INAUGURAL ADDRESS

IS MEASURING PERFORMANCE IRRATIONAL OR INEFFICIENT?

Every member of society will encounter numerous obstacles and surprises during the different phases of his or her life (Eberstadt, 2004; Galindo, 2019; Jenkinson, 2021). No matter the obstacle or phase of life, humanity has a natural instinct to survive, implying the ability to adjust (Kantor, 1920) by learning from experience how to better deal with various situations (Ten Berge & De Raad, 2002; Carbonell *et al.*, 2014) and how to improve current circumstances (Cell, 1984) with the information and resources at hand to reach a predetermined goal. This natural instinct also calls for a subconscious desire to constantly improve and to establish a personal reference point through performance measurement. The necessity to improve cannot be limited to only the corporate world or to a select few, but its importance in everyone's personal lives should also be acknowledged and deployed even on a subconscious level with the purpose of expanding the well-being in every aspect of our life.

For academics, especially interdisciplinary researchers with an achiever life theme (top Gallup strength), this natural instinct will not only manifest in teaching and learning but also in research and innovation. This group of researchers need to gain perspective regarding the impact of their practices and to measure the impact of the environment in which they function, including how this influences overall performance, especially because the life course pattern of any individual can be altered by social and environmental structures and changes, which can produce new social structures (McDaniel & Bernard, 2011). However, the way performance, especially of employees, is perceived constantly evolves as more information is processed and more experience is obtained over time. Ultimately, humanity will reach a point where there is no reference for how to better themselves in their crafts, except from some form of experience to guide them (Mintzberg, 2004). This level of experience is a product of past positive and negative emotions, which fundamentally shape future human behaviour (Desmet, 2008; 2010; 2011) and thus the course of future performance.

The successful design and implementation of performance measurement and control systems depends on the understanding and incorporation of human behaviour (Holloway *et al.*, 1995; Simons, 2000). However, because humans are known to be irrational (Lo, 2006; Mata *et al.*, 2006; Brehmer, 2007) and to be evolving in nature – and therefore unpredictable – it is difficult to conceptualise and quantify human behaviour into a performance measure or model. Lord Kelvin accentuates this notion by stating the following: *"I often say that when you can measure*

what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind. If you cannot measure it, you cannot improve it." (Norton & Kaplan, 1991). **This leads to the following two questions: Is it possible to truly measure the level of performance with the presence of irrational behaviour? Why and to what extent are existing methodologies/performance measurements tools limited due to human behaviour?**

Although the concept of performance measurement had its origins in the field of operational research, irrationality in human behaviour is more observable in the field of finance, making the latter a logical starting point. Irrationality can have severe repercussions for how we manage and measure portfolio performance if not acknowledged and actively managed. Modern portfolio theory, originally developed by Markowitz (1952; 1959), guides financial analysts and portfolio managers by emphasising the importance of reducing risk exposure through portfolio diversification. However, fundamental finance theory and economic models draw heavily upon two modern portfolio theory assumptions: (1) financial markets are efficient; and (2) investors are risk-averse and rational (Vaclavik & Jablonsky, 2012). These assumptions were based on traditional economists' views, as they portrayed humans as being rational, always striving to maximise their utility. People's judgement in general is, however, bounded by their rationality, which means that they will choose the solution that is considered reasonable or acceptable – also known as the decision maker's *"satisfice"* (March & Simon, 1958). To simplify, Shackle (1949:10) argues that *"we decide on one particular course of action out of a number of rival courses because this one gives us, as an immediate present experience, the most enjoyment by anticipation of its outcome".* However, proponents of behavioural finance (e.g. Lo, 2006) challenge these assumptions, as they believe that numerous factors, including both irrational and rational thinking, drive the behaviour of investors. These assumptions pose a problem for portfolio theory, where the latter integrates the process of efficient portfolio formation and the pricing of individual assets. Consequently, market prices will not always be considered a fair estimate of the underlying fundamental value of a firm, because investor psychology will drive market prices and fundamental value far apart (Shefrin, 2000).

Additionally, assuming that markets are efficient implies that all information can be captured by all market participants, further implying that it is impossible to outperform the market (Fama, 1970). However, evidence has been found that supports the notion of Lo (2004) that markets are actually time-varying information efficient, and that market efficiency also has a

tendency to vary across different markets and indices (Ito *et al.*, 2014; Heymans & Santana, 2018). According to Lo (2004), this can be explained by the impact of human behaviour (e.g. market participants under-reacting or overreacting to information), something the traditional Efficient Market Hypothesis theory that was developed by Fama (1970) fails to acknowledge (see e.g. Spyrou e*t al*., 2007). Also, irrational behaviour can cause market anomalies to develop, leading to temporary trends in the market that allows for short-term market-outperforming investment decisions (e.g. Schwert, 2002; Latif *et al.*, 2011; Araújo & Machado, 2018). Consequently, irrationality and market inefficiency will undermine the reliability of technical and fundamental analyses, because the input variables used in these analyses will have the tendency to be inconclusive at times. This will contribute to inconsistency in the reliability of traditional asset pricing models, financial and risk-adjusted performance ratios – and ultimately limit the ability to measure performance and thus not only hinder successful asset selections, which will affect future portfolio performance, but also provide some explanation as to why there is still no consensus on the prescribed methodology for measuring performance (Van Heerden, 2020). However, experienced practitioners will argue that the problem does not lie with the methodology but rather with the implementation of it (Warner, 2010). Proponents of behavioural finance may argue that irrational behaviour like that driven by overconfidence may be a contributing factor, at it can cause investors to take on too much risk, under-diversify portfolios and trade too frequently (Daniel & Titman, 1999; Adair, 2018).

Regardless of the probable contribution of irrational behaviour, the issue of poor implementation all begins with how we define and measure risk, because the absence of a comprehensive definition makes it difficult to comprehend what such a measure should reflect exactly. For example, if risk is considered to be something perceived by individuals who are self-aware (Holton, 2004), then how do you measure the risk of organisations, companies and governments that are not? Markowitz also never truly defined risk. He only proposed the following rule: *"that the investor does (or should) consider expected return a desirable thing and variance of return an undesirable thing"* (Markowitz, 1952:77). Markowitz (1952) never suggested the use of the variance of returns as a proxy for risk, but merely referred to it as an "undesirable thing". It was only at the end of this paper that Markowitz (1952) suggested that variance of returns might be a proxy for risk but distanced himself from this association (Holton, 2004). Traditionally, risk is defined by academics as *"the uncertainty that an investment will earn its expected rate of return"* (Brown & Reilly, 2009:1024); however, Knight (1921) preserved the distinction between the concepts of risk and uncertainty.

According to Knight (1921), risk relates to objective probabilities, whereas uncertainty relates to subjective probabilities. Objective probabilities are considered to be real and can be discovered (measurable uncertainty) by logic or statistical analyses (Holton, 2004). Subjective probabilities are human beliefs which are not intrinsic in nature and are specified by individuals to characterise their own uncertainty (unmeasurable uncertainty). However, some may argue that risk entails both uncertainty and exposure, but Knight's (1921) distinction only addressed uncertainty, implying that in the absence of objective probabilities no risks can be defined.

Keynes (1921:23), on the other hand, defined a probability as a relationship between two pairs of propositions that is *"rationally determinate"* and argued that if two intelligent brokers are acting on the same information they would always arrive at the same result. However, Ramsey (1931) criticised the view of probabilities being rationally determinate relationships between pairs of propositions. Moreover, both Keynes (1921) and Knight (1921) admitted that in some instances of uncertainty it is difficult to assign objective probabilities. Nevertheless, it remains a difficult task to rationally and quantitatively defend the objective interpretation of probability, as it is difficult to measure true risk (Ramsey, 1931; Holton, 2004). If one conceives of risk as defined by Markowitz (1952), more specifically the proxy proposed for risk, it will become clear that it falls short of defining true risk. It appears that Markowitz's definition was widely accepted by academia and mathematicians without asking the important question of whether it reflects true risk. Psychologists argue that this type of behaviour arises from people having an irrational tendency to rely too heavily on the very first piece of information they learn. This type of cognitive bias is known as the anchoring bias or anchoring effect (Tversky & Kahneman, 1974).

As a result of use of Markowitz's definition of risk, common practice in selecting suitable portfolio compositions involves the characterising of the different assets under consideration according to the desired properties in terms of reward and risk (Markowitz, 1952). Based on modern portfolio theory, this refers to the use of the mean and variance of returns. The latter treats both the negative and positive side of the distribution (upside and downside volatility) as risk. However, Roy (1952) pointed out that investors are not necessarily interested in how share prices deviate around a profitable mean, but tend to protect against the possibility of making losses. Consequently, this contradicts the modern portfolio theory assumption that investors are risk-averse, as Roy's (1952) argument suggests that investors are rather loss-averse. From this argument, Markowitz (1959) was inspired to introduce the downside risk measure, named semi-variance, for the first time in portfolio selection, replacing the ordinary variance measure.

This resulted in greater focus on the negative side of a distribution (also referred to as the downside). Also, as investors' attitude towards risk can vary considerably, this led some studies to consider different n^{th} moments of downside to suit different preferences, resulting in the introduction of the lower partial moment of the downside (Bawa, 1975; Fishburn, 1977). Despite that, the theory of portfolio analysis was assumed to be essentially normative by many, as modern portfolio theory assumes that all asset returns are normally distributed and that all parameters of a distribution can be estimated correctly (Van Heerden, 2020; Vaclavik & Jablonsky, 2012). This led to the preservation of measuring risk on the basis of variance through the application of the standard deviation or beta.

However, over time, practitioners and academics came to realise the obstacle this poses to performance measurement, as it measures only the dispersion of returns around its historical average and penalises positive and negative deviations from the historical average in a similar manner. The concern is the use of an average that brings about a smoothing effect, undermining original volatility levels of both normal and non-normal distributions, leading to the misperception of actual risk (Harlow, 1991; Lhabitant, 2004). Furthermore, variance-based risk measures do not differentiate between downside and upside risk (De Wet *et al.*, 2008; Harding, 2002), especially if the divergence from normality becomes more apparent when the higher moments (skewness and kurtosis) of the return distributions are taken into account (Kat, 2003). This can pose a problem when investing in emerging markets on exchanges such as the Johannesburg Stock Exchange, where the presence of higher moments has been established (Bekaert *et al.*, 1998; Van Heerden, 2015). These findings, therefore, imply that it will be difficult to rank volatile returns using variance-based risk measures (Lo, 2002), as they are unable to capture downside surprises (Lamm, 2003). The limitations of these risk measures extend to the inability to capture liquidity risk, callability risk or discounting factors such as tax implications and other opportunity costs, a characteristic that is unfortunately also exhibited by the majority of risk measures used in practice (Van Heerden, 2020). Consequently, the overwhelming evidence provided here unequivocally supports the notion that our definition of risk and how to measure it must be reconceptualised, requiring the revision of the fundamentals of performance measurement in the field of finance.

Unfortunately, there are other erroneous conclusions drawn by both practitioners and academia that have also contributed to the poor implementation of the methodology promoted by modern portfolio theory. For example, the Markowitz model assumes that correlation of returns is constant over time and can be estimated correctly (Markowitz, 1952; 1959). However, in

practice, the stability of correlations is closely linked to the stability of market sentiment. Evidence has been reported that investor sentiment can produce noise trading, which leads to the violation of this modern portfolio theory assumption (De Long *et al*., 1990; Vaclavik & Jablonsky, 2012; Renault, 2017). Also, the application of correlation itself rests on the assumption that a linear relationship between returns exists (Vaclavik & Jablonsky, 2012). This dubious assertion led to the wrongful implementation of beta to capture market risk. Regrettably, the literature is littered with evidence that proves the failure of this risk measure. For example, the market index proxy used in the estimation of beta must be a complete representation of the entire market – an index that does not exist. Other factors, such as beta instability, its failure to explain share return behaviour, regression bias and thin trading (e.g. Blume, 1975; Bradfield, 2015; Fama & French, 1992) also caused many to criticise its viability as a risk measure. Of all these, it is beta's fundamental flaw of ignoring unsystematic risk (company-related risk) by assuming complete portfolio diversification and by focusing only on systematic risk (market risk) that has crippled the ability to develop suitable asset pricing models, such as the Capital Asset Pricing Model developed by Sharpe (1964), Lintner (1965), Mossin (1966) and Black (1972), or risk-adjusted performance measures, such as the Treynor ratio developed by Treynor (1965).

Nonetheless, it can be argued that this fundamental flaw has been overstated, as the concept of portfolio diversification has been misinterpreted by many. It is not insurance or protection against loss, but merely an attempt to moderate bad returns (Warner, 2010). Also, the anchoring bias may have contributed to the ignorance of assuming complete market efficiency. However, the presence of market anomalies confined beta's ability to explain market returns. To overcome the limitation posed by this behavioural bias, practitioners and academia turned to traditional financial ratios to find proxies that could represent different market anomalies and thereby improve beta's ability to explain market returns. These ratios are perceived to represent a firm's financial performance characteristics, which are used by fundamental analysts to forecast the future rate of return (Barnes, 1987; Ross e*t al.*, 2003) to identify undervalued shares (Baresa *et al*., 2013). However, the ability of traditional financial ratios to measure performance has been questioned by the academic community for almost half a century. Traditional financial ratios are limited by the static and output-orientated perspective they provide, a characteristic also exhibited by all risk-adjusted performance measures. In addition, ratios in general are backwards-looking, lacking the ability to reflect future consequences of managerial actions (Clark, 1997). This can be due to: (1) their inability to represent the many facets of performance

and to explain the reasons for good or bad performances (Avkiran, 1997); (2) their inability to capture the interplay among the multiple resources and outputs of a company (Davenport & Sherman, 1987); (3) their reliability on internal historical data, which can be easily manipulated (Van Heerden & Heymans, 2013); and (4) their inability to always consider the risk associated with the investment or company (Gâdoiu, 2014).

Additionally, other limitations in the field of finance that may hinder performance measurement include the selection of thresholds and a risk-free rate as a reference point. The consequence of incorrectly specifying a risk-free rate proxy extends not only to the time value of money and the measuring of risk premia but also to derivative pricing, risk-adjusted performance measurement and asset pricing (Van Heerden, 2021). Studies have shown that *"there is really no such thing as a truly riskless asset"* (Brigham & Ehrhardt, 2005:312), which can lead to errors in performance measurement and asset pricing. Furthermore, the selection of thresholds for ratios like the Omega ratio (Keating & Shadwick, 2002) will differ between investors, leading to inconsistent, relative performance measurement. Also, when ratios are consulted during a relative valuation process, current valuations are generated through industry or market proxy comparisons. However, these valuations will be questionable if the industry or market proxy benchmark is already inherently overvalued, implying that fundamental analysts must have access to good sets of comparable entities in terms of industry, size and risk, which may be an impossible task.

Unfortunately, the field of finance offers a limited scope, where efficiency and productivity ratios used in fundamental analyses are limited by focusing only on overall company performance to establish investment opportunities, ignoring input factors and hidden costs from an employee's perspective (e.g. employee time and efforts). Thus, offering no methodology to measure personal or employee performance. To overcome some of the obstacles of measuring performance, as promoted by the field of finance (with reference to modern portfolio theory), the field of operational research suggests the use of non-financial measure methodology as a solution. This is based on the evidence that non-financial measures are: (1) considered to be a more reliable source of information on firm failure; (2) better predictors of long-term performance; and (3) less prone to manipulation (Johnson & Kaplan, 1987; Singleton-Green, 1993; Kaplan & Norton, 1996; Ames *et al.*, 2012). Farrell (1957) originally proposed that productivity efficiency or performance can be measured by means of an equi-proportionate reduction in current inputs to produce predetermined levels of outputs. This led to the development of several approaches to efficiency and productivity analysis. Among these are

the Data Envelopment Analysis (DEA) model (Charnes *et al*., 1978) and the Stochastic Frontier (Aigner *et al.*, 1977; Meeusen & Van den Broeck, 1977) — two pioneering contributions (Sharma *et al.*, 1997). Although these models enabled the ability to realise frontier estimations, they too have several drawbacks. Besides for the mathematical limitations posed by both approaches (e.g. Sexton *et al.*, 1986; Hafner *et al.*, 2018), performance estimates generated by these models will remain of a relative nature, as they will always be dependent on and limited to the input and output dimensions specified (Berg *et al.*, 1991). Also, approaches such as the DEA model establishes efficiency/performance levels through benchmarking (Avkiran, 1999; Jaforullah & Whiteman, 1999), a major setback due to the relative nature of performance (Rosenzweig, 2007), and the lack of available benchmark metrics (Love & Smith, 2003). For example, when measuring employee performance, a comparable proxy with the same circumstances/obstacles/responsibilities and characteristics does not exist, nor comparable entities in terms of industry, size and risk in the field of finance.

Another well-known branch of non-financial measures that is proposed as an alternative to the above-mentioned methods and which academics are familiar with, includes a version of the balanced scorecard (Kaplan & Norton, 1992), known as the performance appraisal. This branch of measures considers objectives, measures and targets (Niven, 2002), but also ignores input management or more specifically input-orientated efficiency, which can be defined as producing a given output mix with the minimum inputs (Coelli *et al.*, 1998). This provides a limited performance perspective, which may be intentional due to the irrational goals set out by top management. Gardner and Mills (1994) justifies this approach by arguing that the objective of performance evaluation and the information used depends on the perspective of the evaluator. However, De Waal (2003) argues that performance must be considered as an outcome of both organisational and human activities. But then again that is not always the case, and management's tendency to identify areas of improvement through unrealistic benchmarking will always overshadow the fact that more inputs (e.g. time) had to be utilised, due to different conditions to realise the same set of outputs. This cause doubt and questions the motive of management for implementing the performance appraisal as a measurement tool. One explanation is the irrational behaviour that management can exhibit, called the herd instinct (the herding effect). This phenomenon explains that companies follow the wisdom of the crowds without determining the best performance evaluation approach that would best suit their respective companies' dynamic structures. Unfortunately, management's uncanny success (with luck/fluke) with this behaviour may motivate other irrational characteristics to

surface, such as: (1) cognitive bias – continue making decisions based on irrational assumptions; (2) irrational exuberance – getting carried away with the assets at hand; and (3) lack of control – consuming more than you need to.

The lack of dispute by employees can be explained by Nietzsche (1878), who argues that *"the irrationality of a thing is no argument against its existence, rather a condition of it"* (Parisis & Smith, 2005:3). Seeing as the quality of appraisals will by biases in reviews for behavioural or strategic reasons. Especially when information about employees' effort is imperfect (i.e. where the evaluation was subjective), there will be a tendency for the performance evaluation to be biased to the company's advantage (Gibbs, 1991; Prendergast & Topel, 1993; Prendergast, 1999; Lazear & Gibbs, 2009). Parisis and Smith (2005:6) further explains by implicating top management's irrational behaviour, which is encouraged by attempts to achieve unrealistic goals, by stating that *"the needs of human reality impose cognitive limits on mankind that restrict inputs into the decision-making process, leading to seemingly irrational choices"*. Additionally, due to the performance appraisal's format top management links bonuses to desired outcomes, where immediate goals are overemphasised. This implies that long-term focus is neglected, where obtaining new skills, building on research and development, or developing large networks or impressive ongoing research projects are no longer enough. This is also true for academia, where the sole focus is on throughput rates and resource outputs, ignoring academics' input costs and the benefits of long-term collaboration and synergy among colleagues.

In conclusion, the irrational tendencies of human behaviour not only led to the misguided development of methodologies and practices, but also to the wrongful implementation of existing performance measurement tools. However, the universal concept of performance remains inherently relative, which is why no ratio or module will ever *"predictably lead"* to success (Rosenzweig, 2007:15), and why benchmarking will remain inexecutable. Unfortunately, it is expected from human nature that some may continue to try to capitalise on this loophole without considering the costs. Irrationality will always lead to inefficient performance measurement, ignoring the connection between subjective well-being and relative inputs with company outputs. In the end, it may make more sense if performance measurement would remain only as a cognitive action, with the purpose of keeping humanity sane.

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