

Grant round: AFAANZ Research Fund 2020 Round 2

Category: Mentoring developing researchers

Project title: What are the motivations and the effects of divesting and optimization in portfolio decarbonisation?

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Project Summary:

The aim of this project is to investigate the mechanisms to develop divestment strategies that are an important component of carbon reduction strategies. The rate at which investors should divest has become a critical aspect of effective divestment, which has moved from the periphery to a movement of over a thousand major investors, totalling more than \$14.5 trillion committed funds.

Within this research, we address multiple shortcomings of divestment research. To date, the primary focus of most studies undertaken on fossil fuel divestment simply recommends divestment or not. These studies cover equity markets (Henriques and Sadorsky (2018); Trinks and Scholtens (2017); Hunt and Weber (2019), Kuang, et. al. (2021); Bolton and Kacperczyk (2021)), ETF markets (Ritchie and Dowlatabadi (2014)), and mutual fund management (Humphrey and Li (2021)) and Rohleder et. al. (2022)). The majority of the fossil fuel divestment research excludes all high-carbon stocks over the entire period of study, assuming that the fossil-free portfolio remains unchanged over time. In addition, these studies provide an aggregate assessment of the impact of divestment strategies and not a dynamic assessment based on the evolution of the impact of these strategies over time.

We use a comprehensive approach and various asset allocation methodologies to address and assess this impact overtime on S&P 500 portfolios and ETFs. For the S&P 500 portfolios, instantaneous divestment provides an advantage in terms of management structure. With regards to ESG attributes, the ranking of a decreasing rate of divestment is recommended, yet it generates higher tracking error. Once full divested, divesting from energy and utility sectors reduces carbon footprint

up to 7%, while ETFs' divesting offers more substantial reductions. Investing in low carbon footprint funds results in lower dividend returns and attracts lower management fees.

A study on ETFs with varying concentrations on carbon-intensive assets reveals that even though the return profile of the ETFs is insensitive to divestment strategies, their risk profile is proportionally (to their carbon intensity) affected by divestment strategies.

The original application was limited to investigating the risk and return characteristics of fossil fuels and renewables using a single optimized method, via the divestment approach and re-investment into the green industry. Within the original framework, the construction strategies targeted various levels of decarbonising holdings but did not consider a dynamic assessment. The optimization problem was extended beyond the original dynamic conditional correlation estimators and also considers the rate of divestment. Portfolio risk and return assessment was proposed originally via the standard suite of metrics such as Sharpe ratios, Omega ratios, Sortinos ratios Feibel (2003). This has been extended to a time series of clustering risk profiles to assess the effect of the divestment on the stability of the behaviour of the given portfolios. A clustering method belongs an unsupervised machine learning used to group similar factors into the same category or cluster. We use the time series of the risk profiles (performances) as the feature vector. In this case, if the divestment portfolios are classified into different groups from the non-divestment, it means the relative behaviour of the portfolio affects significantly by the divestment.

Funds Granted: \$ 7357.00

Expenditure of Funds:

To bring this project to successful completion and disseminate the research outcome to research outlets including submission to a top-tier journal, financial support for a Senior Research Assistant (RA) was required. Pasin Marupanthorn was employed in this role to undertake: the data collection and cleaning and the execution of routine empirical investigations involving statistical analysis performed in R.

The RA was paid a lump sum of \$7,000 for 20 days of RA work.

Outcomes:

One working paper has been produced with title "Mechanisms to incentivise fossil fuel divestment and implications to investors risk and returns".

The paper has been submitted and accepted for presentation to the following 3 conferences:

1. 11th International Conference of the Financial Engineering and Banking Society, Portsmouth, UK. The special theme of this year's conference is "Climate change, regulatory responses, and sustainable finance".
2. 2022 Annual Meeting of the [Commodity & Energy Markets Association](#) (CEMA 2022), Chicago US. The 2022 Annual Meeting will put a special emphasis on ESG topics as relates to commodities.
3. Institute and Faculty of Actuaries Conference 2022, London, UK.

The target journal submission is the *Journal of Banking and Finance (JBF)*, which is an A* ABDC with 5-year impact factor of 4.594, SNIP 2.166, SJR 1.58. Due to the calibre of the target journal, we invested significant time in advancing the analysis and expanding the scope of the paper. As an essential step, the paper has been and continues to be promoted to conferences and to received

feedback before submitting to the journal. Shortly, after these conference presentations, the paper will be submitted to the JBF.

Summary of Outcomes and Benefits:

The sale of fossil fuel firm shares as a result of divestment should exert downward pressure on the share price, making it more difficult for the company to attract capital. The key to divestment strategy is to divest the stocks of potentially carbon-emissions companies and to simultaneously invest more in the stocks of other companies in the portfolio. However, divestment may affect the risk profile and performance of the portfolio. This becomes challenging for funds, such as pension funds and exchange-traded funds (ETFs), which have specific investment objectives and/or governing regulation compliance constraints. The outcomes of this research control the amount of the divested carbon asset across time and presents a methodology that facilitates the gradual divest rather than relying on instant divestment, which brings a realist element in divestment strategies first time to be studied in the literature. Our study also underscores the importance of the investor's demographics such as dividend, management structure and carbon reduction targets on divestment strategies, with results of practical relevance to fund managers, superannuation funds, and institutional investors.