

DIVERSIFICATION DASHBOARD

Research Insights from Outside the Box

October 2020



Investing Sustainably without Giving Up Market Premium

Original research, actionable insight

A note from the CIO desk...



Investors, particularly those with long-term investment horizons, are increasingly turning their attention to the question of sustainability within their investments and, more particularly, how to implement a sustainable program aligned with their principal risk and return objectives. That is, how to invest sustainably without giving up market premium.

The task is not necessarily an easy one as it often entails translating the values of an investor into sustainability goals that are defined in a very individual way and, then, integrating the sustainability dimension into investment policy in an efficient and measurable manner.

This month, we challenge the widely cited notion that accommodating SRI investment policies necessarily impacts the risk-return behavior of the portfolio. Indeed, our research suggests that a portfolio construction approach that aims to maximize diversification, actually lends itself to accommodation of potentially highly restrictive SRI investment policies, without significant impact on the risk-return characteristics of the asset portfolio.

This is a great win for investors, their beneficiaries and stakeholders, and we are delighted to share our research with you in this month's Dashboard.

Tatjana

Dr. Tatjana Puhán
Deputy Chief Investment Officer

TOBAM 
CORE INVESTMENTS

out-of-the-box thinking

noun. Thinking that moves away from established convention to incorporate alternative perspectives and which sometimes leads to novel ideas and solutions.

Investing Sustainably without Giving Up Market Premium

Many investors are currently shifting their focus from purely risk-return based investment objectives towards the inclusion of a third dimension, which addresses the sustainability of the investments they make. While the academic literature is not conclusive about the consequences of this third dimension of portfolio construction¹, it is widely feared that very strict exclusion or integration policies could lead to significant changes in the risk-return behavior of portfolios, the consequences of which are hard to measure. A further potential issue is the impact of this shift in relative terms, i.e. the potential impact on tracking error.

Investment objectives related to sustainability goals may be very individual and depend largely on the values of the respective investors. Despite this, new benchmarks that implement a vast range of sustainable investment policies are popping up like mushrooms after a long summer rain. It is increasingly difficult for investors to navigate this jungle of exclusions, integrations and, then, to understand the real impact they have to expect of their decision to move toward a more sustainable investment policy.

TOBAM has established and illustrated that widely adopted cap-weighted benchmarks:

- are ill-constructed attempts to capture the market risk premium, and
- expose investors to a high time variation (often extreme) in idiosyncratic, sector or style specific risks.

In their place, we have highlighted that a portfolio that aims at a maximal level of diversification for a given investment universe (i.e. the Most Diversified Portfolio, “MDP”), can be considered that which best captures the market risk premium (alternatively defined as the return of the un-diversifiable portfolio).

In this Dashboard we draw attention to another remarkable characteristic of a Maximum Diversification[®] approach, that is, the ability to accommodate SRI investment policies without substantial impact on the risk-return behavior of the MDP.

First, we revisit the most important principles of the Maximum Diversification[®] portfolio construction approach to highlight the relevant features that conceptually allow an Anti-Benchmark[®] portfolio (which is the implementable version of the MDP applying a minimal set of constraints related to, for example, liquidity or other capacity related controls) to be relatively insensitive towards even very restrictive SRI investment constraints. We then explore the empirical evidence for this using the exclusion of fossil fuel applied to both Global High Yield and Emerging Markets equities investment universes as an example.

Our results can be summarized as follows, in the medium- to long-term:

1. all studied characteristics of the Anti-Benchmark[®] portfolio remain qualitatively unchanged when excluding fossil fuel related securities, and
2. the average level of diversification also remains largely unchanged following exclusion.

I. What is special about investing in a maximally diversified way?

To better understand why the MDP is particularly adapted to accommodating an SRI investment policy without giving up a significant amount of market risk premium, it is worthwhile revisiting certain core properties of the MDP that we have established previously.

Maximizing the diversification of a portfolio, using the Diversification Ratio[®] (“DR”), is equivalent to the notion of maximizing the number of independent effective risk factors that a portfolio can possibly be exposed to in each investment universe. Therefore, the number of assets is of little relevance, it is the correlation of the assets that mostly matters for constructing the portfolio that is maximally diversified.

¹ E.g. Rennebog et al., 2008, The price of ethics and stakeholder governance: The performance of socially responsible mutual funds, Journal of Corporate Finance, 14 (3), pp 302-322.

In their 2013 paper, Choueifaty et al.² highlight several mathematical properties of the MDP. The first core property they introduce is the fact that “Any stock not held by the MDP is more correlated to the MDP than any of the stocks that belong to it. Furthermore, all stocks belonging to the MDP have the same correlation to it.” (Choueifaty et al., 2013 p. 5). This core property implies that all assets in the respective investment universe are effectively represented in the MDP, and there is no need for the MDP to physically hold a particular security to achieve this.

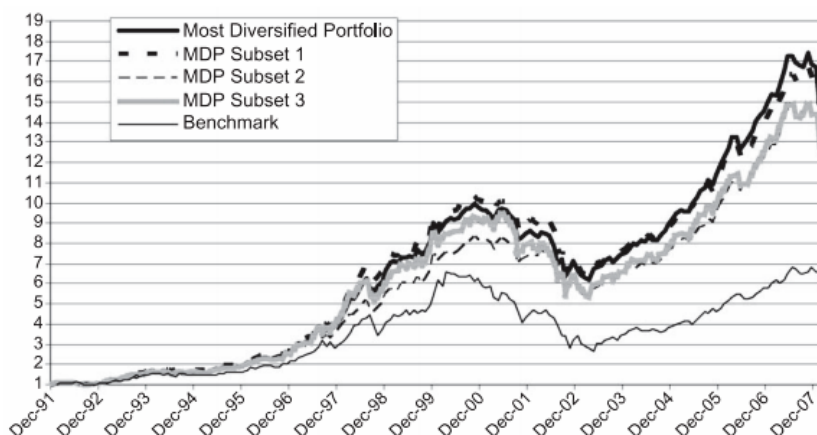
This core property suggests that the Maximum Diversification[®] approach is particularly suited to accommodating an SRI investment policy without giving up a significant market risk premium.

Consider, for example, a portfolio based on the S&P 500 investment universe. While the MDP may only be invested in around 50 stocks within the universe, it would be wrong to conclude that the portfolio is not diversified solely on the number of holdings and the size of their respective weights. Why? Since the 450 stocks outside the MDP are more correlated to the MDP than those 50 stocks in which it is invested. This is also in line with the notion that the MDP is the undiversifiable portfolio. By extension, even if we implement an SRI investment policy that is relatively restrictive in terms of the permissible universe, as long as we have a wide correlation spectrum of assets within the restricted universe, we are still able to construct a portfolio that is maximally diversified. In other words, the approach makes it relatively easy to replace an asset that is excluded for SRI reasons with another asset that contributes a qualitatively similar level of diversification.

An alternative definition of this core property is to say that “The long-only MDP is the long-only portfolio such that the correlation between any other long-only portfolio and itself is greater than or equal to the ratio of their DRs.” (Choueifaty et al. 2013, p. 6). It implies that the more diversified any given portfolio within the same investment universe of the MDP is, the more it is correlated with the MDP. Applied to the concrete context of an SRI investment policy, it means that as long as we can assure that the portfolio can still cover a wide correlation spectrum, we can obtain an SRI constrained portfolio that is sufficiently close to the MDP without these additional constraints.

Choueifaty and Coignard (2008)³ show empirically that, thanks to the specific portfolio construction approach of the MDP (i.e. portfolio construction along correlation between risk factors rather than specific stocks or sectors), we can even randomly exclude one third of the portfolio and still obtain a risk-return profile based on the remaining investment universe that is extremely similar to the original result (Figure 1).

Figure 1: Performance of Eurozone Most-Diversified Portfolios
Full universe versus three random subsets, 1992 - 2008



This result provides further support for the hypotheses that the MDP portfolio construction process lends itself particularly well to being used in the context of SRI investment policies.

² Choueifaty et al., 2013, Properties of the most diversified portfolio, Journal of Systematic Investing, 2(2), pp 1-22.

³ Choueifaty and Coignard, 2008, Towards Maximum Diversification, Journal of Portfolio Management, Fall, pp 40-51.

In the discussion that follows, we complement the existing evidence with more concrete empirical results showing that even relatively strict SRI investment policies should not substantially alter the level of diversification nor harm the risk-return profile of the resulting SRI compliant MDP - with empirical evidence.

II. Case Studies: Excluding Fossil Fuel Energies from Emerging Markets Equity and Global High Yield Portfolios

As we have noted, the investor debate concerning the role of fossil fuel energies within long term investment portfolios has increased. Indeed some have gone as far as to exclude the entire sector of fossil fuel energy production related companies, recognizing both long term investment horizons and a broader fiduciary duty.

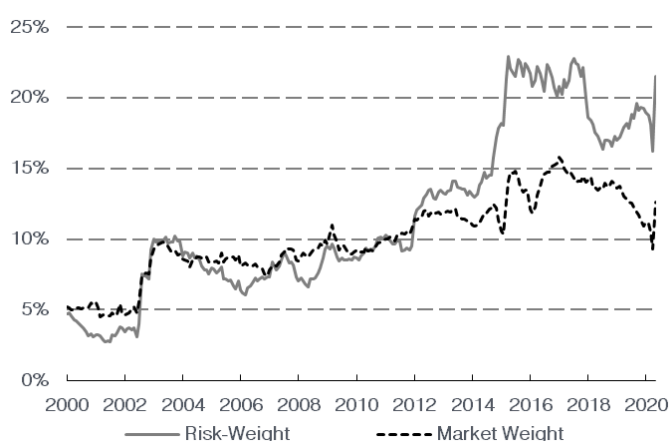
Given that some 20% of the investment universe (risk weighted) in the Global High Yield space is currently within the scope of a fossil fuel exclusion policy and the equivalent is more than 8% within Emerging Markets Equities, such an exclusion policy might raise concerns with traditional benchmark-oriented portfolio managers.

The next sections provide results for how a portfolio constructed based on correlations, and the maximization of diversification as the driving principle, masters this seemingly challenging task.

i. Global High Yield

Over the last decade, the global high yield bond market has seen a significant increase in energy company issuance. This in response to favorable oil price developments and the increasing energy demands of many fast-growing economies. As such, and as discussed in previous Dashboards and other publication outlets, the energy sector has, over the last several years, grown to represent a major risk concentration within the global high yield market. This concentration is so significant that excluding fossil fuel related⁴ issuers may result in the exclusion of more than 25% of the risk weighted bond universe of Global High Yield Bonds at certain periods (Figure 2).

Figure 2: Evolution of fossil fuel related issuer risk concentration
Risk and market weights of excluded Issuers in the BofAML Global High Yield Benchmark



Source: BofAML, TOBAM
Data shown from January 2000 to May 2020

So how does the Anti-Benchmark® portfolio behave in light of such a constraint? We first consider potential changes in the diversification characteristics, discuss thereafter any potential changes in the risk profile, and finally turn to performance dimension. Note that in the following discussion we apply the following convention for ease of understanding:

⁴ That is, companies with significant involvement in the production, sales or extraction of fossil fuels (including coal, coal power generation, oil and gas)

- the “unconstrained” portfolio is the Anti-Benchmark® portfolio where we do not exclude fossil fuel related companies, while
- the “constrained” portfolio reflects the Anti-Benchmark® portfolio where the exclusion is applied.

Table 1 summarizes key statistics concerning the diversification characteristics of the AB Global High Yield portfolio with and without fossil fuel constraint and the benchmark. While the Anti-Benchmark® portfolio has in both cases a substantially higher level of diversification than the benchmark, there is no significant difference between the unconstrained and the constrained Anti-Benchmark® portfolio.

Table 1: Diversification Properties
Constrained versus unconstrained Global High Yield Portfolios

	Unconstrained Global High Yield	Constrained Global High Yield	Benchmark
DR ²	9.94	9.37	4.43
DR ² vs Benchmark ⁶	221%	209%	--

Source: TOBAM, BofAML. TOBAM calculations – from December 31, 1999 to May 28, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched.

Next, we consider how key relative risk metrics change once the constraint on fossil fuel related investment is introduced (Table 2). Despite the relatively large weight of the Energy issuers in the Benchmark, the tracking error between both Anti-Benchmark® portfolios is relatively small compared to the quite sizeable tracking error that both portfolios have against the benchmark.

Moreover, it is noticeable that the Anti-Benchmark® portfolio with and without the constraint are almost perfectly correlated over the period, in spite of a significant active share of 31% between both Anti-Benchmark® portfolios. This is a clear illustration of one of the core properties of the MDP discussed earlier – that the approach allows the construction of a portfolio that is qualitatively extremely similar, even if we exclude a large part of the investment universe.⁶

Table 2: Relative Risk Properties
Constrained versus unconstrained Global High Yield Portfolios

Portfolio	Tracking Error vs.		Correlation vs.			1-way Active Share vs.
	Unconstrained GHY	Benchmark	Unconstrained GHY	Constrained GHY	Benchmark	Unconstrained GHY
Unconstrained GHY	--	3.22%	--	0.98	0.90	--
Constrained GHY	1.27%	3.38%	0.98	--	0.89	31

Source: TOBAM, BofAML. TOBAM calculations – from December 31, 1999 to May 28, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched.

Finally, we turn to key return and absolute risk metrics to verify whether we can find any substantial difference between the constrained and the unconstrained portfolios.

Figure 3 plots the cumulative performance of both the constrained and unconstrained Anti-Benchmark® portfolio alongside the Benchmark, while Table 3 summarizes key risk and return statistics. While both Anti-Benchmark®

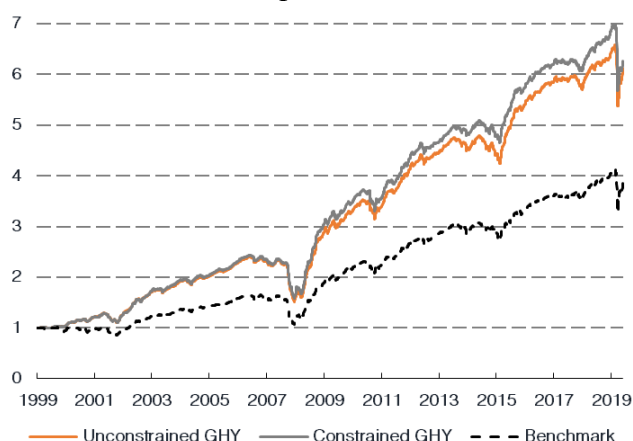
⁵ The square of the Diversification Ratio® (“DR²”) measures the number of independent sources of risk within a portfolio. The higher/ lower the DR² the greater risk diversification/ concentration within the portfolio.

⁶ We recognise, however, that a well-diversified portfolio like the Anti-Benchmark® Global High Yield portfolio (unconstrained) will have been less exposed to the broader Energy sector than the benchmark over the past years, even if they were not formally excluded. This is a function of both the approach’s core objective (diversification) and the increasing risk concentration of Energy within the investment universe.

portfolios exhibit a higher gross performance and a lower volatility on average than the Benchmark, we cannot detect any significant difference between both Anti-Benchmark® portfolios across these dimensions over the simulation period.

While over shorter time horizons, there might have been somewhat more visible differences between the constrained and unconstrained portfolios, these shorter-term differences tended to level out over a reasonable investment horizon.

Figure 3: Cumulative Performance
Constrained/ unconstrained Global High Yield Portfolios versus Benchmark



Source: TOBAM, BofAML. TOBAM calculations – from December 31, 1999 to May 28, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched. Back tested performance returns and/or charts illustrating performance provided on this page are gross of management fees, sales charges and other commissions, other taxes and relevant costs to be paid by an investor are not included in the calculations. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested. Performance details provided are in USD hedged and does not include reinvested dividends. Performance net of fees and is calculated to be 8.58% annualized. We believe this is a fair estimate of fees impact on AB GHY (constrained) Strategy focused in the HY asset class. We estimate transaction costs for the AB GHY (constrained) to be equal to 0.5% annualized.

Table 3: Performance and Risk Summary
Constrained/ unconstrained Global High Yield Portfolios and Benchmark

	Unconstrained Global High Yield	Constrained Global High Yield	Benchmark
Return p.a.	9.23%	9.17%	6.82%
Excess Return p.a.	2.41%	2.35%	--
Volatility p.a.	7.13%	6.98%	7.51%
Return/ Volatility	1.29	1.31	0.91
Beta	0.86	0.83	1
Drawdown	36.21%	36.82%	35.20%

Source: TOBAM, BofAML. TOBAM calculations – from December 31, 1999 to May 28, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched. Back tested performance returns and/or charts illustrating performance provided on this page are gross of management fees, sales charges and other commissions, other taxes and relevant costs to be paid by an investor are not included in the calculations. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested. Performance details provided are in USD hedged and does not include reinvested dividends. Performance net of fees and is calculated to be 8.58% annualized. We believe this is a fair estimate of fees impact on AB GHY (constrained) Strategy focused in the HY asset class. We estimate transaction costs for the AB GHY (constrained) to be equal to 0.5% annualized.

ii. Emerging Markets Equity

Next, we study the behavior of both constrained and unconstrained Anti-Benchmark® portfolios within an Emerging Markets Equity investment universe.

While fossil fuel related companies are less prevalent as a percentage of total risk in Equity markets compared to the High Yield market, they remain a relatively important part of the Emerging Markets Equity universe. Fossil fuel related companies now represent more than 8% of the MSCI Emerging Markets universe (at 31 March, 2020), although we have seen this risk exposure rise above 9% at times.

As highlighted in Table 4, excluding fossil fuel related companies from the MSCI Emerging Markets investment universe results in limited change in terms of the diversification properties for the Anti-Benchmark® Emerging Markets Equity portfolios with, or without, the additional constraint.

Table 4: Diversification properties
Constrained versus unconstrained Emerging Markets Equity Portfolios

	Unconstrained Emerging Markets	Constrained Emerging Markets	Benchmark
DR ²	7.71	7.58	3.36
DR ² vs Benchmark	229%	226%	--

Source: TOBAM, Bloomberg. TOBAM calculations – from 30th of June 2004 to March 17th, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched.

Next, in Table 5, we consider again whether the exclusion of fossil energy related companies creates a sizeable wedge between the relative risk and correlation characteristics of the constrained vs the unconstrained Anti-Benchmark® portfolios.

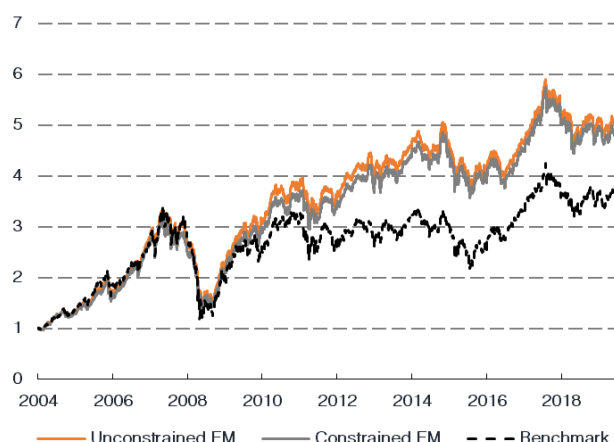
Table 5: Relative Risk Properties
Constrained versus unconstrained Emerging Markets Equity Portfolios

Portfolio	Tracking Error vs.		Correlation vs.			1-way Active Share vs.
	Unconstrained EM	Benchmark	Unconstrained EM	Constrained EM	Benchmark	Unconstrained EM
Unconstrained EM	--	9.22%	--	99.81%	88.29%	0.00%
Constrained EM	0.99%	9.28%	99.81%	--	88.13%	7.48%

Source: TOBAM, Bloomberg. TOBAM calculations – from June 30, 2004 to March 17, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched.

As seen in the High Yield universe, the performance consequences of a fossil fuel related company exclusion in Emerging Markets Equity remain limited relative to the unconstrained portfolio, and positive versus the benchmark (Figure 4 and Table 6). This confirms the notion that a portfolio that maximizes diversification does not depend on the presence of particular stocks in the portfolio per se. Instead, what really matters is the correlation spectrum that can be captured by those stocks that remain within the investable universe.

Figure 4: Cumulative Performance
Constrained/ unconstrained Emerging Markets Equity Portfolios versus Benchmark



Source: TOBAM, Bloomberg. TOBAM calculations – from June 30, 2004 to March 17, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched. Back tested performance returns and/or charts illustrating performance provided on this page are gross of management fees, sales charges and other commissions, other taxes and relevant costs to be paid by an investor are not included in the calculations. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested. Performance details provided are in USD hedged and does not include reinvested dividends. Performance net of fees and is calculated to be 7.27% and 7.97% annualized for the constrained and unconstrained strategy assuming a fee of 1% p.a.

Table 6: Performance and Risk Summary
Constrained/ unconstrained Emerging Markets Equity Portfolios and Benchmark

	Unconstrained Emerging Markets	Constrained Emerging Markets	Benchmark
Return p.a.	9.06%	8.81%	7.08%
Excess Return p.a.	1.98%	1.73%	--
Volatility p.a.	15.60%	15.90%	19.37%
Return/ Volatility	0.58	0.55	0.37
Beta	0.73	0.73	1
Drawdown	-57.64%	-57.74%	-65.14%

Source: TOBAM, Bloomberg. TOBAM calculations – from June 30, 2004 to March 17, 2020. Returns reflect back tested data for the entire time provided. Back tested results are for information purposes only. They are intended to illustrate how the Strategy may have behaved had it been launched. Back tested performance returns and/or charts illustrating performance provided on this page are gross of management fees, sales charges and other commissions, other taxes and relevant costs to be paid by an investor are not included in the calculations. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested. Performance details provided are in USD hedged and does not include reinvested dividends. Performance net of fees and is calculated to be 7.22% and 7.97% annualized for the constrained and unconstrained strategy assuming a fee of 1% p.a.

III. Conclusion

Alongside risk and return, an increasing number of investors, particularly those with long-term investment horizons, wish to add a third dimension – sustainability – as a component of portfolio construction. This dimension reflects the impact of their investment decisions on certain sustainability goals and may be defined in a very individual way reflecting the values of the respective investors.

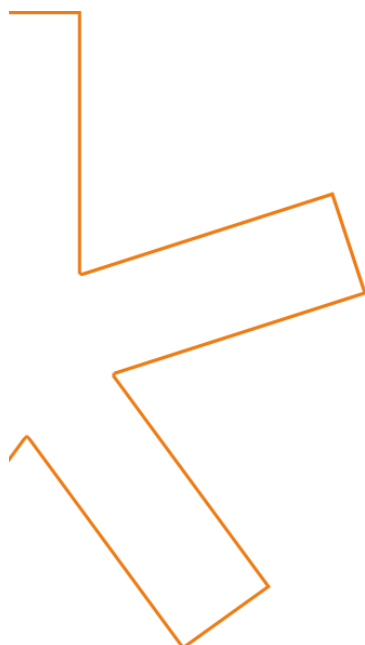
In this Dashboard we have seen that a portfolio construction approach based on correlations and with the express aim to maximize portfolio diversification along these correlations, lends itself to accommodating even very restrictive SRI investment policies, without significantly impacting the risk-return characteristics of the resulting asset portfolio.

Using the example of an exclusion of all fossil fuel related companies from both Global High Yield and Emerging Market Equities portfolios we complement a conceptual analysis with empirical evidence which demonstrates that the Maximum Diversification[®] construction approach is robust to significant exclusion policies.

Diversification was once described as “the only free lunch in investing” by Nobel Prize laureate Harry Markowitz. As ESG considerations gain momentum in the investment community, it is important to realize that diversification may very well be the only free lunch in sustainable investing as well.

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The Maximum Diversification[®] approach, TOBAM's flagship investment process founded in 2006, is supported by original, patented research and a mathematical definition of diversification and provides clients with diversified core exposures, across equity and fixed income markets.

In line with its mission statement and commitment to diversification, TOBAM also launched a separate activity on cryptocurrencies in 2017.

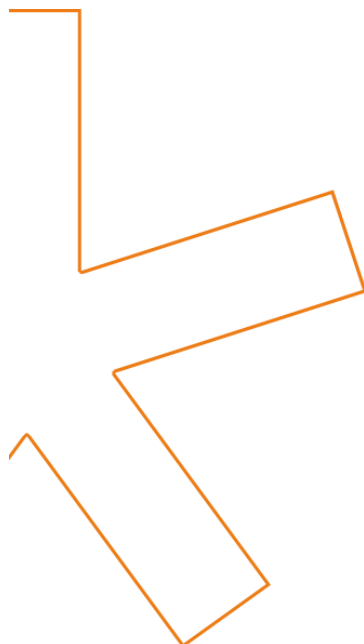
As at September 2020, TOBAM manages US\$8.1 billion on behalf of clients globally. TOBAM's team is composed of 48 professionals.

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