TOBAM*
CORE INVESTMENTS

DIVERSIFICATION DASHBOARD

March 2016

Diversification Ratios

TOBAM's Diversification Ratio (DR) measures to what extent a portfolio is diversified. The DR^2 (square of the diversification ratio) measures the number of effective degrees of freedom to which a portfolio is exposed.
As the table shows, the "broad market" indices leave diversification on the table. In addition to a snapshot of each market's DR2, the table shows the DR2 of a well-diversified portfolio, and the fraction of available diversification used by the index.

Universes	DR^2 Index diversification	DR^2 Maximum diversification	% diversification used by index
All Countries World	3.86	11.07	34.9 %
World	3.54	10.03	35.3 %
Emerging Markets	4.09	7.77	52.6 %
Canada	3.37	7.22	46.8 %
US Equity	2.42	5.50	44.0 %
Pacific Ex-Japan	2.24	4.78	46.9 %
EMU	1.68	3.22	52.3 %
UK	2.01	3.16	63.5 %
Japan	1.81	2.95	61.5 %
US Credit	2.76	3.69	74.9%

Source: TOBAM, figures as of February 29^{th}, 2016

We present in this month's Dashboard a comparative review of our flagship Anti-Benchmark® Emerging Markets Equity Strategy.

We will show that the Anti-Benchmark® Emerging Markets Equity Strategy, by maximizing diversification, has produced a long-term risk/return performance significantly superior to that of most strategies on the same investment universe. In particular, the Anti-Benchmark® Emerging Markets has produced higher annualized returns, a significant volatility reduction and has been lowly correlated to the Benchmark and to a set of selected representative strategies on the same investment universe.

Using a standard factor regression analysis (i.e. a Fama-French regression), we will also show how the Anti-Benchmark performance is achieved without a particular bias towards small cap stocks.

Finally, in the context of current market instability, we show how the Anti-Benchmark, as the most diversified portfolio, is lowly correlated to two major risk factors of the emerging markets equity benchmarks - oil prices and Chinese equities.

The Benefits of Diversification in Emerging Markets

1. Diversification pays: the Anti-Benchmark EM strong performance since inception to date (2011-2016)

The Anti-Benchmark® Emerging Markets (EM) equity strategy launched in June 2011 will soon celebrate its 5^{th} anniversary. Since inception (as of February 29^{th}, 2016), the AB EM has returned an excess return of +14.42% (gross of fees) over the MSCI EM benchmark (-12.36% versus -26.78%), or a 3.67% annualized excess return. This positive excess return over the benchmark has been achieved at a lower volatility: 14.09%, vs. 16.98% for the MSCI EM benchmark – that is a long term volatility reduction of 17%.

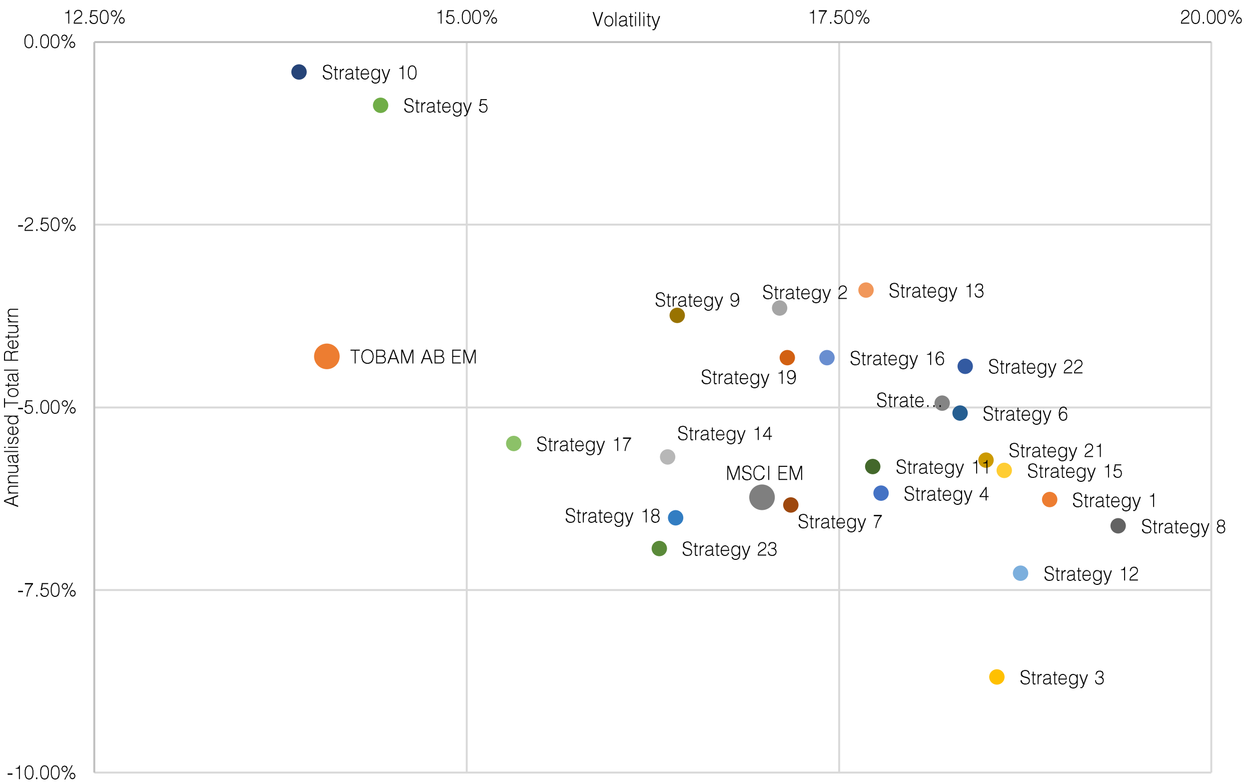
We compare the long-term performance of the Anti-Benchmark EM and its benchmark, the MSCI EM, together with that of a large group of representative strategies investing in the same universe. More concretely, we have included the emerging equity markets funds:

1. With a track record available since June 2011 (inception of the Anti-Benchmark EM strategy)
2. With AUM above $2bn as of February 2016 (that gives 21 funds), and
3. The 4 funds with highest net collections in 2015. Of note, The Anti-Benchmark Emerging Markets Equity strategy was ranked 3rd among the top largest collectors of inflows in 2015.

This leads to a total of 23 funds.

Figure 1 below charts the risk/return of the Anti-Benchmark EM, the benchmark (MSCI EM) and the 23-funds.

Figure 1: AB EM, MSCI EM and the 23 funds of the review universe
Annualised returns/volatility
From 29/06/2011 to 29/02/2016



All returns are in USD and net of all fees as published by Bloomberg. In particular, TOBAM AB EM returns are net of 1.5% management fees, the highest level currently applied.

Source: Bloomberg, TOBAM. Past performance is not indicative of future results.

Figure 1 shows that the Anti-Benchmark EM has had a better risk/return profile than the MSCI EM benchmark on a long-term basis. The AB EM also dominates most of the funds in the comparison set, particularly in the volatility dimension.

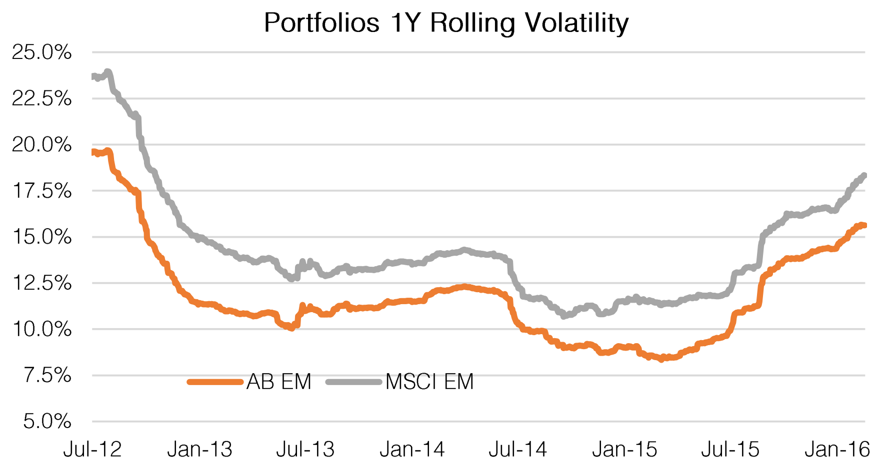
Only two funds (strategies 5 and 10) provide higher returns with a similar level of volatility. We remark that these two funds share the same manager and that their returns have a correlation close to 1 (99.65%). For the same token, given our broad criteria to select the funds for comparison (largest AUM and largest AUM collection in 2015), we have included funds which are effectively trackers for the MSCI EM and hence lie very close to the benchmark in the risk/reward space. All in all, over this period, funds which are comparable to the Anti-Benchmark (long only, fully invested, no leverage) with a similar level of returns have produced a significantly higher level of volatility.

We stress that the strong long-term performance of the AB EM is obtained in a consistent manner. **The AB EM has outperformed the MSCI EM every calendar year since its inception, with a lower volatility.**

2. The Anti-Benchmark Emerging Markets – Reducing volatility without a bias towards low vol stocks - nor a bias towards small cap stocks

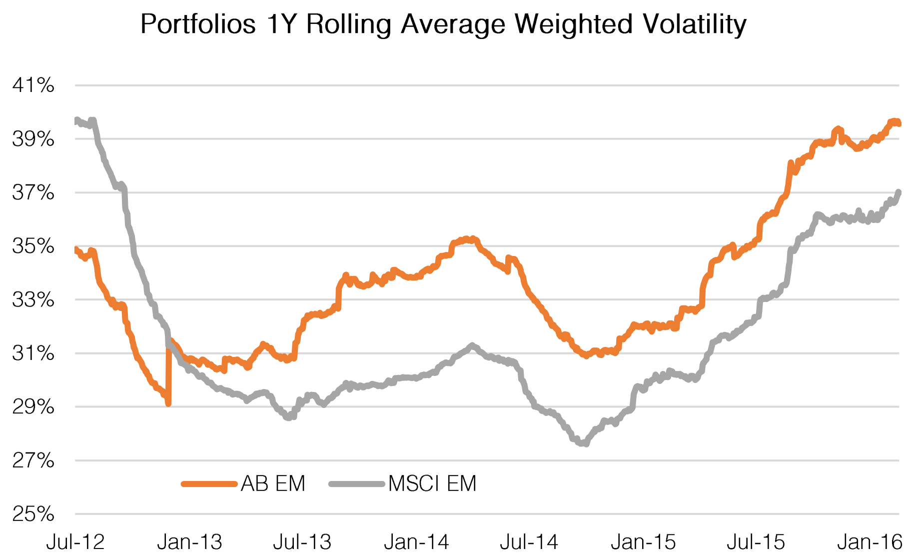
The risk/return chart (figure 1) shows that the Anti-Benchmark Emerging Markets strategy has resulted since inception in a substantial volatility reduction vs. the benchmark and vs. most peers. The evolution of the portfolio volatility and the reduction vs. the MSCI EM benchmark can be seen graphically in Figures 2.i and ii below.

Figure 2.i – The Anti-Benchmark consistently reduced return volatility vs. the MSCI benchmark



Source: TOBAM

Figure 2.ii – No bias towards low volatility stocks



Source: TOBAM

The volatility reduction by the Anti-Benchmark EM is not achieved by systematically allocating more than the benchmark into low volatility stocks. In fact, in Figure 2.ii we can see, for example, how over the last three years, the stocks in the AB EM have not displayed on average a bias towards low volatility stocks when compared to the MSCI EM benchmark.

The AB portfolio volatility reduction has been obtained not via a bias towards low volatility, but rather by combining stocks that are lowly correlated to each other.

Figure 3: No significant contribution to excess return from small cap stocks
Regression of excess returns on Fama-French factors
June 2011 to March 2016

29/06/2011 - 29/02/2016	AB EM - RFR		MSCI EM - RFR	Small/Large	Value/Growth	Intercept
AB EM Annualized Excess Return	-1.91%	=	-4.25%	0.43%	1.01%	0.91%
Coefficients			0.77	0.15	-0.25	
Regression t-statistic			94.08	6.33	-7.98	
Level of significance			100.0%	100.0%	100.0%	

Returns are monthly returns over the risk-free rate (RFR), stated in USD and gross of fees. Source: TOBAM

The market cap weighted benchmark is by construction biased towards large market cap stocks. The Anti-Benchmark, on the other hand, is agnostic regarding market cap. One way to show this is to perform a regression of excess returns over the benchmark on the classical Fama-French factors (market, small vs. large and value vs growth) to assess the impact of the Small/Large, Value/Growth factors in the explanation of excess returns. The results can be seen in Figure 3 above.

Over the period under consideration, the small/large market cap factor has contributed a positive excess return of 0.43% (annualised). This is much smaller than the impact of the Market Factor in absolute terms (4.25%), and less than half the impact of the Value/Growth factor (1.01%).

3. The Anti-Benchmark Emerging Markets – a lower correlation portfolio relative to the benchmark and to peers

How does the AB EM portfolio help in diversifying the risk at the strategy level?

To answer that question, we compute the correlation of monthly returns vs. the benchmark and vs. the comparison set. As the peer group is made of the largest strategies in terms of AuM, as well as largest collectors, it could be considered as being relatively well representative, even if not homogeneous: the strategies included in the peer group includes pure active managers, trackers, strategies that are not 100% EM invested but still classified as EM strategy by Morningstar.

Figure 5: Correlation of monthly returns vs. MSCI EM and vs. comparison set
June 2011 to March 2016

Strategy	Average Correlation Absolute Returns vs Other Funds	Average Correlation Relative Returns vs Other Funds	Correlation Vs Benchmark	Final RANK
TOBAM AB EM	92.79%	17.96%	95.5%	2
Strategy 1	96.55%	34.97%	98.8%	23
Strategy 2	94.67%	36.44%	95.3%	11
Strategy 3	94.99%	0.64%	98.3%	7
Strategy 4	94.62%	31.20%	95.7%	8
Strategy 5	89.42%	38.91%	87.2%	5
Strategy 6	96.26%	41.31%	97.5%	22
Strategy 7	96.32%	19.03%	100.0%	21
Strategy 8	95.87%	-22.30%	99.9%	16
Strategy 9	91.73%	14.03%	93.7%	1
Strategy 10	89.81%	35.68%	88.2%	5
Strategy 11	96.59%	40.08%	98.9%	24
Strategy 12	93.47%	15.47%	95.7%	3
Strategy 13	93.21%	19.31%	95.3%	4
Strategy 14	96.07%	16.80%	99.2%	20
Strategy 15	95.24%	32.09%	96.4%	13
Strategy 16	94.54%	39.53%	94.8%	10
Strategy 17	95.55%	33.60%	97.5%	17
Strategy 18	95.64%	34.72%	97.3%	19
Strategy 19	95.29%	7.28%	98.8%	12
Strategy 20	95.43%	26.08%	97.7%	15
Strategy 21	94.57%	39.21%	94.8%	9
Strategy 22	95.63%	24.22%	98.2%	17
Strategy 23	95.12%	20.14%	97.7%	13

Source: Bloomberg, TOBAM

We consider three different correlations calculations:

- First, we look at the average correlation of monthly returns vs. the returns of the other funds. This is, for all cases, above 89%. It reflects that the “market” is the prime risk factor for all funds.
- We look at the average correlation of each fund’s relative returns (vs. the MSCI benchmark), against those of the other funds. Here we find larger divergences, with the Anti-Benchmark average correlation vs. other strategies just below 18%.
- Finally, we compute the correlation with the benchmark itself, and again the Anti-Benchmark is on the low side.

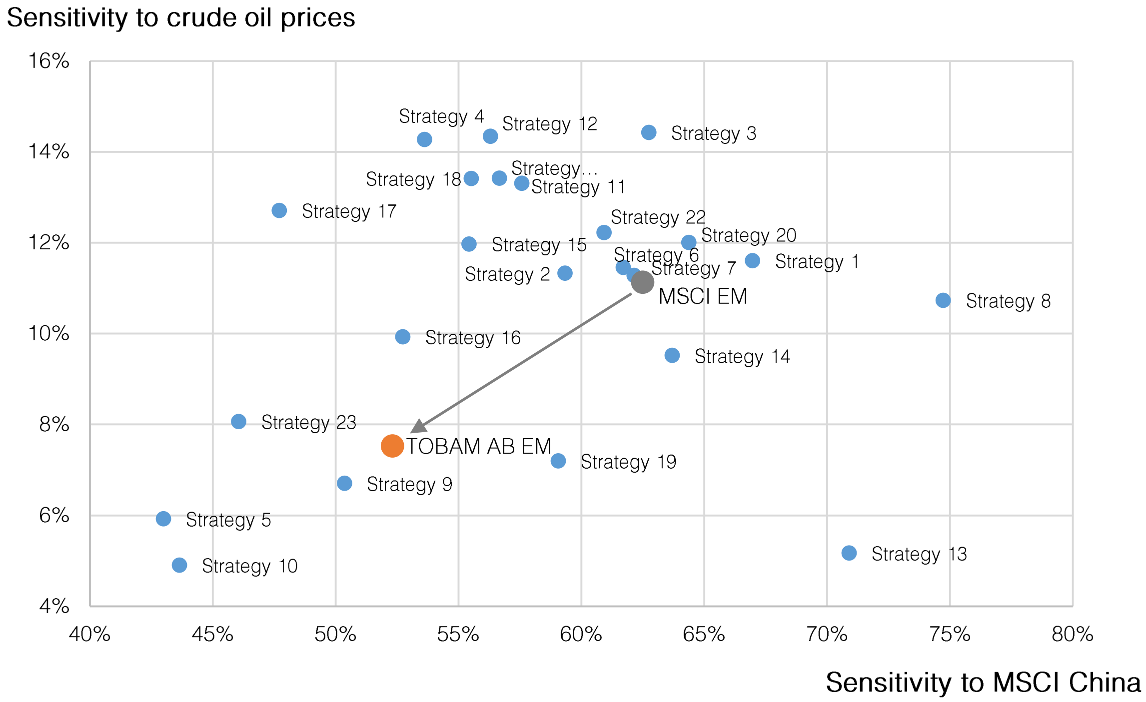
To aggregate the results into a comprehensive measure, we have computed the funds’ rank for each correlation and averaged to get to the final rank. The result is that the Anti-Benchmark ranks 2nd in the ranking of lowest correlation funds. Of note, the number one in our sample is a fund that may invest only two thirds of its assets in EM equities, hence it may well be “less” correlated to EM than the Anti-Benchmark by construction.

4. Anti-Benchmark Emerging Markets vs. Oil and China: diversifying major risk factors

We consider in this last chapter of our analysis, two particular biases that are of significant importance in today’s market environment: the exposure to Commodities (and oil specifically) and the exposure to Chinese equities.

Over the last year, for instance, China has represented about 28.5% of the MSCI EM index (with Chinese Financials representing about 9.75% of the index). The correlation of the MSCI EM with Chinese stocks has been increasing since the beginning of 2015 (50.3% at the end of January 2015) and it now stands at over 87%. The correlation of the benchmark with oil prices while unstable between crisis, shows some re-correlation patterns during crisis.

Figure 6: Sensitivities to Crude Oil prices and MSCI China - Risk factor regression
February 2015-February 2016, weekly returns



Source: Bloomberg, TOBAM

Figure 6 shows the results of a return regression using the MSCI China and Crude Oil prices as risk factors, using one year of weekly data. We can observe how the AB EM shows a low sensitivity to both risk factors. These sensitivities are well below that of the MSCI EM, and to the median or average sensitivity across all strategies considered. This is in line with TOBAM's investment philosophy – the Anti-Benchmark does not necessarily exhibit the lowest sensitivity to every risk factor, it should be evenly exposed to all effective risk factors.

5. Conclusion

Inception to date, the Anti-Benchmark EM Equity strategy has proven to be:

- Attractive vs. the benchmark and the largest/most successful EM equity strategies around in terms of returns;
- Attractive vs. the benchmark and the largest/most successful EM equity strategies around in terms of risk, without a significant bias towards low volatility stocks;
- Lowly correlated to the largest EM equity strategies on the market, including the benchmark, making a case for a potential efficient combination with these strategies;
- Lowly correlated on a relative basis vs. the price of oil and the Chinese equity market.

For more information

TOBAM is an asset management company offering innovative investment capabilities whose aim is to maximize diversification. TOBAM's Maximum Diversification® approach, supported by original, patented research and a mathematical definition of diversification, provides clients with diversified core exposure, in both the equity and fixed income markets. The company manages $8 billion (March 2015) via its Anti-Benchmark® strategies in Equities and Fixed Income. Its team includes 41 investment professionals.

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