TOBAM*
Core investments

Diversification Dashboard
February 29, 2012

Diversification Update at 29/02/2012

TOBAM's Diversification Ratio (DR)[1] measures to what extent a portfolio is diversified. The DR^2 (square of the diversification ratio) corresponds to the number of independent degrees of freedom in a particular portfolio – or the number of independent variables at work. As the table shows, the "broad market" indices leave diversification on the table. In addition to a snapshot of each market's DR^2, the table shows the DR^2 of a well-diversified portfolio, and the fraction of available diversification used by the index.

	DR^2 - Index diversification	*DR^2 - Maximum diversification*	*% diversification used by index*
MSCI EMU	1.66	3.65	*46%*
MSCI US	1.74	3.72	*47%*
MSCI UK	1.80	2.92	*61%*
MSCI Japan	2.02	5.06	*40%*
MSCI World	2.31	5.06	*46%*
MSCI Australia	1.66	2.76	*60%*
MSCI Emerging[2]	2.92	4.16	*70%*

Diversification runs deeper than sector allocation

We aim to shed light on the way the Anti-Benchmark portfolio maintains maximum diversification among industry sectors by examining the portfolio's correlation to these sectors, and not simply the portfolio's sector weights. We show in this short note that just looking at a given portfolio's sector weightings does not give a complete picture of the nature of this portfolio's sector exposures. The following table shows the AB World portfolio's average correlations with each industry sector, for the year ended December 31, 2011:

Sector Correlations with AB World Portfolio

Sectors	*AB Correlation to Sector**	*AB Weight***
Energy	83.5%	0.00%
Materials	85.7%	9.36%
Industrials	88.5%	5.63%
Consumer Discretionary	89.3%	14.78%
Consumer Staples	85.8%	27.88%
Health Care	87.6%	8.76%
Financials	83.0%	7.55%
Information Technology	85.0%	5.17%
Telecommunication Services	82.8%	5.78%
Utilities	82.1%	14.07%

**Average correlation over 2011 (daily data)*

***Portfolio weight as of 31.12.2011*

Consider for example the Energy and Utilities sector weights in the Anti-Benchmark: as indicated to the left, the portfolio does not hold any Energy stocks, and its third largest sector holding is in the Utilities sector. At first glance, one might be tempted to conclude that the portfolio has a zero exposure to the Energy sector, and a rather high exposure to the Utilities sector. This conclusion would be correct if all sectors were uncorrelated. This is clearly not the case; it is possible, for example, for a portfolio to invest in a given sector (A) that is highly correlated to another sector (B),

[1]TOBAM's Diversification Ratio measures a portfolio's or index's diversification. It is supported by original research and is based on a mathematical definition of diversification. TOBAM's "Anti-Benchmark" Most Diversified Portfolio® maximizes this Diversification Ratio. Maximizing diversification within a universe of securities provides a result closer to the true market risk premium from that universe. "Maximum Diversification®" and "MaxDiv®" are registered trademarks of TOBAM.

[2] The Anti-Benchmark Emerging Markets Equity strategy filters the reference index to the 200 largest market capitalizations.

and as such achieve a significant exposure to sector B, without actually holding any stock belonging to it.

The above table illustrates this phenomenon: the Anti-Benchmark is actually more correlated to the Energy sector – in which it does not hold any stocks – compared to the Utility sector – to which it has a sizeable allocation.

This is a result of maximum diversification: the AB portfolio is by construction more correlated to the assets it does not hold than to those it holds. In the case of Energy, the AB World portfolio is already exposed to the effective risk factors underlying this sector via its other holdings. Holding additional Energy stocks would be redundant and most likely lower portfolio diversification. Conversely, the Utilities stocks held provide additional diversification, seen via the lower correlation despite the 14% allocation to the sector.

Regardless of a stock's sector label, the AB aims to select the least correlated stocks from a bottom-up perspective. The resulting sector allocation consistently favors the *most diversified* sectors that also have the *most diversifying* potential compared to other sectors.

For more information

TOBAM is an asset management company offering innovative investment capabilities whose aim is to maximize diversification. TOBAM's flagship Anti-Benchmark® strategies, supported by original research and a mathematical definition of diversification, provide clients with diversified core equity exposure, both globally and in domestic markets. FTSE also publishes the FTSE TOBAM Maximum Diversification Index Series based on the Anti-Benchmark equity portfolio construction methodology. The company manages over $2.3 billion via its Anti-Benchmark strategies for institutional clients worldwide. Its team includes sixteen financial professionals based in Paris, Los Angeles and Amsterdam (29.02.2012).

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