco Emerging Markets funds is around 1 billion euros, or 1013 million euros. The smaller funds, or smaller than average, has an performance of around 2%. This is below the average return of 2.29%. The main cause of the fact that the smaller funds have on average also smaller performance than the larger funds is because of the performance of one specific fund: Robeco QI Emerging Conservative Equities. This fund has the highest alpha of all the Robeco Emerging Markets Funds and is also the fund with the largest fund size. Because of this outlier it is hard to conclude if funds with larger fund size create higher returns than funds with smaller fund size.

Section 6: Conclusions and discussion

In this thesis the performance of Emerging Markets funds is investigated. The research question of this thesis is as follows: Do Robeco Emerging Markets funds provide significant alpha? To answer the research question I have state three hypotheses.

The first hypothesis is about the comparison of the Emerging Markets funds with the indices. There is a significant positive alpha in the results of the regression analysis of the funds against the indices. That means the rejection of the null hypothesis (no significant positive alpha) in favour of the alternative hypothesis (significant positive alpha). Conclusively, after regressing the returns of the funds on these indices, it is observed that most of the funds are able to replicate the returns of the indices with only a mild tracking error.

The second hypothesis compared the Emerging Markets funds of Robeco with the four-factor model of Carhart. When regressing the fund returns on the Carhart four-factor model, it can be seen that a large proportion of the variance in fund returns can be explained by common market anomalies. There is no significant alpha found on all the nine Robeco Emerging funds in the regression against the four-factor Carhart Model. Because of the insignificant results, the second hypothesis cannot therefore not be rejected: the returns of the funds seem to be explained by the Carhart four-factor model.

The three hypotheses are created for subdividing the research question in different areas and after research the three hypothesis, a concluding part of the thesis answered the general research question. Conclusively, the third and last hypothesis that correspondents closely to answering the research question. The performance of the Emerging Markets fund alpha is on most cases in this research positive against the indices and the four-factor model. The smaller part of the alpha outcomes from the regressions which shows significance, are all positive. Most of the active Emerging Markets funds show good risk-adjusted returns, with some funds achieving significant outperformance with respect to the tracked benchmark over the investigated samples.

After all, this research has its limitations. For further research it is interesting to investigate active Emerging Markets funds performance against passive solutions like index funds or ETF's. Another part to create deeper research is looking at the strategy of a specific Emerging Markets fund and what the impact of the strategy is for the long term returns of the fund against the market. Lastly, it remains to be investigated how the performance of the investment funds look after considering participation fees. Given the recent popularity of passive investment solutions, this thesis provides evidence that the Emerging Markets funds of Robeco can provide a competitive advantage before costs. It remains an open question whether this conclusion also holds when transaction costs are taken into account.

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Appendix

Figure 13: Robeco Emerging Opportunities Equities compared with indices

- Robeco Emerging Opportunities Equities
- Robeco Benchmark
- Robeco MSCI Emerging Markets IMI Index
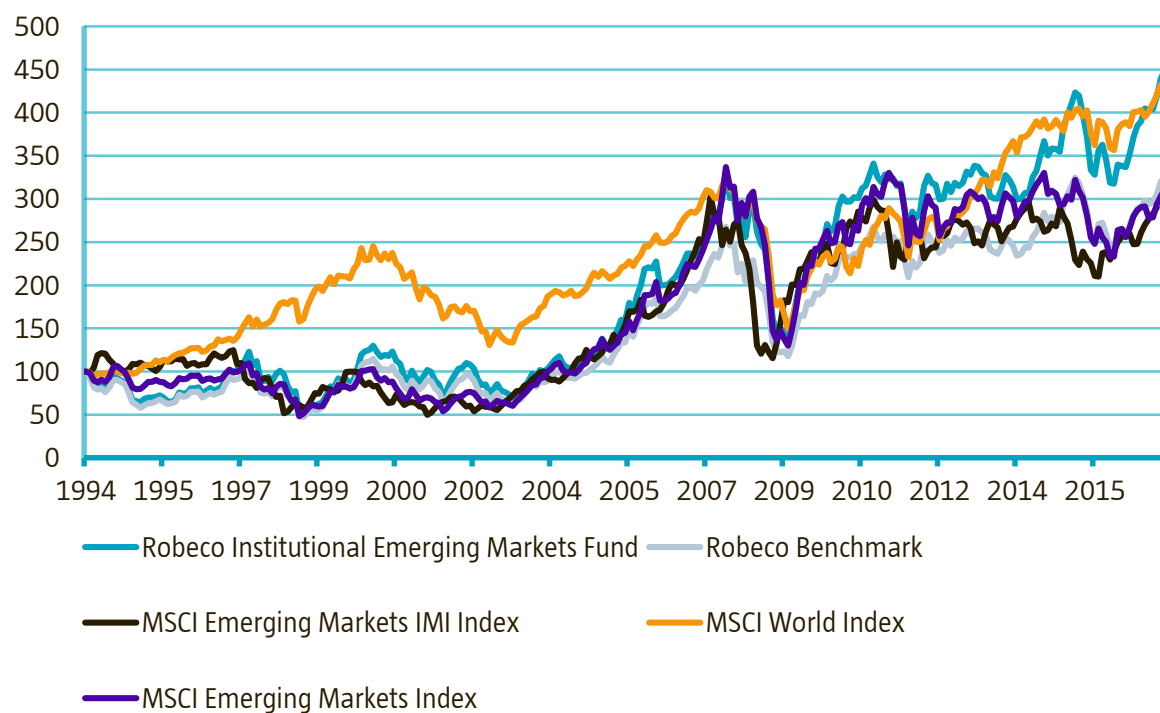- MSCI World Index
- MSCI Emerging Markets Index
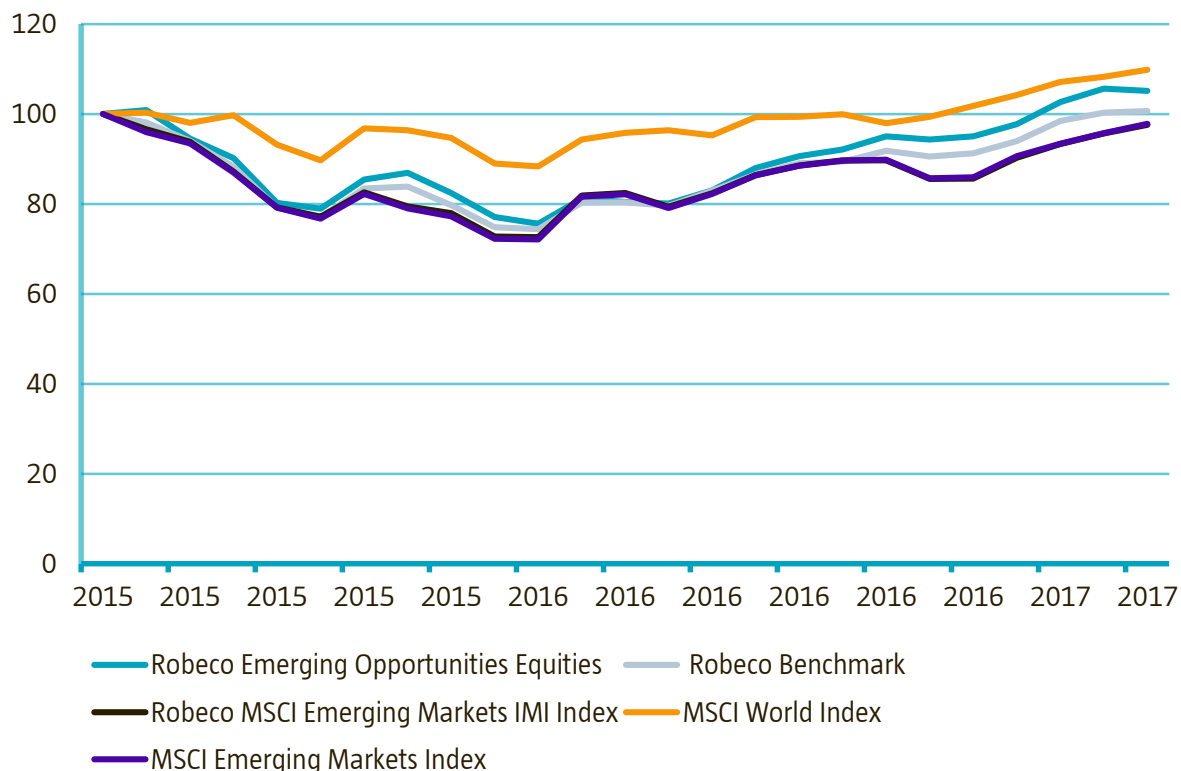
Robeco Benchmark: Since start - MSCI Emerging Markets (Net Return)

Figure 14: Regression Analysis Robeco Emerging Opportunities Equities

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	2.60%	2.76%	-2.77%	2.57%
	Standard Error	0.002	0.005	0.006	0.005
	P-value	0.338	0.654	0.694	0.684
Beta (β)	Coefficient	1.011	0.781	1.083	0.758
	Standard Error	0.052	0.106	0.176	0.106
	P-value	0.000	0.000	0.000	0.000
R-squared		0.943	0.703	0.622	0.688

Figure 15: Robeco Institutional Emerging Markets Fund compared with indices


Robeco Benchmark: Since start - 31/12/2000 S&P/IFC Investable Composite (Gross Return) 1/1/2001 - 31/12/2007 S&P/IFC Investable Composite (Net Return) 1/1/2008 - now MSCI Emerging Markets Index (Net Return)

Figure 16: Regression Analysis Robeco Institutional Emerging Markets Fund

	Regression statistics	Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	1.41%	3.36%	0.95%	2.14%
	Standard Error	0.001	0.002	0.003	0.002
	P-value	0.078	0.129	0.786	0.312
Beta (β)	Coefficient	1.032	0.903	1.092	0.912
	Standard Error	0.010	0.028	0.068	0.027
	P-value	0.000	0.000	0.000	0.000
R-squared		0.973	0.794	0.480	0.808

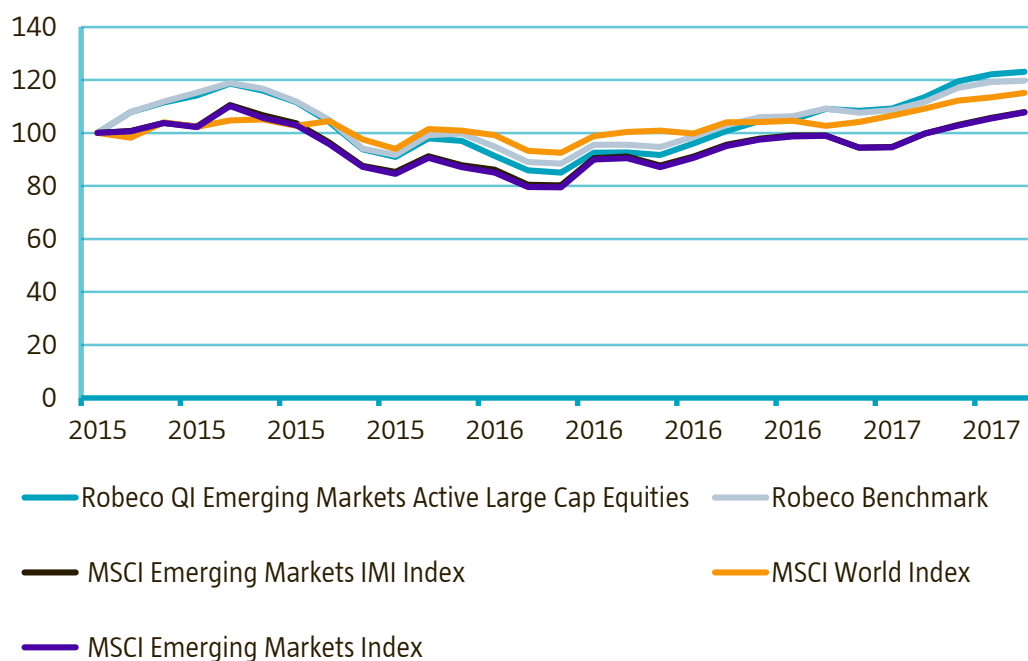**Figure 17: Robeco Institutional Emerging Markets Quant Fund compared with indices**
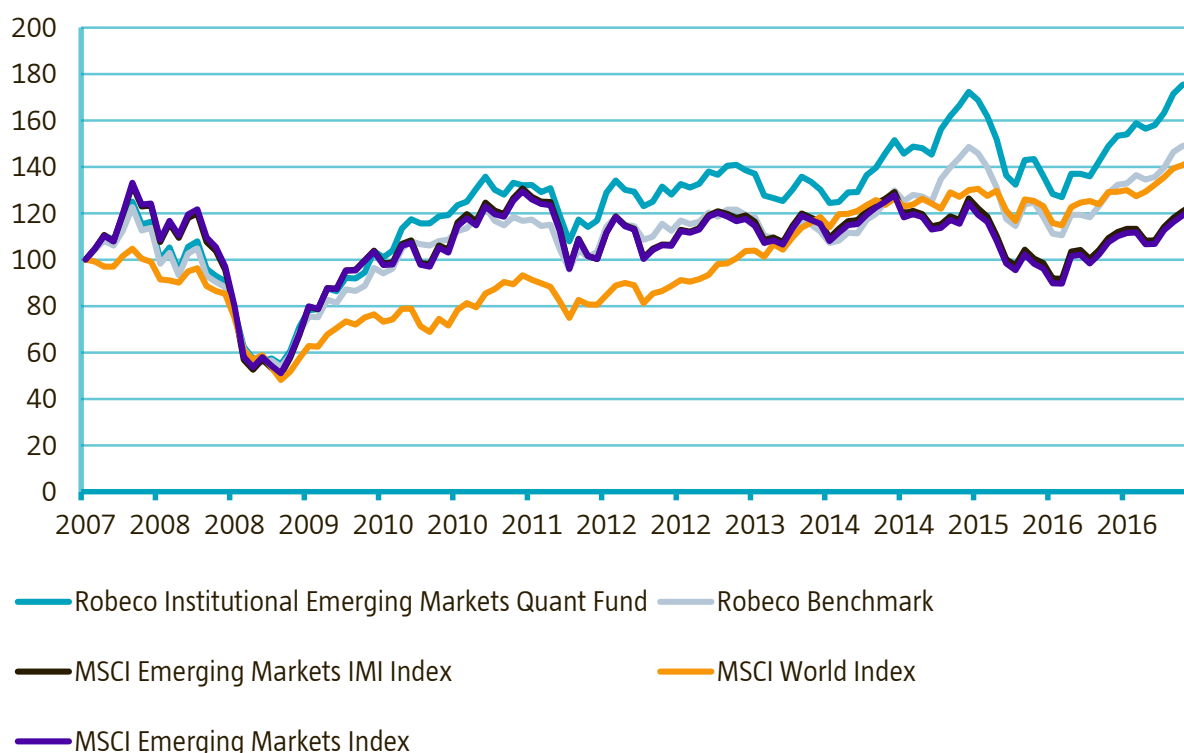
Robeco Benchmark: Since start - MSCI Emerging Markets (Net Return)

Figure 18: Regression Analysis Robeco Institutional Emerging Markets Quant Fund

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	1.55%	3.69%	3.04%	3.78%
	Standard Error	0.000	0.002	0.003	0.002
	P-value	0.000	0.191	0.469	0.182
Beta (β)	Coefficient	1.024	0.732	0.862	0.734
	Standard Error	0.007	0.035	0.073	0.035
	P-value	0.000	0.000	0.000	0.000
R-squared		0.995	0.792	0.540	0.790

Figure 19: Robeco QI Emerging Markets Active Large Cap Equities compared with indices

Legend:
— Robeco QI Emerging Markets Active Large Cap Equities — Robeco Benchmark
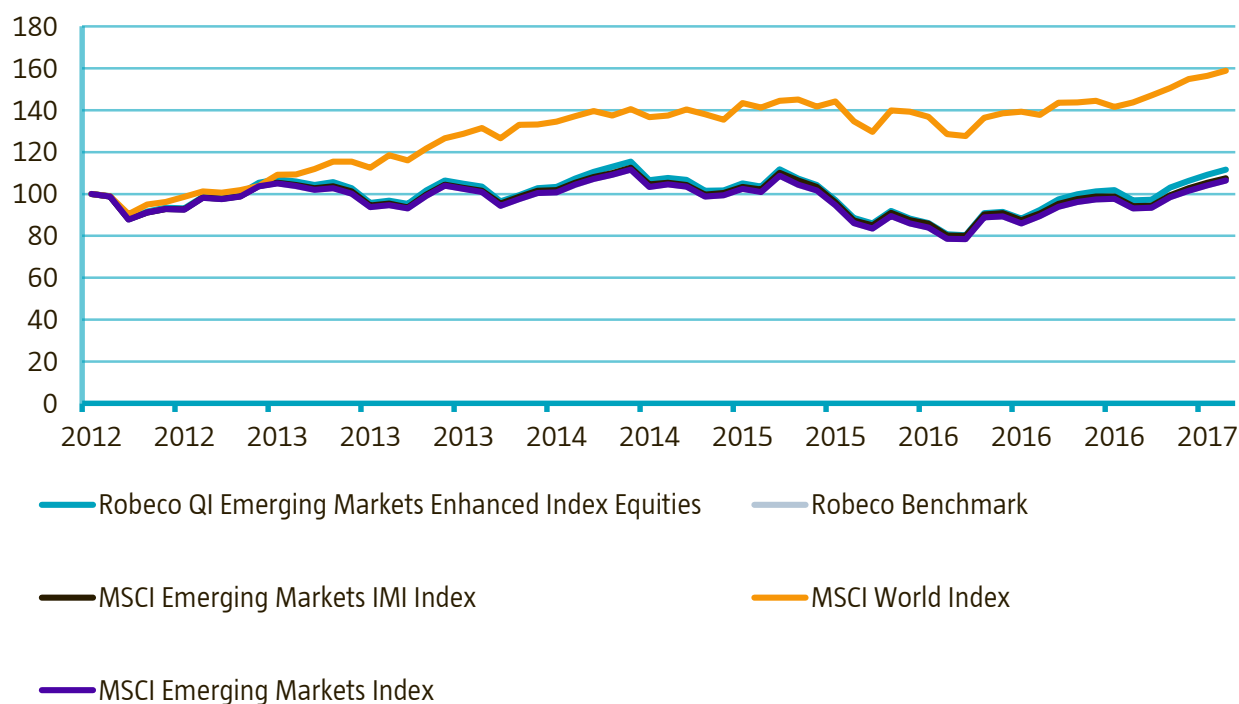— MSCI Emerging Markets IMI Index — MSCI World Index
— MSCI Emerging Markets Index

Robeco Benchmark: Since start - MSCI Emerging Markets (Net Return)

Figure 20: Regression Analysis Robeco QI Emerging Markets Active Large Cap Equities

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	0.72%	4.95%	2.89%	4.94%
	Standard Error	0.001	0.005	0.007	0.005
	P-value	0.616	0.371	0.722	0.376
Beta (β)	Coefficient	1.034	0.817	0.900	0.803
	Standard Error	0.027	0.096	0.203	0.096
	P-value	0.000	0.000	0.000	0.000
R-squared		0.982	0.729	0.421	0.724

Figure 21: Robeco QI Emerging Markets Enhanced Index Equities compared with indices

Legend:
- Robeco QI Emerging Markets Enhanced Index Equities
- Robeco Benchmark
- MSCI Emerging Markets IMI Index
- MSCI World Index
- MSCI Emerging Markets Index

Robeco Benchmark: Since start - MSCI Emerging Markets (Net Return)

Figure 22: Regression Analysis Robeco QI Emerging Markets Enhanced Index Equities

Regression statistics		Robeco Benchmark	MSCI Emerging Markets IMI Index	MSCI World Index	MSCI Emerging Markets Index
Alpha (α)	Annualised Coefficient	0.88%	0.72%	-6.82%	0.88%
	Standard Error	0.000	0.000	0.004	0.000
	P-value	0.030	0.167	0.151	0.030
Beta (β)	Coefficient	1.014	1.031	1.067	1.014
	Standard Error	0.008	0.010	0.122	0.008
	P-value	0.000	0.000	0.000	0.000
R-squared		0.997	0.994	0.560	0.997