Investigating the effectiveness of diversification strategies based on alternative risk measures

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Proposal

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1   Introduction

Asset allocation is an important aspect of creating a portfolio of assets. This process is commonly referred to as the diversification strategy. The majority of literature on the matter, however, focuses specifically on diversification strategies which use volatility as the risk measure. With this project, we intend to assess the efficacy of diversification strategies based on alternative risk measures. This research is important, because the use of volatility as a risk measure has come under scrutiny of late (add reference here).

2   Research Question

3   Literature Review

3.1   Literature Reviewed

To date some quantile-based risk measures have been looked into. Namely "Value-at-Risk (VaR), coherent risk measures, spectral risk measures, and distortion risk measures" (Dowd and Blake, 2006).

Dowd and Blake (2006) believe that VaR is an imperfect measure. It may well still be reasonable to look into VaR as it is a well known measure and is not particularly complicated for someone in the relevant field of work to understand. Looking further into VaR, Dowd and Blake (2006) feel that there are some positive aspects. Namely that VaR can be used to compare portfolios that are not restricted to a certain type of asset; VaR takes into account the portfolios internal correlations in turn allowing a consideration of num-

ber of variables changing at once and lastly it's result is easy to understand and has a linked probability. Dowd and Blake (2006) believe a significant limitation of VaR is that it gives no information about what happens if that worst case lower tail end occurs and they feel that this makes this particular measure a poor measure to be used as a risk target measure. Acerbi (2002) believe VaR is not a good measure because it does not meet the axioms of coherence.

It is worth mentioning that Dowd and Blake (2006) state in their paper that with regards to risk measures it may often be a case of the best measure for a particular application and not a case of their being a certain risk measure that is better than all the others.

3.2   Further Reading

In addition to the major works discussed, we plan to consult the following supplementary readings:

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4   Data

We will have to collect historical equities' price data. We will be concentrating on the South African market. This will be obtained from industry with the help of our supervisor, Rowan Douglas, or otherwise using the available

library resources at our disposal, such as the Bloomberg terminal. Fortunately, this data is not difficult to obtain.

5 Methodology

First and foremost, we must devise diversification strategies using various alternative risk measures. We intend to focus on either three or four risk measures. Despite its flaws (discussed in section 3.1 above) VaR has been identified as an important risk measure to consider, due to its prominent use in industry today (Consigli, 2004). Expected Shortfall (ES) and downside deviance are other measures which are widely used and easily/intuitively understood, and should also be considered. Additionally, we want to take a closer look at one or two of either the spectral or coherent risk measures, as discussed by Dowd and Blake (2006).

Risk budgeting (RB) is an alternative method to weight assets in a portfolio, and is a likely diversification strategy to be used given the alternative risk measures. Generally, assets are weighted according to market capitalisation. For the case of RB, the weightings will be a function of risk (Bruder and Roncalli, 2012). According to Bruder and Roncalli (2012), RB can be applied to various risk measures, $\mathcal{R}$, provided:

- $\mathcal{R}$ is convex

- $\mathcal{R}$ satisfies the Euler decomposition.

Of course, this means that we will have to ensure that the risk measures are compatible with this diversification technique. Further research and readings will help in the specifics of using this approach, and may also bring other

alternative diversification techniques to light.

We plan to perform a back test on the collected past data to assess the efficacy of the diversification strategies based on the alternative risk measures we shall be investigating. This will be compared against a benchmark: namely the diversification strategy based on volatility as its risk measure. If any similar investigations are found in the course of our research, further comparisons can be made. The programming language used will be R.

6 Paper Structure

1. Introduction

2. Background & Theory

   (a) Alternative Risk Measures

   (b) Diversification Methods

3. Methodology & Data

4. Results

5. Discussion & Conclusion

6. Appendices

7. References

7 Division of Work

This is a group project. Collaborative work allows for opportunities of synergy following from a greater scope of knowledge and skills. It does, however, come with its own challenges. Richard Montgomery will be taking charge of the theoretical aspect of the project, such as the literature review. Tayla Radmore will be heading the practical, coding aspect of the project. Thomas Königkrämer will act as an intermediary for these two aspects of the project: assisting in research, writing or coding, editing writing and workings, and ensuring cohesion in the project.

8 Time-line

- **Monday, 30 April 2018:** Any individual work for the literature review is to be completed by this date. Up until the next deadline, we will bring our individual parts together into a cohesive whole.

- **Friday, 4 May 2018:** Soft deadline for literature review - to be sent to our supervisor. Over the weekend, each group member will individually inspect the draft.

- **Monday, 7 May 2018:** Group editing of draft after individual editing over the weekend. If necessary, a meeting will be set up with our supervisor as soon as possible.

- **Friday, 11 May 2018:** Submit literature review

- **Pre-June Exams:** Utilise this time to:
  - Collect the necessary stocks' data

- Start work on the diversification methods to be used

- Possibly perform a back test, using the historical data, for the diversification strategy using volatility as its benchmark. This result will be used as a benchmark against which the other strategies will be compared.

- **June/July Vac:** Utilise this time to:

  - Perform the back tests for the alternative strategies

  - Assess how these strategies performed in comparison to the MPT strategy.

- **Monday, 23 July 2018:** Any individual work for the draft is to be completed by this date. Up until the next deadline, we will bring our individual parts together into a cohesive whole.

- **Friday, 27 July 2018:** Soft deadline for draft paper - to be sent to our supervisor. Over the weekend, each group member will individually inspect the draft.

- **Monday, 30 July 2018:** Group editing of draft after individual editing over the weekend. If necessary, a meeting will be set up with our supervisor as soon as possible.

- **Friday, 10 August 2018:** Submit draft paper

- **Friday, 7 September 2018:** Feedback for submitted draft. The next month will be used to improve our project, which will hopefully only require polishing.

- **Friday, 19 October 2018:** Submit final paper

References

Acerbi, C. (2002). Spectral measures of risk: A coherent representation of subjective risk aversion. *Journal of Banking & Finance*, **26**(7), 1505 – 1518.

Bruder, B. and Roncalli, T. (2012). Managing risk exposures using the risk budgeting approach.

Consigli, G. (2004). Risk measures for the 21st century giorgio szegö ed john wiley and sons pbl (2004) wiley finance.

Dowd, K. and Blake, D. (2006). After var: the theory, estimation, and insurance applications of quantile-based risk measures. *Journal of Risk and Insurance*, **73**(2), 193–229.