

Correlated Strategy Risk

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Good afternoon Dragons. My name is John Cartlidge and I am a post-doctoral research associate at the University of Central Lancashire. I specialise in Artificial Intelligence, Adaptive Systems and Optimization. Previously, I have worked on simulation models with the London stock exchange and with a dark liquidity pool on gaming. Today, I would like to present to you a research proposal that will enable us to better understand the risks associated with correlated investment strategies in equity markets: or “correlated strategy risk”.

The outcomes of this research will be to improve risk estimates for pricing models; leading to safer investment strategies and greater market stability. Dragons, I hope you will see this as an exciting opportunity to invest in a research program capable of revolutionising risk estimation in equity pricing.

Before I continue, I would like to make it clear that this is research that my collaborators and I think should be done.¹ Currently, we have a research proposal submitted to the EPSRC for an initial one year grant to fund this project. If this grant is successful, I would like to spend time talking to people in industry about how to make the outcomes of this research most applicable to them. So, if you can see how this research may be applied by your organization, then I would be pleased to discuss that with you.

Correlated strategy risk is a real phenomenon that can have devastating consequences for the unsuspecting investor. In October 2008, after a large group of hedge funds went short on VW shares, it was announced that a large proportion of shares had been acquired in a take-over bid. The ensuing rush by hedge-funds to buy VW and reduce their exposure led to an unprecedented rise in share value. Within 24 hours, VW briefly became the world’s largest company by market cap. Hedge fund losses were catastrophic.

This example highlights the key problem of correlated strategy risk. When a significant proportion of the market is using similar investment strategies, it is possible for rapid and severe price swings to occur as market participants react to information in a similar way. While individual investors or institutions assume that they are price takers – and model risk accordingly – this assumption becomes invalid if groups of investors take a similar strategy. Under these circumstances, the group acts almost in unison as one large investor – thus leading to adverse market movements. The result is an unanticipated price impact and underestimated risk.

Traditionally, pricing models such as CAPM model risk using statistical analysis of historical data. Historical data analysis assumes that what has happened before is likely to happen again. Statistical properties and correlations between financial assets are derived from historical data and then assumed to be fixed or very slowly changing. However, when many traders follow similar strategies and hold similar

¹ Collaborator: Dr Dan Ladley, Lecturer in Finance, University of Leicester, UK

positions, previous correlations can quickly fail. As a result, traders can lose money on both sides of a hedge. This risk is not accounted for in the pricing model.

The driving principle behind this research is that in order to accurately model risk, it is necessary to understand the interactions between players. Local interactions between groups of agents can radically affect global market dynamics. Only by studying these local interactions will we be able to understand the global phenomena. Historical data analysis alone is not enough.

We propose using a multi-agent model of simple adaptive traders to simulate a marketplace of interacting investors. Investors will use a strategy to trade on a simulated exchange with other investors. By modelling at the level of the individual, we are able to directly observe investor interactions and behaviour. Simulation models are dynamic and allow us to easily test “what if” scenarios and market shocks. Essentially, we can prod the market and observe the result. This is a different approach to more traditional economic models, but is one well suited to complex adaptive systems, such as markets, where global phenomena emerge from local interactions.

Initially, investors will use a standard pricing model such as CAPM. We will vary the correlation between investment strategies and observe the effect this has on the market. As strategy correlations increase, will we see risk increase gradually in a well behaved relationship; or will there be a catastrophic transition or discontinuity once strategy correlations reach a certain level? Only once we have an understanding of this relationship will we be able to derive accurate models of correlated strategy risk.

Since we will be able to observe the market under different levels of strategy correlation, we will have the opportunity to derive a model for estimating strategy correlation in a market. This model could then be used by investors to assess correlated strategy risk when using their pricing model.

Finally, we will be able to look at how different market structures affect correlated strategy risk. Are there trading mechanisms capable of reducing this risk? This could be a selling point for a trading platform; or a means for a regulatory body to reduce systemic risk for market stability.

So, in summary – I would like investment in a research proposal to investigate correlated strategy risk of investors in equity markets. By modelling investors in a dynamic simulation at the level of individuals and their interactions, this research will attempt to derive relationships between strategy correlation and risk in order to improve asset pricing models. [Such multi-agent modelling techniques offer a powerful alternative to traditional economic models and historical data analysis. This research will enable us to identify and quantify the risks associated with strategy correlation. Reducing this currently unforeseen risk will directly improve portfolio management; and enable regulatory bodies to reduce market instability by taking action to avoid significant build up of strategy correlations.]

Who knows, maybe if we currently had a better understanding of correlated strategy risk, then perhaps the current global financial crisis - largely created by an endemic over-exposure to unanticipated risks - could have been avoided!