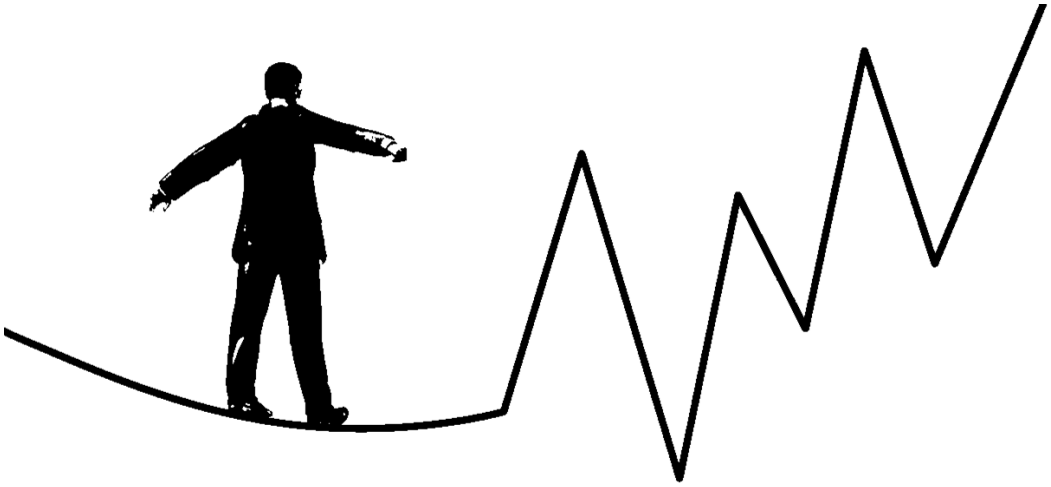
# Why Are We Still Unhappy About Investment Risk Management?

## A counter-cyclical economic value-based alternative to variance

*Despite years of investment in the development of the function, investment risk management at pension funds and insurance companies still fails to deliver on the promise. Several fundamental issues are to blame and there is a fix, but it requires different set of skills.*



For several years now regulators have paid disproportionate attention to risk management at pension funds and insurance companies. After years of investment, database rollouts, building stronger risk functions and reporting procedures one would expect that the end client – the Boards, who are supposed to be the consumers of risk intelligence as the responsible risk-takers, should be satisfied by the "service" provided by the industry. Yet, our discussions and meetings suggest that nothing is further from the truth.

There is plenty of reporting, of course, but it falls short in two areas:

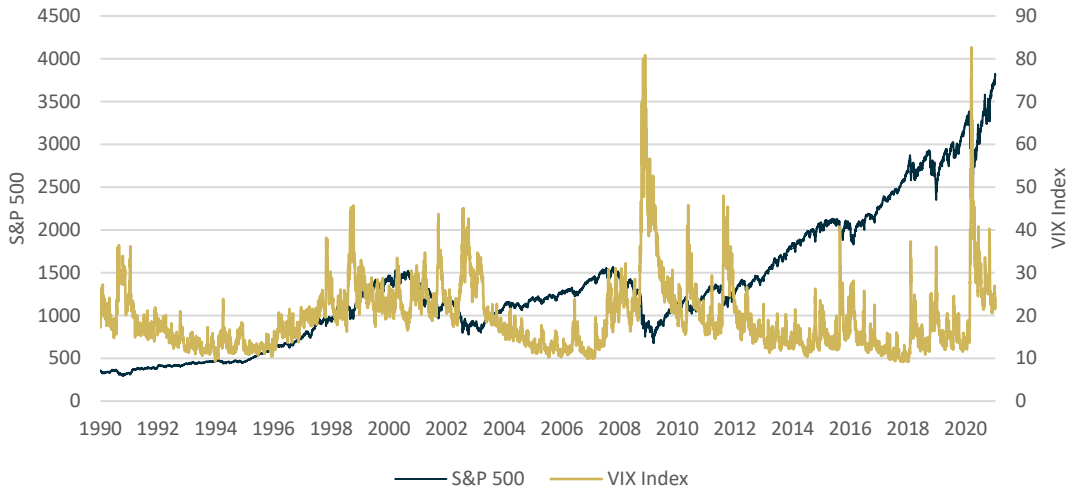
- counterintuitive pro-cyclicality of any action based on the reporting
- the difficulty of interpreting of and acting upon the day-to-day numbers

The combined effect renders nearly all reporting not actionable, which defies the purpose of risk management. In this paper we propose a brief introduction of an alternative investment risk management toolkit that LINKS Analytics have developed and put in place at major pension funds and insurance companies over the last decade. The economic value-based approach to risk management addresses both the pro-cyclicality issue and creates actionable intelligence for investment risk management.

## The Default Outcome is No Action

The problem of pro-cyclicality has been widely publicized of course (Youngman, 2009). Returns are negatively correlated with volatility, with the latter being highly clustered (Figure 1). This means that acting on volatility (VaR, CVaR or any similar) measure would mean progressively increasing risks as the markets become more expensive and cutting exposures as the markets contract, thus cementing the losses (Figure 1).

**Figure 1: S&P 500 and VIX index, Source: Thomson, Standard & Poor's**




High (implied) volatility as indicated by the VIX index in the periods of for instance 2003, 2009, 2018 would result in high value-at-risk levels. Similarly, the extreme value of volatility during the peak of the market reaction to the Covid-19 pandemic, if mechanically implemented, would cause continuous de-risking at the low market pricing environment. This **pro-cyclicality** of the main risk indicator is not only undesirable, but also outright dangerous.

One way many institutions address the issue is by ignoring the medium-term variability of the variance-based metrics and focusing on the long-term averages. This creates the other large problem – **inability to act based on risk intelligence**. Decision-makers are forced to monitor minor changes in risk numbers year-in year-out as the actual economic risk in various asset classes builds up. There is little intuition to tie changes in the macroeconomic and investment climate with the observed risk numbers. Thus, few boards are prepared to act on risk numbers unless risk budgeting is rule-based, in which case pro-cyclical value destruction is built into the policy.

## What Do We Need From Risk Management?

The current framework is adequate for managing trading risk – building a short-term portfolio at a snapshot of time. But in a more long-term dynamic environment, where political developments, environmental risks, shifts in technology and industry landscapes can change drastically behaviour of asset prices and the economic value, the performance of the conventional approach is woefully inadequate.

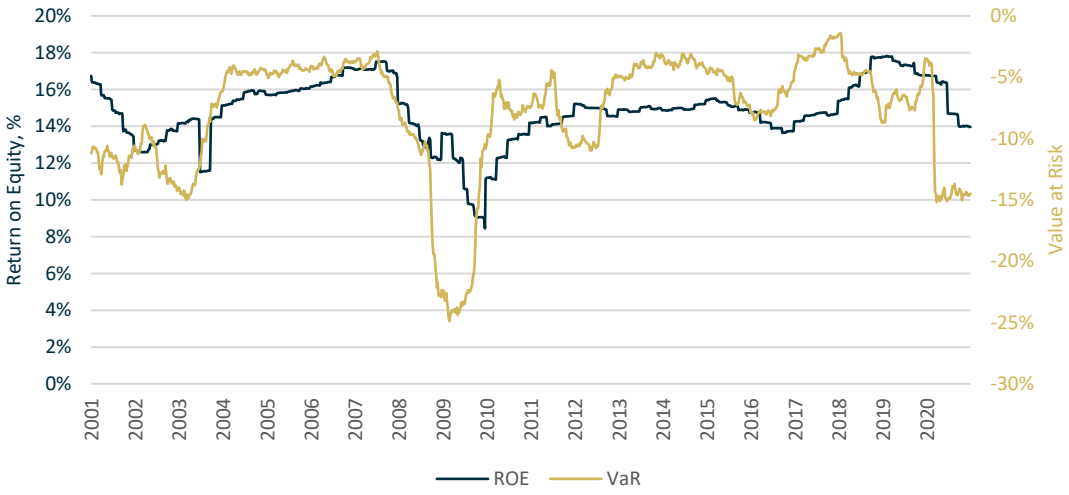
A risk management framework and function should fulfil at least three critical functions, to be judged operationally (as opposed to regulatory) adequate. First, it should help **identify** and understand the actual economic risks behind the portfolio at a level that enables informed decision-making. Secondly, it should enable the assessment of **potential** impact. Finally, it should be possible to **act** based on risk reporting.

## Identifying Risks

Variance-based assessment of risk covers only a single dimension of investment risk, and not particularly reliably at that. Useful risk "information" is extracted from the asset price alone, which makes this information noisy, as asset prices are also driven by ad-hoc market infrastructure-related forces. To the extent that these forces are part of the overall investment risk, this is fine. But if institutional investors hold the asset class for longer periods, as is usually the case, this short-term source of market risk is not relevant for them.

As it happens, some economic value-based indicators fully capture the same risk dimension captured by the variance-based measures, but without the accompanying short-term noise. Compare for instance return-on-equity[1] (ROE) of S&P 500 and the 95% 1-month value-at-risk (VaR) calculated using realised volatility. The ability of accounting variables such as ROE or ROA to measure risk has been well documented (John Y. Campbell, 2008). While ROE captures the same risky periods in history, it is a lot more stable and its interpretation – a lot more intuitive (Figure 2).

**Figure 2: Value-at-risk (VaR) and return-on-equity (ROE) of S&P 500, Source: Bloomberg, LINKS Calculations**




Using ROE alone will deliver reasonable coverage of the same risk dimension as VaR, but evidently, ROE is still pro-cyclical. High risk periods as indicated by VaR coincide with high-risk periods indicated by ROE. The missing component or dimension of risk is the **price paid**. Clearly, both VaR and ROE miss the fact that as the prices of assets rapidly fall, the investment **risk is altered**. To illustrate this, consider that there is always a sufficiently low price for the asset class that renders the risk of investing almost non-existent, yet the lower the price paid, the higher the variance-based risk metric.

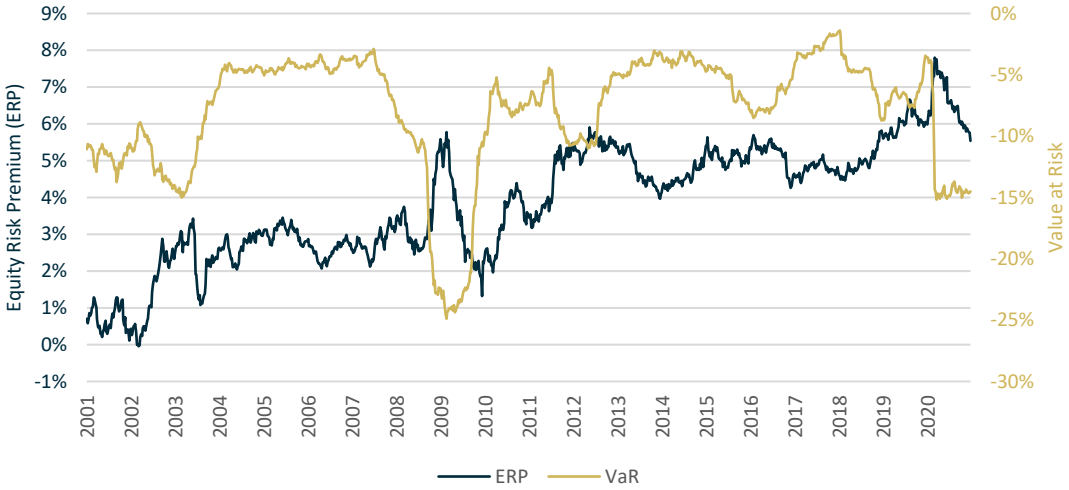
[1] Net income of all companies in the universe over the book value of total shareholders' equity.

Moving from ROE to equity risk premium (ERP) solves this issue. Since we deal with the whole market, we can use a simple ERP calculation based on single-stage discounted cash-flow analysis formula (Gordon growth model)[2]:

$$ERP = ROE \times (1 - PR) + \frac{D}{P} - r$$

The counter-cyclical nature of ERP is clear, as it indicates low risk in the low-price environments and highlights higher risk in high-price environments (Figure 3). In a simple application, high ERP levels indicate that price levels of the asset class are low compared to the economic value.

**Figure 3: S&P 500 Value-at-Risk and equity risk premium (ERP), Source: Bloomberg, LINKS calculations**




Note that ERP already includes the cyclical dimension of the risk, i.e. it includes information rendered by VaR.

One deficiency of ERP is the trending nature; ERP may be range-bound or trend depending on the economic environment. The question is, what levels of ERP are risky and what levels of ERP are safe? The final step of building the counter-cyclical risk measure is to find a "fair" level of ERP and check the difference between the fair and actual levels. Such fair level could be based on an average reading over a long period. But this would assume that the future is the same as the past.

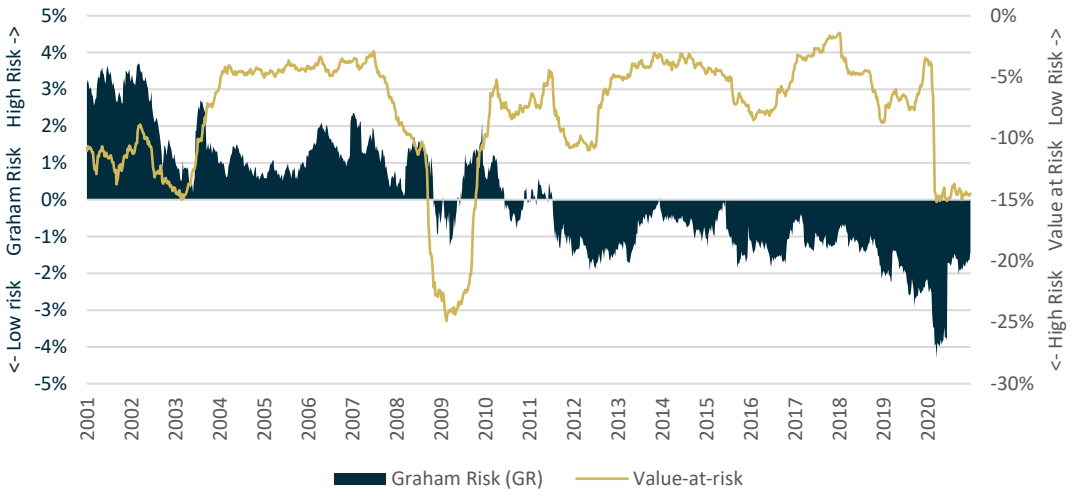
An alternative approach would be to use macroeconomic drivers to estimate the value of fair ERP, such as for instance the household savings rate, surprise inflation and leverage. Whatever the approach to assessing the fair level of ERP, this level must be very stable. The final economic value-based risk measure, called **Graham Risk (GR)**, is the difference between the fair and actual ERP:

$$GR = ERP^{fair} - ERP^{actual}$$

Higher readings of GR correspond to higher risk, as the actual ERP is low compared to the fair (expected) ERP. Lower values of GR mean that the current ERP, implied by the current low price of the asset, is high compared with what it should be (Figure 4).

[2] See the Appendix for derivation

Figure 4: Graham Risk and Value-at-Risk (VaR), Source: Bloomberg, LINKS calculations




Graham Risk has all the desired features of a long-term investment risk measure:

- counter-cyclicality: high risk indications coincide with high prices, and low risk levels are in a low-price level environment,
- actionable: GR values incorporate the consideration of market price vs. economic value, and therefore capture all risk dimensions, enabling a balanced decision-making.

Finally, although in our example we calculated GR for equities, the same metric can be calculated for all asset categories, including sovereign bonds (difference between fair and actual yield), corporate bonds (difference between fair and actual spreads) as well as less liquid asset classes that have economic value (property, infrastructure, private equity etc.) ***The latter is a significant advantage of GR compared with variance-based risk measures, as GR does not require frequent historical pricing for risk estimation.***

## Assessment of the Impact

Clear interpretation of a risk measure is an absolute requirement. One of the advantages of value-at-risk is its easy interpretation, although in many instances this interpretation is misunderstood. A 1-month 95% VaR of -25% (in our example) means that in 95% of cases one-month return is likely to be above -25%. This does not mean that within the month returns cannot be below 25%. Neither does it mean that the worst that can happen in one month is the -25%. So clearly, VaR as risk measure has its own deficiencies.

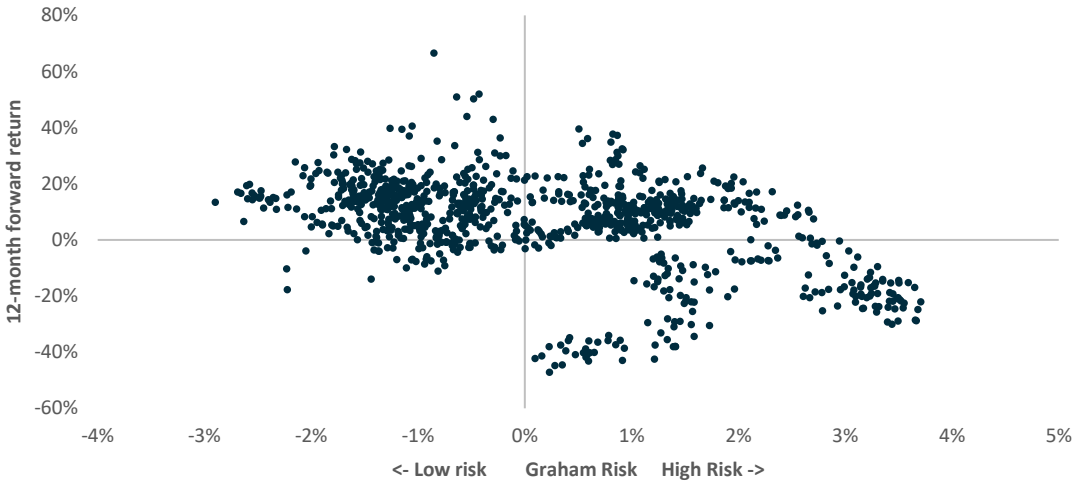
Intuition behind the expected risk/impact of Graham Risk can be equally easy, if we recall that GR is the difference between the fair and actual level of ERP (or yield for bonds). This means that a GR of say -2% implies that the bond's yield should be 2% lower. A change of 2% in yield would imply a value impact that depends on duration:

$$Impact = -GR \times Duration$$

We would therefore expect to see historically that low levels of GR have been followed by high returns and vice versa. Looking at actual one-year forward returns given GR levels, the range of returns indeed depends on GR. In the period of the analysis (2001-2020), GR levels of 2.5% and

higher were followed by one-year returns of -30% to 12.5%. At the same time, GR levels of less than -2.5% were followed by returns in the range of +6% and +19% (Figure 5).

**Figure 5: S&P 500 Graham Risk and 12-month forward returns. Source: LINKS Analytics calculations**




Positive GR levels that indicate high risk were followed by 12-month return of 0.6%, while negative GR levels were followed by 12-month return of 12.7% (Table 1).

**Table 1: 12-month forward returns that follow positive and negative values of GR, S&P 500, Source: LINKS Analytics**

| | Positive GR | Negative GR |
|---|---|---|
| **Average** | 0.59% | 12.73% |
| **Max** | 39.6% | 66.6% |
| **Min** | -47.2% | -17.7% |
| **95th Percentile** | -36.2% | -3.0% |

## Acting: Portfolio Risk and Mitigation

Most "balanced" institutional portfolios are split between equities and bonds. Equities have generally high variance, while bonds have low variance and this reality never changes. As a result, variance-based risk reporting at the strategic level is generally meaningless. Of course, VaR risk and tracking error monitoring make sure that there are no excessive idiosyncratic risks taken by managers, and that is a good thing. But once the diversification is built into the process, variance-based risk system has not much else to contribute at the strategic level.

Economic value-based risk, in this sense, complements the overall investment risk management process. At any given point and depending on the asset pricing and emerging economic value gaps, parts of a global balanced portfolio across asset class categories may be riskier than others. Bonds would have equal chance of appearing risky in a specific pricing and economic environment (Table 2).

Table 2: Risk reporting for a balanced global portfolio, Source: Mira ABM

| Asset name | % of portfolio | Short term return | Long term return | Graham risk | Duration | Risk (+/- valuation) |
|---|---|---|---|---|---|---|
| Bonds EMU (Barclays Eur Govt 10 year) | 34.00% | -2.78% | 1.68% | 1.93% | 8.21 | -15.87% |
| Equities EMU (MSCI) | 35.00% | 2.36% | 6.68% | 0.83% | 16.26 | -13.52% |
| Bonds Global (Barclays Tr. US + EMU + UK) | 10.00% | -2.24% | 1.75% | 1.60% | 8.92 | -14.27% |
| Bonds US (Barclays US Govt 10 year) | 10.10% | 0.16% | 2.80% | 1.08% | 7.98 | -8.64% |
| Equities DM (MSCI World) | 10.00% | 7.59% | 7.64% | -0.12% | 14.73 | 1.71% |
| Bonds UK (Barclays UK Govt All Bonds) | 13.00% | 2.06% | 0.21% | -0.45% | 13.04 | 5.92% |
| Equities US (MSCI) | 9.50% | 13.64% | 8.38% | -1.76% | 11.47 | 20.18% |
| Equities EM (MSCI) | 10.00% | 15.97% | 7.10% | -1.71% | 20.5 | 35.04% |

Given these expected risk values, EMU Bonds and European equities can be considered the riskiest asset categories and contingency plans can be prepared to mitigate this risk by hedging or rebalancing the portfolio.

## Conclusion

Traditional variance-based risk measures, such as VaR, tracking error, are effective in the short-term and for trading purposes. Using these measures at the strategic risk management level of institutional portfolios is less straightforward due to the pro-cyclical nature of these measures and the difficulty of enacting risk mitigation measures on the back of reporting.

Economic value-based risk measures from the perspective of a long-term investment risk management not only cover more dimensions of investment risk compared to the variance-based risk measures, but can also serve as actionable intelligence for strategic portfolio risk mitigation and management.

LINKS Analytics have been successfully implementing at many large institutions one such measure – Graham Risk, which is an economic value-based (internal rate of return) risk measure that successfully meets the necessary criteria for actionable risk measures:

- Graham Risk is counter-cyclical in nature, so acting on GR values results in value creation
- High risk readings of GR usually do result in low returns in the future, so the metric has a strong predictive power
- Values of GR are scaled across asset classes, so GR may accurately identify bonds as a major risk in a mixed portfolio given the economic environment

# References

John Y. Campbell, J. H. (2008). In Search of Distress Risk. *THE JOURNAL OF FINANCE*.

Youngman, P. (2009, June 1). Procyclicality and Value at Risk. *Financial System Review*, p. 51.

# APPENDIX

Return on Equity is normally the most direct and impactful value driver of companies. Expressed in currency, ROE describes the net profit made from every 1 euro invested in the business. For a business that grows at a steady growth rate, the value of business can be represented by the Gordon growth formula:

$$P = \frac{D}{ERP + r - g} \rightarrow ERP = g + \frac{D}{P} - r$$

Growth in the long-term can be sustained only if the companies (the market) are profitable. The sustainable growth rate is represented by the following relationship (where PR is the dividend payout ratio):

$$g = ROE \times (1 - PR)$$

$$ERP = ROE \times (1 - PR) + \frac{D}{P} - r$$

, where ***ROE*** is Return on Equity,

***D*** is dividends paid out during the year,

***PR*** is the Payout ratio,

***r*** is the 10-year risk-free rate,

***g*** is the growth rate,

***P*** is the market capitalization.

**About LINKS:**

LINKS Analytics B.V. has a focused offering of industry leading systemic risk management solutions for institutional investors. Our unique and proven methodology of estimating the degree of systemic risk is based on the assessment of asset valuation dislocations globally (Graham Risk) and the degree of interconnectedness and concentration.

**Contact:**

LINKS Analytics B.V.
Molenweer 2, 2291 NR Wateringen
The Netherlands
Tel: + 31 (0) 70 891 9282

E-mail: info@linksanalytics.com
www.linksanalytics.com