Benchmarking Excellence:

Navigating the Nexus of Skill and Luck in Organisational Performance Evaluations

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Research report submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Philosophy (Corporate Strategy)

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Philosophy, Corporate Strategy at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University.

I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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ABSTRACT

This academic inquiry delves into the intricate dynamics of organisational performance evaluations, challenging conventional assumptions by exploring the interplay between strategic skill and stochastic fortune. Focused on a global sample of 2,029 companies over a 16-year period, the research draws insights provided by Henderson, Raynor, and Ahmed (2012) to navigate the complex landscape of organisational success, shedding light on the elusive intersection of strategic intent and serendipity. Utilising advanced statistical techniques, including Decile Transition Matrices and Markov Chain simulations, this inquiry seeks to discriminate between periods of performance attributable to strategic prowess from such period that may simply have resulted from fortuitous circumstances. In doing so, truly exceptional organisations are distinguished from those that may simply have benefited from luck.

This research plays a crucial role in advancing the comprehension of the interplay between luck and skill in organisational performance assessments. It provides valuable insights to empower scholars and practitioners in accurately discerning truly exceptional organisations, whether for case studies or strategic emulation. The study serves as an indispensable guide, underscoring the importance of acknowledging the potential influence of luck in periods of superior performance and cautioning against overlooking randomness in performance evaluations.

Keywords

Luck, Skill, Randomness, Organisational Performance

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
RESEARCH PROBLEM

1.1 BACKGROUND TO THE RESEARCH PROBLEM

In the milieu of management studies, a pivotal inquiry emerges: which factors lead to organisations achieving prolonged periods of superior performance? This fundamental question has prompted divergent perspectives within scholarly discourse. While a substantial cohort of researchers believe that prolonged periods of exceptional performance is attributable to strategic prowess, an opposing faction contends that such periods may simply be experienced by organisations as a result of luck. The role of luck in the achievement of extraordinary results is well portrayed in the story of Honda's phenomenal success in establishing its presence in the U.S. market.

In 1975, the British Government commissioned the Boston Consulting Group (BCG) to investigate the factors contributing to Honda's success during the 1950s and 1960s. BCG attributed Honda's success to a deliberate and adept utilisation of economies of scale (Rumelt, 1995). Minzberg (1985) highlighted an interview conducted by Pascale (1984), a faculty member at the Stanford University Graduate School of Business and a consultant and advisor to several Fortune 500 companies in the U.S. and Europe (World Economic Forum, 2023), in which luck was indicated as playing a pivotal role in Honda's success. Interviews were conducted with six of Honda's founding executives, and the narrative of Honda's success appeared to be primarily attributed to "*miscalculation, serendipity, and organisational learning*" (Pascale, 1984). In his conversation with Honda Executive Kawashima, it was revealed that Honda had no specific strategy other than testing the waters to see if they could sell something in the U.S. (Pascale, 1984).

Kawashima entered the U.S. market with four Honda motorcycles: the 50cc Supercub, 125cc, 250cc, and 300cc. He assumed that the 300cc model had the best chance of success since the U.S. market was dominated by larger motorcycles at the time. Interestingly, Kawashima and his assistant commuted on the smaller 50cc Supercub motorcycles and were spotted by a buyer from Sears, a major U.S. sporting goods retailer, an encounter which led to Sears proposing to sell the 50cc motorcycles in their stores. Kawashima was initially hesitant to establish a distribution agreement with Sears, fearing it might harm the image of their larger motorcycles in the highly competitive U.S. market. However, due to the larger motorcycles' inability to achieve the necessary sales volumes to sustain their U.S. operations, Kawashima ultimately agreed. The reception of the 50cc Supercub exceeded all expectations and played

a pivotal role in successfully establishing the Honda brand in the U.S. market (Pascale, 1984; Rumelt, 1995). The element of luck in Honda's success was evident in the fortuitous encounter between Kawashima's team and the Sears buyer which arguably played a major part in Honda's successful establishment in the US market.

Despite Minzberg's (1985) findings highlighting the influence of luck in Honda's favourable establishment in the U.S. market, contemporary academic literature still predominantly attributes Honda's success to skilful strategy development, albeit with an emergent nature, often omitting the luck factor (Whittington et al., 2019).

1.2 BUSINESS RELEVANCE OF THE RESEARCH

Peters and Waterman's (1982) influential publication dissected the determinants of success across 29 companies, of which Honda was one, which they deemed as "excellent performers". Peters and Waterman (1982) scrutinised financial data for these 29 companies meticulously from 1976 – 1980 and continued to identify 39 companies as "unexcellent" based on their financial performance for the same period.

The tale of Honda's rise to success, which encompasses elements of both strategic intent and serendipity, resonates with the themes discussed by Peters and Waterman (1982). Honda's success was attributed to flexibility and innovation as the authors state that Honda *"uses lots of project teams and is quite flexible. Innovation typically occurs at the interface, requiring multiple disciplines. Thus, the flexible Japanese organisation has now, especially, become an asset*" (Peters & Waterman, 1982). In opposition to the work of Peters and Waterman (1982), Clayman (1994) embarked on a distinct trajectory of research, investigating the performance of companies identified as "excellent" within Peters and Waterman's (1982) publication. Her empirical analysis yielded a compelling revelation: the performance of the companies that were identified by Peters and Waterman (1982) as being "excellent", often exhibited performance metrics that closely mirrored those of their industry counterparts that were deemed as "unexcellent" (Clayman, 1994). Clayman's (1994) findings were underpinned by the fact that a significant number of the organisations singled out as exemplary by Peters and Waterman (1982) during the timeframe spanning from 1976 to 1980, found themselves surpassed in performance by their industry rivals during the subsequent period from 1981 to 1985. Clayman's (1994) findings cast a shadow of scepticism on the methods used by Peters and Waterman to identify extraordinary companies such as Honda, and on the factors that researchers of such labelled companies believed to be the drivers of their sustainable superior performance.

It is clear that the Honda story exemplifies the complex interplay between strategy and good fortune. Honda's journey, as narrated by Pascale (1984) and influenced by elements of luck and experimentation, adds depth to the discussions raised by Peters and Waterman (1982) and underscores the importance of distinguishing between skilful strategy and serendipitous success when examining the performance of organisations. This distinction is crucial for researchers and strategists to avoid recommending ineffective strategies based solely on past success stories that may have been shaped by factors beyond strategy alone.

A substantial proportion of formal strategies advanced for organisations are crafted through empirical investigations such as the one undertaken by Peters and Waterman (1982), where business strategists focus their inquiries on companies that are labelled as excellent. This paradigm highlights the necessity for researchers to distinguish a clear demarcation between genuinely outstanding companies, and those that are merely experiencing temporary periods of good fortune. Neglecting this distinction poses a risk wherein the development and endorsement of strategies may incorrectly attribute exceptional performance to skill when, in reality, it is influenced by random events, thereby potentially rendering such strategies ineffective or ill-suited for application within other organisational contexts.

1.3 THEORETICAL RELEVANCE OF THE RESEARCH

Support for the concern of confusing luck with skill when evaluating companies based on their performance emerge from a study conducted by Henderson, Raynor, and Ahmed (2012) who employed benchmarking techniques in conjunction with Markov Chain simulations. This research illuminated the possibility that the success achieved by certain organisations might owe more to chance than to a well-crafted strategy or other discernible drivers of prosperous performance. When considered alongside Clayman’s (1994) insights, these findings forcefully underscore the propensity to confuse short-lived periods of successful organisational performance with strategic prowess when attempting to identify organisations for study within the context of strategy formulation.

Scholarly discourse often draws substantial insights from companies which are identified as exceptional performers using varying benchmarking techniques (Burgelman et al., 2018). These insights can be alluring, prompting academics to contemplate replicating the success of organisations spotlighted in case studies by endeavouring to transplant their strategies, processes, and organisational structures into alternative contexts (Rivkin, 2000). Over the past three decades, an array of organisations deemed as having achieved sustained superior performance have undergone extensive examination, and their case studies have been widely disseminated, featuring prominently in academic textbooks such as *Exploring Strategy*

(Whittington et al., 2019), *Crafting and Executing Strategy* (Thompson et al., 2020), and *Strategic Management: A Competitive Advantage Approach* (Fred et al., 2019). Furthermore, practitioners and academics alike frequently turn to practitioner-oriented books, including as *In Search of Excellence* (Peters & Waterman, 1982), *Built to Last* (Collins & Porras, 1994), *Good to Great* (Collins, 2001), and *What Really Works* (Joyce et al., 2003), which showcase case studies of organisations deemed as exceptional performers. These cases often serve as foundational pillars for scholarly research in the realm of organisational strategy, which deems it essential for scholars to be able to distinguish between organisational performance that is attributable to skill, and that arising from randomness.

1.4 RESEARCH OBJECTIVES

The findings derived from the study conducted by Henderson, Raynor, and Ahmed (2012) aimed at determining the duration of sustained superior performance required to eliminate the influence of chance, are contingent upon a dataset primarily comprising U.S. publicly traded companies, thereby implying a constrained geographical scope. The applicability and generalisability of these findings to companies operating within dissimilar regions or under distinct regulatory frameworks thus necessitates careful consideration. Expanding the scope of this research to encompass a more diverse spectrum of organisations from varied geographic locations may enhance the relevance and external validity of the outcomes. The research undertaken by Henderson, Raynor, and Ahmed (2012) was executed in 2008 which also renders it crucial to consider the need for contemporaneous data for a more comprehensive analysis.

The principal objective of this present study is to contemporise and advance the work initiated by Henderson, Raynor, and Ahmed (2012), whilst simultaneously removing the geographical constraints to include publicly traded global companies from around the globe to establish the generalisability of their findings.

A critical facet within the realm of management research resides in the ability to effectively distinguish between periods of organisational performance attributable to skill, and periods of success which arise from luck. The absence of such a capability inherently brings about the risk of erroneously attributing stochastic correlations identified within organisational case study data as causal factors contributing to success (Guo et al., 2022).

Liu & de Rond (2016) noted that the theme of 'luck versus skill' within the domain of management studies has remained relatively underexplored. In their systematic review, encompassing a comprehensive analysis of the term "luck" within six preeminent management

journals, they discovered that a mere 2% of articles incorporated the term "luck" in their primary text, abstract, or title (Liu & de Rond, 2016). In recognition of this evident shortcoming within the realm of academic inquiry, the authors issue a call to scholars, urging them to actively engage in the ongoing development of conceptual tools that could hold the potential to better understand the role of luck in the context of organisational performance. To date (November 2023), limited notable responses to their call have materialised within the annals of prominent academic journals.

Considering this lack of scholarly engagement, the principal objective of this paper is to respond to Liu and de Rond's (2016) call to action by extending the application of the methods deployed by Henderson, Raynor, and Ahmed (2012). These methods were meticulously designed to establish and implement a benchmark for identifying the specific duration during which an organisation must consistently maintain a high level of performance to confidently differentiate its performance from that which could result from fortuitous events. Through this scholarly endeavour, this paper aspires to contribute substantively to the ongoing efforts aimed at bridging the prevailing knowledge gap within this domain of inquiry.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

This literature review seeks to distinguish between organisations that achieve high levels of organisational performance due to skill, and those that do so as a result of luck. The expedition begins with a comprehensive elucidation of key terms, including luck, skill, organisational performance, and benchmarking. Further exploration delves into the fundamental concepts, constructs, frameworks, models, and theories found in the literature to ensure a robust foundation for understanding their applications. This review then explores both the seminal and contemporary literature to build a scholarly backdrop that leads to the core research objective of this paper. This objective involves the employment of methods similar to those developed by authors Henderson, Raynor, and Ahmed (2012) which aims to discern between companies that achieve periods of superior performance through luck, and those that do so as a result of strategic prowess.

Given the lack of theoretical and empirical literature exclusively focusing on the dichotomy of luck and skill in organisational performance, this literature review expands its horizons beyond the realm of management studies, as it reaches into the realms of economics, psychology, and sociology, where luck is explored as an influential factor shaping outcomes. This interdisciplinary approach enriches the understanding of the intricate interplay between fortune and strategy that permeates the modern corporate landscape.

The distinction between companies that achieve sustained superior performance through skill and those that owe their performance, or at least part thereof, to serendipity should be an essential consideration for researchers in the realm of management studies. Organisations which produce high levels of performance often serve as benchmarks and sources of inspiration for practitioners and scholars alike. Attempts to replicate the strategies, processes, and structures of organisations deemed as 'remarkable' without discerning luck from skill may lead to the formulation of misguided strategies, rendering them ineffective or ill-suited to alternative contexts.

The influence of luck versus skill has been a subject of interest across various domains. This intrigue spans from the realms of gambling (Losak, 2021; Guo et al., 2022), to the intricate landscape of financial markets, encompassing the performance of mutual funds and hedge funds (Agyei-Ampomah et al., 2015; Yang & Liu, 2017; Cai et al., 2018 and Huang et al., 2020). This dichotomy further extends its reach into the realms of entrepreneurial ventures (Derbyshire & Garnsey, 2014; Coad & Storey, 2021; Soto-Simeone et al., 2021 and Zunino et

al., 2022), as well as into the performance of established and mature organisations (Denrell, 2004 and Henderson et al., 2012). Paradoxically, amid these multifaceted explorations, the notion of luck has, somewhat surprisingly, remained a relatively uncharted territory within top-tier management journals (Liu & de Rond, 2016). But what contributes to this limited scholarly attention? As Liu and de Rond (2016) suggest, the reluctance to incorporate luck as a determinant of results often stems from its inherent non-operationalisability.

2.2. LUCK

2.2.1 Definition of Luck

The Cambridge dictionary defines luck as "*the force that causes things, especially good things, to happen to you by chance and not as a result of your own efforts or abilities*" (Cambridge Dictionary, 2023). Denrell, Fang, and Liu (2015) define luck as "*the impact of a temporary factor that is not expected to persist*, *and that leads to favourable outcomes"*. The concept of luck can be dichotomised into two distinct categories: good luck, and bad luck. Good luck pertains to fortuitous and serendipitous events that result in favourable outcomes, while bad luck encompasses random events that lead to unfavourable or adverse consequences. In the context of this research, it is imperative to clarify that the former definition, aligning with favourable outcomes, is the one employed for the general usage of the term.

2.2.2 Perspectives of Luck

Liu and de Rond's (2016) exploration of the various perspectives on luck takes us deeper into the psychology of how individuals perceive and understand luck. The authors offer a comprehensive exploration of the various perspectives on luck whereby they identify six distinct perspectives of luck in the context of management and organisations.

The first perspective discussed by Liu and de Rond (2016) is 'luck as Attribution'. This perspective emphasises the human tendency to attribute outcomes, whether positive or negative, to personal or collective factors such as skill, effort, or merit. Researchers often underestimate the role of luck in shaping outcomes, leading to biases in how success and failure are attributed to an organisation's abilities or choices.

The second perspective is 'luck as Randomness'. In this view, luck is seen as a random and uncontrollable force that significantly influences outcomes. This perspective challenges the notion that outcomes can be fully predicted or controlled, highlighting the role of chance events in organisational performance (Liu & de Rond, 2016).

The third perspective, ‘luck as Counterfactual’, explores how researchers often use counterfactual thinking to evaluate outcomes. Individuals tend to imagine alternative scenarios or "what-ifs" to assess how different choices might have led to better or worse outcomes, thereby influencing their perceptions on the drivers behind resulting performance. This perspective reveals how counterfactual thinking can shape perceptions of performance outcomes and influence decision-making (Liu & de Rond, 2016).

The fourth perspective, ‘luck as Serendipity’, focuses on how some organisations can capitalise on unexpected opportunities and make serendipitous discoveries, such that may lead to periods of exceptional performance. It highlights the potential of companies to recognise and seize chance opportunities that may lead to heightened levels of performance, even when the outcomes of such opportunities may not align with initial organisational goals (Liu & de Rond, 2016).

Liu and de Rond’s (2016) research provides a comprehensive overview of four distinct perspectives on luck, offering valuable insights into how outcomes are perceived, evaluated, and integrated into decision-making processes that are aimed at improving organisational performance.

This section advances our understanding into how luck may influence the performance of organisations, and how the resulting organisational performance may be interpreted by researchers.

2.2.3 Luck at Various Organisational Levels

The concept of luck is not confined to individual or micro-level events. It extends to and macro organisational level, where external elements can exert unpredictable influences on performance. The extent of this luck, whether is at the micro-level shaping an individual organisation's success or at the macro-level impacting the broader economic landscape, remains a critical factor to consider as we explore the identification of luck and skill. Luck can be dichotomised into two distinct perspectives: that of micro level, and that of the macro level.

At the **micro-level**, luck pertains to external elements or events that exert a significant influence on the success or failure of an individual organisation. These elements or events lie outside the organisation's control and are often characterised by unpredictability, and the element of serendipity. This perspective aligns with the insights offered by Minzberg (1985) who contended that luck played a pivotal role in the successful market penetration of Honda in the U.S. In this context, luck assumes a role in shaping the performance of individual organisations. Such random events have the potential to create opportunities, exemplified by the distribution of Honda's 50cc SuperCub in Sears stores, or obstacles that profoundly affect both their immediate and long-term chances for success.

Rumelt (1991) highlights that random variations at a macro level also have the potential to affect organisational performance. From this perspective, the concept of luck pertains to factors that can exert influence over the broader economic landscape exerting an impact on all organisations within a given industry, region or country. Such occurrences may include economic cycles, fluctuations in interest rates, or rapid changes in governments. Even though macroeconomic policies and governmental interventions may endeavour to alleviate adverse effects of such occurrences, the undeniable presence of luck within the macroeconomic realm remains prevalent.

In this section it is revealed how the influence of luck on organisational performance is not confined to micro-level events but extends to the macro organisational level where external factors can unpredictably influence an entire industry's performance. Understanding how luck operates at both levels is crucial in gaining a comprehensive perspective on its influence on performance. This insight contributes to building the foundation for our ongoing exploration of the delicate balance between luck and skill in the realm of organisational performance evaluations.

2.3. SKILL AND ORGANISATIONAL PERFORMANCE

2.3.1 Definition of Skill

Guo, Zhuu, Zhu, Rosenthal, and Schoenberg (2022) refer to skill at an organisational level as the conscious and deliberate actions that are carried out by the members of an organisation and that lead to their intended outcomes, and that are done so on the basis of knowledge and abilities. Brookman and Thistle (2013) proxy skill at an organisational level as company performance that is not explained by industry performance (common cause variation), also known as 'special cause variation'.

Skill refers to the capability and proficiency of organisations in making deliberate and informed decisions, executing strategies, and effectively managing their resources to achieve sustained superior performance. It embodies the aptitude to consistently produce favourable outcomes through well-informed choices and competently executed actions, irrespective of transient or uncontrollable external factors such as luck. This understanding of skill resonates with various critical success factors and dynamic capabilities identified by scholars as drivers of sustained organisational performance (Peters & Waterman, 1982; Collins & Porras, 1994; Rumelt, 1995; Collins, 2001; Joyce et al., 2003; Teece, 2007; McGrath, 2012; Navimipour et al., 2018; Wu et al., 2019 and Agusti et al., 2022).

The shift from discussing the nuanced facets of luck to focusing on the concept of skill underscores the significance of skilful decision-making and strategic execution in the pursuit of sustained superior performance. It also prompts a deeper examination of how skill and luck intertwine within the context of organisational performance, as it is defined in the following section.

2.3.2. Definition of Organisational Performance

In the realm of management studies, organisational performance is assessed from three standpoints:

1. The capability to accomplish strategic aims;
2. The capacity to achieve operational targets; and
3. An organisation's aptitude to produce favourable financial returns to its investors.

Organisational performance is described by Doz (2020) as the outcome of strategic planning and implementation actioned based on the intentional practices, behaviours, and skills of managers within an organisation. He and Wei (2011) define organisational performance as an organisations self-assessed capacity to attain its strategic objectives, bringing to light the subjective nature of organisational performance when evaluated from an internal perspective. Furthermore, Chen, Lin, and Tsai (2020) posit the notion of organisational performance as a subjective self-evaluation that gauges the comprehensive achievement of an organisation's multifaceted goals concerning its operational functions, as opposed to its overarching strategic aims.

From a financial standpoint which offers an objective perspective, Dimitratos, Lioukas, and Carter (2004), notable for boasting more than 600 citations, define organisational performance as an organisation’s ability to generate favourable financial returns for its shareholders. In line with this perspective, the study conducted by Henderson, Raynor, and Ahmed (2012) utilises financial performance metrics such as Return on Assets (ROA) and Tobin’s Q as proxies for organisational performance.

2.3.3. Critical Success Factors and Organisational Performance

Numerous eminent scholars assert that sustained organisational performance stems from critical success factors such as economies of scale, rapid adaption, experimentation, flexibility, slack resources, culture, and innovation (Peters & Waterman, 1982; Collins & Porras, 1994; Rumelt, 1995; Collins, 2001; Joyce et al., 2003; McGrath, 2012; Navimipour et al., 2018; Wu et al., 2019 and Agusti et al., 2022). Contemporary academic literature also attributes superior organisational performance to dynamic capabilities (Teece et al., 1997 and Teece, 2007) which is an organisations ability to sense environmental opportunities and threats, capitalise

from opportunities, and orchestrate assets in such a way as to mitigate weaknesses whilst enhancing organisational strengths.

These perspectives, however, may overlook the argument that success can be attributed to chance rather than the skilful management of an organisation and its resources. It is important to note that the factors facilitating success during a particular period may differ from those that continue to drive performance in subsequent periods, as will be discussed in Section 2.4.

2.3.4. Causal Identification of Organisational Performance

Causal identification pertains to the capacity to delineate the cause-and-effect mechanisms that establish relationships between the variables under examination (Shaver, 2020). While critical success factors and dynamic capabilities are frequently acknowledged as drivers of sustained superior performance (Pascale, 1984; Teece, 2007 and Mauboussin, 2012), the ability to accurately identify these determinants may prove to be elusive (Tversky & Kahneman, 1974; Rivkin, 2000 and Shaver, 2020).

When organisations endeavour to emulate the strategies of those considered superior performers, as advocated by Rivkin (2000) whose work has garnered recognition from not only Henderson, Raynor, and Ahmed (2012), but also more than 1700 other scholars, they identify challenges that may hinder researchers in accurately identifying the causal drivers of sustained organisational performance. Henderson, Raynor, and Ahmed (2012) propose that causal identification of these determinants may lead to erroneous conclusions if organisations targeted for emulation have attained their performance primarily through luck rather than strategic prowess.

This section establishes a connection to the broader discourse within this paper by emphasising the imperative for innovative approaches in identifying truly exceptional-performing organisations to enhance the accuracy of pinpointing the key drivers of organisational success.

2.3.5. Fluidity in the Drivers of Organisational Performance

Within the complex landscape of organisational performance, the intricate interplay between luck and skill unveils a multifaceted narrative. As illuminated in the preceding section, the ability to accurately identify the determinants of success may prove to be elusive, emphasising the challenges in discerning the relative contributions of skill and luck on resulting performance. The intricacies surrounding causal identification of the drivers behind organisational performance, and the delineation of the dynamic contributions of luck and skill are compounded by the scenario where the factors enabling success during one specific period may differ from those that continue to drive performance in a subsequent period. This

scenario is highlighted by McGrath (2013) who identified that this temporal evolution of performance drivers introduces a layer of complexity that deepens the challenge of unravelling the nuanced interplay between luck and skill.

Sull (2005) concurs with these perspectives on the dynamic character of the factors influencing organisational performance, believing that the determinants of success which propel an organisations performance may exhibit a fluidity, devoid of a rigid and unchanging blueprint. For example, where large amounts of company resources may have been a major factor for success in one decade, an asset-lite structure with a higher focus on agility and innovation may be more beneficial for performance in the next (Sull, 2005).

Sull's (2005) research raises the pertinent question: At what juncture does the influence of luck surpass the realm of skill in shaping organisational performance? This shift in focus navigates the discourse toward the temporal aspects of performance and the nuanced equilibrium between skill and luck in shaping organisational performance.

2.3.6. Organisational Performance and the Theory of Random Walks

Considering the preceding discussions on luck, skill, and organisational performance it is essential to explore the concept of randomness in organisational outcomes. Coad, Frankish, Roberts, and Storey (2013) introduce a theoretical framework suggesting that an organisation's performance can be effectively modelled as a random walk process, a statistical method used to analyse variables such as organisational performance. This approach connects with the idea that random processes, as demonstrated by Denrell, Fang, and Liu (2015), can generate data used in statistical analyses that closely resemble strategic intent when, in fact, they are simply the result of an interplay between stochastic processes and resource endowment.

Denrell (2004), as acknowledged on multiple occasions by Henderson, Raynor, and Ahmed (2012), posits that company performance may not always be determined by a meticulously devised strategy as it may also be significantly influenced by resource endowment and fortuitous curcumstances. Such a perspective implies that the success or failure of an organisation is sometimes more dependent on resource endowment and random chance events than on strategic prowess. Denrell (2004) also believes that while organisational success might exhibit elements of randomness, the skilful orchestration of an organisation's resources is still essential in avoiding failure. Agusti, Galan, and Acedo (2022) support this viewpoint, arguing that sustained organisational performance is contingent on an organisation's resource slack.

The observations made by both Henderson, Raynor, and Ahmed (2012) and Denrell (2004) converge on the notion that random walks can produce prolonged sequences of outcomes

that may appear to represent strategic prowess, however, are largely influenced by luck. This phenomenon aligns with the concept of random walks where chance-driven variations in performance can lead to extended periods of seemingly exceptional results.

Despite the profound implications of these insights, it is noteworthy that stochastic processes and their significance in the context of sustained superior performance have remained somewhat underexplored within the existing body of literature (Denrell, 2004; Liu & de Rond, 2016). Furthermore, it is essential to acknowledge that some researchers persist in attributing sustained periods of successful performance to skill rather than luck, potentially due to the imposition of perceived patterns on random data by researchers themselves (Taleb, 2004; Henderson et al., 2012 and Denrell et al., 2015).

2.4. BENCHMARKING

2.4.1. Introduction

The intricate interplay between luck and skill is the central theme of this paper as attention is drawn to the complexities in deciphering their contributions to extended periods of successful organisational performance. A significant challenge arises from the difficulties in causal identification of organisational performance, further exacerbated by the dynamic nature of the driving factors (Sull, 2005 and McGrath, 2013). As this exploration delves into the multifaceted landscape of organisational performance assessments, it becomes clear that the task of separating luck from skill is far from straightforward as the methods employed to identify truly exceptional performing organisations are shown to be questionable (Clayman, 1994 and Henderson et al., 2012).

2.4.2. Definition of Benchmarking

The primary method used to identify exceptional performers is that of benchmarking. Maiga (2004) defines benchmarking as a management technique that involves comparing a company's performance against those of industry leaders in order to identify areas of improvement required to achieve higher levels of organisational performance. The concept of benchmarking, as advocated by Maiga (2004), is prominent in the realm of performance evaluation as it is frequently employed to aid in causal identification.

2.4.3. Flaws in Benchmarking Organisational Performance

There is growing contention among researchers who assert that benchmarking techniques might inadvertently misguide researchers, advocating for alternative approaches to steer clear

of misinterpretations rooted in random data (de Wet & du Toit, 2007; Mauboussin, 2012; Henderson et al., 2012; Liu & de Rond, 2016 and Guo et al., 2022;).

Henderson, Raynor, and Ahmed's (2012) and Clayman's (1994) seminal research revealed a significant revelation: a substantial number of companies labelled as 'exceptional performers' had achieved this distinction by surpassing predefined performance benchmarks during specific periods, only to subsequently fall short of these benchmarks. Several of the 'exceptional' companies also often exhibited historical performance records that were essentially indistinguishable from randomness. This revelation has triggered pertinent inquiries into the reliability of conventional benchmarks when identifying superior performers and has spurred Henderson, Raynor, and Ahmed (2012) to explore the frequency with which an organisation must exceed performance benchmarks like ROA and Tobin's q before being truly classified as a superior performer.

As we navigate the intricate relationship between luck, skill, and sustained organisational performance, it becomes apparent that the landscape is a nuanced one that necessitates a more comprehensive understanding beyond traditional benchmarking techniques and performance metrics.

2.4.4. Return on Assets and Tobin's q as Performance Benchmarks

In the research conducted by Henderson, Raynor, and Ahmed (2012), aimed at establishing how frequently a company needs to surpass a performance benchmark to genuinely distinguish exceptional performance from statistical anomalies, two key financial performance metrics, Return on Assets (ROA) and Tobin's q, were employed.

ROA, an extensively utilised and fundamental benchmarking metric for evaluating organisational performance (de Wet & du Toit, 2007), is computed by dividing a company's net income by its total assets. ROA serves as an indicator of a company's performance by assessing how efficiently it generates profits concerning the total value of its assets. It stands as a relatively objective measure since it primarily factors in net profit as the numerator, which does not raise subjectivity concerns. Despite the lack of concerns regarding subjectivity, it is important to note that accounting methods may be employed to manipulate net profits, particularly by businesses attempting to minimise their taxable earnings.

Tobin's Q aims to provide a market-based perspective on an organisation's performance. This metric is calculated by dividing the year-end market value of a company's stock by the replacement value (net realisable value) of its assets. Due to the inherent complexities in accurately determining an organisation's net realisable asset value, Henderson, Raynor, and Ahmed (2012) resort to using book values to compute this metric. Unfortunately, this metric introduces a shared limitation with ROA as it relies on asset values as the denominator for its

calculation. In an empirical inquiry conducted by Bendle & Butt (2018) where they examined the effectiveness of Tobin's q as a performance metric, they demonstrated that the resulting output from this metric may be inaccurate due to over or under-valuation of intangible assets, and concerns regarding the depreciated value of assets. Should the net realisable asset value, as opposed to book values, be utilised it adds further concerns regarding the reliability of the results due to subjectivity required in the evaluation of the replacement value of such assets. Further concerns regarding the Tobin's q metric arise since the market value of an organisation's stock, used as the numerator in the Tobin's q formula, may also be influenced by the subjective valuation of a company by its shareholders.

The subjectivity in the numerator, combined with potential valuation issues in the denominator of the Tobin's q formula, raises concerns regarding the use of this metric in the evaluation of organisational performance. In contrast, ROA carries fewer concerns regarding subjectivity, even though accounting methods can be employed to manipulate net profits. It is for this reason that ROA is considered in this paper as a more stable and less susceptible metric, making it a better option for use in the evaluation of organisational performance.

2.5. MISATTRIBUTION OF LUCK FOR SKILL

2.5.1. Introduction

Preceding sections have delved into the intricate relationship between luck, skill, benchmarking techniques, and organisational performance. They underscore the recognition that organisational outcomes can be influenced by randomness that occasionally yields extended periods of exceptional performance. As Henderson, Raynor, and Ahmed (2012) highlight, random patterns in data are at times erroneously interpreted as indicators of skill when scholars and analysts scrutinise data in their quest to identify superior performers. Such a phenomenon, as also highlighted by Denrell, Fang & Liu (2015) and Liu & de Rond (2016), underscores the crucial need to differentiate between outcomes resulting from skilful management, and those attributable to randomness when assessing the achievements of organisations. A central facet that warrants further exploration within this discourse pertains to the confusion of luck as skill, a concept aptly encapsulated as the "Misattributions of Luck for Skill".

2.5.2. Heuristics, Cognitive Biases and Misattributions

The misattribution of luck for skill is inherently intertwined with cognitive biases and heuristics, as cognitive shortcuts and perceptual distortions may lead researchers and practitioners to misinterpret random outcomes as markers of skill.

Attribution biases pose an undeniable challenge when assessing organisational performance records, as noted by Liu and de Rond (2016). These biases manifest when superior organisational performance is attributed to dispositional factors, such as skill, while downplaying the influence of situational factors like luck (Liu & de Rond, 2016). A prime example of an attribution bias is the self-serving bias, which reveals a common tendency among companies to attribute their successful performance to skill or effort, while attributing periods of poor performance to bad luck (Miller & Ross, 1975, as cited in Liu & de Rond, 2016).

The influence of cognitive heuristics, as emphasised by the influential research of Tversky and Kahneman (1974) which boasts over 50,000 citations, further compounds the issue. One specific heuristic, the 'anchoring heuristic' plays a significant role in this phenomenon. This heuristic outlines the tendency of researchers to form final judgments by initiating from an initial value, known as an anchor, often a predefined benchmark, and subsequently adjusting their assessments based on new information. This cognitive procedure exerts a substantial influence on decision-making, frequently resulting in the final assessments closely mirroring the initial anchor (Tversky & Kahneman, 1974).

The utilisation of anchoring heuristics introduces the potential for errors in judgment and assessment, especially when evaluating organisational achievements and their contributing factors. This becomes apparent when companies achieving performance benchmarks due to luck rather than skill are used as anchor points for assessing the performance of other organisations. The genuine accomplishments of a high-performing organisation may thus be overshadowed by the performance of a false positive that has merely experienced periods of good fortune.

Another cognitive heuristic relevant to this context is the availability heuristic. This mental shortcut pertains to the human tendency to gauge the probability of an event based on the ease with which pertinent examples or instances come to mind (Tversky & Kahneman, 1974 and Kahneman et al., 1982). The availability heuristic can lead to cognitive biases, as individuals often overestimate the likelihood of events that are readily recalled from their memory, irrespective of the actual statistical probability (Tversky & Kahneman, 1974 and Taleb, 2004). This heuristic-driven cognitive bias significantly contributes to the misattribution of luck as skill, as intentional behaviours, choices, and actions are more readily recalled and identified by individuals than serendipitous events.

Building on the discussion of cognitive heuristics, particularly the availability heuristic, there is an additional layer of complexity introduced when selecting companies for use as success case studies. Researchers may inadvertently fall into the trap of choosing companies solely based on recent performance results, rather than conducting a comprehensive evaluation of

their overall performance track records. This selection bias arises from the human tendency to rely on mental shortcuts, such as the availability heuristic, which influences performance assessments by prioritising easily accessible information. In the realm of organisational studies, this means that companies standing out due to the achievement of recent performance benchmarks may be disproportionately chosen for examination. Availability heuristics may lead to the neglection of the broader assessment of an organisation's performance based an in-depth consideration of the underlying factors contributing to periods of exceptional performance. As a result, researchers may be misled to attributing success to specific intentional strategies or competencies when, in reality, such success might be a product of fortuitous circumstances or isolated achievements.

Empirical evidence from a study by Adame (2016) demonstrates the risk that heuristics such as anchoring, and availability heuristics can pose when evaluating the effectiveness of organisational strategies. The research underscores the substantial impact of heuristics and cognitive biases on the decision-making process where researchers' performance assessments are notably susceptible to influence. Henderson, Raynor, and Ahmed (2012) conclude that heuristic-driven cognitive biases and their influence on organisational evaluations cannot be underestimated.

The pervasive nature of attribution biases, coupled with the anchoring and availability heuristics, and the search for meaning in random events, collectively contribute to the persistent misattribution of luck as skill. These facets are intricately connected with the topics discussed in previous sections of this paper, highlighting the need for a comprehensive understanding of these factors to address the complex issue of misattributions in the evaluation of organisational performance.

2.5.3. Difficulties in Causal Identification

In the realm of organisational performance assessments, a critical concern arises from the misattribution of luck for skill. This misattribution is often exacerbated by flaws in data analytics which can lead to the distorted interpretation of an organisations performance by researchers, and the actual causal factors of such performance (Denrell, 2004; Henderson et al., 2012). Shaver (2020) highlights the difficulties inherent in causal identification of organisational success using inferential statistics and emphasises the need for innovative approaches to causal identification in empirical research.

2.5.4. Data Analytics and Misattributions

In the context of organisational performance, the complexities of causal identification and the misattribution of luck for skill have been central themes in this paper, underlining the significance of distinguishing between chance and genuine skill when evaluating

organisational performance. The following section explores the intricate nature of data analytics and interpretation, revealing how flawed practices can exacerbate the misattribution of luck for skill, ultimately leading to distorted causal determinations of performance. As a crucial aspect of the broader exploration of misattribution phenomena, this section emphasises the importance of advancing data analytics methodologies and mitigating cognitive biases.

2.5.5. Perceive Patterns in Random Data

Delving deeper into the challenges associated with misattributions in performance assessments, the inclination to ascribe luck to skill often arises from the innate human tendency to discern patterns and significance in data, even when genuine patterns are absent (Denrell, 2004; Henderson et al., 2012; Taleb, 2004; Tversky & Kahneman, 1974). This recurrent theme in the literature underscores the imperative of judiciously applying advanced data analytics techniques to counteract the misappropriation of skill for luck in data interpretation. Researchers' attempts to mitigate inherent cognitive biases in the analysis process necessitate this cautious approach (Tversky & Kahneman, 1974; Maiga, 2004; Taleb, 2004; Denrell, 2004 and Agyei-Ampomah et al., 2015).

When researchers concentrate on distorted patterns within performance reports, such as an organisation meeting specific predefined benchmarks within restricted time frames, there exists a pronounced risk of overestimating the strategic prowess of an organisation while simultaneously underestimating the influence of luck. This overestimation occurs when assessments rely on selective metrics within confined time frames, disregarding other metrics or time periods that may offer insights into average or below-average performance. To fortify the robustness of performance evaluations, researchers must adopt a nuanced approach to data analytics. This involves considering a comprehensive array of metrics over extended periods, ensuring a holistic understanding of performance dynamics. Such an approach guards against undue reliance on isolated patterns, thereby averting misattributions of skill and luck in the assessment of organisational success.

2.5.6. Regression to the Mean

Denrell (2004) advocates for a nuanced approach to data analytics that considers the statistical principle often overlooked – the tendency for data to regress to the mean given sufficient time and a large sample population. Neglecting this principle can lead to the misperception of organisations experiencing periods of exceptional performance as solely indicative of skill when, in fact, luck may be a predominant factor. This misattribution becomes particularly pronounced when organisations exhibit extraordinary performance levels due to chance, only to revert to average performance in subsequent periods. Recognising and

incorporating this statistical principle into data analytics, as underscored by Hamilton and Lordan (2023), enhances the understanding of how luck and skill intertwine over time, reducing the likelihood of erroneously attributing sustained performance solely to skill when chance may be a significant contributor (Henderson et al., 2012). This approach aligns with the broader exploration of misattributions of luck for skill, emphasising the need for comprehensive performance evaluations in organisational performance to avoid misleading conclusions.

2.5.7. Flawed Interpretations of Data

Due to the influence of cognitive heuristics and biases, individuals frequently demonstrate a limited capacity to effectively interpret data that might inherently contain elements of randomness (Tversky & Kahneman, 1974; Denrell, 2004 and Henderson et al., 2012). These cognitive heuristics, which encompass attribution, availability, and anchoring biases, introduce a significant risk of facilitating the misattribution of luck as skill. This occurs because these biases exert a substantial impact on how researchers process and interpret data outputs, potentially distorting the accurate assessment of performance drivers within organisations (Tversky & Kahneman, 1974; Taleb, 2004; Denrell, 2004 and Henderson et al., 2012).

Flawed interpretations of data may present challenges to researchers in accurately appraising organisational performance, particularly when assessing isolated benchmarks or achievements within confined time frames. The allure of these benchmarks might lead researchers to perceive organisations as exemplary performers without considering a broader context. Such interpretations may be misleading, as organisations achieving specific benchmarks in isolation or for a limited period may be experiencing transient periods of good fortune rather than showcasing sustained excellence. The risk also exists that organisations may possess track records not significantly divergent from their competitors, challenging the notion of exceptional performance.

This potential misinterpretation of data underscores the importance of examining performance metrics comprehensively, and over extended time periods to draw accurate conclusions about an organisation's sustained success and its comparative standing within its industry and broader market.

2.6. CONSEQUENCES OF MISSATRIBUTIONS

The misattribution of luck for skill carries significant consequences that permeate the realm of organisational performance assessments, as emphasised by Denrell (2004) and Henderson, Raynor, and Ahmed (2012). These consequences are far-reaching and can significantly

impact an organisation's trajectory, including its ability to sustain superior performance. This section delves into the multifaceted repercussions of misattributing luck for skill.

2.6.1. Misguided or Ill-suited Strategies

The selection of top performers solely based on performance benchmarks as case studies used to drive future strategies can carry substantial risks, particularly when the role of luck is not fully understood or considered. Henderson, Raynor, and Ahmed (2012) emphasise that top-performing organisations may have achieved a superior status through sheer chance, and not necessarily due to inherent or replicable skills or capabilities. This approach can therefore lead to the development or recommendation of ill-suited strategies as the information used for formulating such strategies may be rooted in flawed interpretations of data. Should organisations or researchers seek to replicate the practices of such organisations without a nuanced understanding of the role of luck, it may lead to the adoption of strategies and practices that are not causally linked to drivers of superior performance (Henderson et al., 2012; Shaver, 2020). This can result in a misguided quest for a formula for success based on flaws in the interpretation of past data of alternative organisations.

2.6.2. Overconfidence and Resistance to Change

Misattributing luck as skill often fosters overconfidence within organisations as individuals conflate luck with strategic prowess (Denrell, 2004). When organisations misattribute their past success to their internal capabilities and overlook the role of luck, they are at risk of developing a sense overconfidence and false expectations of future performance based on availability heuristics (Tversky & Kahneman, 1974 and Denrell, 2004). This overconfidence can have profound consequences, as it often leads to complacency and a presumption that past achievements serve as dependable indicators of future performance (Sull, 2005).

Sull (2005) further states that overconfidence can become a significant roadblock to organisational adaptation as organisations are prone to resist changing circumstances when they fail to recognise the role of luck in their success. Such a rigid approach hinders the agility and flexibility required to adjust strategies in response to an evolving context.

2.6.3. Imbalanced Organisational Learning

As posited by Liu and de Rond (2016), the misattribution of luck as skill introduces a substantial risk within the organisational context whereby successes are overvalued, failures are underappreciated, and an illusion of control may manifest. This tendency can lead to imbalanced organisational learning that may be detrimental to an organisations medium to long-term performance (Mauboussin, 2012).

2.7. EFFORTS IN THE MITIGATION OF MISATTRIBUTION

In the domain of evaluating organisational performance assessments, the challenge of misattributing luck for skill has been a recurrent concern. The ability to distinguish between performance resulting from genuine skill and that which is a product of chance is pivotal for the formulation of effective strategies. However, this distinction has frequently been neglected due to the absence of analytical tools available to facilitate such discrimination (Denrell, 2004; Taleb, 2004; Henderson et al., 2012; Liu & de Rond, 2016 and Hamilton & Lordan, 2023).

Authors Henderson, Raynor, and Ahmed (2012) conducted a pivotal study involving a systematic approach aimed at mitigating the misattribution of luck for skill in organisational performance assessments. Through the use of benchmarking techniques and computer-aided Markov Chain simulations, their research unearthed a critical concern regarding the dependent variables employed in inferential statistics suggesting that these variables might be influenced by randomness within datasets. This discovery raises the fundamental concern that organisations earmarked as superior performers by virtue of skill may simply have reaped the rewards of fortuitous circumstances (Clayman, 1994; Denrell, 2004; Henderson et al., 2012).

In their study, Henderson, Raynor, and Ahmed (2012) scrutinised a sample of 430 publicly traded U.S. companies over a span of 43 years, focusing on return on assets (ROA) and Tobin's q as performance measures. One of their critical findings was that false positives can mislead researchers' attempts to identify superior performers, as they lack the capabilities required to discern between successful periods of such performance attributable to skill, and that resulting from random variations in financial performance. (Henderson et al., 2012). Their study pioneers a more scientific approach that enables researchers to scrutinise and classify organisations with greater precision.

The approach undertaken by Henderson, Raynor, and Ahmed (2012) stands as a valuable methodological instrument, offering researchers a systematic means to differentiate genuinely exceptional organisations from those that may have merely experienced fortuitous periods. This pioneering methodology provides a promising avenue for expanding the robustness and credibility of inquiries into the determinants of outstanding organisational performance, facilitating a more nuanced and rigorous examination of the factors influencing organisational excellence.

2.8. SUMMARY OF LITERATURE REVIEW

This literature review on the influence of luck versus that of skill in organisational performance assessments reveals a nuanced landscape where authors exhibit both areas of consensus and disagreement.

Scholars unanimously agree that both luck and skill may significantly impact organisational performance (Minzberg, 1985; Clayman, 1994; Denrell, 2004; Henderson et al., 2012; Derbyshire & Garnsey, 2014; Denrell et al., 2015; Liu & de Rond, 2016; Coad, Roberts, & Storey, 2021; Soto-Simeone et al., 2021 and Hamilton & Lordan, 2023). It is widely recognised that these factors are dynamically interwoven, where some periods of outstanding performance may be attributed to chance.

The role of cognitive biases and heuristics is acknowledged in perpetuating the misattribution of luck for skill in performance assessments (Tversky & Kahneman, 1974; Taleb, 2004; Henderson et al., 2012 and Denrell et al., 2015). Attribution biases, such as the self-serving bias, and cognitive heuristics like anchoring and availability, may lead researchers to misinterpret random performance outcomes as indicators of skill.

There is a shared understanding that the confusion of luck for skill is a prevalent challenge in organisational performance assessments as researchers often misinterpret random patterns in data as indicators of strategic prowess (Clayman, 1994; Rumelt, 1995; Denrell, 2004; Henderson et al., 2012 and Mauboussin, 2012). To mitigate this challenge, authors emphasise the need for more advanced data analytics methodologies aimed at improving the rigor and integrity of data analysis, allowing researchers to effectively distinguish between truly exceptional organisations and those which may simply have benefited from periods of good fortune (Denrell, 2004; Henderson et al., 2012; Liu & de Rond, 2016).

Points of disagreement and contradictory perspectives also emerge in the literature. Some authors emphasise the role of luck, suggesting that periods of exceptional performance may be largely attributed to randomness (Taleb, 2004; Clayman, 1994; Denrell, 2004 and Henderson et al., 2012). In contrast, many authors underscore the significance of skill whilst omitting the factor of luck, arguing that the success of superior organisations is attributable to inherent resources, and strategic prowess (Porter, n.d.; Pascale, 1984; Collins & Porras, 1994; Joyce et al., 2003; Johnson et al., 2005; Teece, 2007; Friesl & Silberzahn, 2017; Whittington et al., 2019; Wu et al., 2019; Doz, 2020; Soto-Simeone et al., 2021;Agusti et al., 2022).

The interpretation of organisational performance, driven by individual cognitive biases, may lead to varying assessments of the same company's success based on the benchmarks that are used as anchors, and the time periods brought under scrutiny (Tversky & Kahneman,

1974; Miller & Ross, 1975; Kahneman et al., 1982; Taleb, 2004; Henderson et al., 2012 and Adame, 2016). Nuances surrounding causal identification and data analytics are points of contention among scholars, highlighting the need for more robust methodologies for assessing performance (Rivkin, 2000; Sull, 2005 and Shaver, 2020).

2.9. ACADEMIC DEBATE

Opposing views within the academic literature regarding the sources of organisational success are evident, and these perspectives encompass the role of strategic prowess and good fortune. These divergent viewpoints are illuminated through various studies and narratives.

One perspective, exemplified by Minzberg (1985), emphasises the significance of luck in organisational success, as evidenced in Honda's journey. Pascale's (1984) interviews with Honda's founding executives highlight the role of "miscalculation, serendipity, and organisational learning" in Honda's success (Minzberg, 1985). Furthermore, the study by Clayman (1994) raises scepticism about organisations labelled as "excellent" by emphasising that their performance metrics closely mirrored those of their industry counterparts. This finding questions the basis for identifying truly outstanding organisations and suggests that luck might play a significant role in such assessments, a sentiment shared by various other prominent authors (Denrell, 2004; Taleb, 2004 and Henderson et al., 2012).

Academic literature predominantly attributes organisational success to strategic prowess (Collins & Porras, 1994; Rumelt, 1995; Collins, 2001; Joyce et al., 2003; Teece, 2007; McGrath, 2012; Navimipour et al., 2018; Wu et al., 2019; Agusti et al., 2022), often downplaying the role of luck (Taleb, 2004; Soto-Simeone et al., 2021 and Hamilton & Lordan, 2023). The work of Peters and Waterman (1982) suggests that organisations like Honda succeeded due to their flexibility and innovation, with a focus on project teams and the ability to adapt to changing circumstances.

Henderson, Raynor, and Ahmed (2012) add another dimension to this discourse by exploring the benchmarking of sustained superior performance. Their research employs benchmarking techniques and simulations to address the question of whether success can be attributed to skill or luck. Their findings, as well as the conclusions posed by Denrell (2004), suggest that some organisations' success might owe more to chance than to a well-crafted strategy or other discernible drivers of performance. This view aligns with the perspective highlighting the potential misattribution of luck for skill when assessing organisational performance.

This debate remains relevant as it impacts not only the understanding of organisational success but also the development of strategies and decision-making processes in both

academic and practical contexts. As the field of management studies continues to evolve, addressing the "luck versus skill" dilemma will be essential for gaining a more comprehensive understanding of sustained superior performance. Researchers should heed the call made by Liu and de Rond (2016) to actively engage in the development of conceptual tools and frameworks to better navigate this intricate terrain. This ongoing dialogue is integral to bridging the existing knowledge gap in this field and ensuring that organisational strategies are based on robust and well-informed foundations.

CHAPTER 3
RESEARCH QUESTION AND HYPOTHESIS

In an endeavour to advance the foundational work laid out by Henderson, Raynor, and Ahmed (2012), and in response to the call by Liu and de Rond's (2016) for the continued development of conceptual tools to advance researchers' understanding of the interplay between skill and luck, this paper embarks on a systematic examination aimed at contributing to the development of analytical tools that may aid researchers in unravelling the interplay between skill and luck in the context of organisational performance evaluations. It seeks to distinguish between organisations whose achievements may be attributed to fortuitous circumstances, and those that are truly exceptional. The overarching research question that underpins this paper is formulated as follows:

Research Question: How can researchers effectively discriminate between companies that display exceptional periods of performance because of skill, and those that simply achieve such levels of performance as a result of randomness?

To guide this inquiry, the following hypotheses are posited:

Null Hypothesis (H_0): The misattribution of luck for skill is not a common occurrence in performance evaluations.

Alternative Hypothesis (H_1): The misattribution of luck for skill is a common occurrence in performance evaluations.

CHAPTER 4
RESEARCH METHODOLOGY

4.1. INTRODUCTION

The primary objective of this research is to extend and contemporise the methodologies initially developed by Henderson, Raynor, and Ahmed (2012). The aim is to effectively distinguish between periods of successful organisational performance resulting from strategic prowess, and those experiencing such periods of success that may be attributable to chance. This study responds to the call made by Liu and de Rond (2016) to employ analytical tools capable of discerning between skill and luck in organisational performance assessments, thus contributing to the refinement of knowledge in this domain.

A comprehensive analysis is conducted on a population comprising 2029 listed companies globally, spanning a 16-year historical period. Decile transition matrices are constructed to explore variations in their performance from year to year. These matrices are then cumulated and imputed into a computer-based Markov Chain simulation, establishing a benchmark for performance influenced by randomness. Finally, this benchmark is applied to the actual performance of the population, enabling the identification of organisations that have attained periods of superior performance due to luck and those whose success is attributed to skill. This research endeavours to bridge existing knowledge gaps in the evaluation of organisational performance, aligning with the evolving discourse in the field.

4.2. RESEARCH PHILOSOPHY

There are three philosophical components of research philosophy that shape the design of a research study, namely: 1. Ontology; 2. Epistemology; and 3. Research Strategy (Ragab & Arisha, 2017). Creswell (2007) provides the following explanations for the aforementioned philosophical components:

1. Ontology is concerned with the nature of reality, and poses questions such as “what exists” and “What is the nature of reality”.
2. Epistemology is concerned with the manner in which knowledge can be gained about reality. It poses questions such as “how can we know something” and “what is knowledge”.
3. Research strategy is concerned with approaches used to conduct a research study. It involves decisions pertaining to research design, methods of data collection and analysis, and interpretation of results. Research strategy draws from both ontological and epistemological philosophies (Bell et al., 2019).

In this study, the primary aim is to differentiate between companies that achieve sustained superior performance as a result of chance and those that do so as a result of skill. Embedded within this research are all three philosophical dimensions: Ontology, Epistemology, and Research Strategy. These philosophical constructs collectively encompass the lens through which the phenomenon is perceived and investigated.

According to Bell, Bryman, and Harley (2019), ontology pertains to the conceptual exploration and theoretical examination of the fundamental essence of reality. Ontologically, this study grapples with the nature of sustained superior performance itself. It recognises this phenomenon as manifest in measurable financial indicators, specifically Return on Assets (ROA) and Tobin's q. These metrics function as windows into the financial performance of companies, enabling a nuanced exploration of the intrinsic attributes and potential sources of sustained performance.

Within an epistemological framework, researchers employ a philosophical perspective that enables them to understand a business phenomenon by meticulously collecting and scrutinising data, as is elucidated by Bell, Bryman, and Harley (2020). Therefore, epistemologically, the research seeks to unravel the methods through which insights into the nature of sustained superior performance are acquired. Within the epistemological landscape, Bell, Bryman, and Harley (2020) identify two prevailing perspectives: positivism and interpretivism. Positivism is an empirical and scientific approach that is anchored on the understanding that reality is objective and external to the researcher. Positivists typically use quantitative research methods to test hypotheses in a bid to identify and explain phenomena (Creswell, 2007). According to Ragab and Arisha (2017), positivists attempt to “reduce phenomena to context-free generalisations”. While both positivism and interpretivism possess merits, this research aligns more harmoniously with positivism as the focal point is to distinguish between performance that is derived from common cause variation (luck) versus that which stems from special cause variation (skill), through empirical examination.

The research strategy is guided by the research philosophy and encompasses the research design, methods utilised for data collection and analysis, and the interpretation of the findings. The research strategy involves the quantitative analysis of historical financial data, striving to identify performance patterns among companies.

The advocacy for a positivist epistemology is underscored by the pivotal focus on understanding the distinctive nature of sustained superior performance. The intent is to investigate empirical data using statistical tools to differentiate between chance and skill-driven variations in performance. Embracing the positivist perspective highlights the desire to advance empirical understanding in the strategic management domain, whilst enriching the

current academic discourse on organisational performance. The choice of a positivist epistemological framework stems from the ultimate aim to discern the root causes of sustained superior performance. By diligently scrutinising empirical evidence the research aims to unravel the boundary between fortuity and skilful management, contributing substantive insights to the strategic management body of knowledge. This alignment signifies the researchers' dedication to illuminating the factors that shape organisational success.

4.3. RESEARCH APPROACH

In the realm of research methodologies, scholars are presented with two primary approaches as outlined by Ragab and Arisha (2017): deduction and induction. Deduction represents a methodical approach wherein the researcher delves into causal relationships among predefined variables to elucidate a particular phenomenon. Conversely, Induction entails the observation of variables in an attempt to identify emergent patterns (mainly through qualitative methodologies), subsequently leading to the formulation and testing of hypotheses. Deductive research follows a structured trajectory characterised by predefined hypotheses and variables. Inductive research exhibits greater flexibility, however, with hypotheses and variables not rigidly predetermined (Douglas, 2003).

A deductive approach was selected, aligning with the top-down methodology where theories and variables are predefined, largely guided by the work of Henderson, Raynor, and Ahmed (2012). This study is designed to gather, analyse, and interpret objective data methodically to test hypotheses.

Ragab and Arisha (2017) identify three fundamental purposes of research: exploratory, explanatory, and descriptive. While exploratory research seeks to unearth novel insights without necessarily elucidating the underlying reasons for these insights, explanatory research seeks to uncover causal relationships between variables. In contrast, descriptive studies aim to provide an accurate portrayal of individuals, events, or situations. Our research purpose aligns with the explanatory domain, as it seeks to discern patterns within secondary data that can differentiate between skill and luck in the context of sustained organisational performance.

4.4. RESEARCH DESIGN

The research design adopted for this study is framed as a longitudinal comparative investigation utilising a deductive approach. The primary methodological focus will be on secondary data analysis, with the overarching aim of discerning the potential impact of luck versus skill in the assessment of organisational performance.

The core objective of this research is to replicate and extend the seminal study conducted by Henderson, Raynor, and Ahmed (2012). The focal point of the investigation is to ascertain the frequency with which companies must surpass a predefined performance benchmark to legitimately qualify as 'exceptional.' This approach seeks to mitigate the risk of false positives arising from chance occurrences being identified as superior performers. In order to achieve this objective, an extensive examination of the historical performance data of 2029 listed companies worldwide is undertaken, spanning a comprehensive 16-year timeframe.

The longitudinal comparative nature of the study allows for an in-depth exploration of performance trends over time, offering valuable insights into the sustained exceptional performance of organisations. The deductive approach aligns with the established theoretical frameworks, providing a structured and systematic means of testing hypotheses derived from prior research. Secondary data analysis proves instrumental in capitalising on the wealth of historical performance data available for the selected companies, enabling a rigorous assessment of the influence of luck and skill in organisational performance assessments. This research design is poised to contribute significantly to the understanding of what distinguishes genuinely exceptional organisational performance from instances influenced by fortuitous circumstances.

4.5. POPULATION SELECTION

The targeted population for this research encompasses the top 2,318 publicly traded companies globally, each possessing a 16-year historical financial dataset. The inclusion criterion for selection is based on these organisations achieving a position within the top decile of performers in terms of Return on Assets (ROA) specifically in the year 2022. This expansive population selection represents a departure from the geographical constraints imposed in the original study conducted by Henderson, Raynor, and Ahmed (2012).

Henderson, Raynor, and Ahmed’s (2012) seminal inquiry into organisational performance covered the period from 1965 to 2008. A crucial aspect of the current research design is to extend their work to the present day, thereby facilitating a more comprehensive and contemporary assessment of organisational performance. The period under scrutiny in this study spans the period 2007 to 2022. This temporal extension aims to capture and analyse the evolving dynamics of organisational performance, offering insights into the current landscape and allowing for a nuanced comparison with the historical context outlined in the original study.

4.6. CENSUS CRITERIA

The selection criteria for this research are pivotal, serving the dual purpose of fulfilling the study's core objectives. Firstly, the criteria aim to identify the highest performing companies in terms of ROA, those that researchers and practitioners are most likely to classify as "superior." This classification hinges on the benchmarking criteria of ROA as opposed to Tobin's Q due to the limitations of Tobin's Q as highlighted in the Section 2.4. Secondly, these criteria facilitate the execution of a Markov Chain simulation on the entire population to ascertain the number of false positive "superior" companies that could be expected to result from randomness. This simulation employs ROA as a yardstick to determine the consecutive years of superior performance required for a company to attain the "superior" status, marked by a consistent top ranking within the global population.

To effectively meet these objectives while advancing beyond the geographical constraints of the previous study by Henderson, Raynor, and Ahmed (2012), the following selection criteria have been set:

1. Historical Financial Data: Selected companies must have a comprehensive historical financial dataset spanning a minimum of 16 years. This criterion is vital to facilitate a thorough assessment of long-term performance trends amidst dynamic market conditions.
2. Publicly Traded Status: In order to mitigate the risk of incorporating unreliable financial data into the dataset, only publicly traded companies will be included. This condition ensures a higher degree of data accuracy and reliability.
3. Company Size: Contrary to common assumptions, company size will not serve as a paramount parameter for selection. This decision aligns with the findings of Henderson, Raynor, and Ahmed (2012), which indicated that company size exerted minimal influence on the analysis outcomes.
4. Geographic Neutrality: The geographic location of a company will not be a pivotal criterion. This study seeks to transcend geographical boundaries, applying the research methodologies established by Henderson, Raynor, and Ahmed (2012) to companies worldwide. This condition thus fosters a more inclusive and comprehensive global assessment. Adhering to these selection criteria ensures a judicious and impartial approach to identifying truly exceptional companies.

4.7. DATA GATHERING

The data gathering methodology for this research involves a meticulous retrieval of secondary data from Refinitive Datastream, recognised as one of the foremost repositories of historical company financial data globally (*Datastream Macroeconomic Analysis | Refinitiv*, n.d.). The overarching aim is to construct a comprehensive dataset encompassing listed companies worldwide that adhere to specified criteria, specifically ranking within the top decile of performers in terms of Return on Assets (ROA) for the year 2022.

The data collection process was executed with precision, aligning with the previously outlined census criteria (Section 3.6) to verify compliance for each selected company. A total of 2,316 publicly traded companies met the census criteria within the designated timeframe, achieving top decile ROA status for the year 2022. This phase necessitated meticulous attention to detail, ensuring data accuracy and reliability. Stringent quality assurance measures were implemented to detect and rectify any anomalies or missing data. A total of 251 companies were excluded due to incomplete datasets, and an additional 36 companies were excluded as they fell under the Thomson Reuters Business Classification (TRBC) code 551010, indicating mutual funds and trust funds functioning solely as tax shelters without an active workforce.

These rigorous quality checks played a pivotal role in upholding the integrity of the dataset, bolstering the credibility of the research. Furthermore, the extensive dataset underwent efficient organisation and storage to facilitate subsequent analysis. Robust data management practices were employed to categorise, structure, and pre-process the collected information, ensuring its preparedness for in-depth examination.

Following meticulous scrutiny, a total of 287 companies were identified as problematic and subsequently excluded from the dataset, resulting in a final dataset of 2,029 companies for comprehensive analysis.

4.8. DATA ANALYSIS APPROACH

The analysis process unfolds in a structured sequence of steps designed to differentiate performance that is attributable to randomness from that of skill. Beginning with the decile ranking of organisations based on ROA, stringent criteria are established to set a benchmark for the number of years a company needs to display exceptional results to be considered a truly superior performer, rather than simply a false positive resulting from fortuitous circumstances. By meticulously traversing the analytical steps outlined in this section, the aim is to reveal the multifaceted dynamics underlying performance assessments.

4.8.1. Decile Ranking of Organisations

The first step in the analysis involves the generation of a comprehensive dataset that ranks each of the 2,029 companies based on their ROA for each of the 16 years under investigation. When the top 20 performing organisations are viewed from a 2007 standpoint which is the first year of our dataset, notable companies such as Aveng Ltd, British American Tabaco, Monster Beverage Corp, Unilever, and Choice Hotels International are seen as achieving superior performance based on ROA. A more detailed exploration of the decile ranking process will be provided in the forthcoming results chapter (Chapter 5).

Table 1: Top 20 performing companies ranked on ROA for 2007.

2007 FINANCIAL YEAR		
RANK	**COMPANY NAME**	**ROA%**
1	Mackenzie Master LP	91,0%
2	London City Equities Ltd	66,7%
3	EVS Broadcast Equipment SA	60,6%
4	Cerveceria San Juan SA	53,1%
5	InterDigital Inc	52,2%
6	Aveng Ltd	50,6%
7	Pinetree Capital Ltd	50,2%
8	Corby Spirit and Wine Ltd	48,0%
9	USANA Health Sciences Inc	47,5%
10	Northam Platinum Holdings Ltd	43,7%
11	British American Tobacco (Malaysia) Bhd	43,1%
12	Inversiones Union Espanola SA	42,4%
13	Monster Beverage Corp	41,5%
14	Private Equity Holding AG	41,1%
15	Unilever Indonesia Tbk PT	40,6%
16	Akzo Nobel India Ltd	40,4%
17	Psychemedics Corp	40,2%
18	Choice Hotels International Inc	39,7%
19	Uralkaliy PAO	39,4%
20	Oyak Cimento Fabrikalari AS	39,3%

Following the sorting of companies into deciles based on their annual achievements, the outcomes are systematically compiled into a table to ascertain the cumulative frequency of instances wherein a company achieved a top-decile ranking in Return on Assets (ROA) over the course of 16 years. The upper segment, constituting the top 10% of overall performers and comprising a total of 203 companies, is isolated. These companies are positioned as potential subjects for recognition by scholars and researchers as superior performers. There is the risk that some of these companies may simply have appeared in the top decile because of chance, rather than skill.

The variable denoted as $n_{superior}$ represents the number of times an organisation is required to achieve within the top decile during the 16-year span, to fall within the category of superior

performing organisations. In this study, $n_{superior}$ is found to be $(top\ 10\%\ ROA\ observed; p_{firm} < 0.10;\ 16\ years) = 6\ years$, as discussed in Chapter 5.

4.8.2. Establishment of Decile Transition Matrices

Following the generation of a comprehensive dataset that ranks each of the 2,029 companies based on their Return on Assets (ROA) for each of the 16 years under investigation, a detailed analysis is conducted to explore variations in annual performance. This investigation aimed to understand the dynamics of how companies transitioned between deciles over the specified time frame. This step involves the creation of a Decile Transition Matrix (DTM) for each transitional period, capturing the movements of each company between deciles from year-to-year. The DTM corresponding to the interval from 2007 to 2008 is presented herewith as an illustrative sample, with comprehensive representations of DTMs for all intervals slated for presentation in the forthcoming 'Results' section (Chapter 5).

Table 2: Decile transition matrix (DTM) for the period 2007 – 2008.

		DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2007 - 2008									
		DECILE LOCATION (t)									
DECILE LOCATION (t-1)		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	1	64,9%	19,7%	3,9%	2,5%	2,5%	3,0%	1,5%	0,5%	0,0%	1,5%
	2	17,3%	39,4%	21,7%	6,9%	6,4%	3,4%	0,0%	0,5%	2,0%	2,5%
	3	4,5%	20,7%	30,5%	22,7%	9,9%	6,4%	2,5%	0,5%	1,0%	1,5%
	4	2,0%	6,4%	19,7%	31,5%	17,7%	10,3%	5,9%	2,5%	1,5%	2,5%
	5	1,0%	3,9%	9,9%	17,2%	25,6%	22,7%	9,4%	5,9%	3,0%	1,5%
	6	2,0%	1,0%	5,9%	4,4%	17,2%	23,2%	20,7%	12,8%	6,4%	6,4%
	7	3,0%	3,9%	3,9%	3,0%	7,9%	14,8%	22,2%	26,6%	11,8%	3,0%
	8	2,0%	1,0%	1,0%	2,5%	6,4%	8,4%	20,2%	30,0%	23,6%	5,0%
	9	0,5%	3,0%	1,5%	5,4%	3,0%	3,0%	11,8%	14,3%	33,5%	24,3%
	10	3,0%	1,0%	2,0%	3,9%	3,4%	4,9%	5,9%	6,4%	17,2%	52,0%

4.8.3. Preparing the Final DTM for use in Markov Chain Simulations

Once the DTMs are generated for each transitional period, a final transition matrix is constructed to encapsulate the aggregated transitions over the entire 16-year period. This matrix provides a comprehensive overview of the probabilities of companies moving between performance deciles from the initial year $(t-16)$ to the final year $(t-1)$. This Final DTM assumes a pivotal role as the foundational component for subsequent Markov Chain simulations, serving the purpose of establishing the frequency with which an organisation may find itself within the top echelons of performers as a result of luck.

Upon close examination of the DTM, variations and unexpected patterns in annual performance transitions were observed. Anomalies, such as fluctuations in transition probabilities along certain rows or columns, were identified. To address these observations, several factors were considered, including:

1. Data Quality Check: A meticulous review of the dataset was conducted to ensure accuracy, consistency, and absence of anomalies or errors.
2. Calculation Validation: Formulas used in the generation of transition matrices were validated to eliminate potential errors, typos, or miscalculations.
3. Distribution Analysis: Examination of the distribution of companies across deciles was performed, considering the impact of small sample sizes on transition probabilities.

4.8.4. Establishing what Randomness May Produce

In this step, the establishment of the temporal occurrences where companies might find themselves among the top deciles due solely to chance, in order to fall within the top 10% of performers, is ascertained through the employment of time-homogeneous Markov Chain simulations. This process is pivotal in determining the duration an organisation must consistently achieve a superior status to confidently dismiss it as a false positive. Integration of the final Decile Transition Matrix (DTM) from Step 3, coupled with the performance outcomes of the population's initial appearance in the dataset (2007), forms the basis of this comprehensive analysis.

The numerical representation of instances where an organisation must fall within the top decile of ROA over the 16-year period, in order to fall within the ranks of top performers in the random data, is denoted as n_{random}. As shown in the 'Results' chapter (Chapter 5), this numerical value is determined as $(top\ 10\%\ ROA\ random;\ p_{firm} < 0.10;\ 16\ years) = 4\ years$. This observation indicates that randomness alone can produce a minimum of four appearances in the top decile across a 16-year period, within the top 10% rank of overall performers.

4.8.5. Refinement of the Benchmark

In this analytical phase, the outcomes of simulations, indicating the frequency of a company attaining top-decile status due to randomness alone, are compared with the accomplishments of the top 10% of performers in the observed dataset. The primary objective of this comparative analysis is to distinguish the authentic performance of the scrutinized companies from instances that may be ascribed to chance.

Given that the initial benchmark for superior performance ($n_{superior}$, as acquired in Step 3) is set at six years, it is deduced that four years of such achievements cannot conclusively be attributed to skill, as stochastic processes could yield comparable results within the upper

echelons. Following the differentiation between luck and skill in organisational performance evaluations, it is asserted that an organisation observed for 16 years necessitates a minimum of ten years within the top decile to meet the $n_{superior}$ benchmark. This is expressed as:

$$Superior\ Performer\colon\ Observed\ Performance - n_{random} \geq 6.$$

Upon applying n_{random} to companies within the top 10% of the observed data, it is discerned that organisations achieving top-decile performances nine times or less can no longer have their performance confidently attributed solely to skill. Consequently, these organizations are labelled as potential false positives denoted by the symbol μ.

4.8.6. Calculating θ

The next step in the data analysis approach is to test the hypothesis as outlined in Section 1.5 through the calculation of the ratio θ, which compares the number of observed sustained superior performers ($n_{superior}$, as acquired by step 3) to the expected number of false positives (μ, as acquired by step 5).

θ is calculated using the following formula: $\theta = \frac{(Superior - \mu)}{\mu}$

Where:

- $Superior$ represents the number of companies that still surpass the initial benchmark of $n_{superior}$ after their results are adjusted to exclude occurrences that resemble outcomes attributable to randomness.
- μ Represents the number of potential false positives – companies that no longer surpass the initial benchmark of $n_{superior}$ after their results are adjusted to exclude occurrences that resemble outcomes attributable to randomness.

The resulting ratio is interpreted as follows:

- If θ is significantly > 0, there is an overrepresentation of companies exhibiting exceptional performance beyond what random chance would predict.
- If $\theta \approx 0$ or < 0, the sustained superior performance of the companies may be attributed to chance as opposed to skill.

This analytical step serves as a statistical tool, essential for discerning whether there exists a potential overrepresentation of genuine superior performers or, conversely, an inflation of false positives within the top 10% performers in the observed data which will disprove the null-hypothesis ($H1$), and serve as confirmation of the alternative hypothesis ($H2$).

4.8.7. Test for Statistical Significance

The final step in the data analysis approach is to assess statistically significant differences between empirical and random data. To determine statistical significance a χ^2 goodness-of-fit test is used. This determines whether there is indeed a statistically significant misattribution of randomness as skill. The χ^2 goodness-of-fit test statistic is calculated using:

$$\chi^2 = \sum \left[\frac{(O - E)^2}{E} \right]$$

where

- O represents the observed number of superior performers.
- E represents the expected number of false positives based on randomness.
- Σ signifies the summation over all categories.

The χ^2 value and a specified level of desired confidence establishes a critical value and if $\chi^2_{crit} <$. If the χ^2 value is statistically significant, a misattribution of randomness as skill in organisational performance is likely. This statistical test allows the empirical evaluation as to whether the misattribution of randomness as skill is indeed a common occurrence in performance evaluations.

4.9. CONTROL VARIABLES

Control variables play a crucial role in ensuring the comparability of observations and exploring sustained superiority across companies. To align with the research objectives of contemporising the work of Henderson, Raynor, and Ahmed (2012) while eliminating geographical constraints, the chosen variables mirror those utilised in their study. This section delineates the specific control variables applied in the current investigation.

Economic Cycles

Economic cycles are not controlled for in this study, as the removal of geographical constraints presupposes that macro-economic cycles uniformly impact all companies within the population. This assumption acknowledges the shared potential for both improvements and declines in performance results due to macro-economic variations from year to year.

Industry Controls

A meticulous control was exercised over 36 companies falling under the Thomson Reuters Business Classification (TRBC) code 551010, denoting mutual funds and trust funds functioning solely as tax shelters without an active workforce, to exclude them from the

dataset. It is imperative to highlight that more intricate industry controls distinguishing between manufacturing and service-based organisations are reserved for future studies delving into the potential influence of luck on performance assessments.

Company Size and Market Share

While considerations for company size and market share may be explored in subsequent studies, they are not controlled for in this research. Both variables signify endowments from prior years that can independently influence performance. This is accounted for by utilising the Return on Assets (ROA) achieved in the initial year of appearance (2007) as a proxy for such endowments.

Survivor Bias

The dataset, commencing from 2007, accommodates the performance of companies in existence before the observation window opened. This accounts for the possibility that certain companies may have been superior performers but ceased operations before the observation window's commencement. The study incorporates the years a company has been observed within the sample window, updated annually, to capture the frequency of opportunities for outstanding performances. The total number of observations for each company is documented to mitigate the potential impact of longevity on performance.

The research includes an analytical component assessing the influence of these control variables on the study's outcomes. Henderson, Raynor, and Ahmed (2012) demonstrated that when controlling for year, industry, company size, and market share, the core outcomes remained robust. Although company size and market share exerted some influence on specific companies meeting their respective benchmarks, their overall impact on the total number of companies meeting these benchmarks was limited (Henderson et al., 2012).

4.10. RESEARCH INSTRUMENTS

The research instruments used in this study are meticulously designed to explore the intricate interplay of luck and skill in the context of organisational performance assessments. The comprehensive toolset encompasses the acquisition and rigorous scrutiny of financial data extracted from a credible source, the application of advanced statistical techniques used for the formulation of DTM's, and the employment of Markov Chain simulations to simulate stochastic performance trajectories of 2,029 companies over a 16-year period.

Financial Databases

Refinitiv Datastream is used to gather ROA data for 2,316 companies for a 16-year period. ROA Serves as the proxy for organisational performance in this study.

Database Development

The study involves the development and maintenance of an intricate and comprehensive database of companies, their financial data, TRBC codes, and other relevant variables over the observation period.

Transition Matrices

Customised transition matrices are created to model how initial advantages have impacted performance transitions over time. These matrices are created for each of the transition period spanning across the 16-year observations.

Markov Chain Simulations

Markov Chains have evolved into a foundational tool for comprehending stochastic processes, contributing significantly to the exploration of randomness. They manifest as computer-based simulations designed to model and analyse the state paths of stochastic processes as these processes undergo state transitions (Gagniux, 2007).

Within the framework of this investigation, the state conditions are defined by the Return on Assets (ROA) decile scores of companies from one period to the next. The utilisation of Markov Chains adheres to the principle of memorylessness, whereby the simulation omits considerations of states preceding the one labelled as 'state one.' This approach is reliant on an initial Decile Transition Matrix (DTM), serving as the foundation for generating random performance outcomes for each observed company. The simulations are conducted individually for each company, spanning 1000 simulated lifetimes, with each lifetime encompassing a 16-year observation period.

The application of Markov Chain simulations in this study adheres to these foundational principles, offering a robust framework for modelling and examining the dynamic transitions in companies' ROA decile scores over successive periods because of randomness.

4.11. LIMITATIONS OF RESEARCH DESIGN AND METHODS

This study employs a robust research design and methodological approach, yet it is not devoid of certain limitations that warrant acknowledgment and consideration. These limitations encompass the following aspects:

Sole Reliance on ROA

The primary utilisation of Return on Assets (ROA) as the proxy for sustained superior performance, while a well-established financial metric (Maiga, 2004 and De Wet & Du Toit, 2007), may offer a somewhat limited perspective. As discussed in Section 2.4, accounting methods may be employed to manipulate net profits, particularly by businesses attempting to minimise their taxable earnings. Alternative performance indicators, such as Return on Equity (ROE) or market-driven metrics, could be employed in future research efforts aimed at providing supplementary dimensions to assess enduring excellence.

Control Variables

This research employs a restricted set of control variables, aiming to emulate those utilised by Henderson, Raynor, and Ahmed (2012) with specific exclusions such as company size, industry, and capital structure. While the exclusion of these control variables is undertaken with the intention of enhancing result comparability with the aforementioned study, it is essential to acknowledge the potential impact they may exert on the outcomes.

The deliberate exclusion of geographic location, while aligned with the research objective of eliminating geographical constraints, warrants consideration as this omission may overlook pertinent factors that could influence company performance, including but not limited to political stability and localised economic conditions.

Assumption of Markov Processes

The study's reliance on Markov processes as a modelling framework for random performance transitions, while providing a valuable simplification, introduces the risk of oversimplifying the intricate dynamics inherent to real-world business environments. The generation of random simulations for each company's observed life, repeated 1000 times, offers insights into potential variations. It is essential to note that running the simulation more times might yield different results. Nevertheless, the principle of ergodicity, the idea that over a sufficiently long period, a system's average behaviour over time will converge to the ensemble average, suggests that the results from 1,000 simulations may not deviate significantly from those obtained by running a larger number of simulations.

To enhance the study's modelling robustness and address the potential limitations of oversimplification, future research endeavours could explore more sophisticated modelling approaches. Specifically, incorporating frameworks that accommodate non-Markovian behaviours could prove instrumental in providing a nuanced understanding of performance persistence dynamics.

Data Quality and Availability

The foundational reliance on financial data, integral to the study's methodology, encounters challenges related to data quality and accessibility. The presence of incomplete or inaccurate data may introduce biases or curtail analytical precision, necessitating the application of assumptions and adjustments that, in turn, introduce a degree of uncertainty. Despite the meticulous attention to data source selection, it may prove advantageous in future research endeavours to procure and cross-reference data from diverse sources, enhancing the robustness and reliability of the analytical framework. This approach would contribute to a more comprehensive validation of findings and foster heightened confidence in the study's outcomes. An expanded duration and increased population size may also be beneficial in future studies as this study consists of a final count of 2,029 organisations spanning a period of 16 years.

Homogeneity Assumption

The study operates under the assumption of homogeneity within performance deciles and industries, treating all companies within these groupings as equivalent. In reality, significant heterogeneity may exist in terms of resources, strategies, and competitive advantages. The omission of such heterogeneity could obscure important subtleties.

Survivorship Bias Mitigation

Although the study employs controls to mitigate survivorship bias, its choice to include data solely from companies active at the onset of the observation window may still impart a form of bias. Organisations entering the dataset at earlier or later stages may possess distinct characteristics that could influence the study's conclusions.

Addressing the Complexity of Skill and Luck

This study does not claim to eliminate all potential sources of randomness from the analysis, as there exist diverse stochastic processes beyond the particular category of Markov chains that are investigated. As emphasised by Denrell (2004), the mere possibility of a random process producing results akin to those observed in successful companies does not definitively establish that the achievements of these companies lack skill or are solely the result of chance.

While the research design and methodologies within the study provide valuable insights into the realm of superior performance assessments, it is crucial to recognise and grapple with the inherent limitations spanning data constraints, assumptions, and the scope of generalisability.

CHAPTER 5
RESULTS

5.1. INTRODUCTION

This section interrogates the heart of the research, where the research methodology, drawn from the conceptual foundations laid in previous chapters, comes to fruition.

As the results are navigated, the goal is to unravel the intricate dynamics of sustained superior performance among publicly traded companies, examining the interplay between skill and randomness in the achievement of a superior status. Building upon the methodologies of Henderson, Raynor, and Ahmed (2012), our chapter commences with a comprehensive benchmarking of organisations for the 16-year period under investigation. Random performance trajectories are simulated, establishing a baseline for distinguishing genuine excellence from outcomes attributed to chance. The subsequent sections unfold a stringent analysis, applying sophisticated statistical techniques and custom methodologies to identify, assess, and validate sustained superior performers.

5.2. DECILE RANKING OF ORGANISATIONS

In the initial phase of the results analysis, each of the 2,029 companies are subjected to a rigorous sorting process to determine the respective decile of Return on Assets (ROA) achievement for each year from 2007 ($t-16$) to 2022 ($t-1$). The ranking was structured on a decile scale from 1 to 10, where decile 1 represented companies within the top 10% of achievers for a given year, decile 2 denoted the top 20%, and so forth, with decile 10 indicating the lowest ranking. Table 3 is then constructed to consolidate the decile achievements of each company, with rows representing the deciles achieved and columns corresponding to the years. The far-right column encompasses the total frequency with which companies in the dataset fell within the 1st decile. The companies are ranked based on their frequency of appearances in the 1st decile over the 16-year period. Table 3 shows the top 10% of performing companies, determined by their overall occurrences in the top decile across the specified timeframe.

Table 3: Companies Ranked Most Frequently in First Decile of ROA, 2007 - 2022.

RANK	COMPANY NAME	YEAR																TOP DECILE APPEARANCES
		'22	'21	'20	'19	'18	'17	'16	'15	'14	'13	'12	'11	'10	'9	'8	'7	
1	Mackenzie Master LP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
2	British American Tobacco (Malaysia) Bhd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
3	Unilever Indonesia Tbk PT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
4	Texas Pacific Land Corp	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
5	Infosys Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
6	Carreras Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
7	CRISIL Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
8	Taiwan Semiconductor Manufacturing Co Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
9	Simcorp A/S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
10	Abu Qir Fertilizers and Chemical Industries Co SAE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
11	Colgate-Palmolive (India) Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
12	Procter & Gamble Hygiene and Health Care Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
13	Oracle Corp Japan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
14	ITC Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
15	Nestle (Malaysia) Bhd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
16	United-Guardian Inc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
17	Monster Beverage Corp	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	15
18	SEI Investments Co	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	15
19	T Rowe Price Group Inc	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	15
20	Fastenal Co	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	15
21	Buckle Inc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	15
22	Novo Nordisk A/S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	15
23	Hankook Shell Oil Co Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	15
24	USANA Health Sciences Inc	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	15
25	Vtech Holdings Ltd	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
26	Dabur India Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
27	Hallenstein Glasson Holdings Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
28	Factset Research Systems Inc	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
29	Mr Price Group Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
30	Cerveceria San Juan SA	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	14
31	Belimo Holding AG	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	14
32	Swaraj Engines Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	14
33	Hero MotoCorp Ltd	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
34	Asian Paints Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	14
35	Next PLC	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
36	Industria de Diseno Textil SA	3	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
37	Domino's Pizza Group PLC	2	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	14
38	ARB Corporation Ltd	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	2	13
39	Thaitheparos PCL	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	2	13
40	CSL Ltd	3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	13
41	Federated Hermes Inc	2	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	13
42	Colgate-Palmolive Co	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	13
43	Graco Inc	1	1	1	1	1	7	1	1	1	2	1	1	3	1	1	1	13
44	Melexis NV	1	1	2	1	1	1	1	1	1	1	1	1	9	2	1	1	13
45	Victrex PLC	2	2	1	1	1	1	1	1	1	1	1	1	4	1	1	1	13
46	EVS Broadcast Equipment SA	2	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	13
47	Choice Hotels International Inc	2	5	1	1	1	2	1	1	1	1	1	1	1	1	1	1	13
48	ITT Educational Services Inc	7	9	1	1	1	1	1	1	1	1	1	1	1	1	1	2	13
49	Truworths International Ltd	1	1	10	8	2	1	1	1	1	1	1	1	1	1	1	1	13
50	Inmobiliaria Central de Estacionamientos Agustinas SA	1	1	1	1	1	1	1	1	1	1	1	1	1	7	6	9	13
51	Italtile Ltd	1	1	2	1	1	1	1	1	1	1	1	2	2	2	1	1	12
52	Corporacion Moctezuma SAB de CV	1	1	1	1	1	1	1	1	2	1	2	2	1	1	2	1	12
53	Marico Ltd	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	2	12
54	Apple Inc	1	1	1	1	2	2	1	1	1	1	1	1	1	1	2	2	12
55	Oracle Financial Services Software Ltd	1	1	1	1	1	1	1	1	1	2	2	1	1	1	3	2	12
56	Advantech Co Ltd	2	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	12
57	Fielmann Group AG	4	3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	12
58	Amadeus Fire AG	3	4	2	1	1	1	1	1	1	1	1	1	1	1	1	3	12
59	Luzhou Laojiao Co Ltd	1	1	1	1	1	2	2	4	1	1	1	1	1	1	1	4	12
60	National Beverage Corp	1	1	1	1	1	1	1	1	1	1	1	1	2	3	4	4	12
61	H & M Hennes & Mauritz AB	5	8	2	2	1	1	1	1	1	1	1	1	1	1	1	1	12
62	Robert Half Inc	1	2	1	1	1	1	1	1	1	1	2	6	7	1	1	1	12
63	Winmark Corp	1	1	1	1	1	1	1	1	1	1	1	1	3	7	6	4	12
64	Sturm Ruger & Company Inc	1	1	3	1	1	1	1	1	1	1	1	1	1	4	4	9	12
65	Carlsberg Brewery Malaysia Bhd	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	2	11
66	CH Robinson Worldwide Inc	2	2	2	1	2	2	1	1	1	1	1	1	1	1	1	1	11
67	Oyak Cimento Fabrikalari AS	2	1	3	3	1	2	1	1	1	2	1	1	1	1	1	1	11
68	TJX Companies Inc	3	8	1	1	1	1	1	1	1	1	1	1	1	2	3	2	11
69	Van de Velde NV	2	3	2	1	1	1	1	8	1	2	1	1	1	1	1	1	11
70	Ross Stores Inc	2	8	1	1	1	1	1	1	1	1	1	1	1	2	3	3	11
71	Lancaster Colony Corp	4	2	1	1	1	1	1	1	1	1	2	1	1	1	5	4	11
72	Games Workshop Group PLC	1	1	1	1	1	1	1	1	2	1	1	2	1	4	9	10	11
73	Dong-E-E-Jiao Co Ltd	7	8	9	1	1	1	1	1	1	1	1	1	1	1	2	3	11

74	Manhattan Associates Inc	1	1	1	1	1	1	1	1	1	1	1	3	5	4	4	6	11
75	Nichols PLC	10	6	1	1	1	1	1	1	1	1	1	1	1	4	2	4	11
76	Psychemedics Corp	10	10	4	1	1	1	4	1	1	1	1	1	2	1	1	1	11
77	Hermes International SCA	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	10
78	Ems Chemie Holding AG	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	10
79	King Slide Works Co Ltd	2	3	2	1	3	1	1	1	1	1	1	2	2	1	1	1	10
80	Microsoft Corp	1	1	1	1	2	2	2	4	2	1	2	1	1	1	1	1	10
81	Labrador Iron Ore Royalty Corp	1	1	1	1	1	2	4	2	1	2	1	1	2	1	2	1	10
82	China Steel Chemical Corp	3	4	2	2	2	2	1	1	1	1	1	1	1	1	1	1	10
83	Aaon Inc	3	1	1	2	1	1	1	1	1	1	4	2	1	1	2	2	10
84	Howden Joinery Group PLC	2	2	1	1	1	1	1	1	1	1	1	1	2	2	3	9	10
85	Cochlear Ltd	3	2	10	1	1	1	1	1	2	1	4	1	1	1	1	2	10
86	Coloplast A/S	1	1	1	1	1	1	3	1	1	1	1	2	3	3	7	6	10
87	Core Laboratories Inc	7	10	2	2	2	2	1	1	1	1	1	1	1	1	1	1	10
88	LY Corp	8	7	7	7	5	3	1	1	1	1	1	1	1	1	1	1	10
89	BEC World PCL	4	9	9	9	9	4	1	1	1	1	1	1	1	1	1	1	10
90	NamSys Inc	1	10	1	1	1	1	1	1	1	10	6	4	10	10	1	1	10
91	Egyptian International Pharmaceutical Industries Com	3	2	1	1	1	1	1	2	2	2	1	1	1	1	2	2	9
92	Yum! Brands Inc	1	1	1	1	1	1	2	2	2	1	1	2	1	2	3	2	9
93	Wuliangye Yibin Co Ltd	1	1	1	1	2	2	2	2	1	1	1	1	1	2	2	3	9
94	Zwack Unicum Likoripari es Kereskedelmi Nyrt	1	2	1	1	1	1	1	1	2	3	2	3	2	1	2	1	9
95	Philip Morris CR as	1	1	1	1	1	1	1	2	2	2	1	2	1	3	3	3	9
96	Cognizant Technology Solutions Corp	2	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	9
97	Rotork PLC	3	2	2	2	4	3	2	1	1	1	1	1	1	1	1	1	9
98	Sleep Number Corp	1	1	2	2	2	2	2	1	1	1	1	1	1	10	3	1	9
99	Pidilite Industries Ltd	2	1	1	1	1	1	1	1	1	1	2	2	2	4	2	2	9
100	Luk Fook Holdings (International) Ltd	4	3	4	2	2	3	3	1	1	1	1	1	1	1	1	1	9
101	Intuit Inc	3	1	1	1	1	1	1	4	1	1	1	2	2	3	4	3	9
102	GMK Noril'skiy Nikel' PAO	1	1	1	1	2	1	2	2	7	3	1	1	2	9	1	1	9
103	Britannia Industries Ltd	1	1	1	1	1	1	1	1	1	2	2	4	5	3	3	4	9
104	Seagate Technology Holdings PLC	1	1	2	1	1	3	7	1	1	1	1	6	1	10	3	4	9
105	Strategic Education Inc	8	5	5	9	3	2	1	1	4	1	1	1	1	1	1	1	9
106	Alarko Gayrimenkul Yatirim Ortakligi AS	1	1	1	1	1	1	1	1	1	6	2	8	6	2	9	9	9
107	Bure Equity AB	1	1	1	1	2	1	1	1	1	10	9	1	9	7	6	8	9
108	Helios Technologies Inc	4	7	4	4	4	4	1	1	1	1	1	1	8	1	1	1	9
109	Trex Company Inc	1	1	1	1	1	1	1	1	1	8	10	10	10	8	10	9	9
110	Waters Corp	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2	8
111	Copart Inc	1	1	1	1	1	1	1	2	2	2	1	2	2	2	2	2	8
112	Nike Inc	2	1	3	1	1	1	1	1	1	1	2	2	2	2	2	2	8
113	Autozone Inc	2	1	1	1	2	2	1	1	1	1	1	2	2	2	3	3	8
114	Brown-Forman Corp	2	1	1	2	1	1	1	1	1	1	2	2	2	2	3	3	8
115	InBody Co Ltd	1	2	2	1	1	1	1	1	2	2	2	2	1	1	4	9	8
116	Gentex Corp	2	1	1	1	1	1	1	1	2	2	1	2	4	4	2	3	8
117	Thai Vegetable Oil PCL	2	2	2	1	2	1	1	1	3	1	4	1	1	3	1	6	8
118	OEKOWORLD AG	1	1	1	1	1	1	1	1	2	2	4	2	10	4	2	3	8
119	Renishaw PLC	2	2	9	2	1	1	3	1	1	1	1	1	3	8	2	1	8
120	Biogen Inc	5	1	1	1	1	1	1	1	1	2	2	3	2	3	6	9	8
121	Monadelphous Group Ltd	5	4	5	4	3	3	3	2	1	1	1	1	1	1	1	1	8
122	Value Line Inc	1	1	1	2	1	2	3	3	4	4	4	1	10	1	1	1	8
123	Beter Bed Holding NV	3	3	9	6	4	2	1	1	4	2	1	1	1	1	1	1	8
124	NVR Inc	1	1	1	1	1	1	1	2	3	4	5	4	4	6	2	1	8
125	Home Depot Inc	1	1	1	1	1	1	1	1	2	2	3	4	5	5	5	4	8
126	Sun Pharmaceutical Industries Ltd	6	6	4	5	6	2	2	2	1	1	1	1	1	1	1	1	8
127	Starbucks Corp	2	6	1	1	1	1	1	1	9	1	1	2	5	5	2	2	8
128	Straumann Holding AG	2	6	1	1	1	1	4	1	2	6	4	2	1	8	1	1	8
129	Astra Agro Lestari Tbk PT	5	6	8	5	4	3	7	1	2	1	1	1	1	1	1	1	8
130	Schroder Asian Total Return Investment Company PLC	5	1	2	10	1	1	7	1	10	1	10	1	1	10	1	2	8
131	Tonghua Dongbao Pharmaceutical Co Ltd	1	1	1	1	1	1	1	3	4	8	1	5	7	7	8	10	8
132	Industrivarden AB	1	4	1	10	2	1	6	5	1	1	10	1	1	10	10	1	8
133	Landstar System Inc	1	2	1	1	2	2	1	2	2	1	1	2	3	1	2	2	7
134	Expeditors International of Washington Inc	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	2	7
135	Utah Medical Products Inc	2	2	2	1	1	1	1	2	2	2	2	2	1	1	2	1	7
136	3M Co	2	2	2	1	1	1	1	1	2	2	2	2	2	2	1	1	7
137	Ambev SA	3	2	2	2	3	1	1	1	1	1	1	1	2	2	2	5	7
138	S&P Global Inc	1	1	1	1	1	1	1	10	2	3	3	4	2	2	2	2	7
139	McDonald's Corp	2	3	1	1	1	2	2	2	1	1	1	2	1	2	5	4	7
140	Hibbett Inc	1	2	6	5	4	2	1	1	1	1	1	2	2	2	2	1	7
141	Maximus Inc	3	2	1	1	1	2	1	1	1	2	1	2	2	5	10	10	7
142	Famous Brands Ltd	3	9	3	10	8	2	1	1	1	1	1	1	1	2	2	2	7
143	Bio-Techne Corp	3	4	2	5	5	5	3	2	2	1	1	1	1	1	1	1	7
144	Pool Corp	1	1	1	1	1	1	1	2	2	3	3	5	5	4	5	3	7
145	GAMCO Investors Inc	1	1	1	1	1	1	1	2	2	3	3	3	4	7	4	4	7
146	Oceana Group Ltd	6	4	4	3	6	3	3	1	1	1	1	1	1	1	3	4	7
147	United Palm Oil Industry PCL	1	3	9	8	9	6	9	2	1	1	1	3	1	1	1	2	7
148	Investment Oresund AB	1	9	3	3	5	1	1	1	1	3	10	3	1	10	10	1	7
149	ASMPT Ltd	2	6	6	2	1	3	4	2	5	5	1	1	1	1	1	1	7
150	MediaTek Inc	1	3	5	5	5	5	4	1	2	4	3	1	1	1	1	1	7

151	AFP Provida SA	4	4	3	5	4	4	1	1	1	1	1	1	1	9	2	2	7
152	Marine Products Corp	1	1	1	1	1	1	2	3	4	5	5	7	10	5	2	1	7
153	APG SGA SA	3	4	4	1	1	1	1	1	1	1	4	2	10	9	7	5	7
154	Schroder Asiapacific Fund PLC	2	1	8	6	1	1	9	3	8	1	10	1	1	10	1	2	7
155	Canadian General Investments Ltd	1	1	1	10	1	2	10	5	2	4	10	1	1	10	7	1	7
156	Fidelity Asian Values PLC	7	1	10	4	8	1	1	7	3	1	10	1	1	3	10	1	7
157	Central Securities Corp	1	3	1	10	1	1	9	6	1	8	9	1	1	10	5	2	7
158	Television Broadcasts Ltd	10	9	9	9	8	6	9	2	1	1	1	1	2	1	1	1	7
159	BB Biotech AG	10	1	1	10	1	10	1	1	1	1	10	10	8	7	10	3	7
160	Ford Otomotiv Sanayi AS	1	1	2	2	2	2	2	3	2	1	1	1	2	2	2	1	6
161	CorVel Corp	2	2	2	1	2	2	2	2	1	1	1	2	1	2	1	2	6
162	Thai President Foods PCL	2	1	1	1	2	1	2	2	2	2	2	1	1	3	3	2	6
163	Demant A/S	3	5	3	2	2	3	2	2	2	2	1	1	1	1	1	1	6
164	Garmin Ltd	2	1	1	2	2	2	3	4	2	2	2	2	1	1	1	1	6
165	Steven Madden Ltd	2	9	2	2	2	2	2	2	1	1	1	1	1	3	2	1	6
166	Arab Potash Co PLC	2	2	1	2	3	5	2	3	2	1	1	1	2	1	1	4	6
167	AllianceBernstein Holding LP	1	1	1	1	2	2	2	2	3	7	10	5	3	2	1	1	6
168	Lanna Resources PCL	1	5	3	2	2	6	6	4	3	1	1	1	1	1	2	2	6
169	Hektas Ticaret TAS	4	2	1	1	1	1	1	1	2	2	3	3	6	3	4	7	6
170	Papa John's International Inc	2	3	8	8	1	1	1	1	1	1	2	2	2	3	5	2	6
171	Applied Materials Inc	1	1	1	1	1	2	3	3	8	9	1	4	9	3	2	2	6
172	O'Reilly Automotive Inc	1	1	1	1	2	1	1	2	2	3	3	4	5	5	4	4	6
173	Feng Tay Enterprises Co Ltd	3	2	1	1	1	1	1	1	2	3	4	4	3	5	5	6	6
174	Bijou Brigitte modische Accessoires AG	6	10	4	4	4	3	3	3	3	2	1	1	1	1	1	1	6
175	City Lodge Hotels Ltd	8	10	10	4	2	2	1	1	1	1	2	4	2	2	1	1	6
176	Deutsche Beteiligungs AG	1	9	3	4	1	2	3	1	2	1	10	2	4	10	1	1	6
177	Information Planning Co Ltd	2	1	1	1	1	1	2	3	4	6	8	7	9	1	2	2	6
178	Kartonsan Karton Sanayi ve Ticaret AS	1	1	1	1	3	9	5	5	2	2	1	4	4	4	1	5	6
179	Persimmon PLC	2	1	1	1	1	1	1	2	3	5	7	7	8	10	4	3	6
180	Bancroft Fund Ltd	1	1	1	6	2	7	8	3	1	5	8	1	1	10	2	4	6
181	Adams Diversified Equity Fund Inc	1	1	1	9	1	4	8	2	1	2	10	4	1	10	7	3	6
182	Schroder UK Mid Cap Fund PLC	1	10	8	7	1	5	4	3	1	1	9	2	1	10	2	1	6
183	abrdn Asia Focus plc	1	10	5	7	2	1	10	10	1	3	1	1	2	10	1	4	6
184	Elan Microelectronics Corp	1	1	1	1	3	5	4	1	1	2	6	4	6	7	4	8	6
185	Law Debenture Corporation PLC	2	8	1	10	2	1	9	7	1	1	9	1	1	10	6	2	6
186	Templeton Emerging Markets Fund Inc	2	1	9	9	1	2	10	1	8	10	2	1	10	9	1	1	6
187	Fab-Form Industries Ltd	1	2	1	1	1	1	1	2	9	7	4	10	10	10	10	10	6
188	Distilleries Company of Sri Lanka PLC	1	1	1	1	1	4	5	4	4	5	3	1	5	6	7	7	6
189	Novartis India Ltd	9	7	8	6	4	6	5	5	4	2	1	1	1	1	1	1	6
190	4imprint Group PLC	2	7	1	1	1	1	1	1	2	5	9	7	7	5	8	5	6
191	Pason Systems Inc	4	7	2	1	5	10	9	1	6	4	1	4	9	1	1	1	6
192	Mycronic AB (publ)	2	2	1	1	1	1	1	1	9	9	10	8	10	9	10	7	6
193	Compania de Minas Buenaventura SAA	7	9	9	9	8	10	10	9	9	1	1	1	1	3	1	1	6
194	Bolsa de Comercio de Santiago Bolsa de Valores	2	2	2	2	2	1	2	1	2	2	2	2	2	1	1	1	5
195	Sociedad de infraestructuras de Mercado SA	2	2	2	2	2	1	2	1	2	2	2	2	2	1	1	1	5
196	Roche Holding AG	2	1	1	2	2	2	2	2	1	1	1	2	2	2	2	3	5
197	WW Grainger Inc	2	2	1	2	3	2	1	1	1	2	1	2	2	2	2	3	5
198	Polaris Inc	3	3	3	3	4	4	1	1	1	1	1	2	2	2	2	2	5
199	Hugo Boss AG	6	10	3	2	2	2	1	1	1	1	1	2	3	3	2	2	5
200	Tiger Brands Ltd	4	4	1	2	2	2	2	4	2	1	1	1	1	2	2	2	5
201	Hershey Co	2	1	1	1	2	2	3	1	1	2	2	2	2	4	7	2	5
202	Intel Corp	2	1	1	1	2	3	2	2	3	2	1	1	4	3	3	4	5
203	Hoya Corp	1	1	1	1	2	2	2	2	3	2	5	2	4	6	2	1	5

As evident in the presented table, it is apparent that a company must attain a top decile ranking in terms of ROA for a minimum of five instances to be included among the top 10% of companies observed in the 16-year period, thereby designated as a superior performer. However, since 244 and not only 203 companies met the initial benchmark of five, the benchmark is subsequently elevated to six instances to qualify as a superior performer $(n_{superior})$.

These companies are positioned as potential subjects for recognition by scholars and researchers as superior performers. However, there is the risk that some of these companies may simply have appeared in the top decile as a result of chance, rather than skill. The variable denoted as $n_{superior}$ represents the count of times (six) an organisation is required to achieve within the top 10% during the 16-year span, to fall within the category of superior performing organisations in terms of observed ROA data. This section provides the initial benchmark $(n_{superior})$ for observed superior performers $(Superior)$ at:

$$(top\ 10\%\ ROA\ observed; p_{firm} < 0.10;\ 16\ years)\ =\ 6\ years.$$

5.3. ESTABLISHMENT OF DECILE TRANSITION MATRICES

Following the generation of the comprehensive dataset that ranks each of the 2,029 companies based on their ROA for each of the 16 years under investigation, DTMs are generated for each transitional period capturing the movements between deciles from year-to-year. The diagonal highlighted cells indicate the percentage of companies that started and ended in the same decile across the transitional period.

Table 4: Decile transition matrix (DTM) for the period 2007 – 2008.

	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2007 - 2008									
	DECILE LOCATION (t)									
DECILE LOCATION (t-1)	1	2	3	4	5	6	7	8	9	10
1	64,9%	19,7%	3,9%	2,5%	2,5%	3,0%	1,5%	0,5%	0,0%	1,5%
2	17,3%	39,4%	21,7%	6,9%	6,4%	3,4%	0,0%	0,5%	2,0%	2,5%
3	4,5%	20,7%	30,5%	22,7%	9,9%	6,4%	2,5%	0,5%	1,0%	1,5%
4	2,0%	6,4%	19,7%	31,5%	17,7%	10,3%	5,9%	2,5%	1,5%	2,5%
5	1,0%	3,9%	9,9%	17,2%	25,6%	22,7%	9,4%	5,9%	3,0%	1,5%
6	2,0%	1,0%	5,9%	4,4%	17,2%	23,2%	20,7%	12,8%	6,4%	6,4%
7	3,0%	3,9%	3,9%	3,0%	7,9%	14,8%	22,2%	26,6%	11,8%	3,0%
8	2,0%	1,0%	1,0%	2,5%	6,4%	8,4%	20,2%	30,0%	23,6%	5,0%
9	0,5%	3,0%	1,5%	5,4%	3,0%	3,0%	11,8%	14,3%	33,5%	24,3%
10	3,0%	1,0%	2,0%	3,9%	3,4%	4,9%	5,9%	6,4%	17,2%	52,0%

Table 5*: Decile Transition Matrix (DTM) for the Period 2008 – 2009.*

	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2008 - 2009									
	DECILE LOCATION (t)									
DECILE LOCATION (t-1)	1	2	3	4	5	6	7	8	9	10
1	59,4%	18,7%	8,9%	2,0%	3,9%	2,0%	2,0%	0,0%	0,5%	2,5%
2	14,4%	36,5%	28,1%	10,8%	3,4%	3,0%	1,5%	0,5%	1,5%	0,5%
3	8,9%	12,3%	26,1%	23,6%	12,8%	9,4%	3,0%	2,0%	1,0%	1,0%
4	2,0%	9,4%	8,9%	24,1%	24,6%	12,3%	6,4%	3,9%	4,4%	4,0%
5	2,0%	5,9%	6,4%	13,3%	17,7%	21,7%	19,2%	7,9%	2,0%	4,0%
6	0,5%	4,4%	5,4%	8,9%	12,8%	16,3%	23,6%	14,8%	9,9%	3,5%
7	1,5%	3,0%	4,9%	5,4%	7,4%	12,8%	14,3%	27,1%	16,3%	7,4%
8	2,5%	2,0%	4,9%	3,4%	7,9%	9,9%	15,3%	20,7%	24,6%	8,9%
9	3,0%	3,0%	3,4%	5,9%	6,9%	6,4%	7,9%	13,8%	23,6%	26,2%
10	5,9%	4,9%	3,0%	2,5%	2,5%	6,4%	6,9%	9,4%	16,3%	42,1%

Table 6*: Decile Transition Matrix (DTM) for the Period 2009 – 2010.*

	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2009 - 2010									
	DECILE LOCATION (t)									
DECILE LOCATION (t-1)	1	2	3	4	5	6	7	8	9	10
1	55,0%	14,8%	4,4%	3,4%	1,0%	1,0%	1,5%	1,5%	2,0%	15,3%
2	18,8%	36,5%	19,7%	5,9%	3,9%	1,5%	3,9%	3,4%	3,4%	3,0%
3	8,4%	20,2%	28,1%	15,3%	5,4%	7,4%	3,9%	6,4%	2,0%	3,0%
4	4,5%	7,4%	20,2%	27,1%	12,8%	7,4%	6,9%	6,9%	4,9%	2,0%
5	3,5%	4,9%	10,8%	19,2%	22,7%	15,8%	9,9%	6,4%	3,0%	4,0%
6	0,0%	7,9%	4,9%	7,9%	24,1%	20,7%	14,3%	6,4%	6,9%	6,9%
7	2,0%	2,5%	3,0%	7,4%	11,3%	20,7%	23,6%	14,8%	9,9%	5,0%
8	3,0%	3,4%	3,9%	4,9%	8,9%	14,8%	18,7%	22,2%	13,3%	6,9%
9	3,5%	1,0%	2,5%	6,4%	6,4%	6,9%	10,3%	22,2%	25,1%	15,8%
10	1,5%	1,5%	2,5%	2,5%	3,4%	3,9%	6,9%	9,9%	29,6%	38,1%

Table 7*: Decile Transition Matrix (DTM) for the Period 2010 – 2011.*

	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2010 - 2011									
	DECILE LOCATION (t)									
DECILE LOCATION (t-1)	1	2	3	4	5	6	7	8	9	10
1	60,4%	16,7%	4,9%	2,5%	1,5%	1,0%	1,5%	2,5%	3,0%	5,9%
2	21,8%	42,4%	10,8%	7,9%	3,9%	2,0%	2,0%	3,4%	3,4%	2,5%
3	5,9%	18,7%	33,0%	17,7%	9,9%	5,9%	2,0%	1,5%	2,5%	3,0%
4	2,5%	8,4%	21,7%	29,1%	16,7%	7,4%	4,9%	3,4%	3,0%	3,0%
5	3,0%	4,9%	11,8%	19,7%	27,1%	11,8%	7,9%	4,4%	4,9%	4,5%
6	2,0%	3,0%	5,9%	13,3%	16,7%	22,2%	18,2%	12,3%	5,4%	1,0%
7	2,0%	1,0%	3,9%	5,4%	10,8%	26,1%	23,2%	14,3%	6,9%	6,4%
8	0,0%	1,0%	2,5%	2,0%	9,4%	14,8%	24,1%	25,1%	12,8%	8,4%
9	1,0%	2,5%	4,9%	1,5%	3,0%	4,4%	10,8%	20,2%	33,5%	18,3%
10	1,5%	1,5%	0,5%	1,0%	1,0%	4,4%	5,4%	12,8%	24,6%	47,0%

Table 8*: Decile Transition Matrix (DTM) for the Period 2011 – 2012.*

	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2011 - 2012									
	DECILE LOCATION (t)									
DECILE LOCATION (t-1)	1	2	3	4	5	6	7	8	9	10
1	64,4%	22,2%	3,4%	2,5%	2,0%	0,5%	0,5%	1,5%	1,5%	1,5%
2	8,9%	41,9%	27,6%	7,4%	2,5%	3,4%	1,5%	3,9%	0,5%	2,5%
3	6,9%	15,3%	32,0%	26,1%	7,4%	3,9%	3,4%	1,5%	3,0%	0,5%
4	5,4%	8,9%	13,8%	25,1%	26,6%	10,3%	4,4%	2,5%	2,0%	1,0%
5	0,5%	2,0%	5,9%	14,3%	28,1%	25,6%	12,3%	3,9%	3,9%	3,5%
6	1,0%	1,0%	6,9%	8,9%	12,8%	23,6%	24,6%	11,8%	4,4%	5,0%
7	2,0%	1,5%	3,0%	5,9%	8,9%	12,8%	25,6%	26,1%	9,9%	4,5%
8	1,0%	1,5%	2,0%	3,0%	2,5%	13,3%	15,3%	26,6%	23,6%	11,4%
9	4,5%	2,0%	2,5%	3,0%	4,9%	3,9%	7,4%	16,3%	34,0%	21,8%
10	5,4%	3,9%	3,0%	3,9%	4,4%	2,5%	4,9%	5,9%	17,2%	48,5%

Table 9*: Decile Transition Matrix (DTM) for the Period 2012 – 2013.*

	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2012 - 2013									
	DECILE LOCATION (t)									
DECILE LOCATION (t-1)	1	2	3	4	5	6	7	8	9	10
1	62,4%	15,8%	3,4%	3,9%	1,5%	1,5%	0,0%	1,5%	2,5%	7,4%
2	18,8%	40,9%	19,2%	8,4%	4,4%	2,0%	2,0%	0,5%	1,0%	3,0%
3	4,0%	18,7%	42,9%	16,3%	6,9%	3,4%	3,0%	0,5%	2,0%	2,5%
4	2,5%	8,4%	13,8%	34,0%	21,2%	8,9%	4,9%	2,0%	2,5%	2,0%
5	4,0%	3,9%	9,4%	12,3%	29,1%	20,2%	11,3%	4,9%	3,4%	1,5%
6	0,5%	5,4%	3,9%	11,8%	16,7%	28,6%	14,8%	7,9%	7,9%	2,5%
7	2,0%	1,5%	2,5%	5,4%	8,4%	17,7%	30,5%	20,2%	6,4%	5,4%
8	1,0%	1,0%	2,5%	3,9%	5,4%	8,9%	20,2%	29,1%	19,7%	8,4%
9	1,5%	2,0%	1,0%	3,4%	2,0%	4,9%	8,4%	21,2%	33,5%	22,3%
10	3,5%	2,5%	1,5%	0,5%	4,4%	3,9%	4,9%	12,3%	21,2%	45,0%

Table 10*: Decile Transition Matrix (DTM) for the Period 2013 – 2014.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2013 - 2014									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	69,3%	15,8%	5,4%	1,0%	1,5%	1,0%	0,5%	1,5%	0,5%	3,5%
2	12,9%	48,3%	17,2%	9,4%	1,5%	2,5%	3,0%	1,5%	2,5%	1,5%
3	5,4%	17,7%	35,0%	20,7%	7,9%	6,4%	3,4%	2,0%	1,0%	0,5%
4	3,5%	10,8%	16,7%	24,6%	23,6%	7,9%	4,9%	2,0%	3,9%	2,0%
5	0,5%	1,5%	11,3%	23,6%	29,6%	20,2%	5,4%	4,4%	2,5%	1,0%
6	0,5%	3,4%	4,9%	6,4%	15,8%	27,6%	20,7%	11,3%	5,9%	3,5%
7	0,5%	0,0%	2,5%	3,9%	8,9%	17,2%	32,5%	21,7%	7,9%	5,0%
8	2,0%	1,0%	4,9%	3,4%	5,4%	8,9%	16,3%	30,0%	20,7%	7,4%
9	2,0%	1,0%	1,0%	3,4%	3,0%	6,4%	7,9%	19,2%	36,9%	19,3%
10	3,5%	0,5%	1,0%	3,4%	3,0%	2,0%	5,4%	6,4%	18,2%	56,4%

Table 11*: Decile Transition Matrix (DTM) for the Period 2014 – 2015.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2014 - 2015									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	67,3%	18,7%	4,4%	3,0%	0,5%	1,0%	0,0%	0,5%	2,5%	2,0%
2	13,9%	41,9%	23,2%	6,4%	3,0%	1,5%	3,0%	3,0%	2,5%	2,0%
3	5,9%	17,7%	41,4%	16,3%	5,9%	5,9%	1,5%	2,5%	1,5%	1,5%
4	2,0%	6,9%	14,3%	33,0%	24,1%	11,3%	3,4%	3,0%	1,0%	1,0%
5	2,0%	3,4%	3,9%	19,7%	30,0%	18,2%	9,9%	5,9%	5,9%	1,0%
6	2,0%	3,4%	3,9%	11,8%	17,2%	25,1%	20,2%	6,4%	4,9%	5,0%
7	1,0%	2,0%	3,9%	2,5%	9,9%	15,3%	32,0%	18,7%	8,4%	6,4%
8	2,5%	1,5%	2,5%	2,0%	4,9%	12,8%	15,8%	30,5%	20,2%	7,4%
9	1,0%	2,5%	2,0%	3,0%	2,5%	6,4%	8,9%	20,7%	35,0%	18,3%
10	2,5%	2,0%	0,5%	2,5%	2,0%	2,5%	5,4%	8,9%	18,2%	55,4%

Table 12*: Decile Transition Matrix (DTM) for the Period 2015 – 2016.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2015 - 2016									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	69,3%	16,3%	3,0%	2,5%	0,5%	0,5%	1,5%	1,5%	1,5%	3,5%
2	14,4%	45,8%	19,2%	7,9%	3,4%	2,0%	2,0%	1,0%	2,5%	2,0%
3	6,9%	12,8%	37,9%	19,7%	9,9%	4,4%	2,5%	1,0%	1,0%	4,0%
4	2,5%	7,9%	17,7%	33,0%	19,2%	7,9%	5,4%	1,0%	2,0%	3,5%
5	1,5%	5,4%	8,9%	14,8%	28,6%	23,2%	8,4%	4,4%	2,5%	2,5%
6	1,0%	2,0%	3,0%	5,9%	20,7%	28,1%	21,7%	10,3%	5,4%	2,0%
7	2,0%	2,5%	3,0%	6,4%	5,9%	14,3%	28,6%	23,2%	7,4%	6,9%
8	0,5%	1,5%	2,0%	3,4%	6,9%	10,8%	20,7%	29,6%	19,2%	5,4%
9	0,5%	3,4%	4,4%	4,4%	2,0%	5,4%	5,4%	17,7%	39,4%	17,3%
10	1,5%	2,5%	1,0%	2,0%	3,0%	3,4%	3,9%	10,3%	19,2%	53,0%

Table 13*: Decile Transition Matrix (DTM) for the Period 2016 – 2017.*

t-7 to t-6 (2016 - 2017)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2016 - 2017									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	65,3%	13,3%	3,0%	2,5%	2,0%	0,5%	1,5%	1,0%	3,9%	6,9%
2	19,3%	44,3%	18,2%	6,4%	5,4%	0,5%	1,5%	0,0%	1,5%	3,0%
3	3,5%	21,7%	36,9%	18,7%	8,4%	3,0%	3,0%	1,0%	2,0%	2,0%
4	4,0%	8,4%	22,2%	29,6%	16,3%	10,8%	2,5%	3,9%	1,5%	1,0%
5	1,5%	5,4%	6,4%	23,2%	23,6%	20,2%	6,4%	3,9%	3,9%	5,4%
6	0,5%	3,0%	5,9%	8,9%	22,2%	27,1%	16,3%	6,4%	4,9%	5,0%
7	1,0%	2,0%	1,5%	3,4%	8,4%	20,7%	32,0%	19,2%	6,4%	5,4%
8	1,0%	0,5%	2,0%	3,0%	5,4%	6,9%	19,2%	32,5%	19,7%	9,9%
9	1,5%	1,0%	2,0%	3,4%	5,4%	6,9%	8,9%	22,7%	34,5%	13,9%
10	2,5%	0,5%	2,0%	1,0%	3,0%	3,4%	8,9%	9,4%	21,7%	47,5%

Table 14*: Decile Transition Matrix (DTM) for the Period 2017 – 2018.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2017 - 2018									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	67,8%	12,3%	4,9%	2,0%	3,0%	1,5%	1,5%	0,5%	1,5%	5,0%
2	16,3%	46,8%	15,8%	4,4%	4,9%	2,0%	2,5%	1,5%	3,0%	3,0%
3	3,5%	19,2%	41,4%	18,7%	7,9%	3,4%	3,0%	1,5%	1,0%	0,5%
4	2,5%	10,3%	15,8%	31,0%	19,2%	10,8%	3,9%	1,0%	3,9%	1,5%
5	1,0%	3,0%	10,3%	22,7%	27,1%	15,8%	9,4%	4,4%	4,4%	2,0%
6	1,0%	3,4%	4,9%	6,4%	17,7%	34,0%	14,3%	8,4%	4,9%	5,0%
7	1,5%	1,5%	2,5%	5,4%	7,9%	13,3%	30,5%	19,7%	9,9%	7,9%
8	2,5%	2,5%	1,0%	1,0%	5,9%	8,4%	18,2%	33,5%	17,7%	9,4%
9	1,5%	0,0%	2,0%	5,9%	4,4%	6,4%	10,8%	19,7%	33,5%	15,8%
10	2,5%	1,0%	1,5%	2,5%	2,0%	4,4%	5,9%	9,9%	20,2%	50,0%

Table 15*: Decile Transition Matrix (DTM) for the Period 2018 – 2019.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2018 - 2019									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	66,3%	18,7%	3,9%	3,0%	2,5%	0,0%	1,5%	0,5%	1,0%	2,5%
2	9,9%	44,3%	29,6%	6,4%	3,9%	2,0%	1,0%	1,0%	0,5%	1,5%
3	4,0%	13,8%	31,0%	28,6%	7,9%	5,4%	2,0%	3,0%	2,5%	2,0%
4	1,5%	4,9%	16,7%	26,1%	20,7%	13,8%	6,9%	3,4%	2,5%	3,5%
5	1,0%	2,5%	4,9%	15,8%	33,0%	22,2%	11,3%	3,9%	3,4%	2,0%
6	0,5%	3,0%	4,9%	9,4%	12,3%	24,6%	28,6%	10,3%	3,9%	2,5%
7	2,5%	3,4%	2,5%	3,0%	7,4%	14,8%	25,6%	24,6%	13,8%	2,5%
8	1,5%	3,9%	3,0%	3,4%	7,9%	8,4%	11,8%	28,1%	20,7%	11,4%
9	5,4%	3,4%	2,0%	2,0%	2,5%	5,4%	8,4%	18,2%	31,0%	21,8%
10	7,4%	2,0%	1,5%	2,5%	2,0%	3,4%	3,0%	6,9%	20,7%	50,5%

Table 16*: Decile Transition Matrix (DTM) for the Period 2019 – 2020.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2019 - 2020									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	67,3%	10,3%	4,4%	2,5%	0,0%	1,5%	1,5%	2,5%	2,0%	7,9%
2	13,9%	49,3%	17,7%	6,4%	3,0%	2,0%	3,0%	1,0%	1,5%	2,5%
3	4,0%	18,2%	39,9%	18,2%	4,9%	5,9%	1,5%	2,0%	2,0%	3,5%
4	4,5%	5,9%	15,3%	27,6%	24,6%	11,8%	3,4%	3,4%	2,0%	1,5%
5	4,5%	3,9%	7,9%	18,7%	25,6%	19,7%	9,9%	3,0%	3,0%	4,0%
6	1,5%	4,9%	4,9%	10,8%	13,8%	28,6%	19,7%	8,4%	5,4%	2,0%
7	0,0%	1,5%	2,5%	6,9%	7,4%	12,8%	30,5%	22,7%	10,8%	5,0%
8	1,0%	1,0%	1,5%	3,0%	9,9%	8,4%	13,8%	29,1%	22,7%	9,9%
9	1,5%	2,5%	3,0%	2,0%	7,4%	6,4%	10,3%	18,2%	32,0%	16,8%
10	2,0%	2,5%	3,0%	3,9%	3,4%	3,0%	6,4%	9,9%	18,7%	47,0%

Table 17*: Decile Transition Matrix (DTM) for the Period 2020 – 2021.*

DECILE LOCATION (t-1)	DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2020 - 2021									
	DECILE LOCATION (t)									
	1	2	3	4	5	6	7	8	9	10
1	60,4%	16,3%	4,4%	3,4%	3,4%	3,0%	0,0%	1,5%	2,0%	5,4%
2	17,8%	38,4%	17,7%	5,9%	4,4%	4,4%	1,5%	1,5%	5,9%	2,5%
3	6,9%	19,7%	30,0%	13,8%	8,4%	3,9%	5,9%	3,9%	4,9%	2,5%
4	2,0%	8,4%	13,3%	27,6%	15,8%	13,8%	6,9%	4,4%	5,4%	2,5%
5	1,0%	3,4%	13,3%	17,7%	24,6%	15,3%	7,4%	7,4%	8,9%	1,0%
6	3,5%	3,4%	2,5%	9,4%	17,7%	24,1%	20,2%	9,9%	5,9%	3,5%
7	1,0%	2,5%	4,4%	5,9%	9,4%	15,3%	26,6%	16,7%	11,8%	6,4%
8	3,5%	3,0%	4,4%	3,4%	8,4%	6,9%	17,7%	28,1%	14,3%	10,4%
9	1,0%	3,4%	5,4%	5,4%	4,9%	8,4%	9,4%	18,7%	23,2%	20,3%
10	3,0%	1,5%	4,4%	7,4%	3,0%	4,9%	4,4%	7,9%	17,7%	45,5%

Table 18*: Decile Transition Matrix (DTM) for the Period 2021 – 2022.*

		DECILE TRANSITION MATRIX (DTM) FOR THE PERIOD 2021 - 2022									
		DECILE LOCATION (t)									
		1	2	3	4	5	6	7	8	9	10
DECILE LOCATION (t-1)	1	56,9%	13,8%	6,4%	2,0%	3,4%	1,5%	1,5%	2,0%	4,9%	7,4%
	2	23,8%	30,5%	15,8%	4,4%	5,4%	6,9%	3,0%	3,9%	3,0%	3,5%
	3	5,9%	25,6%	25,1%	12,8%	9,9%	3,9%	4,4%	3,4%	4,4%	4,5%
	4	3,5%	11,8%	26,1%	21,2%	10,8%	5,4%	5,9%	7,4%	6,9%	1,0%
	5	1,5%	4,9%	12,3%	25,6%	16,7%	15,8%	9,9%	4,4%	5,9%	3,0%
	6	0,0%	2,0%	7,4%	15,8%	23,6%	17,2%	14,8%	9,4%	5,4%	4,5%
	7	2,0%	2,0%	2,0%	7,9%	14,3%	24,1%	16,7%	15,3%	9,4%	6,4%
	8	0,5%	5,9%	1,0%	5,4%	9,4%	13,3%	27,6%	16,7%	11,3%	8,9%
	9	2,5%	2,5%	2,5%	3,4%	5,4%	8,9%	11,8%	29,6%	22,7%	10,9%
	10	3,5%	1,0%	1,5%	1,5%	1,0%	3,0%	4,4%	7,9%	26,1%	50,0%

During the meticulous creation of DTMs for each transitional period within the data, a salient observation emerges. It is found that companies positioned in the top decile in the period 2009 - 2010 encountered challenges in sustaining their ranking, being 8.8% less likely to maintain their top-tier status compared to the average observed in other periods. Companies situated in the 10th decile during this period displayed a notable resilience, being 10.4% less likely to linger in the bottom rank compared to the averaged likelihood across all other periods. Remarkably, this period aligns with the macro-economic recession of 2009.

This observation substantiates the notion that companies achieving elevated performance levels, without due acknowledgment of the role of luck, might exhibit a heightened tendency towards overconfidence and resistance to change. This discussion extends insights from Section: 2.6.

5.4. FINAL DTM FOR MARKOV CHAIN SIMULATIONS

Following the generation of individual DTMs for each transitional period, an overarching DTM is created that consolidates the composite transitions spanning the comprehensive 16-year investigation. This final DTM assumes paramount significance, being one of the two primary inputs to the ensuing Markov Chain simulations.

This strategic approach is pivotal in establishing a benchmark against which subsequent outcomes can be evaluated, offering insights into performance achievements that may be attributable to randomness. The presented transition matrix considers the 16-year average of movements between deciles experienced by companies. The diagonally highlighted cells denote the probabilities, averaged over the 16-year period, of a company remaining within its current decile during the transitional period.

Table 19: Final DTM for Markov chain simulation use.

		FINAL DECILE TRANSITION MATRIX FOR USE IN MARKOV CHAIN SIMULATIONS									
		DECILE LOCATION (t)									
DECILE LOCATION (t-1)		1	2	3	4	5	6	7	8	9	10
	1	63,76%	16,22%	4,60%	2,56%	1,94%	1,28%	1,08%	1,25%	1,94%	5,21%
	2	16,14%	41,81%	20,10%	7,00%	3,97%	2,59%	2,07%	1,77%	2,30%	2,34%
	3	5,64%	18,16%	34,09%	19,28%	8,21%	5,25%	2,99%	2,17%	2,10%	2,15%
	4	2,97%	8,28%	17,08%	28,31%	19,61%	10,02%	5,12%	3,38%	3,15%	2,11%
	5	1,88%	3,94%	8,90%	18,52%	25,94%	19,21%	9,85%	5,02%	4,04%	2,71%
	6	1,09%	3,42%	5,02%	9,33%	17,44%	24,73%	19,51%	9,79%	5,85%	3,86%
	7	1,58%	2,04%	3,05%	5,19%	8,93%	16,85%	26,31%	20,72%	9,79%	5,58%
	8	1,62%	2,04%	2,59%	3,19%	6,96%	10,31%	18,33%	27,45%	18,95%	8,61%
	9	2,05%	2,20%	2,66%	3,91%	4,24%	6,01%	9,23%	19,51%	31,43%	18,88%
	10	3,27%	1,90%	1,90%	2,73%	2,76%	3,74%	5,52%	8,93%	20,46%	48,55%

In Table 19, the finalized DTM is presented, offering a comprehensive overview of the transitional probabilities among deciles over the entire 16-year period. Accompanying this, Figures 1 to 20 illustrate the distributional probabilities depicting the likelihood of a company transitioning to various deciles within a single transitional period.

Figure 1: Decile 1 Transitional Probabilities

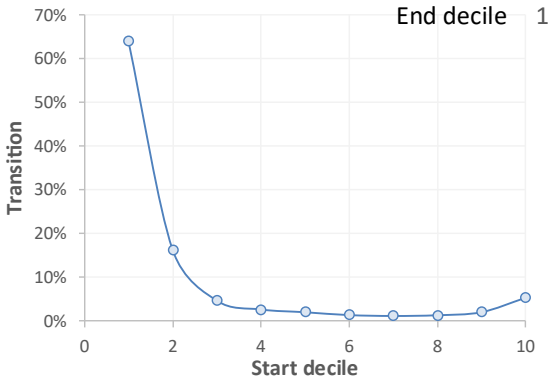


Figure 2: Decile 2 Transitional Probabilities

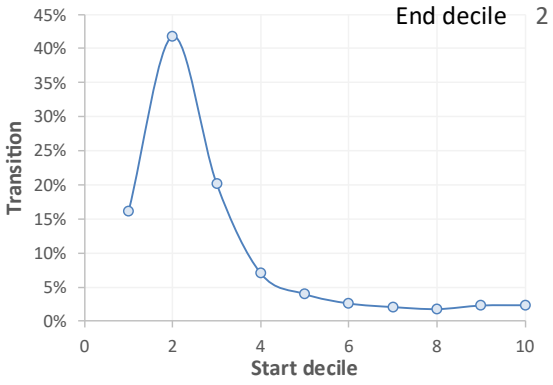


Figure 3: Decile 3 Transitional Probabilities

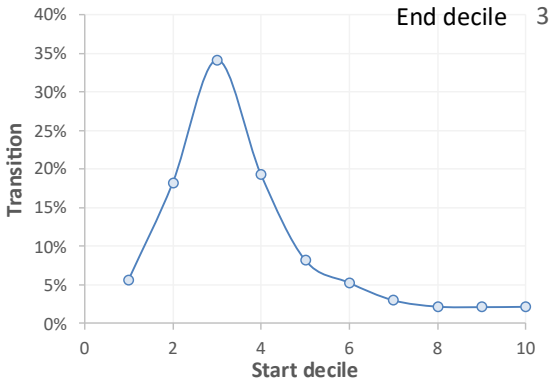


Figure 4: Decile 4 Transitional Probabilities

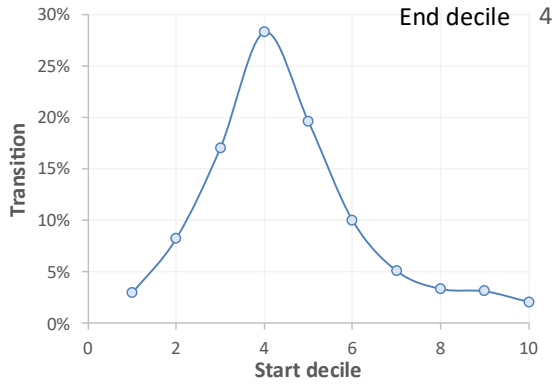


Figure 5: Decile 5 Transitional Probabilities

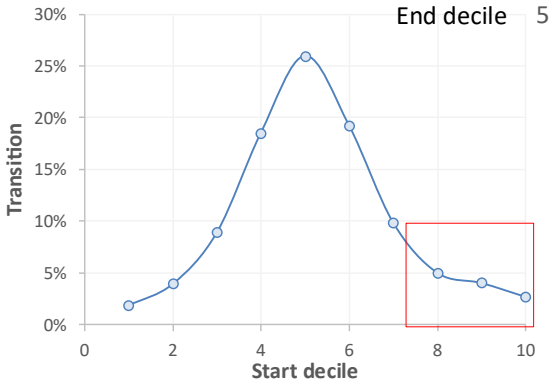


Figure 6: Decile 6 Transitional Probabilities

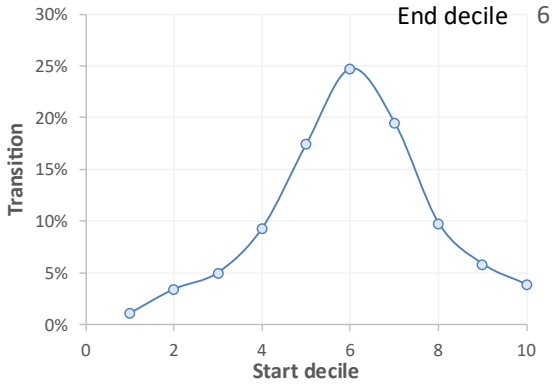


Figure 7: Decile 7 Transitional Probabilities

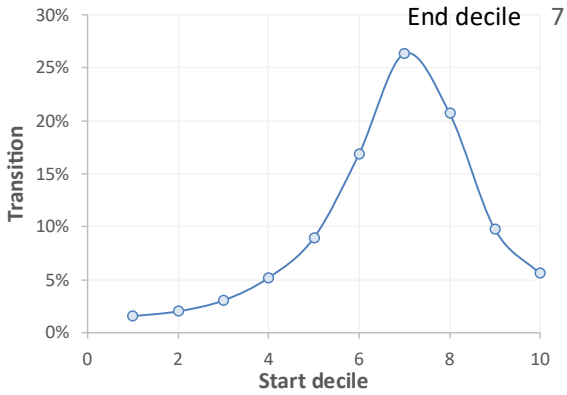


Figure 8: Decile 8 Transitional Probabilities

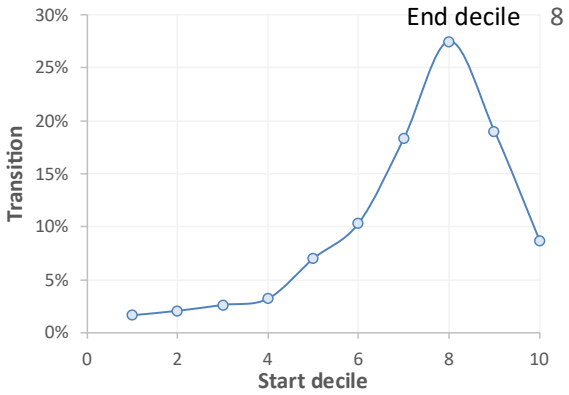


Figure 9: Decile 9 Transitional Probabilities

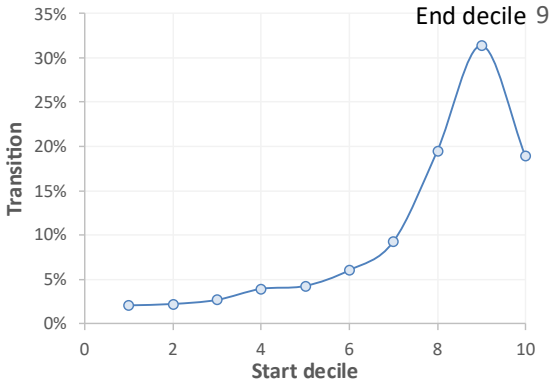
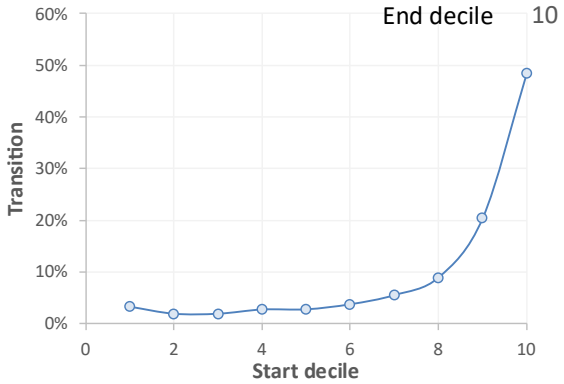


Figure 10: Decile 10 Transitional Probabilities



A noteworthy observation emerges in Figure 5, specifically illustrating the transitional probabilities of companies originating from decile 5. Instead of conforming to an anticipated nominal distribution curve, the graph reveals a higher probability of transitioning from decile 5 to upper deciles 1, 2, and 3, as opposed to lower deciles 8, 9, and 10. This skewed distribution prompts a distinct phenomenon warranting further exploration in subsequent studies.

5.5. ESTABLISHING WHAT RANDOMNESS MAY PRODUCE

In the context of the data analysis framework delineated in Chapter 4, a methodologically strategic approach is instrumental in establishing a benchmark for subsequent evaluative considerations. The forthcoming results from time-homogeneous Markov Chain simulations, that integrated the final DTM presented in the previous section and the initial performance outcomes of the population in 2007, form the basis of this benchmark creation. This stage involves a meticulous process where the 16-year observed life of each company is randomly generated 1000 times, determining, through stochastic processes the decile in which a company might fall for each of the 16 years. The aggregation of these random decile achievements yields a new decile table, shedding light on potential decile placements influenced by chance alone.

The tallying of instances where organisations land in the first decile, coupled with the subsequent ranking of companies based on superior achievements, delineates the top 10% of performers attributable to randomness. This delineation serves as a benchmark, offering the requisite frequency of achieving a top status through randomness to secure a position within the top 10% of performers.

Table 20: Markov Chin Simulations Final Output, 2007 – 2022.

RANK	COMPANY NAME	'22	'21	'20	'19	'18	'17	'16	'15	'14	'13	'12	'11	'10	'9	'8	'7	TOP 10% RANDOM
1	Psychemedics Corp	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
2	Dril-Quip Inc	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
3	Woodside Energy Group Ltd	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	15
4	Cranswick PLC	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
5	Parkland Corp	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	14
6	Folli Follie SA	1	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	14
7	Cyberlink Corp	1	1	1	1	1	1	1	1	1	1	1	1	2	1	6	1	14
8	Value Line Inc	1	1	1	1	1	1	6	1	1	1	1	1	1	1	2	1	14
9	Hana Microelectronics PCL	1	1	1	1	1	1	7	1	1	1	1	2	1	1	1	1	14
10	Sonova Holding AG	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	14
11	Federated Hermes Inc	1	1	1	1	1	1	3	1	1	2	1	1	1	1	1	1	14
12	Simcorp A/S	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	5	14
13	S&P Global Inc	1	1	1	1	1	8	1	1	2	1	1	1	1	1	1	1	14
14	WEYCO Group Inc	1	1	1	1	1	1	2	1	1	1	1	1	4	1	1	1	14
15	Churchill Downs Inc	1	1	1	1	1	1	1	3	1	1	1	1	1	4	1	1	14
16	Pryxie Liquidation Corp	1	1	1	1	8	1	1	1	2	1	1	1	1	1	1	3	13
17	Grupo Security SA	1	1	1	1	2	1	1	2	1	1	1	1	2	1	1	1	13
18	Abercrombie & Fitch Co	1	1	1	2	1	1	1	4	1	1	3	1	1	1	1	1	13
19	Mesa Laboratories Inc	1	8	1	1	1	1	1	1	1	1	1	7	1	2	1	1	13
20	Dongil Technology Ltd	1	2	1	1	1	1	1	2	1	1	1	9	1	1	1	1	13
21	Bmmi BSC	1	1	1	1	8	2	1	1	1	3	1	1	1	1	1	1	13
22	Topps Tiles PLC	1	1	1	1	1	1	2	1	4	1	2	1	1	1	1	1	13
23	Bijou Brigitte modische Accessoires AG	1	1	2	1	1	1	1	1	6	1	1	3	1	1	1	1	13
24	Refrigeration Electrical Engineering Corp	1	5	1	1	3	1	5	1	1	1	1	1	1	1	1	1	13
25	Strategic Education Inc	1	2	1	1	1	1	1	1	1	1	1	2	1	1	2	1	13
26	Clas Ohlson AB	1	1	1	6	1	1	1	1	1	1	1	6	1	1	1	5	13
27	Helios Technologies Inc	1	1	1	1	1	2	6	7	1	1	1	1	1	1	1	1	13
28	Steven Madden Ltd	1	1	1	1	1	2	1	1	5	4	1	1	1	1	1	1	13
29	Demant A/S	1	1	1	1	1	2	1	2	1	1	2	1	1	1	1	1	13
30	Zwack Unicum Likoripari es Kereskedelmi Ny	1	1	1	1	1	2	1	9	1	1	1	1	1	1	4	1	13
31	Domino's Pizza Group PLC	1	1	1	1	1	1	2	2	1	1	1	1	1	4	1	1	13
32	United-Guardian Inc	1	4	1	2	1	1	1	8	1	1	1	1	1	1	1	1	13
33	British American Tobacco (Malaysia) Bhd	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	3	13
34	ITC Ltd	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	2	13
35	Altron Ltd	1	1	1	1	1	1	1	1	3	2	1	1	1	1	3	1	13
36	MTN Group Ltd	1	1	1	1	1	1	1	2	1	1	9	2	1	1	1	1	13
37	Colruyt Group NV	1	1	5	1	1	1	1	1	1	2	1	1	1	1	1	7	13
38	Oracle Corp	1	2	1	1	1	1	1	2	1	2	1	1	1	1	1	1	13
39	Urban Outfitters Inc	1	1	1	1	1	1	1	1	8	1	1	1	2	6	1	1	13
40	Check Point Software Technologies Ltd	1	9	1	8	1	1	2	1	1	1	1	1	1	1	1	1	13
41	Fletcher King PLC	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	3	13
42	Nokian Tyres plc	1	1	1	1	1	4	1	1	1	1	1	1	6	1	7	1	13
43	Combined Motor Holdings Ltd	1	1	1	1	1	1	4	3	1	1	1	1	2	1	1	1	13
44	Tatneft' PAO	1	1	1	1	2	9	1	1	1	1	1	5	1	1	1	1	13
45	RaonSecure Co Ltd	1	1	1	1	1	1	1	1	1	4	3	2	1	1	1	1	13
46	Groep Brussel Lambert NV	1	1	1	1	1	6	1	1	2	2	1	1	4	1	1	1	12
47	Precious Shipping PCL	1	2	1	1	4	1	1	1	2	1	1	1	1	1	1	2	12
48	Arts Optical International Holdings Ltd	1	2	1	1	1	1	1	1	1	3	6	1	1	1	1	2	12
49	Nan Ya Printed Circuit Board Corp	1	1	1	1	1	1	1	5	2	2	1	1	1	1	4	1	12
50	Diamond Offshore Drilling Inc	1	2	1	1	1	1	1	1	2	2	1	6	1	1	1	1	12
51	Alro SA	1	2	1	1	4	1	1	1	1	1	1	1	1	5	2	1	12
52	Nucor Corp	1	1	2	5	1	1	2	1	1	1	1	3	1	1	1	1	12
53	Fidelity Asian Values PLC	1	1	2	2	2	1	1	1	1	1	1	1	3	1	1	1	12
54	InterDigital Inc	1	1	1	1	1	2	4	3	1	1	1	2	1	1	1	1	12
55	Empresa Electrica de Magallanes SA	1	1	1	1	6	2	2	1	1	1	2	1	1	1	1	1	12
56	Compania Industrial el Volcan SA	1	1	2	1	2	2	1	1	1	1	1	1	1	1	2	1	12
57	Hays PLC	1	1	1	1	2	1	1	1	2	2	2	1	1	1	1	1	12
58	Foschini Group Ltd	1	1	1	1	3	1	1	1	1	1	1	4	1	2	3	1	12
59	Astra Agro Lestari Tbk PT	1	1	1	1	2	1	1	1	1	2	3	1	2	1	1	1	12
60	Akzo Nobel India Ltd	1	1	1	1	5	1	1	1	1	1	2	1	1	1	2	6	12
61	Pfeiffer Vacuum Technology AG	1	1	1	1	1	1	1	1	6	6	2	1	1	1	1	3	12
62	AllianceBernstein Holding LP	1	1	3	6	1	1	3	1	1	1	1	1	1	1	1	2	12

63	ASMPT Ltd	1	1	6	1	1	4	1	1	1	1	4	1	1	2	1	1	12
64	Beter Bed Holding NV	1	1	1	1	1	1	1	1	3	2	1	1	6	1	9	1	12
65	Zona Franca de Iquique SA	1	1	1	1	1	1	2	1	6	1	1	1	2	1	1	2	12
66	Sociedad de infraestructuras de Mercado SA	1	3	1	2	1	1	1	1	1	1	1	4	1	2	1	1	12
67	King Slide Works Co Ltd	1	3	1	1	4	1	1	1	1	2	1	1	3	1	1	1	12
68	Advantech Co Ltd	1	1	2	1	3	1	1	2	1	1	1	1	2	1	1	1	12
69	T Rowe Price Group Inc	1	1	1	2	1	4	1	1	1	2	1	1	1	4	1	1	12
70	Monster Beverage Corp	1	3	1	1	1	1	2	1	2	1	1	1	1	3	1	1	12
71	Factset Research Systems Inc	1	1	1	1	1	1	1	2	1	2	1	2	1	1	4	1	12
72	Hallenstein Glasson Holdings Ltd	1	1	2	2	1	2	1	1	1	1	1	8	1	1	1	1	12
73	Carreras Ltd	1	1	1	2	1	1	2	2	1	1	1	1	1	1	1	5	12
74	Mackenzie Master LP	1	1	1	3	1	1	1	3	1	2	1	1	1	2	1	1	12
75	Texas Pacific Land Corp	1	1	1	1	5	1	1	1	1	1	1	7	2	2	1	1	12
76	Procter & Gamble Hygiene and Health Care L	1	4	1	1	1	1	1	2	1	1	2	1	1	1	8	1	12
77	Unilever Indonesia Tbk PT	1	1	3	1	1	1	2	1	1	1	1	1	1	2	2	1	12
78	Taiwan Semiconductor Manufacturing Co Lt	1	1	1	3	1	1	1	2	1	1	2	1	1	1	1	3	12
79	MOL Magyar Olajes Gazipari Nyrt	1	2	1	1	1	1	1	1	1	2	4	1	2	1	1	1	12
80	Yamato Kogyo Co Ltd	1	1	1	1	1	1	2	1	8	3	1	1	2	1	1	1	12
81	Surmodics Inc	1	1	2	1	3	1	1	2	1	1	1	1	1	1	1	2	12
82	Alpine Select AG	1	1	2	1	1	1	1	1	4	1	5	1	1	1	1	2	12
83	Law Debenture Corporation PLC	1	1	2	1	1	2	1	2	1	1	1	1	1	1	2	1	12
84	Investor AB	1	6	1	1	1	1	3	1	1	4	1	1	1	1	2	1	12
85	Korvest Ltd	1	1	6	1	1	1	1	2	1	1	1	1	3	2	1	1	12
86	Lanna Resources PCL	1	1	1	3	1	1	2	6	1	2	1	1	1	1	1	1	12
87	Compania de Inversiones la Espanola SA	1	1	1	8	2	1	2	1	1	1	1	2	1	1	1	1	12
88	Hon Hai Precision Industry Co Ltd	1	1	1	1	2	1	2	1	1	1	1	1	3	2	1	1	12
89	RTC Group PLC	1	1	2	1	1	1	1	1	1	5	2	1	1	1	2	1	12
90	Radian Group Inc	1	1	1	1	2	1	1	1	1	1	1	2	2	1	1	2	12
91	HEICO Corp	1	1	1	1	1	5	3	1	2	1	1	8	1	1	1	1	12
92	SG&G Corp	1	2	1	1	2	1	1	1	1	1	1	1	1	1	3	2	12
93	Precision Drilling Corp	1	6	1	3	6	1	1	1	2	1	1	1	1	1	1	2	11
94	Mivtach Shamir Holdings Ltd	1	1	1	7	1	2	1	6	1	2	1	1	1	1	1	2	11
95	Aveng Ltd	1	1	1	1	1	1	2	1	1	7	2	1	3	1	2	1	11
96	London City Equities Ltd	1	7	1	1	1	1	4	1	1	1	8	1	1	2	1	2	11
97	Ooredoo QPSC	1	3	1	1	1	4	8	4	1	1	1	1	1	1	4	1	11
98	Compania de Minas Buenaventura SAA	1	1	1	2	1	1	1	1	4	8	1	1	1	2	2	1	11
99	Impala Platinum Holdings Ltd	1	5	1	2	5	1	1	1	1	1	8	1	5	1	1	1	11
100	UBCare Co Ltd	1	2	1	2	2	1	1	2	1	1	1	1	1	3	1	1	11
101	Kingboard Holdings Ltd	1	1	1	1	1	1	1	1	3	6	2	1	2	2	1	1	11
102	Arif Habib Corporation Ltd	1	1	2	2	1	1	1	1	1	1	1	2	2	2	1	1	11
103	Novartis India Ltd	1	1	2	4	2	2	1	1	1	1	2	1	1	1	1	1	11
104	Konya Cimento Sanayii AS	1	4	2	1	3	1	1	1	1	1	1	2	1	2	1	1	11
105	Hoya Corp	1	3	1	1	1	3	6	1	1	1	1	1	8	1	1	2	11
106	Monadelphous Group Ltd	1	1	7	1	1	1	3	1	3	2	1	1	1	8	1	1	11
107	Hibbett Inc	1	1	5	1	1	1	5	1	1	1	2	1	3	1	1	3	11
108	Melexis NV	1	1	5	1	4	2	3	1	1	1	1	3	1	1	1	1	11
109	Utah Medical Products Inc	1	1	1	1	3	1	2	1	5	7	1	1	3	1	1	1	11
110	Labrador Iron Ore Royalty Corp	1	1	1	1	2	1	1	2	1	2	1	2	1	2	1	1	11
111	Microsoft Corp	1	1	1	4	2	1	1	1	2	1	1	2	1	1	2	1	11
112	Vtech Holdings Ltd	1	1	1	1	1	1	1	3	2	1	1	5	2	6	1	1	11
113	Escalon Medical Corp	1	1	1	1	1	1	2	1	5	1	7	2	1	1	2	1	11
114	MKF Krasnyi Oktyabr' PAO	1	1	1	2	1	5	1	1	2	1	2	1	1	1	1	2	11
115	Sasol Ltd	1	1	1	1	2	1	2	2	2	3	1	1	1	1	1	1	11
116	Applied Materials Inc	1	1	1	2	6	1	4	1	1	1	2	1	1	1	1	8	11
117	KT&G Corp	1	2	1	2	5	2	1	1	1	1	3	1	1	1	1	1	11
118	Fielmann Group AG	1	1	1	3	1	1	1	1	1	1	2	1	1	5	2	4	11
119	Cosel Co Ltd	1	2	1	1	1	1	1	1	1	9	1	1	2	3	2	1	11
120	Jollibee Foods Corp	1	1	3	9	1	1	2	1	3	1	1	1	2	1	1	1	11
121	Halma PLC	1	1	3	2	1	1	1	1	3	1	1	1	1	1	2	4	11
122	Power Assets Holdings Ltd	1	1	1	1	2	2	1	1	3	1	3	1	1	1	5	1	11
123	Merida Industry Co Ltd	1	2	1	1	1	3	1	8	1	1	1	2	1	1	1	2	11
124	Lung Kee (Bermuda) Holdings Ltd	1	3	1	1	2	2	1	3	1	1	1	1	9	1	1	1	11
125	Pinetree Capital Ltd	1	1	4	1	3	3	4	2	1	1	2	1	1	1	1	1	10
126	SSAB AB	1	6	1	1	1	1	1	1	2	2	4	1	1	2	6	1	10

127	MPC Muenchmeyer Petersen Capital AG	1	1	1	2	1	3	1	1	1	2	1	2	2	1	2	1	10
128	Dio Corp	1	2	2	1	1	2	1	8	1	1	2	1	1	1	1	8	10
129	Autodesk Inc	1	1	1	1	2	6	1	2	2	1	3	1	5	1	1	1	10
130	bebe stores inc	1	2	1	2	1	1	1	2	2	1	2	1	5	1	1	1	10
131	Aneka Tambang Tbk PT	1	1	4	2	1	1	1	1	2	1	4	3	1	2	1	1	10
132	Infortrend Technology Inc	1	1	2	2	9	1	2	1	1	1	1	2	1	5	1	1	10
133	Financiere de Tubize SA	1	2	1	1	1	1	2	1	2	5	1	6	4	1	1	1	10
134	Templeton Emerging Markets Fund Inc	1	2	2	3	1	1	1	1	1	4	1	2	1	4	1	1	10
135	AstraZeneca PLC	1	2	2	4	2	1	2	1	1	5	1	1	1	1	1	1	10
136	Tong Herr Resources Bhd	1	1	1	1	1	1	1	3	2	1	1	2	2	2	2	1	10
137	Investment Oresund AB	1	2	1	1	1	1	1	2	1	6	3	1	7	1	2	1	10
138	TGS ASA	1	1	3	1	2	3	1	2	1	1	1	3	1	1	2	1	10
139	Uralkaliy PAO	1	1	1	2	1	1	5	1	4	2	1	3	1	3	1	1	10
140	Severstal' PAO	1	1	2	1	1	1	8	1	2	2	1	1	8	1	5	1	10
141	Bahrain Telecommunications Company BSC	1	1	2	1	7	1	2	1	1	1	1	2	1	1	6	2	10
142	Lifestyle Communities Ltd	1	1	1	1	2	3	1	1	1	3	2	1	1	1	2	2	10
143	Bursa Cimento Fabrikasi AS	1	4	1	1	1	1	1	1	2	1	1	2	2	7	2	1	10
144	Rotork PLC	1	1	1	2	2	1	1	1	8	3	1	2	1	1	1	4	10
145	Nestle (Malaysia) Bhd	1	8	1	1	3	2	1	1	1	1	2	2	1	1	2	1	10
146	Oracle Corp Japan	1	1	4	2	2	1	5	1	1	1	4	1	1	1	1	5	10
147	Embotelladora Andina SA	1	1	1	1	7	7	1	1	1	1	1	2	1	6	2	2	10
148	Socfinasia SA	1	2	1	4	1	1	1	2	1	1	1	1	4	2	1	2	10
149	Yunnan Copper Co Ltd	1	1	1	3	1	1	9	1	1	2	1	1	1	2	2	2	10
150	Transocean Ltd	1	2	1	1	1	2	1	1	1	1	1	2	2	1	2	2	10
151	Porto Seguro SA	1	1	5	1	1	1	1	1	2	1	2	1	2	2	1	2	10
152	Adobe Inc	1	2	1	5	1	2	1	1	1	1	1	2	1	5	1	2	10
153	Hanil Feed Co Ltd	1	1	3	1	1	1	3	2	1	1	1	2	3	1	1	3	10
154	Taewoong Co Ltd	1	2	2	1	2	2	1	2	1	1	1	2	1	2	1	1	9
155	CB Wind-Down Corp	1	2	2	2	1	1	1	7	1	1	1	4	2	1	2	1	9
156	SCI Information Service Inc	1	7	1	2	1	1	2	2	1	2	1	1	1	2	1	3	9
157	Harley-Davidson Inc	1	2	3	1	1	1	1	1	1	2	5	1	1	2	2	2	9
158	Encore Wire Corp	1	1	1	1	2	1	2	5	3	1	2	3	1	1	3	1	9
159	Shenzhen Yan Tian Port Holdings Co Ltd	1	1	3	1	1	2	1	5	2	2	1	1	1	1	8	2	9
160	Schroder UK Mid Cap Fund PLC	1	2	1	2	1	1	1	1	2	1	2	1	2	2	1	2	9
161	Hong Kong and China Gas Co Ltd	1	1	9	1	8	1	1	3	1	3	1	1	6	1	4	2	9
162	Deutsche Beteiligungs AG	1	1	3	1	2	1	2	1	2	1	1	2	4	3	1	1	9
163	Ponsse Oyj	1	1	2	5	1	1	1	1	1	3	5	1	2	3	1	2	9
164	Siam City Cement PCL	1	1	1	1	1	1	3	1	1	1	5	3	8	2	2	2	9
165	Marine Products Corp	1	1	1	1	4	2	8	4	9	1	1	1	1	2	5	1	9
166	LY Corp	1	1	8	2	2	1	1	1	2	1	1	8	1	9	1	9	9
167	GMK Noril'skiy Nikel' PAO	1	5	8	3	1	3	1	1	1	1	2	1	2	1	3	1	9
168	Aten International Co Ltd	1	2	2	1	1	1	2	4	1	2	2	3	1	1	1	1	9
169	Ford Otomotiv Sanayi AS	1	1	4	2	1	8	1	1	5	1	6	1	1	1	5	3	9
170	Bolsa de Comercio de Santiago Bolsa de Valo	1	8	2	6	1	2	2	1	1	2	1	1	1	2	1	1	9
171	Cognizant Technology Solutions Corp	1	3	2	1	1	1	2	3	2	1	1	1	2	2	1	1	9
172	Oyak Cimento Fabrikalari AS	1	1	2	1	1	2	1	1	2	2	2	2	2	1	1	1	9
173	Industria de Diseno Textil SA	1	3	1	1	1	2	1	1	3	1	1	1	2	8	2	4	9
174	SEI Investments Co	1	2	7	2	2	1	1	1	1	1	8	2	2	1	1	1	9
175	Abu Qir Fertilizers and Chemical Industries C	1	1	2	2	1	4	2	2	2	1	1	4	1	1	1	1	9
176	Kudelski SA	1	3	2	1	1	7	1	1	1	8	2	2	1	1	1	7	9
177	Amarin Corporations PCL	1	2	1	3	1	1	1	2	7	3	1	1	1	2	1	2	9
178	Berger Paints India Ltd	1	2	2	2	1	1	1	1	1	2	2	1	2	1	1	6	9
179	Grand Plaza Hotel Corp	1	1	1	1	2	5	2	1	1	1	1	1	3	3	7	4	9
180	Nexen Corp	1	1	1	5	1	1	1	4	2	1	3	1	7	2	3	1	9
181	Royal Orchid Hotel Thailand PCL	1	1	2	8	1	6	1	2	2	1	7	1	2	1	1	2	8
182	Reliv International Inc	1	1	2	1	1	1	1	5	1	2	3	5	1	3	2	2	8
183	PepsiCo Inc	1	1	1	1	1	2	1	2	1	4	2	2	1	4	3	6	8
184	Italtile Ltd	1	2	8	2	2	5	1	1	1	1	2	1	1	7	8	1	8
185	CCA Industries Inc	1	1	1	1	1	3	2	1	7	8	2	1	2	8	1	8	8
186	Grasim Industries Ltd	2	2	10	1	1	2	2	1	1	3	1	2	1	1	2	1	8
187	Schroder Asian Total Return Investment Co.	1	1	1	2	2	2	1	1	2	1	1	1	5	3	3	2	8
188	Brunel International NV	1	1	6	2	1	8	7	2	1	1	1	4	1	2	2	1	8
189	Upper Egypt Flour Mills SAE	1	1	1	4	3	2	3	2	1	1	2	1	1	2	3	1	8
190	NN Inc	2	2	3	2	1	2	2	1	1	2	1	1	7	1	1	1	8

191	Lattice Semiconductor Corp	2	1	1	1	3	2	1	5	1	1	3	2	2	1	3	5	7
192	Randstad NV	2	1	2	2	1	2	2	2	1	2	2	1	1	1	2	2	6
193	Liaoning Cheng Da Co Ltd	1	5	4	7	1	3	1	6	4	5	6	5	1	1	2	1	6
194	Industrias Penoles SAB de CV	2	5	1	1	2	1	2	3	3	1	2	2	2	1	1	2	6
195	TranSwitch Corp	2	3	5	2	2	1	5	1	1	2	3	1	3	3	1	1	6
196	MillerKnoll Inc	2	2	1	1	4	1	1	2	6	1	2	3	3	4	2	6	5
197	Truworths International Ltd	2	2	9	1	1	2	3	2	1	2	2	5	2	1	1	2	5
198	Van de Velde NV	2	2	1	1	3	2	2	10	1	4	3	2	1	1	2	4	5
199	AKITA Drilling Ltd	2	1	2	10	1	1	2	1	2	2	3	5	2	2	2	1	5
200	Sunrex Technology Corp	2	2	2	7	3	1	1	5	9	3	4	3	2	2	1	1	4
201	Heartland Express Inc	2	1	1	4	1	3	6	2	7	2	2	4	3	4	10	1	4
202	Fernheizwerk Neukoelln AG	2	9	2	3	3	4	1	1	5	1	3	1	2	2	4	6	4
203	Skechers USA Inc	2	10	2	2	3	1	1	3	2	2	1	2	1	2	3	2	4

As demonstrated in the Table 20, ROA achievements arising from stochastic processes, an organization necessitates securing a top decile position for a minimum of four instances within a 16-year period to be categorized within the top 10% of performers, consequently identified as a superior performer stemming from chance occurrences and therefore potential false positives denoted by μ. This segment establishes the benchmark for superior performers influenced by randomness (n_{random}) at $(top\ 10\%\ ROA\ random; p_{firm} < 0.10;\ 16\ years) = 4\ years$, signifying that an observed span of four years exhibiting superior performance within a 16-year period is indistinguishable from outcomes that might be attributed to luck.

5.6. CALCULATING θ

This phase in the data analysis involves the computation of a ratio, denoted as θ, which serves to compare the count of observed sustained superior performers against the number of false positives represented by the variable μ. To accomplish this, the instances where the top 10% of observed superior performers ($Superior$) achieve top-decile standings are adjusted, excluding occurrences that resemble outcomes attributable to randomness, as identified in the earlier Markov Chain simulations. The deduction of n_{random} from the observed performance results is warranted, as confidently attributing these instances to skill is untenable. Consequently, the recalibrated score provides a refined assessment that mitigates the influence of chance events, as depicted in the illustrative table below.

Table 21: Adjusted Performance Scores: Mitigating Randomness.

RANK	COMPANY NAME	'22	'21	'20	'19	'18	'17	'16	'15	'14	'13	'12	'11	'10	'9	'8	'7	INITIAL SCORE	FINAL SCORE
1	Simcorp A/S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
2	British American Tobacco (Malaysia) Bhd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
3	ITC Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
4	United-Guardian Inc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
5	Mackenzie Master LP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
6	Unilever Indonesia Tbk PT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
7	Texas Pacific Land Corp	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
8	Carreras Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
9	Taiwan Semiconductor Manufacturing Co Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
10	Procter & Gamble Hygiene and Health Care Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
11	Oracle Corp Japan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
12	Nestle (Malaysia) Bhd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
13	Abu Qir Fertilizers and Chemical Industries Co SAE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
14	CRISIL Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
15	Colgate-Palmolive (India) Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
16	Infosys Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	12
17	Monster Beverage Corp	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	15	11
18	T Rowe Price Group Inc	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	15	11
19	Hallenstein Glasson Holdings Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	11
20	Factset Research Systems Inc	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	11
21	Vtech Holdings Ltd	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	11
22	SEI Investments Co	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	15	11
23	Dabur India Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	11
24	Buckle Inc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	15	11
25	Hankook Shell Oil Co Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	15	11
26	USANA Health Sciences Inc	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	15	11
27	Fastenal Co	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	15	11
28	Novo Nordisk A/S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	15	11
29	Mr Price Group Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	11
30	Domino's Pizza Group PLC	2	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	14	10
31	Industria de Diseno Textil SA	3	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	10
32	Asian Paints Ltd	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	14	10
33	Cerveceria San Juan SA	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	14	10
34	Belimo Holding AG	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	14	10
35	Swaraj Engines Ltd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	14	10
36	Hero MotoCorp Ltd	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	10
37	Next PLC	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	10
38	Federated Hermes Inc	2	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	13	9
39	Melexis NV	1	1	2	1	1	1	1	1	1	1	1	1	9	2	1	1	13	9
40	ARB Corporation Ltd	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	2	13	9
41	Truworths International Ltd	1	1	10	8	2	1	1	1	1	1	1	1	1	1	1	1	13	9
42	ITT Educational Services Inc	7	9	1	1	1	1	1	1	1	1	1	1	1	1	1	2	13	9
43	Choice Hotels International Inc	2	5	1	1	1	2	1	1	1	1	1	1	1	1	1	1	13	9
44	Thaitheparos PCL	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	2	13	9
45	Colgate-Palmolive Co	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	13	9
46	CSL Ltd	3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	13	9
47	Graco Inc	1	1	1	1	1	7	1	1	1	2	1	1	3	1	1	1	13	9
48	Victrex PLC	2	2	1	1	1	1	1	1	1	1	1	1	4	1	1	1	13	9
49	EVS Broadcast Equipment SA	2	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	13	9
50	Inmobiliaria Central de Estacionamientos Agustinas SA	1	1	1	1	1	1	1	1	1	1	1	1	1	7	6	9	13	9
51	Advantech Co Ltd	2	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	12	8
52	Fielmann Group AG	4	3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	12	8
53	Italtile Ltd	1	1	2	1	1	1	1	1	1	1	1	2	2	2	1	1	12	8
54	Corporacion Moctezuma SAB de CV	1	1	1	1	1	1	1	1	2	1	2	2	1	1	2	1	12	8
55	Marico Ltd	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	2	12	8
56	H & M Hennes & Mauritz AB	5	8	2	2	1	1	1	1	1	1	1	1	1	1	1	1	12	8
57	Oracle Financial Services Software Ltd	1	1	1	1	1	1	1	1	1	2	2	1	1	1	3	2	12	8
58	Amadeus Fire AG	3	4	2	1	1	1	1	1	1	1	1	1	1	1	1	3	12	8
59	Apple Inc	1	1	1	1	2	2	1	1	1	1	1	1	1	1	2	2	12	8
60	Luzhou Laojiao Co Ltd	1	1	1	1	1	2	2	4	1	1	1	1	1	1	1	4	12	8
61	National Beverage Corp	1	1	1	1	1	1	1	1	1	1	1	1	2	3	4	4	12	8
62	Robert Half Inc	1	2	1	1	1	1	1	1	1	1	2	6	7	1	1	1	12	8
63	Winmark Corp	1	1	1	1	1	1	1	1	1	1	1	1	3	7	6	4	12	8
64	Sturm Ruger & Company Inc	1	1	3	1	1	1	1	1	1	1	1	1	1	4	4	9	12	8
65	Psychemedics Corp	10	10	4	1	1	1	4	1	1	1	1	1	2	1	1	1	11	7
66	Oyak Cimento Fabrikalari AS	2	1	3	3	1	2	1	1	1	2	1	1	1	1	1	1	11	7
67	Carlsberg Brewery Malaysia Bhd	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	2	11	7
68	Van de Velde NV	2	3	2	1	1	1	1	8	1	2	1	1	1	1	1	1	11	7
69	TJX Companies Inc	3	8	1	1	1	1	1	1	1	1	1	1	1	2	3	2	11	7
70	CH Robinson Worldwide Inc	2	2	2	1	2	2	1	1	1	1	1	1	1	1	1	1	11	7
71	Nichols PLC	10	6	1	1	1	1	1	1	1	1	1	1	1	4	2	4	11	7
72	Lancaster Colony Corp	4	2	1	1	1	1	1	1	1	1	2	1	1	1	5	4	11	7
73	Ross Stores Inc	2	8	1	1	1	1	1	1	1	1	1	1	1	2	3	3	11	7
74	Games Workshop Group PLC	1	1	1	1	1	1	1	1	2	1	1	2	1	4	9	10	11	7
75	Dong-E-E-Jiao Co Ltd	7	8	9	1	1	1	1	1	1	1	1	1	1	1	2	3	11	7
76	Manhattan Associates Inc	1	1	1	1	1	1	1	1	1	1	1	3	5	4	4	6	11	7
77	King Slide Works Co Ltd	2	3	2	1	3	1	1	1	1	1	1	2	2	1	1	1	10	6
78	Microsoft Corp	1	1	1	1	2	2	2	4	2	1	2	1	1	1	1	1	10	6

79	Labrador Iron Ore Royalty Corp	1	1	1	1	1	2	4	2	1	2	1	1	2	1	2	1	10	6
80	LY Corp	8	7	7	7	5	3	1	1	1	1	1	1	1	1	1	1	10	6
81	Core Laboratories Inc	7	10	2	2	2	2	1	1	1	1	1	1	1	1	1	1	10	6
82	China Steel Chemical Corp	3	4	2	2	2	2	1	1	1	1	1	1	1	1	1	1	10	6
83	Aaon Inc	3	1	1	2	1	1	1	1	1	1	4	2	1	1	2	2	10	6
84	BEC World PCL	4	9	9	9	9	4	1	1	1	1	1	1	1	1	1	1	10	6
85	Hermes International SCA	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	10	6
86	Cochlear Ltd	3	2	10	1	1	1	1	1	2	1	4	1	1	1	1	2	10	6
87	Ems Chemie Holding AG	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	10	6
88	Howden Joinery Group PLC	2	2	1	1	1	1	1	1	1	1	1	1	2	2	3	9	10	6
89	Coloplast A/S	1	1	1	1	1	1	3	1	1	1	1	2	3	3	7	6	10	6
90	NamSys Inc	1	10	1	1	1	1	1	1	1	10	6	4	10	10	1	1	10	6
91	Zwack Unicum Likoripari es Kereskedelmi Nyrt	1	2	1	1	1	1	1	1	2	3	2	3	2	1	2	1	9	5
92	Strategic Education Inc	8	5	5	9	3	2	1	1	4	1	1	1	1	1	1	1	9	5
93	Helios Technologies Inc	4	7	4	4	4	4	1	1	1	1	1	1	8	1	1	1	9	5
94	Rotork PLC	3	2	2	2	4	3	2	1	1	1	1	1	1	1	1	1	9	5
95	Cognizant Technology Solutions Corp	2	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	9	5
96	GMK Noril'skiy Nikel' PAO	1	1	1	1	2	1	2	2	7	3	1	1	2	9	1	1	9	5
97	Yum! Brands Inc	1	1	1	1	1	1	2	2	2	1	1	2	1	2	3	2	9	5
98	Pidilite Industries Ltd	2	1	1	1	1	1	1	1	1	1	2	2	2	4	2	2	9	5
99	Alarko Gayrimenkul Yatirim Ortakligi AS	1	1	1	1	1	1	1	1	1	6	2	8	6	2	9	9	9	5
100	Egyptian International Pharmaceutical Industries Com	3	2	1	1	1	1	1	2	2	2	1	1	1	1	2	2	9	5
101	Wuliangye Yibin Co Ltd	1	1	1	1	2	2	2	2	1	1	1	1	1	2	2	3	9	5
102	Bure Equity AB	1	1	1	1	2	1	1	1	1	10	9	1	9	7	6	8	9	5
103	Sleep Number Corp	1	1	2	2	2	2	2	1	1	1	1	1	1	10	3	1	9	5
104	Intuit Inc	3	1	1	1	1	1	1	4	1	1	1	2	2	3	4	3	9	5
105	Britannia Industries Ltd	1	1	1	1	1	1	1	1	1	2	2	4	5	3	3	4	9	5
106	Philip Morris CR as	1	1	1	1	1	1	1	2	2	2	1	2	1	3	3	3	9	5
107	Luk Fook Holdings (International) Ltd	4	3	4	2	2	3	3	1	1	1	1	1	1	1	1	1	9	5
108	Seagate Technology Holdings PLC	1	1	2	1	1	3	7	1	1	1	1	6	1	10	3	4	9	5
109	Trex Company Inc	1	1	1	1	1	1	1	1	1	8	10	10	10	8	10	9	9	5
110	Value Line Inc	1	1	1	2	1	2	3	3	4	4	4	1	10	1	1	1	8	4
111	Beter Bed Holding NV	3	3	9	6	4	2	1	1	4	2	1	1	1	1	1	1	8	4
112	Astra Agro Lestari Tbk PT	5	6	8	5	4	3	7	1	2	1	1	1	1	1	1	1	8	4
113	Monadelphous Group Ltd	5	4	5	4	3	3	3	2	1	1	1	1	1	1	1	1	8	4
114	Schroder Asian Total Return Investment Company PLC	5	1	2	10	1	1	7	1	10	1	10	1	1	10	1	2	8	4
115	Renishaw PLC	2	2	9	2	1	1	3	1	1	1	1	1	3	8	2	1	8	4
116	Waters Corp	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2	8	4
117	NVR Inc	1	1	1	1	1	1	1	2	3	4	5	4	4	6	2	1	8	4
118	Sun Pharmaceutical Industries Ltd	6	6	4	5	6	2	2	2	1	1	1	1	1	1	1	1	8	4
119	Nike Inc	2	1	3	1	1	1	1	1	1	1	2	2	2	2	2	2	8	4
120	Gentex Corp	2	1	1	1	1	1	1	1	2	2	1	2	4	4	2	3	8	4
121	Straumann Holding AG	2	6	1	1	1	1	4	1	2	6	4	2	1	8	1	1	8	4
122	Copart Inc	1	1	1	1	1	1	1	2	2	2	1	2	2	2	2	2	8	4
123	Autozone Inc	2	1	1	1	2	2	1	1	1	1	1	2	2	2	3	3	8	4
124	Brown-Forman Corp	2	1	1	2	1	1	1	1	1	1	2	2	2	2	3	3	8	4
125	InBody Co Ltd	1	2	2	1	1	1	1	1	2	2	2	2	1	1	4	9	8	4
126	Thai Vegetable Oil PCL	2	2	2	1	2	1	1	1	3	1	4	1	1	3	1	6	8	4
127	OEKOWORLD AG	1	1	1	1	1	1	1	1	2	2	4	2	10	4	2	3	8	4
128	Biogen Inc	5	1	1	1	1	1	1	1	1	2	2	3	2	3	6	9	8	4
129	Home Depot Inc	1	1	1	1	1	1	1	1	2	2	3	4	5	5	5	4	8	4
130	Starbucks Corp	2	6	1	1	1	1	1	1	9	1	1	2	5	5	2	2	8	4
131	Tonghua Dongbao Pharmaceutical Co Ltd	1	1	1	1	1	1	1	3	4	8	1	5	7	7	8	10	8	4
132	Industrivarden AB	1	4	1	10	2	1	6	5	1	1	10	1	1	10	10	1	8	4
133	S&P Global Inc	1	1	1	1	1	1	1	10	2	3	3	4	2	2	2	2	7	3
134	ASMPT Ltd	2	6	6	2	1	3	4	2	5	5	1	1	1	1	1	1	7	3
135	Fidelity Asian Values PLC	7	1	10	4	8	1	1	7	3	1	10	1	1	3	10	1	7	3
136	Utah Medical Products Inc	2	2	2	1	1	1	1	2	2	2	2	2	1	1	2	1	7	3
137	Hibbett Inc	1	2	6	5	4	2	1	1	1	1	1	2	2	2	2	1	7	3
138	Investment Oresund AB	1	9	3	3	5	1	1	1	1	3	10	3	1	10	10	1	7	3
139	Marine Products Corp	1	1	1	1	1	1	2	3	4	5	5	7	10	5	2	1	7	3
140	Bio-Techne Corp	3	4	2	5	5	5	3	2	2	1	1	1	1	1	1	1	7	3
141	MediaTek Inc	1	3	5	5	5	5	4	1	2	4	3	1	1	1	1	1	7	3
142	Canadian General Investments Ltd	1	1	1	10	1	2	10	5	2	4	10	1	1	10	7	1	7	3
143	Ambev SA	3	2	2	2	3	1	1	1	1	1	1	1	2	2	2	5	7	3
144	McDonald's Corp	2	3	1	1	1	2	2	2	1	1	1	2	1	2	5	4	7	3
145	Famous Brands Ltd	3	9	3	10	8	2	1	1	1	1	1	1	1	2	2	2	7	3
146	Pool Corp	1	1	1	1	1	1	1	2	2	3	3	5	5	4	5	3	7	3
147	GAMCO Investors Inc	1	1	1	1	1	1	1	2	2	3	3	3	4	7	4	4	7	3
148	United Palm Oil Industry PCL	1	3	9	8	9	6	9	2	1	1	1	3	1	1	1	2	7	3
149	AFP Provida SA	4	4	3	5	4	4	1	1	1	1	1	1	1	9	2	2	7	3
150	Landstar System Inc	1	2	1	1	2	2	1	2	2	1	1	2	3	1	2	2	7	3
151	Expeditors International of Washington Inc	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	2	7	3
152	3M Co	2	2	2	1	1	1	1	1	2	2	2	2	2	2	1	1	7	3
153	Maximus Inc	3	2	1	1	1	2	1	1	1	2	1	2	2	5	10	10	7	3
154	Oceana Group Ltd	6	4	4	3	6	3	3	1	1	1	1	1	1	1	3	4	7	3
155	APG SGA SA	3	4	4	1	1	1	1	1	1	1	4	2	10	9	7	5	7	3
156	Schroder Asiapacific Fund PLC	2	1	8	6	1	1	9	3	8	1	10	1	1	10	1	2	7	3
157	Central Securities Corp	1	3	1	10	1	1	9	6	1	8	9	1	1	10	5	2	7	3
158	Television Broadcasts Ltd	10	9	9	9	8	6	9	2	1	1	1	1	2	1	1	1	7	3

159	BB Biotech AG	10	1	1	10	1	10	1	1	1	1	10	10	8	7	10	3	7	3
160	Demant A/S	3	5	3	2	2	3	2	2	2	2	1	1	1	1	1	1	6	2
161	Steven Madden Ltd	2	9	2	2	2	2	2	2	1	1	1	1	1	3	2	1	6	2
162	Bijou Brigitte modische Accessoires AG	6	10	4	4	4	3	3	3	3	2	1	1	1	1	1	1	6	2
163	AllianceBernstein Holding LP	1	1	1	1	2	2	2	2	3	7	10	5	3	2	1	1	6	2
164	Lanna Resources PCL	1	5	3	2	2	6	6	4	3	1	1	1	1	1	2	2	6	2
165	Law Debenture Corporation PLC	2	8	1	10	2	1	9	7	1	1	9	1	1	10	6	2	6	2
166	Applied Materials Inc	1	1	1	1	1	2	3	3	8	9	1	4	9	3	2	2	6	2
167	Novartis India Ltd	9	7	8	6	4	6	5	5	4	2	1	1	1	1	1	1	6	2
168	Compania de Minas Buenaventura SAA	7	9	9	9	8	10	10	9	9	1	1	1	1	3	1	1	6	2
169	Templeton Emerging Markets Fund Inc	2	1	9	9	1	2	10	1	8	10	2	1	10	9	1	1	6	2
170	Ford Otomotiv Sanayi AS	1	1	2	2	2	2	2	3	2	1	1	1	2	2	2	1	6	2
171	Deutsche Beteiligungs AG	1	9	3	4	1	2	3	1	2	1	10	2	4	10	1	1	6	2
172	Schroder UK Mid Cap Fund PLC	1	10	8	7	1	5	4	3	1	1	9	2	1	10	2	1	6	2
173	abrdn Asia Focus plc	1	10	5	7	2	1	10	10	1	3	1	1	2	10	1	4	6	2
174	Papa John's International Inc	2	3	8	8	1	1	1	1	1	1	2	2	2	3	5	2	6	2
175	O'Reilly Automotive Inc	1	1	1	1	2	1	1	2	2	3	3	4	5	5	4	4	6	2
176	City Lodge Hotels Ltd	8	10	10	4	2	2	1	1	1	1	2	4	2	2	1	1	6	2
177	Information Planning Co Ltd	2	1	1	1	1	1	2	3	4	6	8	7	9	1	2	2	6	2
178	Pason Systems Inc	4	7	2	1	5	10	9	1	6	4	1	4	9	1	1	1	6	2
179	Garmin Ltd	2	1	1	2	2	2	3	4	2	2	2	2	1	1	1	1	6	2
180	Arab Potash Co PLC	2	2	1	2	3	5	2	3	2	1	1	1	2	1	1	4	6	2
181	Adams Diversified Equity Fund Inc	1	1	1	9	1	4	8	2	1	2	10	4	1	10	7	3	6	2
182	CorVel Corp	2	2	2	1	2	2	2	2	1	1	1	2	1	2	1	2	6	2
183	Thai President Foods PCL	2	1	1	1	2	1	2	2	2	2	2	1	1	3	3	2	6	2
184	Hektas Ticaret TAS	4	2	1	1	1	1	1	1	2	2	3	3	6	3	4	7	6	2
185	Feng Tay Enterprises Co Ltd	3	2	1	1	1	1	1	1	2	3	4	4	3	5	5	6	6	2
186	Kartonsan Karton Sanayi ve Ticaret AS	1	1	1	1	3	9	5	5	2	2	1	4	4	4	1	5	6	2
187	Persimmon PLC	2	1	1	1	1	1	1	2	3	5	7	7	8	10	4	3	6	2
188	Bancroft Fund Ltd	1	1	1	6	2	7	8	3	1	5	8	1	1	10	2	4	6	2
189	Elan Microelectronics Corp	1	1	1	1	3	5	4	1	1	2	6	4	6	7	4	8	6	2
190	Fab-Form Industries Ltd	1	2	1	1	1	1	1	2	9	7	4	10	10	10	10	10	6	2
191	Distilleries Company of Sri Lanka PLC	1	1	1	1	1	4	5	4	4	5	3	1	5	6	7	7	6	2
192	4imprint Group PLC	2	7	1	1	1	1	1	1	2	5	9	7	7	5	8	5	6	2
193	Mycronic AB (publ)	2	2	1	1	1	1	1	1	9	9	10	8	10	9	10	7	6	2
194	Sociedad de infraestructuras de Mercado SA	2	2	2	2	2	1	2	1	2	2	2	2	2	1	1	1	5	1
195	Hoya Corp	1	1	1	1	2	2	2	2	3	2	5	2	4	6	2	1	5	1
196	Bolsa de Comercio de Santiago Bolsa de Valores	2	2	2	2	2	1	2	1	2	2	2	2	2	1	1	1	5	1
197	Polaris Inc	3	3	3	3	4	4	1	1	1	1	1	2	2	2	2	2	5	1
198	Tiger Brands Ltd	4	4	1	2	2	2	2	4	2	1	1	1	1	2	2	2	5	1
199	Hershey Co	2	1	1	1	2	2	3	1	1	2	2	2	2	4	7	2	5	1
200	Roche Holding AG	2	1	1	2	2	2	2	2	1	1	1	2	2	2	2	3	5	1
201	WW Grainger Inc	2	2	1	2	3	2	1	1	1	2	1	2	2	2	2	3	5	1
202	Hugo Boss AG	6	10	3	2	2	2	1	1	1	1	1	2	3	3	2	2	5	1
203	Intel Corp	2	1	1	1	2	3	2	2	3	2	1	1	4	3	3	4	5	1

Table 21 reflects the adjustment made when the instances of the top 10% of observed superior performers are adjusted to exclude occurrences that are indistinguishable from randomness. Consequently, only 90 companies remain confidently identified as superior performers (Superior), meeting the defined benchmark of $n_{superior}$, while the remaining 113 organizations now fail to meet this benchmark and are labelled as potential false positives (μ).

The calculation of the ratio θ is carried out using the formula: $\theta = \frac{(Superior - \mu)}{\mu}$

Applying the actual values:

$$\theta = \frac{(90 - 113)}{113}$$

$$\theta = (0.255)$$

The resulting ratio suggests an overrepresentation of false positives within the identified top 10% of performers based on the observed data. This holds significant implications for the initial null hypothesis (H0) and alternative hypothesis (H1) formulated to guide this inquiry which are as follows:

Null Hypothesis (H0): The misattribution of luck for skill is not a common occurrence in performance evaluations.

Alternative Hypothesis (H1): The misattribution of luck for skill is a common occurrence in performance evaluations.

The calculated ratio θ (0.255) is indicative of an overrepresentation of potential false positives in the top 10% of companies that may initially have been considered as superior performers. This suggests that instances of attributing luck to skill may indeed be more prevalent than initially hypothesized. This insight serves as sufficient evidence to reject the null hypothesis (H0) in favour of the alternative hypothesis (H1), which indicates that the misattribution of luck for skill is a common occurrence in performance evaluations.

5.7. TESTING FOR STATISTICAL SIGNIFICANCE

To assess statistically significant differences between empirical and random data, a χ^2 goodness-of-fit test is used. This determines whether there is a statistically significant misattribution of randomness as skill. The χ^2 goodness-of-fit test statistic is calculated using:

$$\chi^2 = \sum \left[\frac{(O - E)^2}{E} \right]$$

Where:

- O represents the observed number of sustained superior performers.
- E represents the expected number of sustained superior performers based on randomness.
- Σ signifies the summation over all categories.

For 16 degrees of freedom at a significance level of $\alpha = 0.05$, $\chi^2_{crit} = 26.30$ while the $\chi^2 = 86.32$ for the empirical and random sample average times required to assert skill. Because $\chi^2 \gg \chi^2_{crit}$ the null hypothesis can be rejected and it can be concluded that misattribution of randomness as skill in organisational performance assessments is indeed common.

CHAPTER 6
DISCUSSION

6.1 INTRODUCTION

The preceding chapters have delved into an extensive exploration of performance evaluations among publicly traded companies, scrutinizing the nuanced interplay between skill and randomness in organizational success.

Drawing upon a robust research design and methodological framework, the study utilised ROA as a proxy for performance and leveraged advanced statistical techniques, including DTMs and Markov Chain simulations, to unravel the intricate dynamics spanning a 16-year observation period. The empirical investigation sought to identify, assess, and validate sustained superior performers, ultimately challenging prevailing assumptions about the prevalence of skill versus luck in organizational achievements.

In the subsequent discussion, key findings, limitations, and implications of the study are explored. The focal point is the calibration of the adjusted benchmark for sustained superior performance, the observed occurrences of misattribution of luck as skill, and the statistical significance of these observations.

The ensuing sections of this chapter unravel the implications of these findings for the broader understanding of organizational performance assessments by both scholars and practitioners, offering insights into the commonality of misattribution in the realm of organisational performance assessments.

6.2 THEORETICAL IMPLICATIONS

Chapter one laid the groundwork for this inquiry by delineating the dichotomy between luck and skill in organizational performance assessments. The prevalent debate, as discussed, hinges on the extent to which superior performance is attributable to inherent organizational capabilities (skill) or stochastic occurrences (luck). The findings of this study, as expounded in Chapter 5, challenge the traditional dichotomy by revealing a nuanced landscape where misattribution of luck as skill is a common occurrence in organizational performance assessments.

By recalibrating the benchmark for superior performance, the study redefines the parameters within which skill is distinguished from luck amongst a sample of 2,030 listed global organisations. The adjusted threshold, as identified in Chapter 5, demonstrates that the benchmark required for companies to be identified as superior performers ($n_{superior}$)

included companies who's achievement of this benchmark was primarily driven by chance. This challenges traditional assumptions and propels a revaluation of how we conceptualise and measure superior performance.

In examining the benchmark for superior performance ($n_{superior}$), the study concurs the views of scholars Henderson, Raynor, and Ahmed (2012) who posited that false positives may often be erroneously identified as superior performers by researchers. This resonates with arguments presented Denrell (2004), who emphasised the need for researchers to critically evaluate benchmarking criteria, as relying on conventional benchmarking techniques may lead to misinterpretations.

The insights gained from the DTMs shed light on the dynamic nature of performance transitions over time. This complexity aligns with the assertions of Henderson, Raynor, and Ahmed (2012) regarding the multifaceted influences on organisational performance. The specific observation of challenges faced by companies during the 2009 recession introduces a temporal dimension to these transitions, resonating with the work of scholars Tversky and Kahneman (1974), and Taleb (2004) who highlighted the potential impact of heuristics and biases on performance dynamics.

The statistical approach employed in this study, including Markov Chain simulations and the χ^2 goodness-of-fit test, aligns with the recommendations of Henderson, Raynor, and Ahmed (2012) to incorporate rigorous statistical methods in performance evaluations. The rejection of the null hypothesis regarding misattribution of randomness as skill reflects a departure from the traditional perspectives that often assume a clear demarcation between skill-driven and random outcomes. This analytical rigor resonates with the methodological emphasis of scholars like Maiga (2004) and De Wet & Du Toit (2007) on meticulous data analysis in performance evaluations.

6.3 IMPLICATIONS FOR PRACTITIONERS

The insights obtained from this research carry substantial implications for business practitioners aiming to emulate the strategies of alternative organizations which they regard as displaying exceptional performance. This section explores the practical considerations and potential challenges faced by businesses seeking to replicate the success of identified superior performers, emphasizing the critical need for a nuanced understanding of benchmarking, temporal dynamics, statistical rigor, and the risks associated with misattributions.

The recalibration of the benchmark for sustained superior performance ($n_{superior}$), as elucidated in Chapter 5, necessitates a revaluation of benchmarking strategies employed by businesses practitioners. For companies aiming to emulate the strategies of identified superior performers, this adjustment underscores the importance of adopting benchmarks with a heightened degree of caution. Scholars Henderson, Raynor, and Ahmed (2012) have previously emphasised the need for businesses to continually reassess and refine their benchmarks, taking into careful consideration the potential influence of luck in the achievement of such benchmarks.

The exploration of challenges encountered by companies during the 2009 recession, as discerned through the analysis of DTMs, accentuates the imperative of recognising temporal dynamics and external influences on performance, aligning with the perspectives articulated by authors Sull (2005) and McGrath (2013). This revelation imparts a noteworthy implication for organisations, emphasising the necessity to guard against complacency and overconfidence in the face of superior results. It underscores the volatility of fortuitous circumstances, emphasising the need for organizations to perpetually scrutinize their environment and exhibit adaptability to promptly respond to emergent changes. This aligns with Sull (2005) and Teece's (2007) discourse on the necessity of dynamic environmental scanning, and McGrath's (2013) emphasis on adaptability as a crucial organisational attribute.

The application of advanced statistical techniques, such as Markov Chain simulations and the χ^2 goodness-of-fit test, introduces a layer of statistical rigor into performance assessments. For businesses aiming to emulate successful strategies, this underscores the importance of incorporating statistical rigor into decision-making processes. The utilisation of sophisticated statistical techniques aligns with the recommendations of scholars Henderson, Raynor, and Ahmed (2012), advocating for a more data-driven approach to performance evaluation. The findings of this research cautions businesses against solely relying on superficial performance metrics, urging them to adopt a more analytical and statistically informed decision-making framework.

The rejection of the null hypothesis concerning the misattribution of randomness as skill highlights the inherent risks of overlooking the role of chance in performance evaluations. Businesses aspiring to emulate successful strategies should be cognizant that periods of exceptional performance may be influenced by luck, leading to potential misattributions. To mitigate these risks, practitioners should exercise caution when replicating strategies, conduct thorough analyses, and integrate robust statistical tests into their assessments. This approach ensures a more accurate understanding of the genuine skill-based performance of identified superior performers, reducing the likelihood of misguided strategic emulation.

Businesses aspiring to emulate the strategies of alternative organisations should approach benchmarking and strategy replication with a nuanced and analytically driven mindset. The implications of this research provide actionable insights for businesses seeking to enhance the accuracy and effectiveness of their strategic emulation practices. The focus on rethinking benchmarks, acknowledging temporal dynamics, integrating statistical rigor, and mitigating misattribution risks aligns with the perspectives of cited authors in this study and offers practical guidance for businesses navigating the complexities of strategy emulation.

6.4 LIMITATIONS

While this study provides valuable insights into the dynamics of organisational performance and the challenges inherent in distinguishing skill from luck in organizational assessments, certain limitations warrant consideration. The limitations encompass various facets, including methodological constraints, data intricacies, and assumptions inherent in the research design.

The study's sole reliance on ROA as the metric for superior performance introduces a degree of limitation. Although ROA is a well-established financial metric, alternative indicators or market-driven metrics were not explored.
The study also employed a restricted set of control variables, closely mirroring those utilised by Henderson, Raynor, and Ahmed (2012). The exclusion of certain variables, such as company size, industry, and capital structure, was intentional for result comparability. These exclusions may have influenced the outcomes, and future research could explore the impact of additional control variables on the study's findings.

The assumption of homogeneity within performance deciles and industries, treating all companies within these groupings as equivalent, may oversimplify the intricate heterogeneity that exists in terms of resources, strategies, and competitive advantages. This oversimplification could obscure critical nuances that contribute to organizational performance dynamics. The study also grapples with survivorship bias, even with controls in place. The decision to include data solely from companies active at the onset of the observation window may introduce bias, as organisations entering the dataset at different stages may possess distinct characteristics influencing the study's conclusions.
The application of Markov Chain simulations, while offering a valuable simplification, raises the risk of oversimplifying the complex dynamics inherent in real-world business environments.

Finally, the research's reliance on financial data from Refinitiv Datastream, while meticulous in its selection, encounters challenges related to data quality and accessibility. Despite the efforts in data validation, the presence of incomplete or inaccurate data introduces a degree of uncertainty, emphasizing the need for diverse data sources and cross-referencing in future studies. Prospective research endeavours stand to gain from an augmentation in the scale of the sampled population, extending the observation period beyond the current 16 years.

6.5 SUGGESTIONS FOR FUTURE RESEARCH

The insights garnered from the preceding chapters and discussions lay the foundation for potential avenues of future research. Building upon the limitations and considerations outlined in the study, the following suggestions serve as fertile ground for advancing scholarship in the realm of organisational performance assessments:

Exploring Alternative Performance Metrics

This research primarily employed ROA as the principal metric for appraising superior performance. In subsequent investigations, diversifying the repertoire of performance metrics could prove insightful. Consideration of alternative metrics, such as Return on Equity (ROE) or Piotroski's F-score, may offer nuanced perspectives and supplementary dimensions for a comprehensive evaluation of enduring excellence.

Furthermore, the benchmark in this study was predicated on the count of instances wherein a company attained a top decile ranking within the stipulated timeframe, irrespective of the consecutiveness of these occurrences. For future studies, exploring benchmarks based on the continuity of superior performance within predefined periods, or employing ROA percentile states as opposed to decile states, may provide additional granularity and contribute to a more refined understanding of sustained superior performance dynamics.

Refinement of Control Variables

The current research employed a specific set of control variables, closely aligned with the study by Henderson, Raynor, and Ahmed (2012). Future investigations might consider the inclusion of additional control variables, such as company size, industry, and capital structure, to further refine result comparability and unveil potential influences on performance outcomes.

Geographical Considerations

While the present study intentionally omitted geographical constraints, recognising the shared impact of macro-economic cycles, future research could explore the influence of geographic location on organisational performance. This consideration might encompass

factors like political stability and local economic conditions, acknowledging the potential nuanced effects on performance.

Advanced Modelling Approaches

Given the study's reliance on Markov Chain simulations, future research could delve into more sophisticated modelling approaches that accommodate non-Markovian behaviours. Exploring frameworks that capture the intricacies of real-world business environments beyond the assumption of memorylessness may offer a more nuanced understanding of sustained performance dynamics.

Diverse Data Sources

Acknowledging the challenges related to data quality and availability, future studies might benefit from procuring and cross-referencing data from diverse sources. This approach could enhance the reliability and robustness of the analytical framework, mitigating potential biases and uncertainties associated with a singular data source.

Longitudinal Analysis

Extending the study's duration and increasing the population size could contribute to a more comprehensive examination of sustained superior performance. A more extended observation period and a larger dataset may reveal additional patterns, trends, or anomalies that could enrich the understanding of the interplay between luck and skill over time. In addition, while the current study focused on a sample of 2,030 listed organisations from a global context, future studies may derive enhanced insights by expanding the sample population. A larger and more diverse sample could provide a more representative cross-section of organisational performance, thereby enriching the generalisability and applicability of the research findings.

Incorporating Industry-Specific Controls

While the study exercised control over mutual funds and trust funds, future research might explore more intricate industry controls distinguishing between manufacturing and service-based organizations. This could unravel potential industry-specific nuances in the influence of luck on performance assessments.

CHAPTER 7
CONCLUSION

This comprehensive investigation into the dynamics of organisational performance assessments has unveiled intriguing insights into the delicate interplay between skill and luck in organisational performance assessments. Leveraging a meticulous research design and advanced statistical techniques, the study primarily focused on ROA as a proxy for sustained superior performance among 2,030 publicly traded companies over a 16-year period.

The exploration commenced with the establishment of a benchmark for superior performance, revealing that companies must consistently achieve a top decile ranking in ROA for a minimum of six instances within the designated timeframe to be considered superior performers. However, the recalibration of this benchmark, accounting for occurrences indistinguishable from randomness, brought to light the potential misattribution of luck as skill. The ratio θ, calculated as 0.255, signalled an overrepresentation of potential false positives within the identified top 10% of performers, challenging the initial null hypothesis and supporting the alternative hypothesis that the misattribution of luck for skill is a common occurrence in organizational performance evaluations. The subsequent χ^2 goodness-of-fit test statistically validated the observed misattribution, further emphasizing the prevalence of organisations being perceived as superior performers due to chance rather than strategic prowess. This highlights a critical concern for practitioners and scholars alike, urging a re-evaluation of benchmarks and a nuanced interpretation of exceptional performance.

Theoretical implications derived from this study emphasise the importance of acknowledging luck as a potential determinant of superior performance. This highlights the necessity for scholars to exercise caution when selecting companies for case studies, advocating for a comprehensive consideration of various metrics and a thorough examination of a company's complete performance history. Furthermore, recognizing the influence of temporal dynamics and external factors is crucial to avoid oversimplified evaluations and ensure a more nuanced understanding of the drivers of organizational performance.

For practitioners, the study underscores the risks associated with attempts in replicating strategies from seemingly superior performers, as some may be false positives achieving exceptional outcomes due to chance. The consequences of such misattributions should prompt practitioners to exercise caution and consider the transient nature of exceptional

performances. The examination of challenges faced by companies during the 2009 recession, as revealed through DTMs, emphasises the significance of acknowledging external factors on performance, thereby cautioning against complacency and overconfidence.

While the study provides valuable insights, it is not without limitations. Future research endeavours could address these limitations by exploring alternative performance metrics, incorporating larger and more diverse samples, and employing varied benchmarking approaches. This study serves as a foundational step, prompting a broader re-evaluation of organizational performance assessments and encouraging a nuanced understanding of the factors contributing to organisational success.

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APPENDICES

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