

PRISMA WHITEPAPER

Giving investors the freedom to take risks responsibly.

Discover how the technology behind Prisma by Alquant works. In this paper, we take a deep-dive into Prisma's approach to research and the model guiding its decision-making process. Learn more about our methodology and the way Prisma can effectively assist and add value to investment decisions.

February 2023

Executive summary

Prisma is a leading investment solution designed to aid asset managers in informed and effective tactical investment decisions. With a unique range of rigorously tested risk indicators, Prisma is a platform offering to its clients a distinctive advantage. The platform provides valuable insights that supplement an investment committee's in-house perspective, leading to a more robust and informed view of market conditions.

Prisma's approach is rooted in a research process that blends data science, machine learning, and financial analysis expertise to craft high-quality risk indicators. The platform is intuitive and offers flexibility to adjust investment constraints, making it a tailored solution for individual investment needs.

The platform is a powerful hedging tool that can be used for various purposes by all types of investors, such as quant teams or investment committees.

Introduction

The Alquant Prisma platform gives financial institutions and advisors tools to manage market extremes in a customized, rational, and data-driven way, allowing them to proactively address hedging challenges and reap their benefits. They don't need to have prior knowledge of quantitative finance, programming, or data science.

Prisma offers its clients the following services:

- **Actionable risk indicators**
Dynamic adjustment of risk exposure depending on market conditions
- **Run historical simulation**
Without having to code interactively and analyze the impact of a hedging solutions on any portfolio
- **Create customized solutions**
Create indicators, and apply them on any desired underlying
- **Receive automatic notification**
Set up email notifications that match your rebalancing frequency or are based on thresholds.

In this paper we will focus on Prisma's risk indicators, their practical value and how best to use them.

Why Prisma?

Prisma is a leading solution designed to empower investment committees and quantitative teams in their pursuit of informed and effective tactical investment decisions.

Offering a unique range of rigorously tested and predictive raw indicators, as well as aggregating them directly into a comprehensive market view, Prisma provides a distinctive advantage.

With its comprehensive market view, Prisma provides a valuable supplement to an investment committee's in-house perspective, resulting in a more robust and informed view of market conditions.

For quantitative teams, Prisma streamlines the process of developing valuable indicators and frees up time to focus on enhancing and optimizing their algorithmic strategies. With a unique range of raw indicators at their fingertips, teams can confidently optimize and complement their existing strategies, maximizing their success.

With Prisma, investors can elevate their market view and catalyze their quantitative team's success. The rest of this section delves deeper into the benefits that Prisma offers to investment committees and quantitative teams.

Empower Investment Committee with Prisma's Comprehensive Market View

As an investment committee, making informed tactical investment decisions can be a complex and challenging task. With the constant influx of market information, it can be difficult to determine what's relevant and what's not. That's where Prisma comes in.

Prisma provides a comprehensive market view, incorporating systematic and quantitative insights to help you make more informed tactical investment decisions. Prisma's market

view integrates seamlessly into your in-house perspective, serving as a valuable supplement and mitigating the risk of relying solely on a single viewpoint.

Despite the widely accepted importance of diversification between different asset classes, many institutions still overlook the potential risks associated with relying on a limited number of market views. With Prisma, you can easily add an additional, holistic market perspective to embrace the benefits of a more robust and diversified view about market conditions.

Maximize & Accelerate Quantitative Team's Success with Prisma's Raw Indicators

Quantitative teams are constantly seeking ways to enhance and optimize their algorithmic strategies. Prisma provides a valuable solution to this challenge, delivering a comprehensive range of ready-to-use indicators that have been rigorously tested and have demonstrated predictive power, enabling teams to optimize their strategies with confidence.

Developing valuable indicators can be a time-consuming process that often results in inconclusive findings or the risk of overfitting. With Prisma, quant teams can bypass this process, minimizing time spent on new indicator development and maximizing their efforts on what truly adds value - optimizing and complementing their existing algorithmic strategies.

Don't waste valuable time and resources on fundamental research that may not yield conclusive results. Let Prisma be your go-to source for new raw indicators, helping you to optimize your quantitative strategies and maximize your team's potential.

The approach behind Prisma

Prisma's approach is rooted in a research process that blends complementary expertise in data science, machine learning, and financial analysis. Our research team is comprised of individuals with scientific and financial backgrounds, each contributing their expertise and knowledge to craft risk indicators of the highest quality.

Sparkling Viable Ideas

The design of a risk indicator begins with a spark of inspiration, be it from observing market trends or reading academic research. Our research team stays updated with the latest academic publications and evaluates potential ideas for feasibility before launching a project.

Gathering and Cleaning Data

Once the idea is solidified, data collection is the next step. Our research team collaborates with our software engineers to secure high-quality data that is integrated into our automated pipeline. They work together to streamline data flow and ensure the timely, safe collection of multiple data sources where needed, with a focus on automating the process where possible.

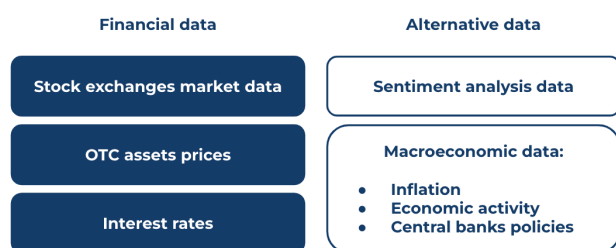


Figure 1: Example of data used in the research process

After collecting data from credible sources, we use data science to assess data quality and identify potential sources of error. The evaluation uses algorithms to ensure thorough analysis, while our investment research team provides final approval based on their expertise. Data that exhibits irregular behavior is not

utilized. If data quality is deemed sufficient, it undergoes cleaning, formatting, and completion. The aim of this step is to secure an ample supply of high-quality data, enabling us to conduct in-depth research.

Unlocking Insights with AI

Next, by leveraging AI techniques, we are able to pinpoint the most critical data components, uncovering correlations and factors that are often overlooked. Our utilization of AI not only saves time but also grants us the ability to reveal novel and predictive relationships that may have gone unnoticed with traditional manual methods.

The objective of this approach is to better identify the relevant underlying dynamics that drive financial markets, allowing us to make more informed investment decisions. Through a systematic evaluation of the data, we carefully select the most relevant pieces to advance our risk indicator development and deliver the best results possible.

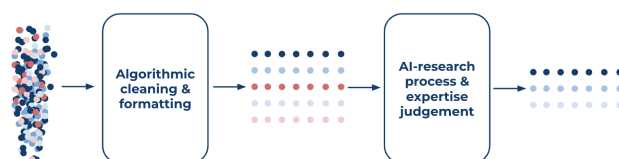


Figure 2: Schematic data processing steps

Rationale and Robust Models through Expertise and Diversification

Once the most pertinent data elements have been identified, our research team takes a data-driven approach to developing a rule-based model that effectively leverages the valuable information contained within. The quantitative research phase encompasses a variety of methodologies and integrates both a rigorous mathematical framework and practical financial insights gained from market experience.

Our models are crafted through a logical interpretation of the data, with a focus on reducing the risk of overfitting at all times. To ensure this, we employ a range of safeguards and precautions. Our ultimate objective is to ensure that the resulting model is underpinned by sound economic or financial rationale that can always be explained intuitively to clients. Hence, machine learning is only used as a supporting tool to identify relevant data and is never used directly in the final model to avoid the so-called "black box" nature of many AI-driven models.

Once a method for leveraging the relevant data has been established, we prioritize diversification by defining a range of model parameters, rather than optimizing for a specific set. This approach leads to models that are more robust and have greater out-of-sample performance. Finally, our research team strives to ensure that the output signal of the model has predictive power for financial market risk.

Throughout this entire process, our research team maintains a singular focus on finding signals that make the most financial sense, while constantly striving to mitigate the risk of overfitting.

Transforming Predictive Signals into User-Friendly and Actionable Indicators

In the last phase, our research team transforms the signal that has been rigorously tested for robustness and predictive power into a user-friendly indicator for our clients. This transformation involves adjusting the signal to align with the standard range of values used for all Prisma indicators. Our team ensures that this transformation process preserves the predictive power of the signal, so that our clients still get access to accurate and actionable insights.

This standardization is a key advantage for our clients as it enables easy and consistent

interpretation of all Prisma risk indicators, regardless of their underlying data sources. This enhances their decision-making capabilities, enabling them to quickly form a comprehensive market view through the combination of multiple indicators via a straightforward weighted average. This not only simplifies the process of gaining robust insights about market risk but also provides transparency in tracking which indicators are driving the changes in the overall market view, leading to informed investment decisions.

What does Prisma offer?

Prisma is an intuitive platform providing risk indicators that can be combined to help our clients in the decision-making of their tactical allocation.

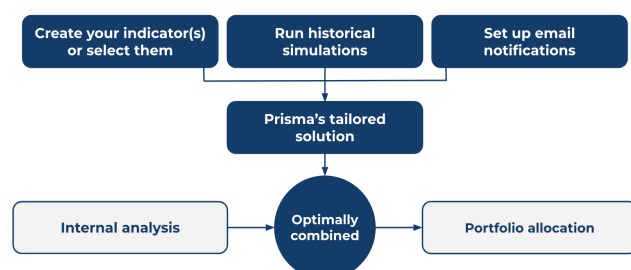


Figure 3: Creating your tailor-made solution on Prisma and incorporating it into your investment process

To give readers a glimpse of our indicators, here is a brief one-sentence description of our three flagship indicators that are live since mid-2018:

- **The Vega indicator** seeks to identify panic periods in the equity market based on the dynamics and trend of the VIX futures and cash term structure.
- **The Macroeconomic indicator** is keeping a timely bird-perspective of the real global economy using leading economic indicators and high-frequency economic data.
- **The Credit indicator** analyzes the dynamics of credit spreads of the global high yield and lower grade bonds segment.

Interpretation and potential use of Prisma's indicators

Prisma's risk indicators provide a valuable tool for investors by offering a clear, concise representation of the estimated underlying risk of the equity market. With values ranging from 0% to 100%, the indicators provide an intuitive understanding of the level of caution an investor should exercise when making tactical allocation decisions.

The value of a given indicator can be thought of as an equity hedge ratio, effectively serving as a guide for how much of an investor's portfolio should be hedged or allocated to risk-free assets, such as cash equivalent, relative to the amount invested in the equity market. The following figure is an example of the optimal portfolio allocation depending on the value of a risk indicator.

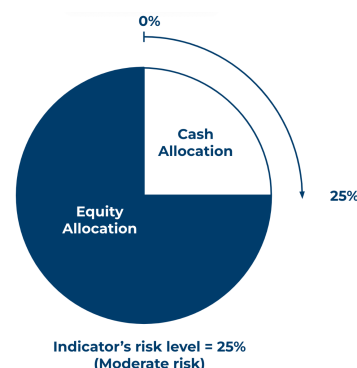


Figure 4: Example of the allocation of an equity portfolio following a given value of the Equity Risk indicator (25%).

For ease of use, the indicators' value vary progressively in 25% increments. The value of an indicator can serve as a guide for optimal portfolio allocation, as depicted in Figure 5, where the equity allocation changes in response to the value of the indicator.

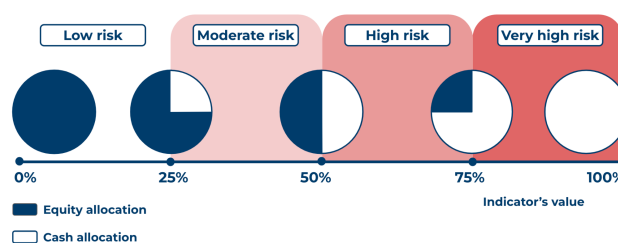


Figure 5: Alquant's portfolio allocation depending on the value of the indicator.

However, clients often have specific investment constraints that limit their maximum and minimum equity exposure, and Prisma takes

this into account by offering the flexibility to adjust these limits. This ensures that the risk indicators are only used to manage exposure within the defined bandwidths, providing a tailored use-case that match individual investment constraints.

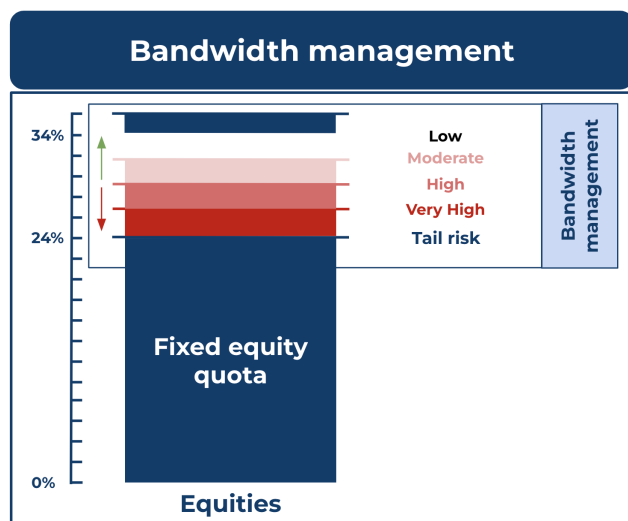


Figure 6: Bandwidth management illustration

Adaptable to specific rebalancing frequency

Per default Prisma's risk indicator can move on a daily basis but can be adjusted to meet the needs of different investors. For large institutions, who may only rebalance on a less frequent basis, Prisma provides the option to select a rebalancing frequency that fits their needs. Additionally, the platform offers the option to introduce ad-hoc rebalancings, triggered when the indicator moves significantly past a pre-defined threshold, which helps reduce the randomness or luck factor induced by low rebalancing frequencies and ensures that important market insights are not missed. This feature was inspired by the behavior of large institutions during times of market turbulence, such as the COVID-19 pandemic, where ad-hoc investment committees were formed to timely reassess market conditions.

Rebalancing frequency ?

Weekly

Rebalancing threshold (in %) ?

Only based on frequency

Transaction cost (in %)

0.05

Figure 7: Prisma's parameters for rebalancing conditions

Automatic notification system

Prisma is designed to be fully customisable to every client's needs, allowing them to set up automatic email notifications. In the case when a fixed rebalancing (e.g. weekly or quarterly) is required for your portfolio or if a risk indicator crosses a predetermined threshold, an email alert will allow you to assess the situation and make decisions with maximum information.

The form displays notification parameters. The 'Notification name' field contains 'Vega indicator threshold breach notification'. The 'Underlying' dropdown is set to 'S&P 500 (SP500INDEX)'. The 'Frequency' dropdown is set to 'Monthly'. The 'Threshold' dropdown is set to '25%'. There are 'Delete' and 'Save' buttons, and a blue button at the bottom labeled 'Add a new notification'.

Figure 8: Notification system parameters

Realistic and feasible implementation

The time lag between the moment a notification is received and a rebalancing is executed is often crucial as it can significantly impact the resulting performance. To ensure that performances displayed in the use-cases section of the platform are reproducible it is assumed that rebalancing is executed at the close following a change in the indicator's value. Notifications about a change in the indicator's value are delivered early in the morning (CET), giving users ample time (at least more than 8 hours) to act on the notification and adjust their portfolio accordingly.

Figure 9 shows the ideal step-by-step process from data collection to the rebalancing implementation with trades executed at day's end.

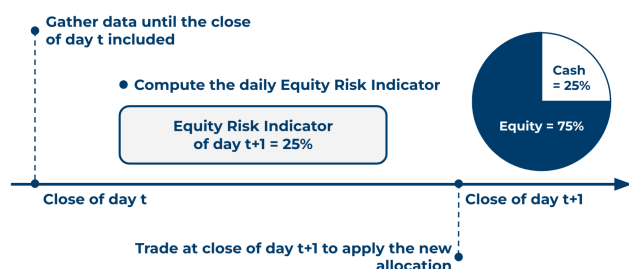


Figure 9: Process followed by Alquant to apply the Equity Risk indicator: our trades are executed at the close of the day.

Nevertheless, our research has shown that the information contained in Prisma's risk indicator remains valuable even if rebalancing must be distributed over or postponed for a couple of days, making our insights accessible to larger institutions as well.

Intuitive platform interface

We will now look at the use of the Prisma platform. This platform is designed to be as simple and intuitive as possible. The following screenshot gives us an overview.

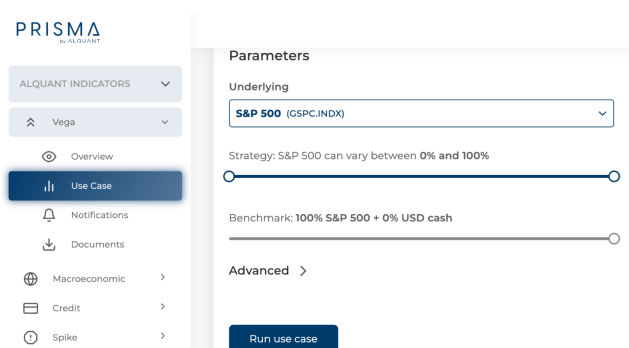


Figure 10: Process followed by Alquant to apply the Equity Risk indicator: our trades are executed at the close of the day.

On the tabs on the left, the user can select the indicator she/he wants to test. In this example, the Vega indicator was selected. The "Use Case"

sub-tab allows the user to run a historical simulation. The user can choose between thousands of underlying values and adjust the benchmark. Some advanced parameters can also be adapted, such as the transaction costs or the frequency of rebalancing. The user can then run her/his simulation. The following screen shot shows the result of the simulation.

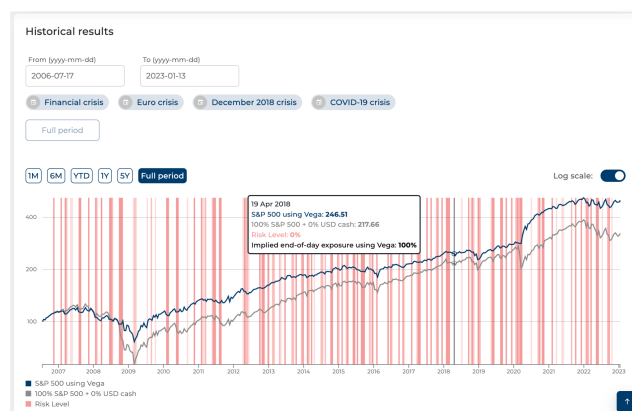


Figure 11: Process followed by Alquant to apply the Equity Risk indicator: our trades are executed at the close of the day.

Figure 11 shows the historical performance of the Vega indicator applied to the S&P 500 Index compared to its benchmark, the index itself. The simulation period can be changed. Prisma also provides statistics on the two strategies, daily exposures, relative performance and drawdowns.

Prisma also offers its clients the possibility of creating custom indicators by combining multiple raw indicators.

Figure 12: Creating a custom indicator

Figure 12 displays the tab for creating a custom indicator based on Prisma's risk indicators. The weighting of the individual indicators can be set manually by the user.

Finally, Prisma allows users to create their own portfolios to run simulations and apply indicators to their portfolio allocation. The following screenshot is an example of how to create a portfolio. Most of the assets traded on the major exchanges can be selected and added to the portfolios.

Figure 13: Creating a portfolio on Prisma

This feature provides added value for clients who want to have a more concrete idea of how Prisma's indicators can benefit them in the long term.

Concrete use-cases

In this last part, we will discuss several concrete uses of the platform. Of course, this list is not exhaustive.

Use-case I: Dynamically hedge equity exposure

Investors searching for an agile and reactive hedging strategy can find it in Prisma's indicators. These indicators empower quick adaptation to daily market fluctuations, enabling dynamic hedging of equity exposure through shorting futures contracts on a benchmark index for an equity portfolio. As an alternative, investors can also directly reduce equity exposure by increasing the cash component in the portfolio instead of shorting futures contracts.

The following figure illustrates this use-case on an S&P 500 portfolio and reveals that investors can attain comparable returns to a passive exposure to the equity market while halving annualized volatility. In this strategy, we rebalance our portfolio of S&P 500 index and USD cash on a daily basis, following a combination of Prisma indicators. Transaction costs of 5 basis points (0.05%) on the traded volume are included in the results.

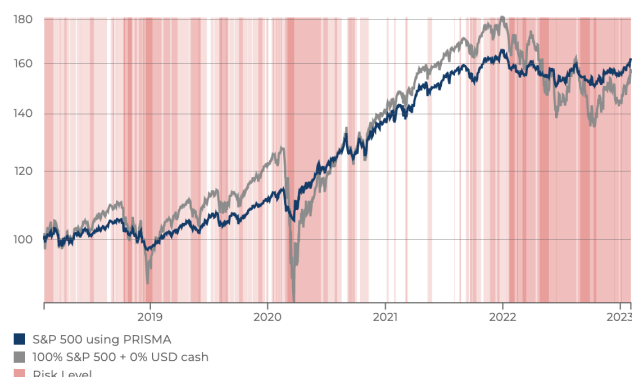


Figure 14: a) Historical Performance of using Prisma to dynamically hedge S&P 500 exposure (blue line) compared to passive investment (gray line).

	S&P 500 index	S&P 500 index with PRISMA
Return p.a.	9.3%	10.1%
Vola p.a.	21.9%	9.3%
Sharpe	0.35	0.91
Max. Drawdown	-33.9%	-9.1%
Information Ratio	-	1.04

Figure 14: b) Performance statistics of using Prisma to dynamically hedge S&P 500 exposure compared to passive investment.

Additionally, as depicted in the next figure, drawdowns are effectively managed, staying below 10% compared to the over 33% seen in the equity market.

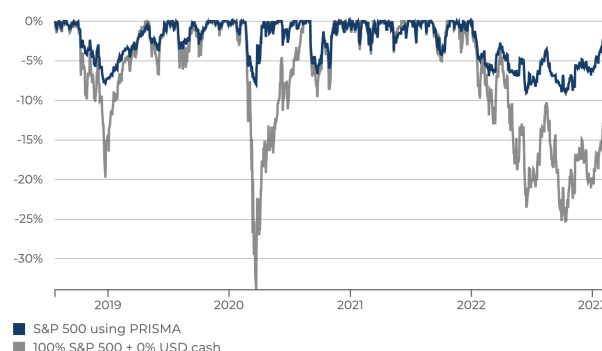


Figure 15: Drawdowns comparison between using Prisma to dynamically hedge S&P 500 exposure (blue line) and a passive investment (gray line).

Use-case II: Support over/underweight decisions during investment committee

Prisma is also an excellent solution for portfolios managed by investment committees that engage in weekly, monthly, or even quarterly rebalancing. With Prisma's rebalancing frequency feature, investors can receive notifications about market risk on committee meeting days, allowing them to factor this information into their final decisions. This enables investment committees to make informed over/underweight decisions and adjust equity exposure through the use of cash, short-term bonds, or credit as a counterpart.

The accompanying figure demonstrates this scenario by comparing the results achieved through the use of a Prisma indicator with monthly rebalancing combining the MSCI ACWI index and cash, with a traditional 50%-50% portfolio comprised of these same assets. Transaction costs of 5 basis points (0.05%) are applied.

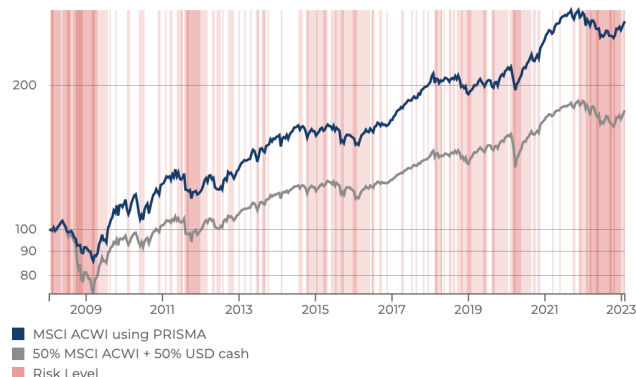


Figure 16: a) Historical performance of a monthly investment process with Prisma (blue line) compared to a passive 50%/50% benchmark (gray line)

	50% MSCI ACWI + 50% USD	MSCI ACWI with PRISMA
Return p.a.	3.7%	6.6%
Vola p.a.	8.6%	9.1%
Sharpe	0.34	0.63
Max. Drawdown	-31.6%	-18.8%
Information Ratio	-	0.66

Figure 16: b) Performance statistics of a monthly investment process with Prisma compared to a passive 50%/50% benchmark

In this use-case, periods with low risk level are used to overweight equity and vice versa. Hence, the goal of this use-case is to be able to benefit from calm periods to achieve higher absolute performance without significantly increasing risk.

The next figure presents the relative performance of the Prisma-managed portfolio compared to the 50%-50% benchmark and illustrates that this approach can indeed generate superior performance during both bull and bear market phases.



Figure 17: Relative performance of a monthly investment process with Prisma compared to a passive approach

By providing consistent outperformance (information ratio > 0.6) and controlling tracking error, Prisma delivers superior long-term performance without increasing volatility and downside risk.

Use-case III: Smart liquidity manager

Prisma can also be a support for large institutions that do not follow a tactical allocation. Indeed, by quantifying the risk inherent in the market in a simple combined indicator, Prisma provides insight into the appropriateness of entering or exiting the market. Thus, in the event of a need to withdraw cash or an imminent receipt of cash, investors can assess whether the circumstances are opportune or whether waiting for a more favourable time to trade would be more appropriate.

Use-case IV: Alerts on proper time to call an ad-hoc investment committee meeting

It can be difficult to know when to call an ad hoc investment committee meeting. In this context, Prisma can be used to systematically alert investment committees about rapidly changing market conditions and therefore when an ad hoc meeting may be necessary. In this use case, the investment committee does not use the risk level of the Prisma indicators to make tactical investment decisions and continues to make them on a discretionary basis. However, it does

use the Prisma indicators to set up a system for knowing when an ad hoc investment committee meeting should be called. In this case, notifications can be set up to receive an email when circumstances require it, without having to log into the platform regularly. This type of process ensures that strict rules are followed and that there is no doubt about the relevance of ad-hoc rebalancing on a daily basis.

Disclaimer

This paper is a simple description of practical use. We encourage you to discover and test our indicators on our platform [Prisma](#). To receive Prisma Insights directly via email click on the following [link](#).

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