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A quantitative and qualitative investment decision making framework for minimising risk and uncertainty: Institutional Investors coming to grips with a highly complex interrelated investment world

Dr Carol Royal* and Bruce Garvey**

*UNSW Business School, University of New South Wales, Sydney, Australia,**

*Dyson School of Design Engineering, Imperial College, London***

Abstract: Ernest Rutherford, the Nobel Prize winning physicist claimed: "Qualitative is nothing but poor quantitative." This 100 year-old dictum unfortunately still castes a long shadow in relation to the qualitative/quantitative divide present in the analytical process and subsequent decision-making. Recent dramatic increases in computing power including big data analytics, have supported the view that quantitative is best. Much financial analysis has concentrated on risk, whereby probabilistic methods can allow decision makers to make decisions based on a belief that quantitative, and therefore measurable indicators, validate such decisions. The appearance of precision through quantification, mathematics, and printouts often conveys a validity that is not justified. But how do institutional investors treat uncertainty, a situation where there is little or no measurable data and where the decision environment is not only rapidly changing but rapidly and randomly evolving in terms of its structure? Investment managers have complained recently not so much about the volatility of the markets, but about uncertainty. Rules of thumb do not work anymore, correlations no longer hold, or worse, sometimes they hold and sometimes not. Mathematicians such as Rene Thom the founder of "catastrophe theory" think differently, being convinced that the qualitative is a great deal more than just a mediocre form of the quantitative. When confronted by uncertainty, this paper proposes a framework which enables both quantitative and qualitative factors to be integrated into, if not more accurate, then more meaningful and consistent forecasts. When qualitative data issued side by side with quantitative analysis, institutional investors have access to more valid and more powerful information on current and potential future financial performance. This framework, applying iterative monitoring of earlier forecasts and judgments, has the virtue of being both more flexible and dynamic, helping institutional investors to mitigate uncertainty and risk.

Keywords: *Human Capital Analysis, Qualitative Analysis, Quantitative Analysis, Investment Risk*.

Introduction

This paper begins by an exploration of the current landscape of the qual/quant divide. This is followed by a short clarification of what we mean by quantitative and qualitative methods. Key to any understanding of the issues concerned is to what extent the accuracy of outcomes can be determined. The more complex and uncertain the problem being addressed, the greater difficulty it is to be accurate. Qualitative data can mitigate the inherent risk in such situations by "qualifying" any quantitative outcomes within ranges rather than a precise and possibly erroneous figure. This position is is explore further by a review of potential imbalances between qualitative and quantitative analysis including reference to the financial sector. There follows a series of arguments highlighted the importance of human capital and its relevance to investment risk - especially under conditions of epistemic uncertainty and complexity and high levels of connectivity.

Literature Review

The Quantitative/Qualitative Divide – the current landscape

After recent corporate collapses, corporate stakeholders and investors have focused more on the human element as a key indicator of risk and of potential future value in firms. This requires financial market professionals to interpret the ambiguity inherent in early warning signs of risk and uncertainty, implying a move away from "lag" to "lead" indicators of a firm's financial performance. Some human capital analytical models used in this regard have been adapted from the discipline of accounting. These have included attempts to value people as assets; creating an index of 'good' management practices and relating these to business results; statistics about the composition of the workforce and measures of the productivity and output of people . However, these models do not interpret the more complex process of managing the uncertainty and ambiguity of human capital in ways that can be readily understood by investors or the corporate leaders. As such, investors and indeed the corporate stakeholders today lack a coherent way to assess whether the configuration of human capital within a firm is internally consistent and provides a context for a firm to deliver its stated strategy.

Initiatives such as the United Nations Principles for Responsible Investment in 2010 (PRI) provide a context for investment markets to broaden equities research to incorporate more ambiguous themes including analysis of good governance principles and strong environmental management. However, while attempting to capitalise on this emerging mandate most fund managers and corporate leaders fall into the trap of measuring what they can measure, such as data on health and occupational safety incidents, staff turnover and headcount, rather than analysing what they should measure. While the Environmental, Social and Governance (ESG) principles of UN PRI incorporate the role of boards and directors' duties, corporate accountability and disclosure, risk management, corporate responsibility and 'doing the right thing' as well as major trends in financial accounting; there is insufficient detail in these themes to sufficiently interpret key elements of ambiguity and uncertainty in relation to human capital related risks within organisations.

Traditionally, risk management within financial institutions such as insurers has evolved around risk identification, quantification, management, monitoring, and review. This process has then led to a situation where managers identifying and quantifying risks themselves. However, this process fails to readily identify the dynamism of human capital risks, most of which can exist simultaneously in the "known", "unknown" and "unknowable" states. A more robust process is to identify the drivers of risk in an institution, and then to develop an appreciation of how these drivers influence the various risks that may arise.

The overly simplistic models that accompanied did not incorporate human capital realities and failed to incorporate underlying systemic uncertainties and ambiguities. As noted by Ganegoda and Evans (2013**),** investing in knowledge cannot reduce system level ambiguity. Financial markets include human interactions, which are characterised by ambiguity and can be subjected to misinterpretations as seen in the fallible system of credit rating of asset-backed securities (ABS). Ganegoda and Evans (2013), observed that the ratings were been based on a set of assumptions based on the probability of default, similar to a bond rating scale, even though the loss distribution of the two are significantly different and the notation systems failed to distinguish the much higher level of ambiguity inherent in the ABS ratings. Similarly, Li's Gaussian cupola formula (2000) for minimising financial risk of mortgage default was criticised by Nassim Nicholas Taleb (2007): "People got very excited about the Gaussian Copula because of its mathematical elegance, but the thing never worked…co-association between securities is not measurable using correlation." . David Li, the author of the model, had no pretensions regarding its infallibility: "The most dangerous part is when people believe everything coming out of it". Additionally, the widely used Black-Sholes-Merton (BSM) pricing model, while successful for a relatively stable environment, had not factored in the potential for crises in human behaviour under conditions of unpredictability. The model was helpful for markets to interpret elements of risk and uncertainty but not ambiguity. Nonetheless, when a critical mass of financial market players use specific models, it is possible that this high level of social commitment can "elevate a model to a paradigm without appropriate acknowledgement of underlying theoretical justifications If such ambiguities are not explicitly treated, consequences can be disastrous".

In investment markets where "quant analysts" use normal distribution models to minimise uncertainty and risk, but not ambiguity, it is not surprising that some institutional investors can become disconnected from the complex reality which the figures are supposed to represent, needing regulatory remediation. However, the risk matrix described by Ganegoda and Evans (2013) distinguishes between risk and uncertainty. Risk applies to situations where one possesses knowledge about the possible set of future outcomes and their underlying probability distributions. Uncertainty applies to situations where knowledge exists about the possible set of future outcomes, but knowledge does not exist about their precise underlying probability distribution. This is consistent with Oberkampf et.al who distinguish between aleatory uncertainty and inherent variation in a system, where outcomes follow a known probability distribution and more knowledge does not change the distribution; as distinct from epistemic uncertainty derived from a level of ignorance of the system, which can be reduced with more knowledge. Ganegoda and Evans (2013) observe that one approach to modelling this kind of episodic uncertainty is to invest in knowledge. However, there are barriers to

acquiring knowledge on these aspects of corporate performance: time horizon concerns, significant expense of obtaining and interpreting data, conflicts of interest, and competitive interests preventing collaboration within a sector. Even so, there is also a cost to not investing in this knowledge.

The importance of knowledge and human capital

Conception of value is immensely different in a knowledge economy in comparison to traditional economies. In the knowledge economy, employees are no longer regarded as labour but as capital (Drucker, 2002). Knowledge-based companies originate profits from the commercialization of the knowledge created by their employees. Bassi et. al. (2001) defines knowledge as "the accumulated insights and understanding, both explicit and implicit, that the employees of a firm use to accomplish their assignments every day". He sees knowledge as the thoughtfulness and attention people bring to doing their job in pursuit of the firm's goals. Often, these new workers are labelled 'knowledge workers' and they are highly skilled, qualified, trained, and experienced. In essence, they are workers who deal with a high degree of complexity and uncertainty that requires a high degree of judgment (Dunphy, 2000).

The stock of competencies, knowledge, social and personality attributes, including creativity, embodied in the ability to perform work to produce economic value is generally termed as human capital. Royal and O'Donnell (2005) defines Human Capital as human resource management systems (HRMS) which consider overtime, the complexity of internal and external interdependencies of the organization. Human Resource Management (HRM, or simply HR) is the management of an organization's workforce. It is responsible for the attraction, selection, training, assessment, and rewarding of employees, while also overseeing organizational leadership and culture, and ensuring compliance with employment and labour laws. Human capital analysis links human resource management systems to the future performance of the firm (Royal & O'Donnell, 2003). However, efficient and effective management of "human capital" and analysis have progressed to an increasingly imperative and complex process. However, for sustainable competitive advantage, all HR functions need to be in synchronisation with each other as well as with the firm's broader strategic infrastructure.

Methodology

As part of an on-going research project in the use of human capital analysis by fund managers, selected fund managers were presented with detailed human capital analyses of listed stocks, incorporating publicly available information on the human capital systems used within selected firms. The research methodology utilised discussions, structured and semi-structured interviews with the regulator, as well as nine major Australian insurers and the Risk Management Research Committee of the Institute of Actuaries of Australia. The discussions first centred with the regulator on aspects of human capital risk systems in the industry and then with the selected sample of Australian insurance institutions, on their current knowledge on human capital.

Results

Knowledge and human capital link to investment and insurance risk?

Knowledge is key to mitigating and reacting to risk in "known", "unknown" and "unknowable" states. Both investment professionals and financial organisations such as Insurers face common external human capital risks in the focus they have on productised thinking they encompass on their core offerings to clients. Additionally, both groups from an organisational operational perspective face internal human capital risks. Although regulators defined the minimum standards on mitigation of such risks through prudential standards and mandatory compliance regulations to ensure the wellbeing of Australia's financial markets supported by confident and informed investors and consumers, it is clear that these guidelines are widely misunderstood by industry. Industry neither focused on specifically nor espoused to analyse human capital data. To make matters worse industry accepted that inconsistency existed across industry between the rhetoric espoused at the top levels of the organisation opposed to the reality of what was practiced within organisations, in regards to human capital risk and risks in general. Although some blame the regulator for lacking definitive guidance and creating confusion, others acknowledge that industry is unaware of or is unprepared to tackle human capital risk despite industries and organisations' genuine efforts to reduce risks and human capital risk exposures. Industry furthermore believed that intangible people management aspect of risk was the main cause of scandals, and that human capital is a lead indicator or predictor of these kinds of situations.

Conclusion

Whilst it is all too apparent that we live in a highly complex world, complexity alone is not the sole reason why decision making is so difficult. It is when complexity is compounded by connectivity, or rather extreme connectivity. It is this tangled interconnectivity, (exacerbated by the ever morphing phenomenon of globalisation as well as micro-technical complexity), that renders not only our understanding of the contemporary environment so difficult to comprehend but makes our ability to forecast accurately so problematical – a typical "wicked problem" as expounded by Rittel and Weber (1973).

If the starting point for making our assumptions is so complex and tangled, as they include the impact of numerous unintended outcomes from previous actions, how can we realistically assume with any level of probability that our predictions, whether short, medium or long, will not be equally flawed? This is the reality we have to work with.

In the end, institutional investors have to accept reality and realise that in order to avoid the inevitable, often unpleasant, let alone unknown, surprises, and the "anomie" associated with such outcomes, it has to be more readily amenable to Vanston's dictum that "precision and the future are incompatible terms". Stratagems (but not necessarily solutions) do exist to address such low levels of predictability and include:

1. Avoiding the illusion of control: this is psychologically disturbing to many decision makers - we don't like uncertainty and not being in control and we seek refuge too often in processes which promise the illusion of certainty.

2. Acknowledging uncertainty: can always make a prediction, whether judgmentally or by using a statistical/mathematical model. Once such a forecast

exists, a greater challenge is to assess its accuracy, or the level of uncertainty. However, as posited long ago by Frank Knight, most of the emphasis in predicting social science events has been on forecasting, rather than assessing uncertainty realistically.

3. Implementing Protective strategies and Being prepared: contingency planning, emergency response, risk management processes. We can but mitigate.

4. Adopting Proactive strategies: via building in redundancy into the strategy (i.e. a little fat can be good for you). Unfortunately institutional investors do not like this – they want forecasts to reflect reality – an impossible ask.

5. Diversifying options to take into account forecast errors. In effect sets of scenarios built with qualitative and quantitative inputs.

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