WHITE PAPER
FEBRUARY 2022

ADVANTAGES OF THE REAL ASSET ECOSYSTEM

Will Thomson and Chip Russell, Managing Partners

MASSIFCAPITAL

At Massif Capital, we take pride in addressing the needs of our investors as fully as possible. Sometimes this can be a challenge due to the diversity of investors we have, ranging from individuals to institutions, all of whom need or want something slightly different. To many, our investment focus appears to compound this challenge as it lends itself to not one but various justifications for investment and allocation. Some of our investors want a high-impact portfolio of assets that advance the goal of decarbonization; other investors are looking for emerging market industrial exposure, while still others are looking for more commodity business exposure.

That we can address all these challenges in a single portfolio is a testament to how poorly understood the complexity and economic breadth of our focus is.

That we can address all these challenges in a single portfolio is a testament to how poorly understood the complexity and economic breadth of our focus is. By confining our investing efforts to Energy, Materials, and Industrials, what we call the Real Asset Ecosystem, we are not creating a niche portfolio. Through a thoughtful and deliberately chosen focus, we free ourselves to explore deeply areas of the economy that are often afterthoughts for equity investors, improving our idea sourcing and expanding our edge.

The net result of all this is a portfolio that can flexibly accommodate the needs of many different types of investors, whether they be institutions that need to grow their allocation to commodities within the context of a broader asset allocation framework or individuals who want something more than the latest ESG ETF.

What follows is an exploration of the strengths of investing in the Real Asset Ecosystem and an explanation as to why we think it is a suitable time to allocate to it. If you find these arguments compelling, give us a call, as we are sure you will find our specific investment thesis even more exciting.

What is the Real Asset Ecosystem

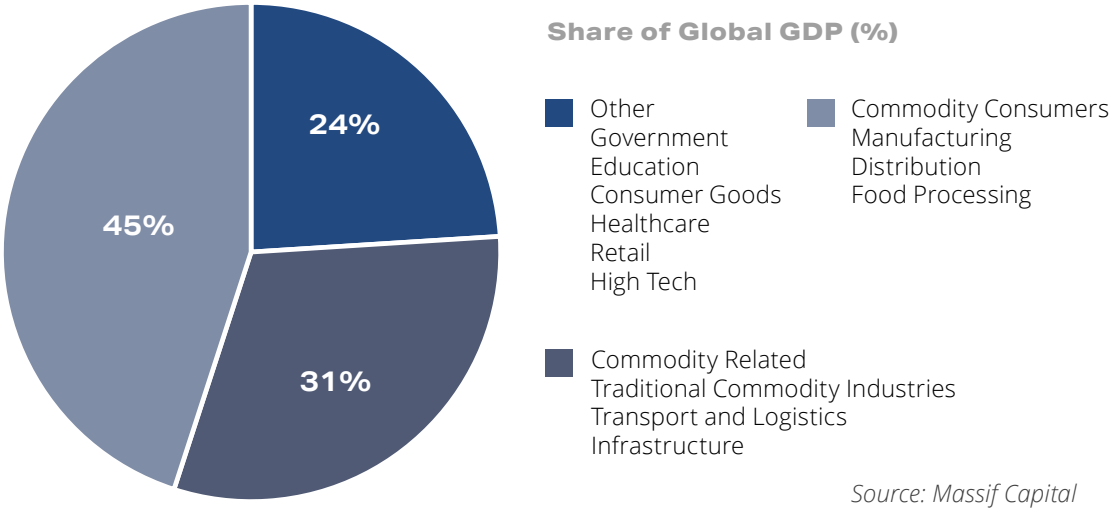
The Real Asset Ecosystem is Massif Capital's shorthand for the universe of firms we focus our investment efforts on. We call it the Real Asset Ecosystem because the businesses we invest in have their roots in what financial parlance terms real assets: natural resources and infrastructure. However our focus (and understanding) of what real assets are is broader, for a good reason.

In 1985 Michael Porter first described firm value chains as "the activities that are performed [by a company] to design, produce, market, deliver and support its product." Porter went on to highlight, in addition to the existence and importance of value chains within a company and the vertical linkages that exist within broader industry value chains. As Porter highlights:

> "Suppliers produce a product or service that a firm employee in its value chains, and suppliers' value chains also influence the firm at other contact points. A firm's procurement and inbound logistics activities interact with a supplier's order entry system, for example, while a supplier's applications engineering staff works with a firm's technology development and manufacturing activities. A supplier's product characteristic, as well as its other contact points with a firm's value chain, can significantly affect a firm's cost and differentiation."

The world of finance is uncomfortably full of arbitrary divisions such as value vs. growth. We choose to dispose of the somewhat arbitrary definition of real assets in favor of a more expansive definition. Our argument makes it less arbitrary for the very reason that Porter identified above: the contact points between industries and vertical value chains. The concentration of economic value chains can be seen by looking at aggregate economic data by industry.

Looking at global GDP data, we estimate that roughly 24% of global GDP is directly the result of natural resources business. A further 31% of global GDP arises via industries that are consumers of commodities. Thus, roughly 55% of the world's GDP rests within the vertical value chains of the related companies we focus on. Our focus is thus much less niche from an economic perspective than it initially appears.



Source: Massif Capital

Despite the economic cyclicality of these commodity-related value chains, many investors view parts of the chains as unsuitable investments. The argument proposed is that many of the factors these businesses are exposed to are exogenous to the realm company managers influence, making individual stock picking within cyclical businesses problematic. This could include everything from structural issues, such as substantial over or under capacity in a supply market, external shocks that drive demand, or unforeseen changes in regulations. Despite this, individual companies within commodity-related and commodity-consuming sectors outperform direct competitors over sustained periods. This reality creates ample stock-picking opportunities.

The linkages between commodity-related and commodity-consuming sectors are very tight, and events in one dramatically impact the value elsewhere in the value chains. Wherever events take place that negatively impact one link, somewhere else in that chain another link will benefit. Capturing that value is only possible if one invests in the expanded asset class. We want to have exposure to an economic footprint throughout the extended and complex commodity-related value chains so that, whenever there is downside risk in a link, there is value to be had in another link.

Our use of the word ecosystem to describe our focus is also deliberate. We use this term because ecosystems work through flows rather than static measures. Within ecosystems, resources are continually moving from one use to another use or reuse. This is very much true of the Real Asset Ecosystem in which, for example, unrefined lithium flows from a mining firm to a processer, who produces battery-grade lithium, to a battery cell manufacturer, to a battery pack assembler, and final to Foxconn and Apple to be placed in an iPhone.

Our focus aims to study, value, and capitalize on that flow of material through the economy up until it transitions into the hands of consumer-facing businesses, a point at which we have chosen to draw a line that is admittedly somewhat arbitrary between consumer-facing and business-facing. There are other portfolio diversification reasons to invest in this broader real asset ecosystem. However, at a philosophical level, the ability to capture the value generated across vertical value chains is at the core of our Real Asset Ecosystem approach.

Why the Real Asset Ecosystem for the Future

The Real Asset Ecosystem is a dynamic, high-tech, and diverse grouping of businesses vital to modern economies. It combines science and engineering with business and finance, and it is fueled by a drive for discovery.

The Real Asset Ecosystem is a dynamic, high-tech, and diverse grouping of businesses vital to modern economies. It combines science and engineering with business and finance, and it is fueled by a drive for discovery. As a collection of companies, the ecosystem requires the expertise of a vast array of participants, where technical and business professionals work alongside entrepreneurs, risk-takers, and creative thinkers to discover, develop, operate, and decommission the mines, factories, refineries, and infrastructure the make modern life possible.

The ecosystem provides the raw, refined, and manufactured durable goods needed for almost all other economic sectors and supports the economic development of countries and communities across the globe. The companies in the ecosystem are continuously striving to operate more efficiently, limit the impact on the environment, and support the economic and social development of their communities.

As the world pushes towards decarbonization goals, the products of the Real Asset Ecosystem will continue to play a vital role in the development of emerging industries such as renewable energy technologies and old but still vital economic sectors, such as chemicals and steel. While the ecosystem comprises companies that often appear to be part of the past, this is far from the case. They are crucial to the present and future.

The global transition to a low-carbon economy will result in new capital formation. Growth will begin to define sub-sectors of the economy that haven't experienced double-digit growth rates in 40 years. Innovation will permeate through to new business models and create structural changes to the links between sectors. Policy efforts will grow stronger to control an undoubtedly messy and complex transitionary period. This is a fruitful sandbox for active management for the next decade, and we're excited to explore this changing environment with our readers in real-time.

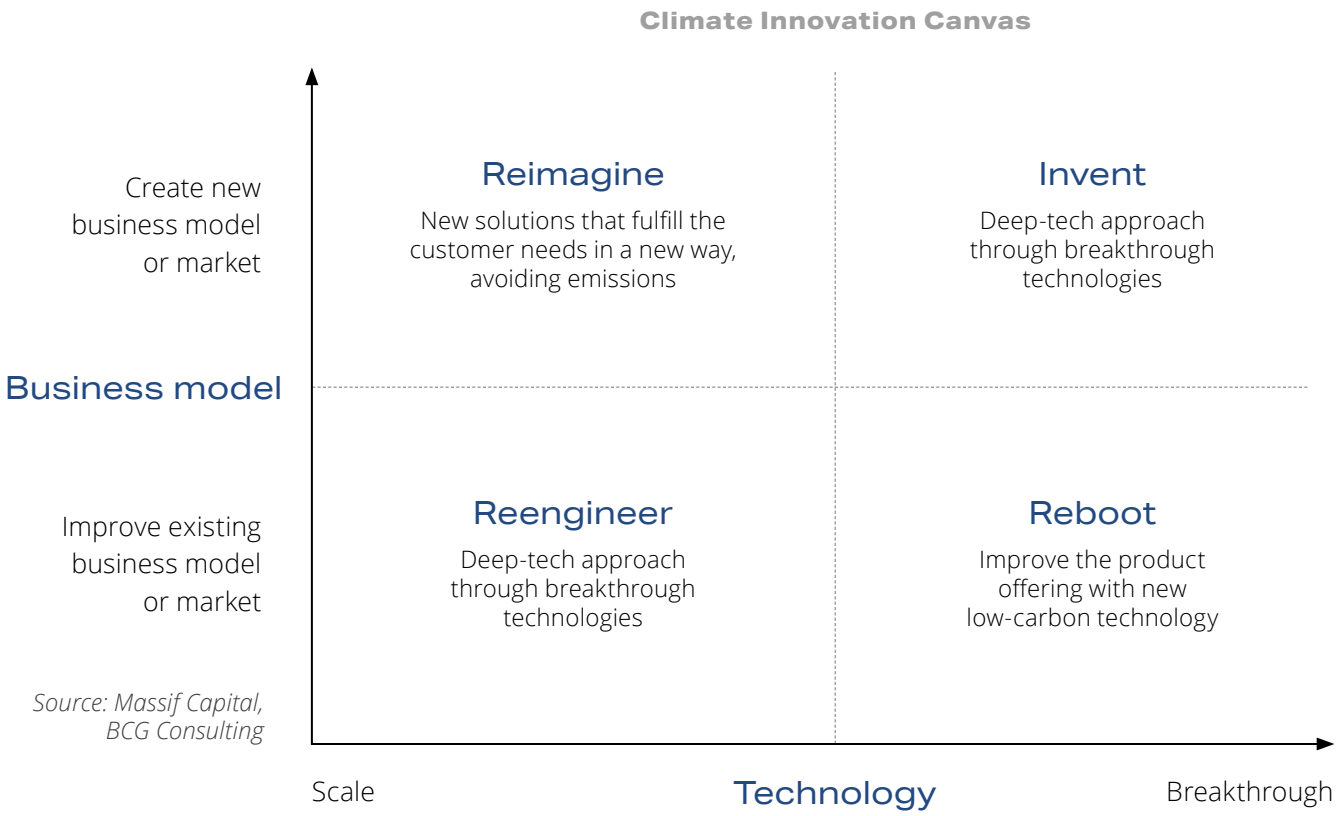
Growth: For the next two decades, growth in the Real Asset Ecosystem will be driven by adaptation to decarbonization efforts. It significantly boosts society's material demands as we shift from a carbon-intensive industrial base to a material-intensive but carbon lite industrial base.

Growth: For the next two decades, growth in the Real Asset Ecosystem will be driven by adaptation to decarbonization efforts. It significantly boosts society's material demands as we shift from a carbon-intensive industrial base to a material-intensive but carbon lite industrial base. As a recent World Bank study noted: "technologies assumed to populate the clean energy shift … are in fact significantly more material-intensive in their composition than current traditional fossil-fuel-based energy supply systems."

The result is that an energy plan proposed earlier this year by the IEA, which falls short of eliminating the use of fossil fuels, would increase demand for minerals such as lithium, graphite, nickel, cobalt, and rare earths by 4,200%, 2,500%, 1,900%, and 700%, respectively, by 2040. As Mark Mills, a senior fellow at the Manhattan Institute and materials engineer, recently noted: "The pursuit of a materials-heavy energy infrastructure will cause economic impacts that ripple beyond energy markets." At Massif Capital, we aim to capture those ripples.

Pockets of growth will also be found in emerging markets whose demographics point towards significant rates of change in the industrialized business landscape. According to data published by the World Bank, 700 million people still live on less than $2 a day, 3 billion people still do not have access to clean fuels for cooking, and close to a billion people still do not have electricity.[i] These people need transportation infrastructure, electrical infrastructure, and industrial market development. Furthermore, to the degree that society is concerned with addressing climate change, pulling these people out of abject poverty via development takes on increasing importance as climate change remains an existential threat for many in the developing world but is still very much a first world consideration.

Innovation: Reworking the global energy system is the single largest, most far-reaching industrial investment activity ever proposed. It makes the economic ramp-up in the United States at the beginning of WW2 look like a minor event. As McKinsey & Co. recently highlighted, transitioning by 2050 will cost roughly $9 trillion in new investment every year. The space is rich for innovation, in part because it spans both technological innovation and business model innovation.



Source: Massif Capital, BCG Consulting

Trends in private capital allocations are already showing evidence of the opportunity set. Venture capital investment in climate technology is growing 5x faster than the average investment rate across all industries.

It is important to reiterate that this capital flow is going towards addressing material and capital-intensive problems. Most of us are predisposed to thinking of innovation in terms of software and consumer electronics. We are also aware of efficiency gains and deflationary trends across broad swaths of the end-use consumer products we interact with. While it is true that there are specific countries and pockets of the economy that have witnessed improvements in material efficiency over time, it is not accurate to suggest that human prosperity has entirely decoupled from resource extraction. Furthermore, there is a solid case to be made that the material intensity of energy production will increase as a result of implementing zero-carbon generation technologies we have available today.

The lack of understanding of both the source of carbon emissions and the scale of the challenge are two reasons why innovation within the Real Asset Ecosystem will continue to be an excellent opportunity for equity investors.

Take, for example, the relationship between utilities and electrified transportation. Since 2004, roughly $3.9 trillion has been invested into renewable energy assets and, since 2014, approximately $826 billion has been invested in electrified transport. Despite this, in 2020 alone, 123 billion gallons of automotive gasoline were consumed in the United States. When envisioned as delivering a transport service, this gas has a

rough annualized value of $267 billion. One way to think about the scale of the shift in the transportation and utilities sectors, and thus the opportunity still left to capture despite the already allocated capital, is to think about the fact that, as time goes on, $267 billion in annual transport services value in the US alone could be delivered via electricity from utilities or some new energy as a service business model.

The shift creates opportunities on all sides. The value of annual gasoline sales that will no longer flow to the companies it has flowed to for the past 100 hundred years will now flow to other businesses that may or may not exist yet. As such, long-term beneficiaries of that flow, including companies like Exxon Mobil, TotalEnergies and Chevron, will need to find new sources of revenue. The odds are good that some of them will succeed. The big oil companies are making investments to decarbonize the energy they sell to consumers, putting the industry on a pathway to lower-carbon production and lower-carbon products. Investment by the 41 largest oil and gas producers last year into low-carbon assets totaled $21 billion, a 53% gain from 2020 levels. This compares to an 11% increase in total capital expenditure for the same group of companies.

As the combination of regulatory and investor pressure on asset allocators drives additional flows into the Real Asset Ecosystem, new and disruptive businesses will spring up and with them equity financing opportunities. Last year, climate-tech companies raised $165 billion in equity financing, and VCs allocated a record $40 billion across more than 600 individual venture deals backed by more than 1,400 individual investment firms.

Business disruption, innovation, and substantial capital flows go hand in hand with new market creation, and, here too, there are reasons to be optimistic that the Real Asset Ecosystem is the place to be.

Business disruption, innovation, and substantial capital flows go hand in hand with new market creation, and, here too, there are reasons to be optimistic that the Real Asset Ecosystem is the place to be. Take, for example, liquefied natural gas (LNG). In the absence of the constraints governments have placed on the development of energy systems within Europe and Asia, it is unclear that commoditization of LNG via a growth spot and short-term traded cargo market would have come into existence. The amount of LNG imported on a spot- or short-term basis is now more than a quarter of global LNG trade, up from zero a few years ago.

Long-term contracts for delivery from key supply projects to major markets still underpin the bulk of trade flows, but the share of spot-traded cargoes is steadily climbing. Spot cargoes flow to the highest bidders, and that interplay changes over the year depending on seasonal demand, weather patterns, and production plant outages; fungibility that will facilitate the growth in a zero-carbon economy as flexible low-carbon baseload power to pair with intermittent renewable energy. Creating an LNG spot market is great for producers and investors, however the real poster child for new market creation is not LNG but rather hydrogen.

Hydrogen has the potential to become one of the principal fuels of a future low-carbon economy. Many leading companies in the energy, industrial, and transport sectors have formed business units for hydrogen, major countries are devising strategies, and pilot projects are being constructed across the world. If policies are put in place, hydrogen offers a solution to lower emissions in many

hard-to-decarbonize sectors such as steelmaking, chemicals manufacturing, and heavy-duty transport.

Energy is not the only place where rates of change, disruption, and new businesses are being created. The plastics value chain, which sits at the core of profitability for many chemical companies, is currently being pressured by policy initiatives, corporate sustainability goals, and consumer backlash to change.

Energy is not the only place where rates of change, disruption, and new businesses are being created. The plastics value chain, which sits at the core of profitability for many chemical companies, is currently being pressured by policy initiatives, corporate sustainability goals, and consumer backlash to change. Market-based measures on waste prevention, reuse, and recycling, such as extended producer responsibility schemes, are now in place in countries that account for 85% of global GDP. Plastic consuming companies are responding by increasing their focus on ways to reduce the use of fossil-based and virgin plastics, while producers are looking to speed up and commercialize both petrochemical substitutes but also cost-effective chemical and feedstock recycling, with the aim of deploying plant-scale capacity in the next 5–10 years. We think it is highly likely that both growth and innovation will catch equity investors off guard over the next decade in the Real Asset Ecosystem.

Diversification: Lastly, an equity portfolio with a cross-section of industries with geographic and market capitalization diversity is beneficial in generating uncor-related returns. This is important because "low correlation" and "high diversification" are insufficient on their own to generate good returns. The key questions are, what do you have low correlation to, and what do you have diversification from? These are important questions to ask because as the paper *Everybody's Doing It: Short Volatility Strategies and Shadow Financial Insurers* recently outlined, a low-yield, low-volatility environment has drawn market participants, with varying investment horizons, into essentially the same volatility strategies based on common volatility risk factors.

Our focus on the Real Asset Ecosystem results in a portfolio that provides important diversification to a growing correlation of equity products. Massif Capital has generated an alpha of 7.1 against the S&P 500 since its inception. The high alpha has, in large part, been driven by a low beta.

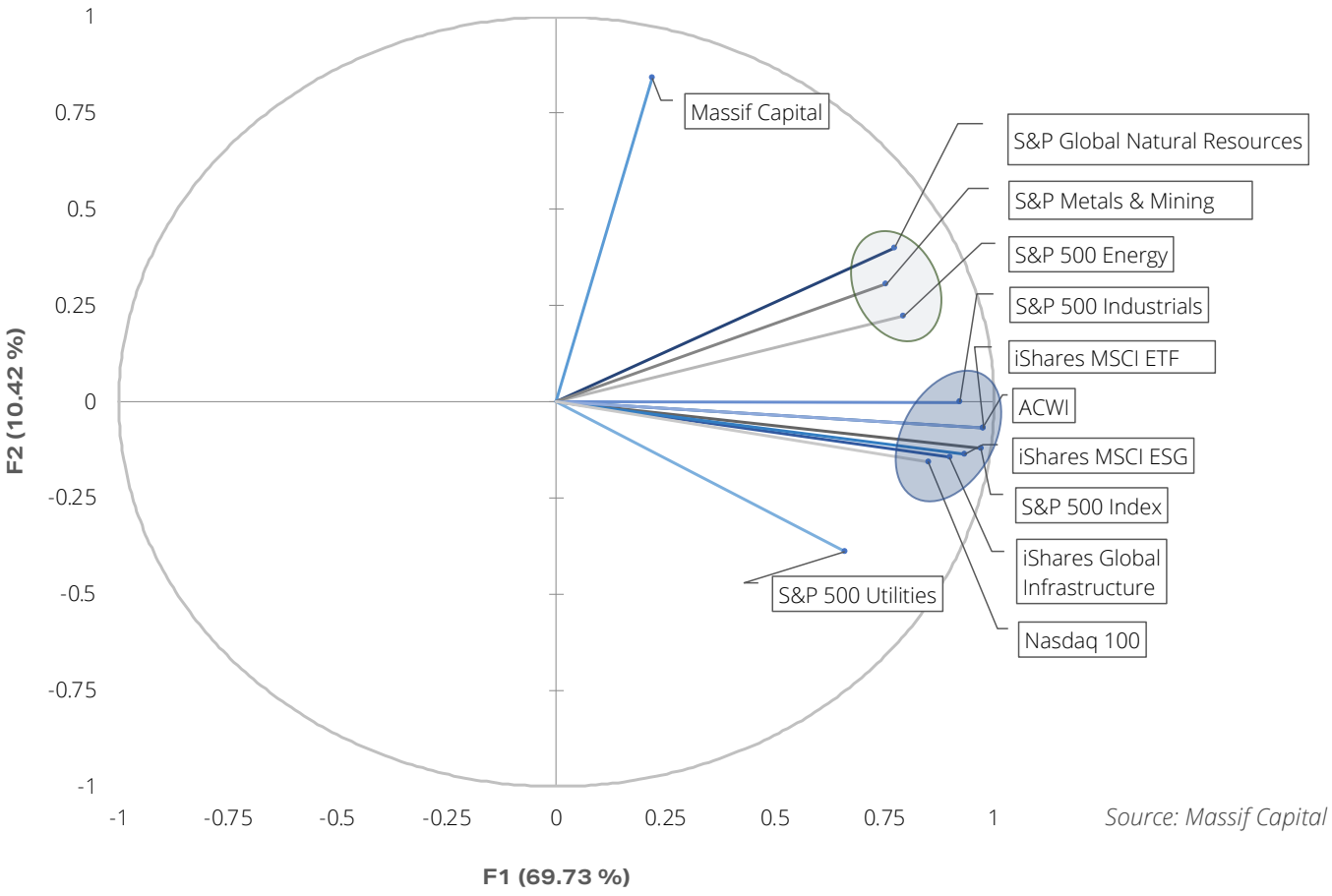
Beta measures the relative volatility of an asset to the market. It is often used to measure relative risk, as in the case of calculating alpha. To make the leap from volatility → risk, the "spirit" of beta is trying to identify how correlated the sources of risks are between assets. Correlated sources of risk can be problematic, as they cannot easily be hedged or diversified out of a portfolio. Because of the unique combination of asset baskets one can create in the Real Asset Ecosystem, we believe our low beta is not a spurious result but, in fact, truly idiosyncratic volatility.

A common way to determine the amount of idiosyncratic risk in a bundle of assets is to use principal component analysis (PCA).[ii] PCA is a tool to identify independent (i.e., uncorrelated) sources of an investment's risk or principal components.[iii] We can think about idiosyncratic volatility as volatility that lacks an explanation. If most of the variance of some assets is explained by market beta, there is little idiosyncratic volatility and little opportunity for diversification.

A core component of many optimization techniques is to compute volatility and correlation in a covariance matrix. It is a helpful tool but becomes increasingly

problematic if more correlated assets are added or if there is instability in relationships between variables over time. If assets have increasingly similar volatility profiles, very small changes in any statistical characteristics will generate large changes to optimized weights (or position sizes).

PCA is a useful tool to visually inspect asset clustering around common factors (similar covariance characteristics). When assets cluster, the proportion of volatility explained by market beta is high. Diversification within asset allocation strategies becomes more difficult when there is less idiosyncratic (unique) volatility. What matters in diversification is increasing idiosyncratic volatility and reducing correlation.



Source: Massif Capital

In the graph above, we are looking at several main market indices and the Massif Capital portfolio from June 2016 through December 2021.[iv] The PCA reveals that 80.1% of the variance in the dataset can be represented in a two-dimensional space. The dimension with the most explained variance is the (x)-axis, F1, which we attribute to market beta. In other words, over this observed period, 69.7% of the variation between all these indexes (and our portfolio) is explained by market beta. Of the 69.7% attributable to market beta, Massif Capital contributes only 0.5% of that variance.

In these results, every index has a large positive association with market beta. The Massif Capital portfolio has a small positive association with market beta. The S&P 500 and the MSCI ETF, MSCI ESG, and industrial indexes are easily identifiable in the same cluster, with the energy, metals, and natural resource indices clustered separately.

The utility index has slightly less variation explained by market beta but is not clustered with the other index and thus subject to diversification risk from multicollinearity. The Massif Capital portfolio has a small, positive association with market beta. It is unambiguous that the Massif portfolio has the highest idiosyncratic risk available for diversification.

We believe that, taken together, this data can be interpreted as a strong indicator that we continue to build a portfolio that can serve all investors well as a source of uncorrelated alpha. When combined with the growth and innovation potential implicit in the Real Asset Ecosystem, investing in the Massif Capital Portfolio is a compelling opportunity.

Endnotes

[i] The World Bank & Our World in Data.

[ii] Central idea of principle component analysis is to reduce the dimensionality of a data set consisting of a large number of interrelated variables, which retaining as much of the variation present in the data set. This is achieved by transforming (linear combination) to a new set of synthetic variables (principle components) which are uncorrelated, and which are ordered so that the first few retain most of the variation present in all of the original variables. *Jolliffe, Principle Component Analysis, 2nd Edition.*

[iii] ReSolve Asset Management has written some highly accessible material on PCA, in particular reference and use in financial markets.

[iv] The inception of Massif Capital through to the fourth quarter, 2021 results.

MASSIF CAPITAL

Massif Capital runs a long/short equity strategy focused on global opportunities in liquid real assets and industrials. We prioritize downside risk management by investing in businesses we understand operating in the Basic Materials, Energy and Industrial industries.

Q&A WITH PORTFOLIO MANAGERS

In a Q&A, Massif Capital portfolio managers explain the benefits of real assets, the role real asset industries will play in the transition to a low-carbon economy, and the ways a long-short strategy can capitalize on the shakeout from this transition.

READ PORTFOLIO MANAGERS Q&A

MASSIFCAPITAL