

DIVERSIFICATION DASHBOARD

September 2017

Diversification Ratios®

TOBAM's Diversification Ratio® (DR) measures to what extent a portfolio is diversified. The DR² (square of the diversification ratio) measures the number of independent sources of risk to which a portfolio is exposed. As the table shows, the "broad market" indices do not fully utilise diversification capabilities. 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	DR² Index diversification	DR² Maximum Diversification®	% diversification used by index
		MSCI All Countries World	8.34	20.49
	MSCI World	7.60	15.94	47.7%
	MSCI US Equity	5.12	10.72	47.8%
	MSCI Canada	5.74	10.70	53.6%
	MSCI Emerging Markets	5.20	10.44	49.8%
	MSCI Pacific Ex-Japan	3.84	8.51	45.2%
	MSCI UK Equity	4.51	7.46	60.5%
	MSCI Japan	2.83	6.97	40.5%
	MSCI EMU	3.20	6.81	47.1%
	BofA Merrill Lynch US Corporate & High Yield	5.65	7.17	78.9%
	BofA Merrill Lynch Global High Yield	6.17	7.81	79.1%

Source: TOBAM, figures as of August 31, 2017.

Measuring the impact of Norges Bank exclusion list on the Anti-Benchmark® strategies and the Maximum Diversification® Indices

In this month's Diversification Dashboard, we research and discuss the impact of applying Norges Bank exclusion list to both the Anti-Benchmark® strategies and the Maximum Diversification® Indices.

1. Description

a) TOBAM's Sustainable and Responsible Investment approach

TOBAM offers a quantitative management style, which integrates socially responsible investment criteria in all open-ended portfolios, all public indices and most of our mandates.

In TOBAM's view, ESG issues are not to be considered "extra-financial" criteria, as they form an instrumental part of the factors to be considered, alongside traditional ones. TOBAM has decided to apply an exclusion policy, suited to its quantitative process, which consists of excluding companies from the investment universes that have unacceptable ESG practices and are consequently exposed to material impacts arising from significant risks (reputational, legal..).

Applied to Equity Anti-Benchmark® strategies since 2007, to Fixed Income Anti-Benchmark® strategies and Maximum Diversification® indices since their inception (2014 and 2011 respectively), this negative screening is based on the exclusion list published by a renowned investment institution and founding member of the PRI, Norges Bank, whose:

- Approach is both transparent and readily accessible
- Exclusion list is aligned with the PRI guidelines without seeking to impart a moral judgment
- Research approach embodies a constructive dialogue with companies that aims to encourage better ESG practices and disclosure
- Engagement approach respects TOBAM's beliefs in the need to establish constructive dialogue with economic players.

b) Evolution of Norges Bank exclusion list

1. Before April 2016

Norges Bank decides on the exclusion of companies from the fund's investment universe, or places companies on an observation list, based on the recommendation of the council on ethics appointed by the Ministry of Finance. Decisions are regulated by the guidelines for the observation and exclusion of companies based on a list of criteria such as:

- Product-based exclusions:
 - ✓ Production of cluster munitions
 - ✓ Production of nuclear weapons
 - ✓ Production of Tobacco
- Conduct-based exclusions
 - ✓ Serious violations of human rights
 - ✓ Severe environmental damage
 - ✓ Gross corruption
 - ✓ Serious violations of individuals' rights in situations of war or conflict
 - ✓ Other particularly serious violations of fundamental ethical norms

These guidelines translated, as of April 13, 2016, into the exclusion of 39 stocks of the MSCI ACWI Index (3.44% of the Index), 24 stocks of the MSCI World Index (3.61%) and 15 stocks of the MSCI EM Index (1.96%).

2. Since April 2016: 3 steps of exclusion of companies related to the production of coal or coal-based energy

In April 2016, Norges Bank decided to divest from companies that generate more than 30% of their output or revenue from coal-related activities.

The process of identifying companies for exclusion is complex. Also in order to let companies an opportunity to give their input before they were excluded, Norges Bank decided to proceed in

several rounds of public disclosure of lists of companies that are excluded based on this new product-based coal criterion.

The addition of this criterion to the guidelines had a significant impact on the overall exclusion list of Norges Bank:

- On April 14, 2016, Norges Bank added 52 companies to its exclusion list, as a result of Norges Bank Investment Management's analysis of a first tranche of companies that could be affected by the criterion. In practice, this guideline translated into the exclusion of 23 stocks from the MSCI ACWI Index, 9 stocks from the MSCI World Index, and 14 stocks from the MSCI EM index.
- A second round of analysis was conducted in December 2016 and led to the exclusion of 15 companies from the Government Pension Fund Global (GPF) investment universe.
- A third tranche of exclusions was implemented on March 2017, with a further 10 exclusions from the GPF investment universe.

In total, as of March 2017, Norges Bank excludes 69 companies and places 13 companies under observation based on the product-based coal criteria.

2. Impact of the exclusion

In this section, we will first measure the impact of the exclusion list in the long run, from a general standpoint, and then specifically analyse the consequences that the 2016 coal-related exclusions had on the Diversification Ratio[®] of our strategies (Anti-Benchmark[®] strategies and Maximum Diversification[®] Indices) in order to determine if a "shock" on the list (i.e. an important number of exclusions at once) had a significant impact on the portfolios' characteristics.

We use the MSCI ACWI Index, MSCI EM Index, MSCI WORLD Index and MSCI USA Index as investment universes. TOBAM's strategies benchmarked against these 4 benchmarks currently represent 87% of TOBAM AuM.

We conduct the back-tests applying identical conditions/parameters that we currently implement in the Anti-Benchmark[®] live funds and Maximum Diversification[®] Indices.

In part a and b of this document, we examine the risk & return characteristics of the back-tested portfolios with and without the implementation of Norges Bank blacklist. It is worth noting that, we apply the exclusions on a dynamic basis, as new companies are added or removed by Norges Bank. In part c, we focus on the impact of the April 2016 exclusions on the Diversification Ratio of the portfolios.

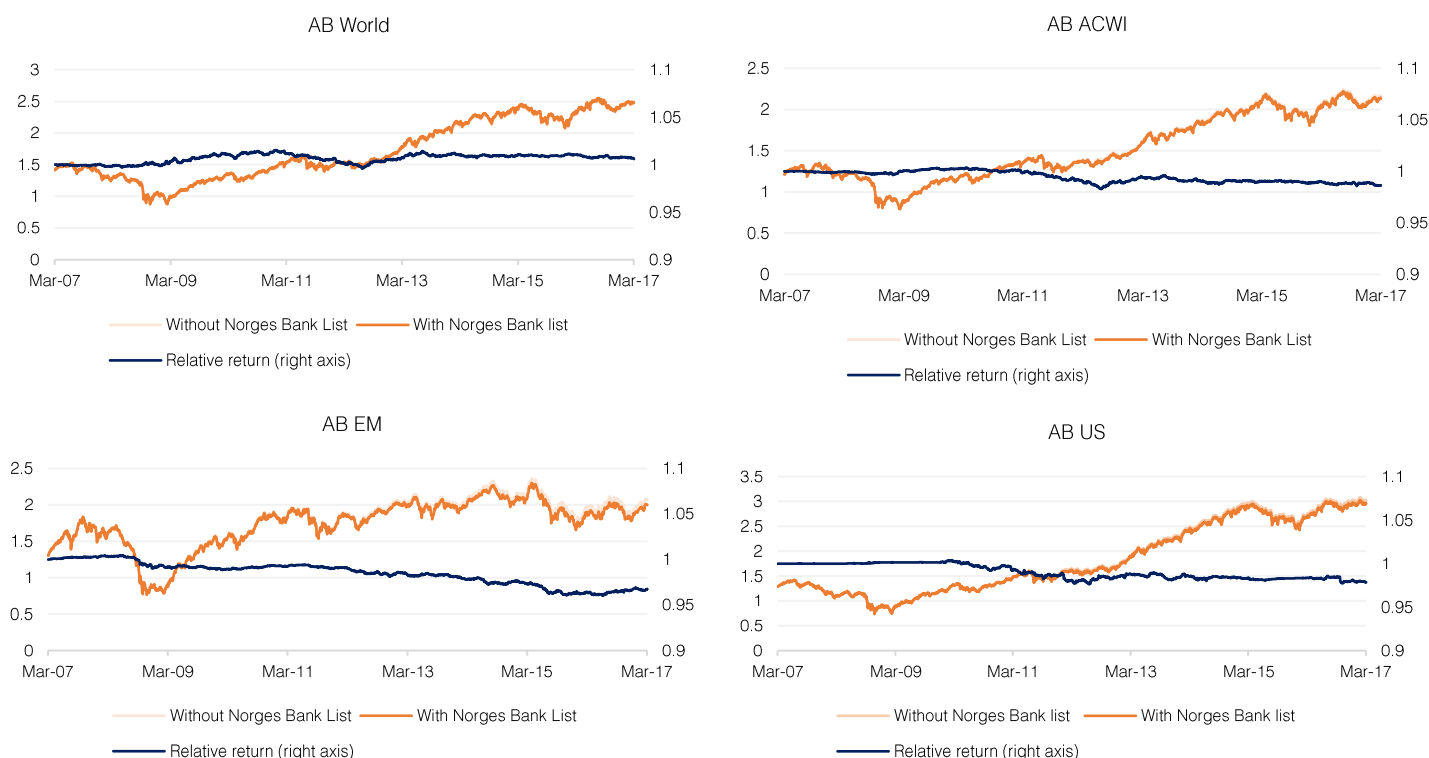
a) Measuring the long-term impact of the application of Norges Bank exclusion list on the Anti-Benchmark[®] strategies

Table 1: Impact of exclusion list on TOBAM's Anti-Benchmark[®] strategies

	Annualized Return	Volatility	Sharpe Ratio	TE to Bench	TE to AB w/o Exclusion List	Average DR ²
MSCI ACWI	4.74%	18.44%	0.26			4.13
AB ACWI	<i>without Norges Bank blacklist</i>	6.20%	11.82%	0.52	9.31%	13.35
	<i>with Norges Bank blacklist</i>	6.04%	11.85%	0.51	9.30%	13.37
MSCI WORLD	4.99%	18.58%	0.27			3.68
AB WORLD	<i>without Norges Bank blacklist</i>	5.94%	12.84%	0.46	8.46%	11.35
	<i>with Norges Bank blacklist</i>	6.00%	12.83%	0.47	8.47%	11.35
MSCI EM	3.16%	22.45%	0.14			3.20
AB EM	<i>without Norges Bank blacklist</i>	4.89%	16.68%	0.29	8.42%	8.22
	<i>with Norges Bank blacklist</i>	4.53%	16.75%	0.27	8.38%	8.19
MSCI USA	7.82%	21.17%	0.37			2.60
AB USA	<i>without Norges Bank blacklist</i>	9.26%	16.34%	0.57	8.91%	6.40
	<i>with Norges Bank blacklist</i>	9.01%	16.39%	0.55	8.90%	6.38

Source: TOBAM and MSCI. Calculations on the period March 30, 2007 to March 31, 2017. Past performance is not indicative of future results.

Chart 1: Risk/Return profile of the Anti-Benchmark[®] strategies with and without application of the exclusion list



Source: TOBAM. Data from March 30, 2007 to March 31, 2017. Past performance is not indicative of future results.

We observe that the application of Norges Bank exclusion list has no stable or significant impact on the Anti-Benchmark[®] strategy characteristics in terms of:

- Returns, in absolute and relative terms
- Risk, as measured by volatility
- Average Diversification Ratio². The Diversification Ratios[®] of the strategies with & without the application of the list stand at the same level, and remain much greater than the benchmark's
- Tracking Error

In particular, performance and volatilities of portfolios integrating Norges Bank exclusions can marginally fluctuate in both directions vs. portfolios without exclusions.

b) Measuring the long-term impact of the application of Norges Bank exclusion list on Maximum Diversification[®] Indices

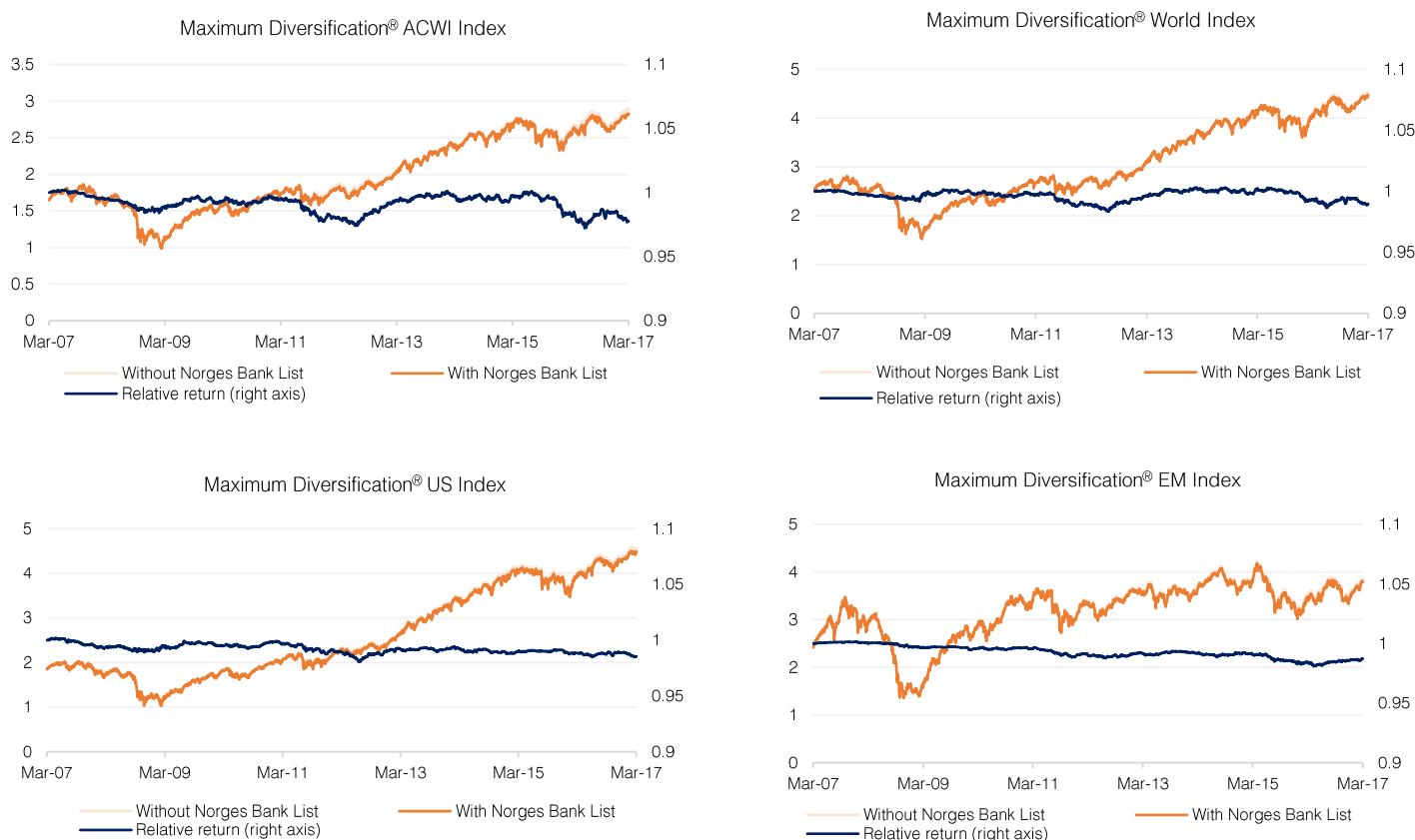
A similar analysis was conducted for the Maximum Diversification[®] Indices and similar results were observed.

Table 2: Impact of exclusion list on TOBAM's Maximum Diversification[®] Indices

		Annualized Return	Volatility	Sharpe Ratio	TE to Bench	TE to MaxDiv w/o exclusion list	Average DR ²
MSCI ACWI		4.74%	18.44%	0.26			4.13
MaxDiv ACWI	<i>w/o Norges Bank blacklist</i>	5.99%	14.11%	0.42	6.22%		7.18
	<i>w Norges Bank blacklist</i>	5.74%	14.41%	0.40	5.87%	0.85%	7.09
MSCI WORLD		4.99%	18.58%	0.27			3.68
MaxDiv WORLD	<i>w/o Norges Bank blacklist</i>	6.15%	14.25%	0.43	6.45%		7.10
	<i>w Norges Bank blacklist</i>	6.03%	14.45%	0.42	6.18%	0.61%	7.02
MSCI EM		3.16%	22.45%	0.14			3.20
MaxDiv EM	<i>w/o Norges Bank blacklist</i>	4.90%	18.37%	0.27	7.20%		6.51
	<i>w Norges Bank blacklist</i>	4.76%	18.46%	0.26	7.15%	0.36%	6.45
MSCI USA		7.82%	21.17%	0.37			2.60
MaxDiv USA	<i>w/o Norges Bank blacklist</i>	9.74%	18.54%	0.53	5.00%		4.33
	<i>w Norges Bank blacklist</i>	9.57%	18.79%	0.51	4.82%	0.60%	4.29

Source: TOBAM and MSCI. Calculations from March 30, 2007 to March 31, 2017. Past performance is not indicative of future results.

Chart 2: Risk/Return profile of the Maximum Diversification® Indices with and without application of the exclusion list



Source: TOBAM. Data from March 30, 2007 to March 31, 2017. Past performance is not indicative of future results.

c) Specific Impact of the April 2016 coal-based energy exclusions on the Diversification Ratios®

On the 14th of April 2016, Norges Bank decided to exclude 52 companies from its investment universe, based on a new product-based coal criterion. We look at the “shock” represented by this sudden increase in the number of exclusions and observe how it has impacted our portfolios.

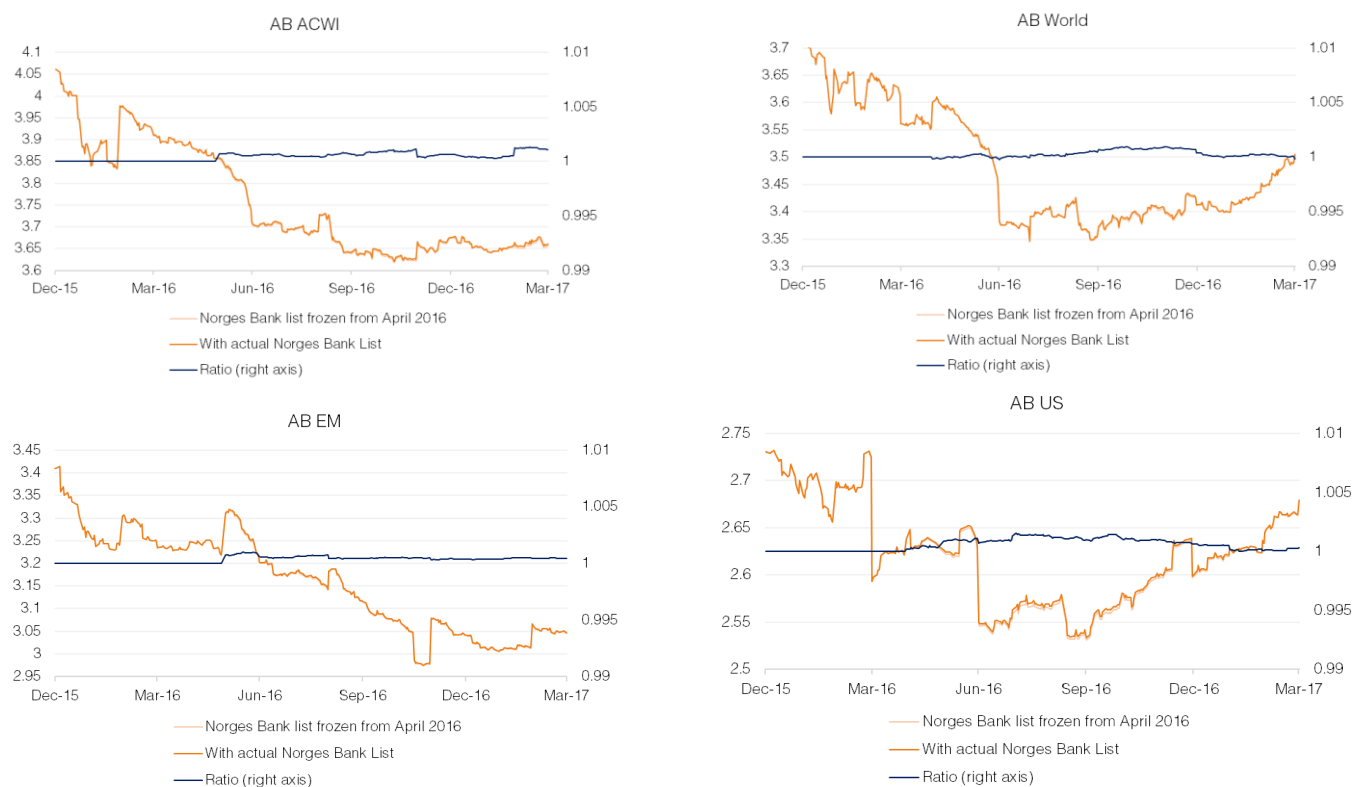
Table 3: Impact of coal-based energy exclusions on MSCI Indices

	% of exclusion in Norges Bank list		Impact of coal-related exclusion in %	Number of stocks excluded in Norges Bank exclusion list	
	13/04/2016	14/04/2016		13/04/2016	14/04/2016
MSCI ACWI	3.44%	3.88%	0.45%	39	62
MSCI World	3.61%	4.02%	0.41%	24	33
MSCI EM	1.96%	2.73%	0.77%	15	29
MSCI US	4.17%	4.79%	0.61%	13	20

Source: TOBAM and Norges Bank.

Chart 3 illustrates the impact of this new set of exclusions in Norges Bank exclusion list. We run the same back-tests as before. In one portfolio, the exclusion list is 'live' until March 2016 when the new carbon-related exclusions appear in the list, but thereafter it is frozen and subsequent exclusions are not applied. The other back-test applies the actual live Norges Bank exclusion list. We subsequently observe the Diversification Ratios[®] for both back-tests.

Chart 3: Diversification Ratios (DR) of the Anti-Benchmark[®] strategies with and without application of the first tranche of exclusion in April 2016.



Source: TOBAM. Data from December 2015 to March 31, 2017 Past performance is not indicative of future results.

As we can see in the few months after April 2016, we observe no significant impact on the DR[®].

Conclusion

The objective of this note is not to conclude or engage in a debate about the under/out performance of SRI portfolios vs. non-SRI portfolios, but rather to test and re-affirm some of TOBAM's principles in terms of portfolio implementation and investment philosophy:

- Implementation of the exclusion list has no significant impact on TOBAM's strategies' characteristics

The exclusion of the companies included in Norges Bank list is a material one (see table 3), however our analysis shows that its impact on TOBAM's strategies and indices is minimal. Notably, applying the exclusion list does not significantly impact the level of the Diversification Ratios[®] in TOBAM's strategies. It means that integrating the exclusion list in our investment process has not altered the nature of our strategies.

- Consideration for E, S and G issues in TOBAM's investment process contributes to encourage good practices

Being excluded by Norges Bank can have significant consequences for listed companies - first on their reputation, but also on their access to the financial markets.

Norway's Government Pension Fund Global is Europe's top pension fund in terms of assets under management¹ and is also one of the largest equity holders in the world. As a pioneer in Sustainable and Responsible Investment, their recommendations are followed by numerous asset owners and managers, hence further increasing the impact of their exclusions.

Consideration for good corporate governance, environmental and social issues can have a lasting, positive impact on the global investment industry. By applying this exclusion list to all **its** portfolios, TOBAM undertakes its part of this responsibility and strives to make a contribution, at its own level, to a global effort.

¹ Source: IPE's Top 1000 European pension funds – September 2017 supplement.



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 \$8.5 billion (June 30, 2017). Its team includes 54 investment professionals.

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