

**Can introducing whisky into a portfolio of traditional investments increase
the portfolio's risk-weighted return?**

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degree of Master of Business Administration.

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Abstract

This dissertation investigates the potential impact of including whisky in investment portfolios alongside traditional asset classes for South African investors. It is the first study to analyse whisky returns, associated risks, and volatility, culminating in the creation of a composite whisky index for performance comparison. The research spans from 2014 to 2024 and evaluates various asset classes, including local and international equities, bonds, property, foreign exchange, commodities, and collectables. Findings reveal that whisky returns were superior up to 2022, primarily driven by reports on rare and exclusive whiskies, which are often inaccessible to average investors. Although the performance of these rare whiskies has since slowed, the Composite 18 whisky index has shown resilience and improvement over the past three years. The analysis further indicates that while whisky exhibits higher volatility than some peers, it maintains a low correlation with traditional assets. This suggests that whisky can be an effective diversification tool, potentially enhancing South African investors' risk-weighted returns. The research concludes that incorporating whisky into investment strategies may provide a valuable hedge against market fluctuations and contribute positively to portfolio performance.

Keywords: Alternative investments, collectables, diversification, risk-weighted return, whisky

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 Business Administration 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.

Llewellyn Gerber**4 November 2024**

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Beta:
$$\beta_i = \frac{\text{Cov}(r_i, r_m)}{\text{Var}(r_m)}$$

β_i : market beta of asset i

Cov: covariance

Var: variance

r_m : average expected rate of return on the market

r_i : expected return on an asset i

Sharpe Ratio:
$$S_a = \frac{E[R_a - R_b]}{\sigma_a}$$

S_a : Sharpe ratio

E: expected value

R_a : asset return

R_b : risk-free return

σ : standard deviation of the asset excess return

Standard deviation:
$$\sigma = \sqrt{\frac{\sum(x_i - \mu)^2}{N}}$$

σ : sample standard deviation

N: the size of the sample

x_i : each value from the sample

μ : the population mean

List of acronyms and abbreviations

ALBI:	South African Bond Index
APEX1000 or RW 101:	Rare Whisky 101 whisky index
AG:	Allan Gray (South African asset manager)
Bn or bn:	billion
c.:	circa or approximately
collectables:	Group name for alternative investments
Composite 18 whisky index:	The whisky index created using the ten most liquid, 18-year-old Scotch whiskies sold in South Africa
DAX:	German Stock Market Index (top 40 equity counters)
Dow Jones:	US Stock Market Index (top 30 equity counters)
Euro or €:	Euro (currency)
Eurozone:	The eurozone, also known as the euro area, is a geographic and economic region consisting of European Union (EU) member states that have adopted the euro (€) as their official currency. As of 2024, there are 20 countries in the eurozone, which include Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain
FTSE or FTSE100:	UK Stock Market Index (top 100 equity counters)
GVA:	Gross value added
JSE:	Johannesburg Stock Exchange
J203 or JALSH:	Johannesburg Stock Exchange All Share Index
K or k:	Thousand/s

LIV-Ex FW 1000:	Liv-ex wine index
LPA:	Litre per annum
M or m:	million
Nikkei:	Japanese Stock Market Index (top 225 equity counters)
Portfolio 1:	Hypothetical created Regulation 28 portfolio
Portfolio 2:	Hypothetical created Regulation 28 portfolio, including 5% whisky
Portfolio 3:	Hypothetical created portfolio including 15% whisky
Pound or £:	British pound (currency)
Rand or R:	South African rand (currency)
Regulation 28:	Regulation 28 of the Pension Funds Act of South Africa
S&P:	US Stock Market Index (top 500 equity counters)
Satrix or SATRIX:	South African Market Index (top 40 equity counters)
SA Property Index:	South African Property Index
SARB:	South African Reserve Bank
Scotch:	Scottish whisky
UK:	United Kingdom
US or USA:	United States
USD or Dollar or \$:	United States dollar (currency)
WIDGI:	WhiskyInvestDirect Grain Index
WIDMI:	WhiskyInvestDirect Malt Index
Whisky:	Scotch whisky (“whiskey” collective name given to the liquor elsewhere in the world)
Whiskystats whisky index:	Whiskystats whisky index

1. CHAPTER 1: INTRODUCTION AND DEFINITION OF PROBLEM AND PURPOSE

1.1. Introduction

In the commercial world, investors are constantly searching for greater returns. Returns are usually an output based on the risk investors will assume. Investors must diversify their portfolios to generate an optimal return and eliminate risk as far as possible. To obtain the optimal risk-weighted return, one needs to understand both the risks and returns of specific investments. Within this context, the study explored how South African investors could potentially include whisky in a portfolio of traditional assets to optimise their risk-weighted returns.

1.2. Background to the research problem

As of 30 June 2024, the Johannesburg Stock Exchange All Share Index (J203 or JALSH) has provided investors with a negative 15.6% return over one year, an annualised 0.8% over three years, 4.5% return over five years, and an annualised 3.2% over ten years (Johannesburg Stock Exchange, 2024; Investing.com, 2024). These returns are well below the return investors could have obtained by purely investing in risk-free (or low-risk) assets such as cash or bonds without taking increased (equity) risk. The Rand appreciated against the Euro (currency in which whisky is produced) by 5.1% over the last year but depreciated by 16.0%, 21.8%, and 43.9.% over the previous respective three, five, and ten-year periods (or 5.1%, 4.0% and 3.7% annually over the same periods) (South African Reserve Bank, 2024). Applying the assumption that whisky prices remained constant and did not change, investors could have obtained similar returns (save for the past year) to the JALSH by just buying and holding whisky as an investment – again, without taking increased (equity) risk.

Rare Whisky 101's latest report states that the APEX 1000 (whiskey index) has increased 227.97% since the index started, outperforming liquor companies like Diageo, the Liv-Ex FW 1000 (wine index), Brent crude oil, gold and the FTSE100 (UK equity index) over the same period (Rare Whisky 101, 2021) but does not provide insight into comparable South African investment returns and it is silent on the associated volatility and risk of whisky.

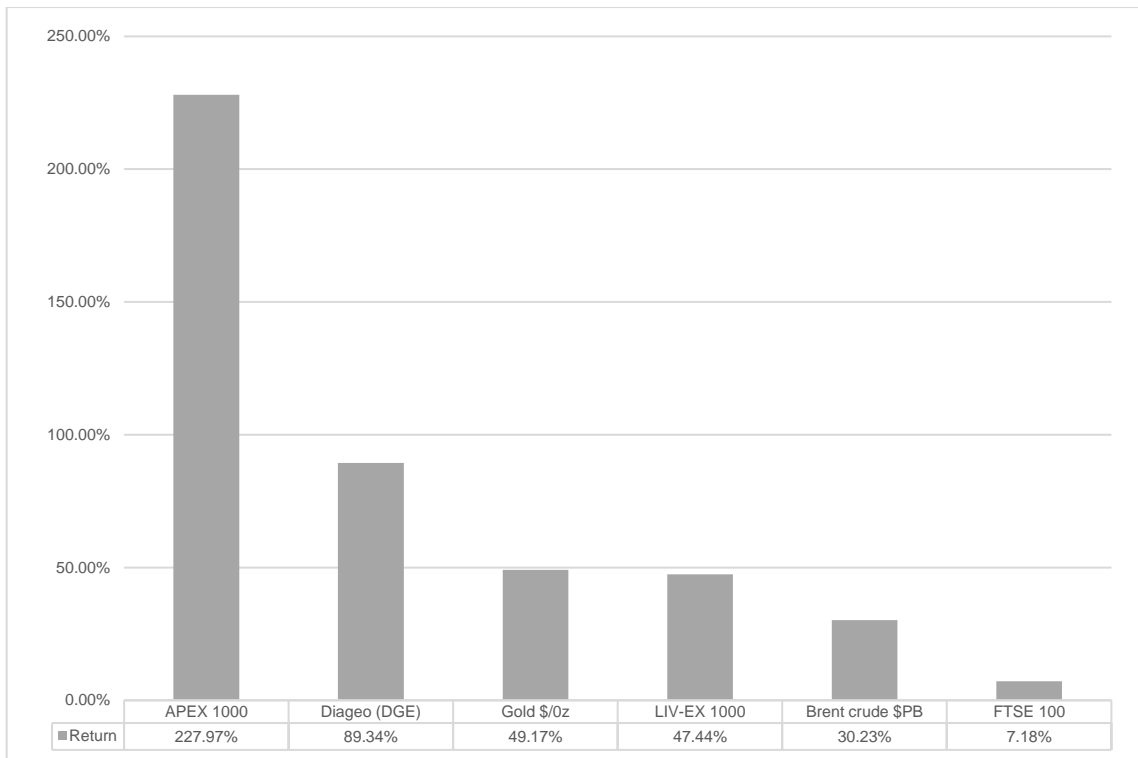


Figure 1: Investment comparison – 6½ years from December 2014

Note: Pound returns of collectables over a six-and-a-half-year period from December 2014. It ignores South African currency depreciation. Source: Rare Whisky 101 (2021, p. 13)

Although the latest edition of the Knight Frank Wealth Report supports the fact that rare whisky has been the best-performing collectable over ten years, it also shows that rare whisky has been the worst performer and traded down 9% for the last 12-month period ended December 2023, signalling signs of volatility and illustrating that even “tangible assets are not immune to market uncertainty” (Knight Frank, 2024, p. 63).

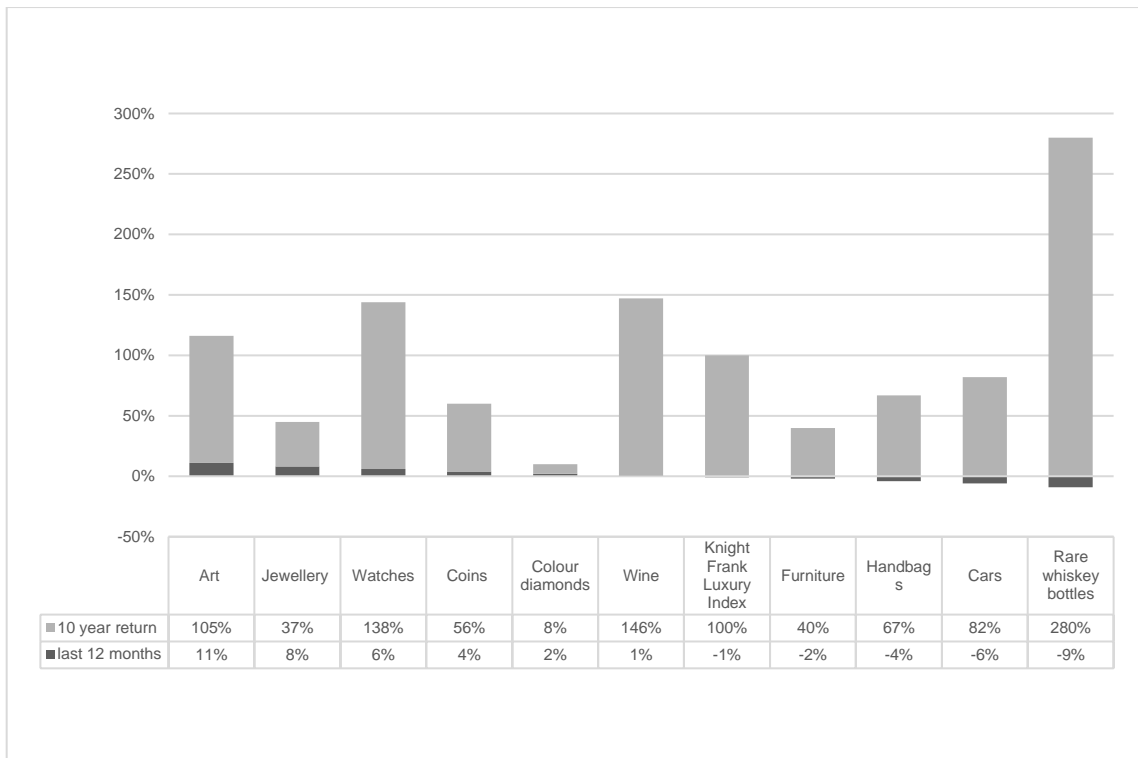


Figure 2: The Knight Frank Wealth Report 2023

Note: Dollar weighted average collectables returns over a 1) 10-year period and 2) over the 12 months ending December 2023. It ignores South African currency depreciation. Source: Knight Frank (2024, p. 63)

Therefore, there is a case to be made for investing in whisky, but no academic research has been conducted to investigate whether the numbers support this.

1.3. Research problem

This research problem was selected to explore alternative ways to increase investor returns, reduce risk, and, therefore, increase investors’ risk-weighted returns in a world where generating “Alpha,” “the excess return of an investment relative to the return of a benchmark index” (Chen, 2024, para. 4), has become much more challenging to achieve. “Collectables,” the group name given to other alternative investments, which also includes whisky, have historically been ignored mainly as investable assets, and the research will aim to explore if whisky could be seen as a viable alternative investment.

Rare Whisky 101 and Knight Frank indicate that rare whisky could potentially provide superior returns to traditional investments. However, they assume that investors will trade only rare and exclusive whisky (whiskies that attract high prices due to scarcity) and do not provide real insight into the general returns of whisky. They also ignore the associated risks with collectables (and whisky), and that risk and returns are not benchmarked against traditional asset classes and portfolios in which South Africans would traditionally invest. The research is, therefore, unique. It will look at a selection of more liquid and commonly purchased whisky to ascertain if whisky could be a differentiator within South African investors' portfolios, whereby it could provide a suitable return, reduce risk/volatility through diversification, and provide South African investors with a better risk-weighted return.

1.4. Research question

Therefore, the research problem postulates whether whisky can provide a sufficient return and greater diversification mechanism, and if introduced into a portfolio of traditional investments, can it ensure a better risk-weighted return for South African Investors than that of only traditional portfolios?

***The hypothesis is thus:** The introduction of whisky into a traditional asset portfolio could increase a South African investor's risk-weighted return.*

1.5. Purpose statement

The most challenging part of ascertaining collectable returns is obtaining accurate price data. Historic whisky prices are not freely available, as is the case for equities, bonds, property, commodities like gold or oil, or other traditional asset classes, and therefore, it is challenging to assess its viability as an investable asset. Rare whiskies, like most other collectables, are generally traded at auctions, are scarce, and are very illiquid, so they do not provide a true reflection of general whisky returns. This research aims to quantify normalised whisky returns, quantify its associated risk or volatility, and, if possible, explore what other additional insight could be obtained as to why, historically, particular whiskies have outperformed others. Actual, normalised returns will provide valuable insight for South African investors looking for alternative assets to include within their portfolios.

The second part of the research will look at risk and risk-weighting. It will use academic/theoretical investment models to determine if whisky could provide greater diversification, reduce a portfolio's risk, and enhance its risk-weighted return. It will further assess what portion of a portfolio could be invested into the asset class. Regulation 28 stipulates that traditional mutual funds can only invest up to 2.5% in other assets (of which whisky would form part) (South African National Treasury, 2011, p. 18). Hedge funds and personal portfolios are not regulated. Therefore, the academic/theoretical models will be overlaid with regulatory limitations (where applicable) to assess whisky's viability as a diversifiable asset. Even if it is found that whisky has lower returns than traditional investment assets but has less volatility and, therefore, less risk, it could still result in whisky providing South African investors with a diversification tool that could result in greater risk-weighted returns.

Therefore, the research will aim to quantify normalised whisky returns, not just rare and exclusive outliers, quantify the associated risk of whisky, and compare the returns and risks of whisky to other traditional asset classes, indices, and portfolios in which South Africans would traditionally invest, to assess if whisky could be a viable alternative investable asset.

1.6. *Research contribution*

With whisky investment still emerging as a theoretical concept, this study's academic contribution is to assess alternative investments (collectables and whisky) as tools for greater diversification and portfolio optimisation. For business, it could provide South African investors with an alternative asset to consider when constructing their investment portfolios.

1.7. *Scope of the study*

From a scope perspective, the following study was set in South Africa and focussed on more commercial whisky investment opportunities. Theoretically, the scope of the study was at the investor level and set within the collectables and alternative asset literature to explore whisky as an alternative investable asset.

1.8. *Outline of the study*

This chapter presented the background of the research problem, the research question, and the research purpose.

The remainder of the study is structured as follows: Chapter 2 reviews the relevant collectables and whisky-related literature to provide the theoretical underpinning of the study. The research question which forms the basis of the study is presented in Chapter 3. Chapter 4 focuses on the study's specific research methodology and design in line with the research question. Chapters 5 and 6, respectively, present and discuss the findings derived from the study. Finally, Chapter 7 concludes with a discussion of the relevant academic and researcher insights gathered from the study and also provides recommendations for future research opportunities.

2. CHAPTER 2: THEORY AND LITERATURE REVIEW

2.1. Introduction

This chapter reviews the most relevant literature about whisky as an alternative investment class. The chapter commences with the theory and literature examining academic/theoretical models available to measure returns, risk, and risk-weighted returns. The chapter then progresses to assessing previous research on collectables to understand whether collectables (and, therefore, by implication, whisky) could be an investable alternative. The chapter concludes by exploring the history of whisky, the whisky industry, role-players and distillers, the supply of whisky, the demand for whisky, distiller and Scottish export price movements, and lastly, some interesting facts and considerations that impact whisky prices, and therefore returns and volatility which could ultimately impact on whisky's risk-weighted returns.

2.2. Academic return and risk models

Nobel prize winner Harry Markowitz (Markowitz) developed the Markowitz portfolio theory (Markowitz, 1952), the foundation of modern portfolio theory. The theory assumes that investors are risk-averse and will always invest in less risky investments based on a certain expected return. Investors must, therefore, receive a higher return if the investment holds a higher risk. The theory, thus, proposes that diversification can increase an investor's risk-weighted return. Rubinstein (2002, p. 1044) states, "Markowitz's approach is now commonplace among institutional portfolio managers who use it both to structure their portfolios and measure their performance."

Markowitz's theory states that portfolio selection consists of two stages – the first involves forming beliefs about an asset's future performance, and the second involves building a portfolio of assets based on those beliefs. (Markowitz, 1952). Markowitz's theory assesses the second stage, where he rejects the rule/theory that investors would only invest in assets to maximize their discounted expected returns as it does not use diversification as a risk mitigant and accepts the rule/theory that investors desire returns and do not desire variance or volatility (Markowitz, 1952). In summary, Markowitz's theory suggests that the 'expected returns-variance of

returns' rule is more relevant in portfolio selection than the rule of maximizing discounted expected returns.

Another Nobel prize winner, James Tobin (Tobin), developed Tobin's separation theorem (Tobin, 1958). The theory explains that investors who do not take risks at all would invest all their money into risk-free assets and that investors who will take risks as much as possible would not invest in risk-free assets at all. The optimal combination of risk-free and risky assets (an efficient portfolio) must be formulated to obtain the best risk-weighted return. The theory was confirmed to be accurate under specific, realistic constraints (Costola et al., 2022).

Tobin (1958, p. 85) states that "the theory of risk-avoiding behavior has been shown to provide a basis for liquidity preference and for an inverse relationship between the demand for cash and the rate of interest," implying an inverse relationship between risk and return. He further suggests that investors will hold a basket of assets due to their risk aversion and diversifying their portfolio.

The third Nobel prize winner, William Sharpe (Sharpe), developed the Sharpe Ratio (Sharpe, 1966). The Sharpe Ratio calculates an absolute measure of an investor's return relative to the risk they have taken. Amédée-Manesme and Barthélémy (2022, p. 692) state that "the Sharpe ratio is the most commonly used risk-adjusted performance metric."

Sharpe (1966, p. 119) states that:

[T]he theory of portfolio analysis is essentially normative; it describes efficient techniques for selecting portfolios on the basis of predictions about the performance of individual securities. The key element in the portfolio analyst's view of the world is his emphasis on both expected return and risk. The selection of a preferred combination of risk and expected return must, in the final analysis, depend on the preferences of the investor and cannot be made solely by the technician. However, the technician can (and should) attempt to

find efficient portfolios - those promising the greatest expected return for any given degree of risk. The portfolio analyst's tasks are thus (1) translating predictions about security performance into predictions of portfolio performance, and (2) selecting from among the large number of possible portfolios those that are efficient. The security analyst's task is to provide the required predictions of security performance (including the interrelationships among the performances of securities). The investor's task is to select from among the efficient portfolios the one that he considers most desirable based on his particular feelings regarding risk and expected return.

Sharpe, therefore, confirms that there might be more than one efficient portfolio, and applying this to the research on whisky, the researcher postulates that whisky could potentially provide an efficient portfolio but that it would depend on the investor or portfolio risk appetite.

Suppose one understands the relationship between return and risk. In that case, one can derive an expected return for whisky, calculate volatility (risk) for whisky, and run academic/theoretical models to test if the introduction of whisky into a portfolio of traditional assets will (or would have, if back-tested) increase(d) the portfolio's risk-weighted return.

2.3. *Collectables as an alternative investment class*

Masset and Weisskopf (2018, p. 66) state that "Academic studies have also started to examine the performance of collectible markets and draw more nuanced conclusions." Kruja (2024, p. 48) states, "Alternative investments' popularity has seen a rapid rise in the past decades, alongside their value, which is why this topic offered an interesting base for a more detailed study." There is a business and academic interest in exploring collectables further as a potential alternative investment class. The literature review will look at other collectables such as bourbon, wine, classic cars, LEGO, stamps, and art to better understand the merits of collectables as investable assets.

While reviewing other collectables literature, it was found that bourbon had a very low correlation to stocks, bonds, and commodities (Lennon & Shofhi, 2021) and therefore suggested that including bourbon in a traditional investment portfolio could increase a portfolio's risk-weighted return. Looking outside the numbers, Lennon and Shofhi (2021, p. 1025) also state that “the market for bourbon whiskey is booming. Demand is so great that bourbon aficionados regularly line up overnight for the chance to purchase a single bottle, and high-end bourbons are allocated to consumers via lotteries,” which illustrates the passion for the collectables, far beyond only price and potential value increase.

When wine was assessed, it was found that “the market is inefficient in the short run and provides investment and diversification opportunities for investors and collectors” (Ameur et al., 2022, p. 12). The research further found that in the long term, markets were more efficient (Ameur et al., 2022). The ability to, therefore, outperform markets lies in the short-term inefficiency of markets, which is usually the case with collectables, where prices are only occasionally transparent.

Classic cars “show that not only are the returns on classic cars comparable to those of traditional financial instruments, but volatility is even lower, making them a good investment class” (Bonanno, 2017, p. 29). Bonanno (2017, p. 1) further states that “a classic car represents a status symbol, a technical masterpiece, and sometimes also a design milestone. Some models, due to their importance or to their impact on society, are regarded as pieces of history”. Classic cars, as per the case of bourbon discussed above, illustrate that collectables could have additional perceived value far beyond production. It demonstrates that people are also passionate about collectables, which would add value in the long term.

Research on LEGO shows it has practically no volatility, with returns uncorrelated with major benchmarks, highlighting significant diversification potential (Shanaev et al., 2020). At the same time, the “Sharpe ratio of LEGO is also shown to be superior to those of the S&P 500” (Shanaev et al., 2020, p. 590). People have also been collecting rarities and luxury items for centuries, turning hobbies or mere tokens into legitimate asset classes traded on large-scale secondary markets (Shanaev et al., 2020). “‘Investments of passion’ provide impressive risk-return tradeoffs and can be

a powerful portfolio diversification tool in an ever-increasing environment of global asset markets interconnectedness” (Shanaev et al., 2020, p. 578). As per the other collectables discussed above, LEGO illustrates the emotional investment of collectables and, therefore, the possibility of generating greater value. It further supports the proposition that it could be a diversification tool to enhance investors' risk-weighted returns.

The above reviews are, however, in contrast to stamps, which have been shown to have a high risk (Grable & Chen, 2015), and research of mainly art, which rejects the hypothesis that collectables would act as a hedge (Kruja, 2024). It is, therefore, clear that not all collectables outperform traditional asset classes; some of them have additional risk, and if investors consider them an alternative investment, they should be appropriately analysed and assessed.

Although the literature review does not cover whisky itself, it suggests that collectables (and, therefore, whisky) could provide investors with reasonable returns. It illustrates that with collectables, there might also be an additional 'emotional value,' which is hard to quantify and not evident within traditional asset classes. There is an even stronger indication that, in most cases, collectables could assist in diversifying portfolios to reduce risk, potentially increasing investors' risk-weighted returns and making them a viable alternative. Based on findings from the literature review, the higher potential risk-weighted returns of collectables (and therefore whisky) warrant further research.

2.4. Information impacting performance

2.4.1. The history of whisky

Uisge beatha | The Water of Life | Scotch Whisky... Whatever you call Scotland's national drink, and whichever Scotch you discover, you know that it is a product of quality, crafted in Scotland, with a unique heritage stretching back more than 500 years. (Scotch Whisky Association, 2024, para. 1)

The earliest evidence of alcoholic beverages was found in China c. 7000–6600 BC, where, through trial and error, the process of distillation was discovered (Stewart et al., 2014). It is further believed that early Egyptians used distillates to produce cosmetics and aromatics and that monks carried this knowledge from the Mediterranean to Scotland (Stewart et al., 2014). The story of Scotch, therefore, begins as early as the 15th century, when documents dated 1494 were obtained indicating that an individual, Friar John Cor, obtained enough malted barley to produce almost 1,500 bottles of spirit (Scotch Whisky Association, 2024). The monasteries retained exclusive whisky production until the 1500s, when Henry VIII dissolved the English monasteries, and Scotland followed suit in the 1560s, allowing the knowledge of distillation to become widespread (Stewart et al., 2014).

Whisky production evolved significantly over the following centuries due to changing agricultural practices and market demands. In the 18th century, declining wine production led Scottish distillers to repurpose sherry casks for ageing whisky, which enhanced flavour profiles and increased demand for Scotch whisky (Stewart et al., 2014). The devastation of French vineyards by the phylloxera beetle in the 1880s further facilitated Scotch's rise as it replaced brandy as a preferred spirit (Scotch Whisky Association, 2024). Throughout the 19th century, figures like James Buchanan and Johnnie Walker expanded Scotch whisky's reach beyond Scotland, establishing a global market (Scotch Whisky Association, 2024).

Following World War II, the Scotch whisky industry faced significant challenges, including declining domestic consumption and increased competition from other spirits (MacKenzie et al., 2024). The industry was characterised by a production-oriented mindset, focusing primarily on the distillation process and traditional practices (MacKenzie et al., 2024). Many new distillers were established, resulting in the *whisky loch*. The term *whisky loch* was coined to represent the surplus whisky produced – the supply was so much more than the demand that it could have filled up a loch (Squires, 2024). Distillers were forced to be price takers rather than price makers. During this period, the industry began to experience pressure to innovate and adapt to changing consumer preferences, and some distillers were closed.

The 1980s marked a pivotal period for the Scotch whisky industry, primarily influenced by the Guinness takeovers of Bells in 1985 and of Distillers Company Limited (the largest whisky company in the world at the time) in 1986 (MacKenzie et al., 2024). These acquisitions catalysed a series of changes that shifted the industry from a production-centric approach to one focused on branding, marketing, and distribution (MacKenzie et al., 2024). The introduction of single malt whisky as a premium product line began redefining the market, allowing Scottish distilleries to capitalise on their brands' heritage and unique characteristics (MacKenzie et al., 2024). This was a crucial era to cement Scotch whisky as the world's leading, premium, and most respected spirit. Whisky supply was reduced, assisting distillers to become price makers rather than price takers.

In the 1990s, the Scotch whisky industry experienced a renaissance, with a growing global demand for premium products (MacKenzie et al., 2024). The shift towards single malts, characterised by higher price points and distinct branding, became a significant trend (MacKenzie et al., 2024). Distilleries began to invest in marketing campaigns that emphasised the quality and craftsmanship of their products (MacKenzie et al., 2024). This period saw the emergence of various marketing techniques, including partnerships with celebrities and the promotion of distillery tours, which enhanced brand visibility and consumer loyalty (MacKenzie et al., 2024).

The 2010s and beyond have been marked by further globalisation of the Scotch whisky market (MacKenzie et al., 2024). The industry capitalised on international markets, particularly the Asian and American markets, leading to increased exports and brand recognition (MacKenzie et al., 2024). The industry continued to evolve, focusing on sustainability and innovation in production methods. Adapting to market trends and consumer preferences became essential for maintaining a competitive advantage.

2.4.2. *The whisky industry, distillers and role-players*

Many countries produce whisky, but Scotch whisky can only be made in Scotland. By law, Scotch whisky must be distilled and matured in Scotland for a minimum of 3

years in oak casks and made from just three natural ingredients - water, cereals, and yeast – at distilleries located across the country. (Scotch Whisky Association, 2024a)

The Scotch Whisky Association (2024, para. 1) states:

Scotland is home to over 150 malt and grain distilleries, making it the greatest concentration of whisky production in the world. Many of the Scotch whisky distilleries bottle some of their production for sale as single malt (i.e., the product of one distillery) or single grain whisky. Malt whisky is classified into one of five main categories – Highland, Lowland, Speyside, Islay, and Campbeltown – according to the distillery's geographical location. In many ways, the geography and climate of each region influence the character of the whisky produced there.

For a detailed list of distillers per region, refer to **Annexure 1**. More information on each distillery can also be found at:

<https://www.dcs.ed.ac.uk/home/jhb/whisky/spey.html>

	<p>Speyside: The most densely populated Whisky region in the world, famous for fertile glens and, of course, the River Spey. Speyside whiskies are known for being frugal with peat and full of fruit. Apple, pear, honey, vanilla, and spice all have a role in expressions from this region, which are commonly matured in Sherry casks.</p> <p>Lowland: Soft and smooth malts are characteristic of this region, offering a gentle, elegant palate reminiscent</p>
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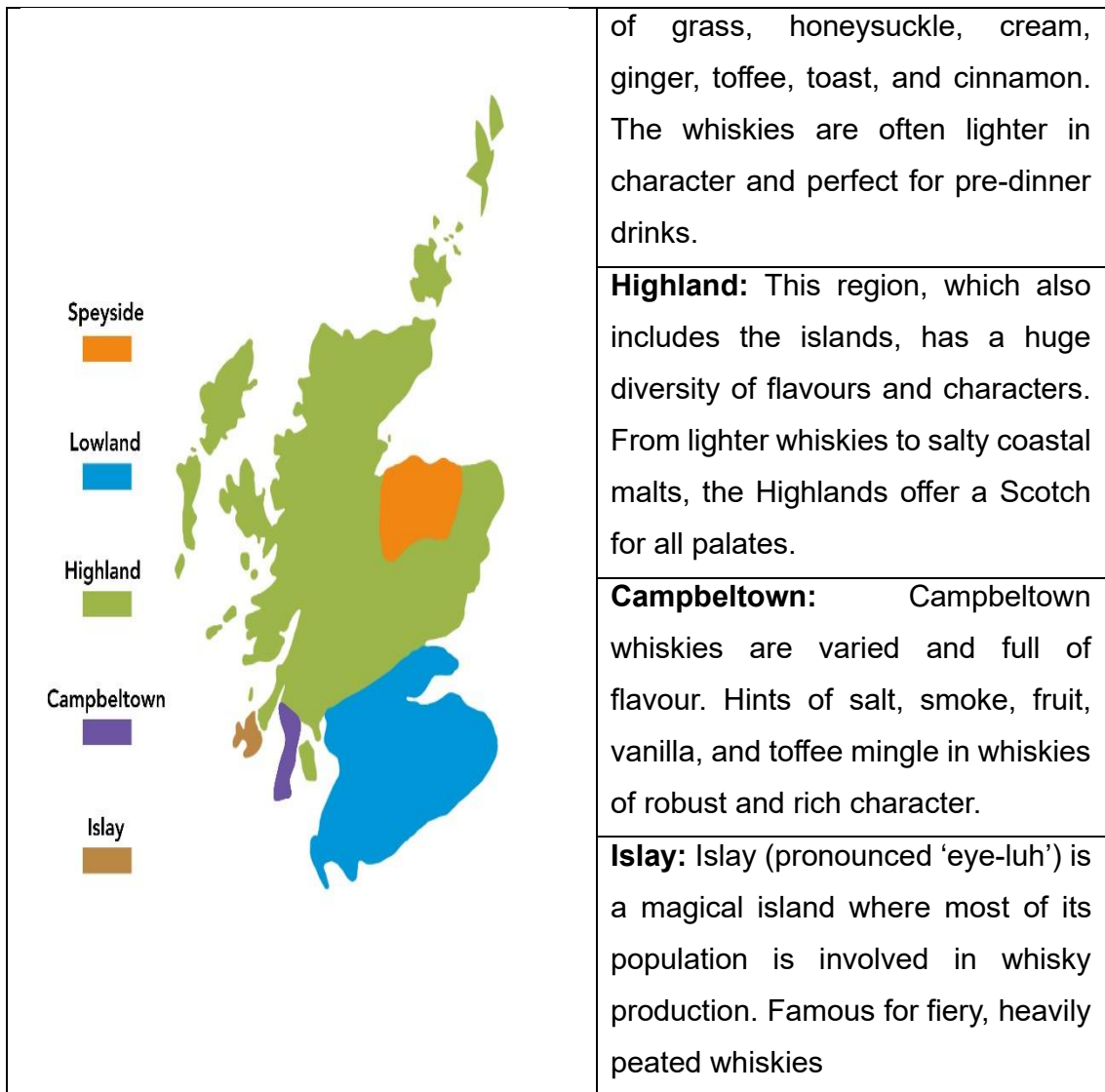


Figure 3: Map of the five whisky regions in Scotland

Note: Map of the five whisky regions in Scotland. Source: (Scotch Whisky Association, 2024b)

The Scotch whisky distillers are tightly held and highly consolidated, with the most significant five players in the industry controlling approximately two-thirds of the malt and grain whisky market volume. The total volume is estimated to be approximately 403 million litres per annum for malt whisky and approximately 410 million litres per annum for grain whisky. For a detailed list of annual production per distillery, refer to Annexure 2.

Table 1: Malt whisky production in Scotland, largest five owners

Distillery	Capacity / LPA
Diageo	111,200,000
Chivas Brothers Ltd. (Pernod Ricard)	72,400,000
William Grant & Sons	43,000,000
The Edrington Group	23,200,000
John Dewar & Sons (Bacardi)	18,200,000
Total litres per annum/largest five shareholders	268,000,000
% of total list as per Annexure 2	66.4%

Note: The table shows Scotland's five largest owners of malt whisky producers.

Source: (Whisky Invest Direct, 2024)

Table 2: Grain whisky production in Scotland, largest five owners

Distillery	Capacity / LPA
Diageo	110,000,000
William Grant & Sons	110,000,000
Chivas Brothers	39,000,000
The Edrington Group	-
John Dewar & Sons (Bacardi)	-
Total litres per annum/largest five shareholders	259,000,000
% of total list as per Annexure 2	63.2%

Note: The table shows Scotland's five largest owners of grain whisky producers.

Source: (Whisky Invest Direct, 2024)

Diageo is a leading global producer and distributor of alcoholic beverages headquartered in London, UK, with a diverse portfolio that includes brands like Johnnie Walker. Diageo operates in numerous countries, offering various products such as whiskey, vodka, and beer. Johnnie Walker is the best-selling whisky in the world. (www.Globaldata.com)

Chivas Brothers Ltd., a subsidiary of Pernod Ricard, specialises in the production of Scotch whisky, with well-known brands including Chivas Regal and

The Glenlivet. The company emphasises craftsmanship and heritage in its offerings, contributing significantly to the premium spirit market. Glenlivet has the greatest production capacity in the world (www.Globaldata.com).

William Grant & Sons is an independent family-owned distiller based in Scotland, recognised for its high-quality Scotch whiskies, including Glenfiddich and The Balvenie. The company prides itself on traditional distilling methods (www.Globaldata.com).

The Edrington Group is a prominent Scottish company known for its premium whisky brands, such as The Macallan and Highland Park. Edrington focuses on sustainability and quality, maintaining a strong presence in the luxury spirit market (www.Globaldata.com).

John Dewar & Sons, part of Bacardi, is famous for its Dewar's blended Scotch whisky. The company has a rich history and is committed to producing high-quality spirits, leveraging traditional and innovative production techniques to appeal to worldwide whisky enthusiasts (www.Globaldata.com).

2.4.3. Whisky supply

From 2000 to 2014, malt production averaged approximately 420 million litres annually, making malt whisky the main collectable whisky.

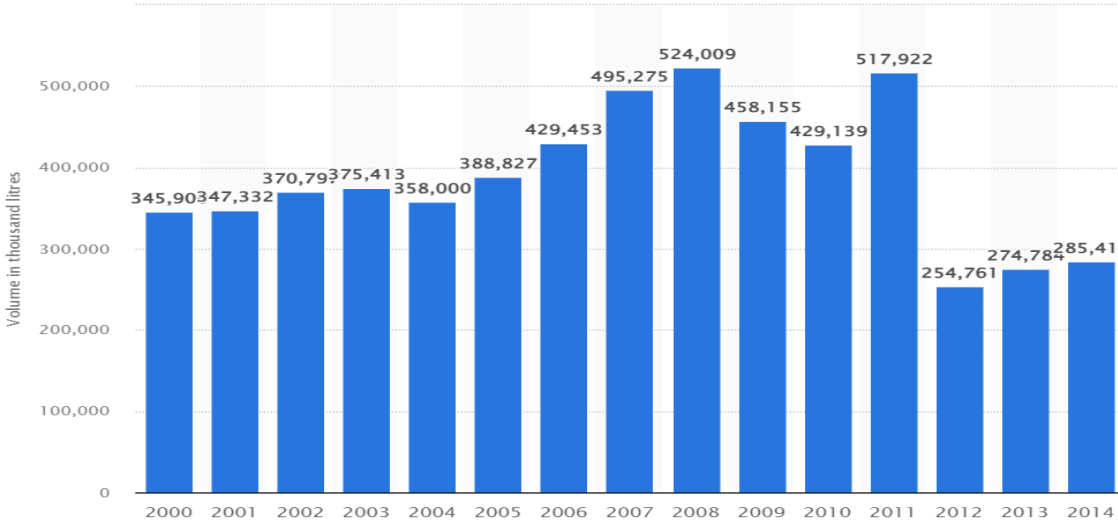


Figure 4: Scotch whisky production

Note: The figure shows whisky production (in 1,000 litres) in Scotland from 2000 to 2014. Source: (Statista, 2024)

Over the last ten years, from 2014, 37 new malt distilleries began either distilling or are due to start distilling this year (Tavish, 2024). The new distilleries will add approximately 33 million litres per year. Below is a list of all the new distilleries to add to the supply.

Table 3: New Scotch malt whisky production (new distilleries)

Distillery	Capacity (LPA)	Year founded
Annandale	500 000	2014
Ardnamurchan	500 000	2014
Balilndalloch	100 000	2014
Kingsbarns	600 000	2014
Arbikie	200 000	2015
Dalmunach	10 000 000	2015
Glasgow	365 000	2015
Harris	399 000	2015
Inchdairnie	4 000 000	2015
Brew Dog	450 000	2016
Dornoch	12 000	2016
Torabhaig	500 000	2016
Aberargie	750 000	2017
Arднаhoe	1 000 000	2017
The Borders	1 600 000	2017
Clydeside	620 000	2017
GlenWyvis	140 000	2017
Raasay	220 000	2017
Lindores Abbey	225 000	2017
Nc'Nean	100 000	2017
Lochlea	200 000	2018
Ardross	1 000 000	2019
Holyrood	250 000	2019

Lagg	750 000	2019
Bonnington	720 000	2020
Burnobennie	680 000	2020
Falkirk	1 200 000	2020
Jackton	300 000	2020
8 Doors	150 000	2022
Brora	800 000	2022
The Cairn	1 000 000	2022
Rosebank	1 000 000	2022
Moffat	12 000	2023
Port of Leith	400 000	2023
Uile-Bheist	20 000	2023
Dunphall	200 000	2023
Ardgowan	1 000 000	2024
Other	750 000	
Total	32 713 000	

Note: The table shows increased Scotch malt whisky production from new distillers from 2014. Source: (Tavish, 2024)

Although the new distilleries are adding c. 33 million litres per annum, the existing distilleries are adding more than double that (Tavish, 2024). The total increase is, therefore, more than 100 million litres of additional supply per year. The warehouses have filled up, with the Scotch Whisky Association reporting there to be around 22 million casks currently in warehouses in Scotland, which they say equates to around 12 billion bottles of whisky. A few years ago, that figure was 20 million (Tavish, 2024).

Table 4: Increase in Scotch malt whisky production (existing distilleries)

Distillery	Old capacity (LPA)	New capacity (LPA)	Increase (LPA)	Date completed
Abelour	3 800 000	7 800 000	4 000 000	2025
Ardberg	1 200 000	2 400 000	1 200 000	2021

Aultmore	3 200 000	6 400 000	3 200 000	2024
Dalmore	4 500 000	9 000 000	4 500 000	2024
Edradour	100 000	260 000	160 000	2018
Glenfiddich	10 500 000	21 000 000	10 500 000	2020
Glenlivet	10 500 000	21 000 000	10 500 000	2018
Glenmorangie	6 500 000	7 100 000	600 000	2021
Glen Moray	3 000 000	8 500 000	5 500 000	2016 & 2023
Glen Ord	5 000 000	11 900 000	6 900 000	2014
Glan Scotia	800 000	1 200 000	400 000	2024
Kilchoman	230 000	975 000	745 000	2019 & 2023
Macallan	9 000 000	15 000 000	6 000 000	2018
Miltonduff	5 800 000	16 000 000	10 200 000	2025
Speyburn	1 800 000	4 500 000	2 700 000	2016
Speyside	600 000	850 000	250 000	2019
Teaninich	4 500 000	10 000 000	5 500 000	2015
Total	71 030 000	143 885 000	72 855 000	

Note: The table shows the increase in Scotch malt whisky production from existing distillers from 2014. Source: (Tavish, 2024)

Therefore, after all the expansion, the total production capacity of malt and grain whisky is estimated to be around 900 million litres per annum, with an immense amount of extra supply added over the past ten years.

2.4.4. Whisky demand/exports

The results published by the Scotch Whisky Association showed a decline in 2023 exports compared to the record-breaking figures from 2022, where the equivalent of 1.67 billion bottles of whisky was exported, which is over a billion litres of Scotch whisky (Tavish, 2024). Those numbers were down to 1.35 billion, or 945 million litres, in 2023, broadly the same as the 1.3 billion bottles exported ten years ago, in 2013 (Tavish, 2024). It is clear that the current estimated demand of approximately 1 billion litres is more than the current supply of approximately 900 million litres (even after taking into consideration the angel's share (evaporation), the devil's cut (absorbed

by the cask), and the water which is added in some instances). Demand has, however, remained relatively flat over the last ten years.

2.4.5. Estimated distiller and export price changes

Looking at the demand data provided above and assuming that approximately 1 billion litres of whisky were exported in 2013, totalling 4.3 billion Pounds, and approximately 1 billion litres of whisky was exported in 2023, totalling 5.6 billion Pounds, it indicates that whisky prices have increased by a compounded annual rate of approximately 3%.

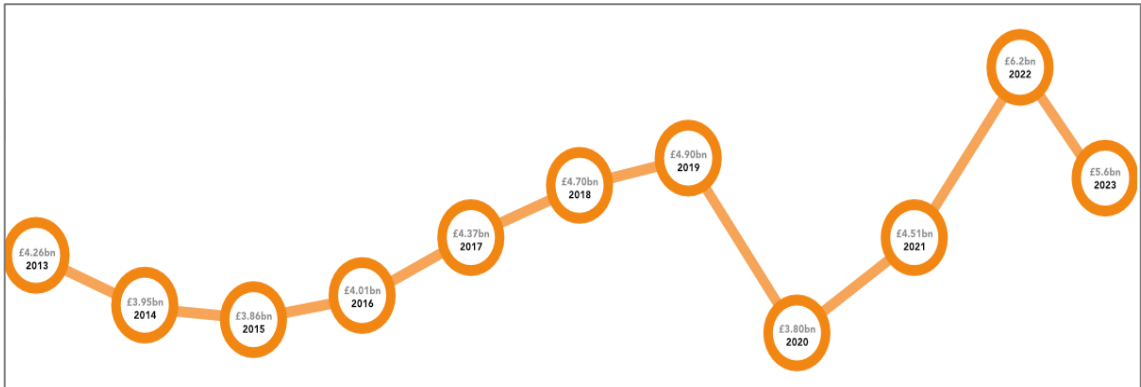


Figure 5: Scotch whisky exports

Note: The figure shows Scotch whisky exports from 2013 to 2023 in Pounds. Source: (Scotch Whisky Association, 2024c)

The above price estimations are supported by the WIDMI and WIDGI, which measure a basket of whiskies constantly four years old. Over the last ten years, the WIDMI has grown at a compounded annual growth rate of approximately 4% per year, and the WIDGI has grown at a compounded annual growth rate of just over 1% per year.

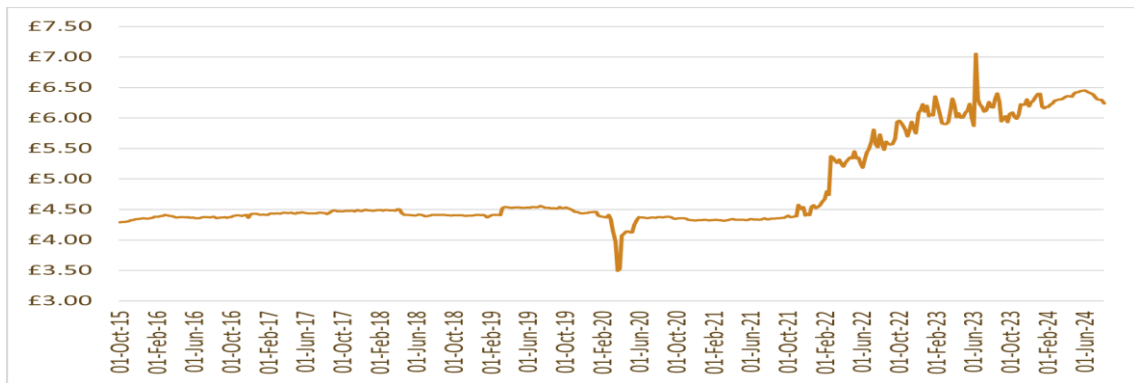


Figure 6: WhiskyInvestDirect Malt Index (WIDMI)

Note: The figure shows the daily price movement of the WIDMI index in Pounds from 2015 to 2024. Source: (Whisky Invest Direct, 2024a)

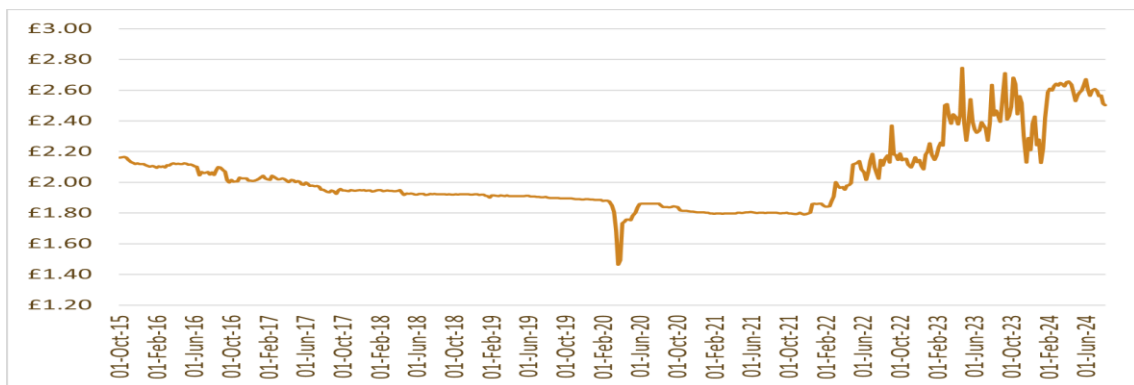


Figure 7: WhiskyInvestDirect Grain Index (WIDGI)

Note: The figure shows the daily price movement of the WIDGI index in Pounds from 2015 to 2024. Source: (Whisky Invest Direct, 2024a)

2.4.6. Whisky statistics to consider (especially retail versus auction prices)

The following key statistics obtained from the Whiskystats Insight Report 2023 are essential factors to consider in assessing the potential price and value of whisky (Whiskystats, 2024):

- The number of single whisky bottles traded at auction in 2023 decreased by 5% from 2022.
- Cumulative auction prices for whisky fell to €118 million, 19% less than in 2022.
- The downward trend in whisky value that started in 2022 continued throughout 2023.

- The Whiskystats whisky index fell 18.3%, the most significant annual setback over the past ten years.
- For the first time in years, lower price segments (whiskies below €250) increased auction market share. Higher price segments (above €250) lost market share.
- Two-thirds of the whisky bottles sold at auction traded for less than €250. Whiskies priced over €5,000 represented 1% of the market.
- At auction, more than 10,000 bottles went unsold, 36% more than in 2022 (already 60% above 2021).
- Retail prices of lower age segments, including *No Age Statement* whisky, increased in line with inflation. In contrast, retail prices of older whiskies, especially those aged between 26 and 30 years, exceeded the inflation rate.
- From 2020 to 2021, the price gap between retail and auction prices ranged between 10% and 30%. This gap has widened significantly. At the end of 2023, it was between 50% and 75%.

Understanding the role that auctions play in realising whisky value is essential. Retail prices and auction prices could be materially different. Still, it is more likely that the whisky included in an investor’s portfolio, if rare and exclusive, will be sold at auction, with the 18-year-old price class becoming more prominent. Obtaining sufficient individual auction prices is difficult, but understanding the difference between retail prices and auction prices should give investors an indication of what premium or discount they could expect in the future. An essential factor is that the number of bottles traded at auction decreased for the first time in over a decade (Whiskystats, 2024).

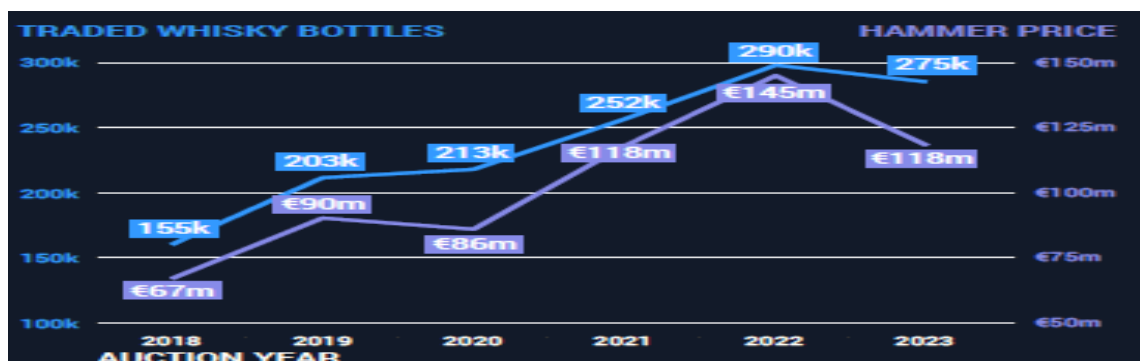


Figure 8: Annual whisky auction trading volume and value

Note: The figure shows the annual volume in thousands and value traded in Pounds of whisky at auction from 2018 to 2023. Source: (Whiskystats, 2024, p. 21)

“For the first time in years, the lower price segments increased their market share, while the higher price segments lost market share at auction. One-third of the whisky bottles sold at auctions in 2023 traded for less than €100” (Whiskystats, 2024, p. 22). It is important to note that the subject of this research, focusing on 18-year-old whisky, mainly now falls within the largest traded segment of €100 – €250.

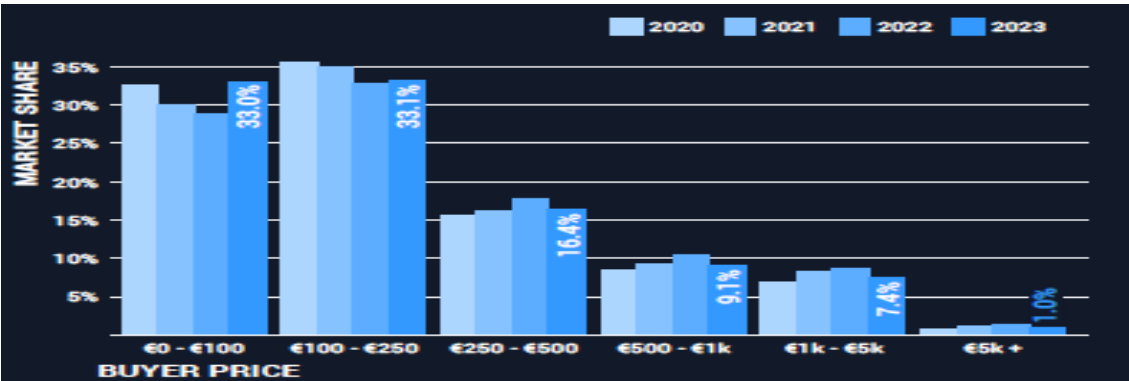


Figure 9: Market share of traded whisky bottles by price segment

Note: The market share of traded whisky per price segment from 2020 to 2023. Source: (Whiskystats, 2024, p. 22)

Referring to Figure 9 and Figure 10, age remains a significant factor driving whisky prices. As whisky ages above 21 years, the prices increase substantially. It is important to note that this statistic is not given because the researcher is trying to identify what factors drive price but rather to understand the liquidity per age segment and, therefore, justify the choice of whisky (18-year-olds) that was the main subject of analysis, further discussed in Chapter 6 below.

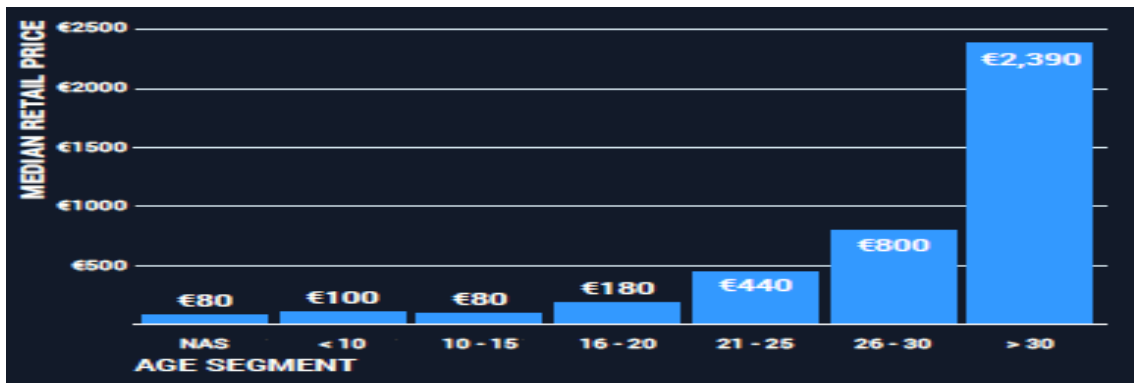


Figure 10: Eurozone retail prices for Scotch single malts per price segment

Note: The figure shows the median Eurozone retail prices for Scotch single malts per price segment by the end of 2023 (Whiskystats, 2024, p. 28)

Referring to Figure 11 below, younger whisky has remained in line with inflation, but whisky aged 16 years and up has, on average, continued to beat inflation.

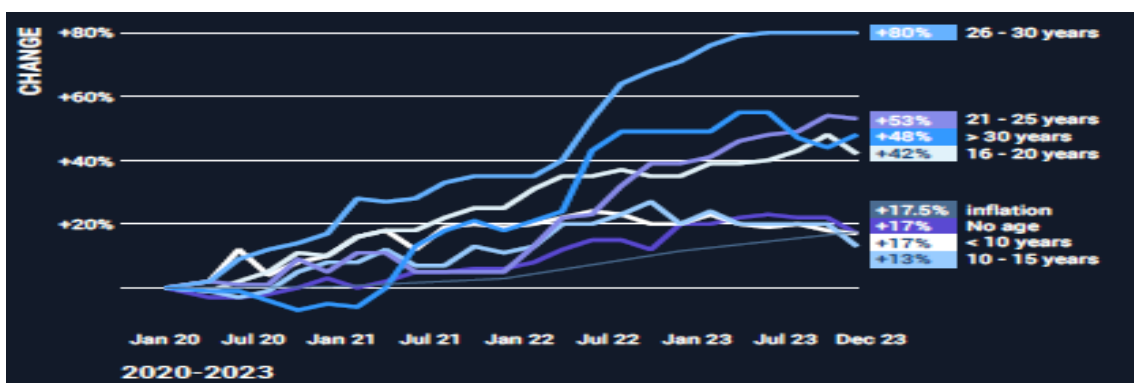


Figure 11: Change in retail prices of Scotch single malt whiskies in the Eurozone

Note: The figure shows the change in median retail prices of Scotch single malt whiskies in the Eurozone from 2020 to 2023. Source: (Whiskystats, 2024, p. 30)

Referring to Figure 12, the gap between retail and auction prices has continued to widen, with auction prices, on average, being 60% less than retail prices in 2023. Although the analysis in Chapter 5 below is based on retail prices, the differences between auction and retail prices are essential to note, as 18-year-old whisky is now being sold more often at auction.

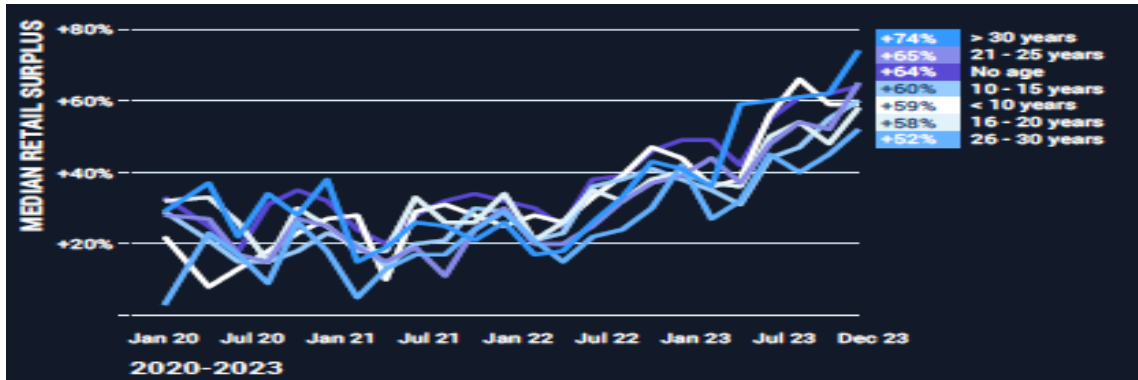


Figure 12: Price gap between Eurozone retail and auction prices

Note: The figure shows the percentage price gap between Eurozone retail and auction prices for Scotch single malts from 2020 to 2023. Source: (Whiskystats, 2024, p. 31)

2.5. Conclusion

Chapter 2 provided a comprehensive review of the theoretical models and academic literature that serve as the foundation for understanding whisky as a potential alternative investment asset. The chapter began by delving into modern portfolio theory, particularly Markowitz's portfolio optimization framework, emphasising the trade-off between risk and return. Markowitz's theory asserts that diversification can improve an investor's risk-adjusted returns by combining assets with low correlation, thus reducing overall portfolio risk. This theory serves as a critical backdrop for evaluating whether whisky can function as a diversification tool when included in traditional portfolios of stocks, bonds, and other financial instruments.

The review further included contributions from other Nobel laureates, such as Tobin and Sharpe, whose models add to the understanding of risk-return relationships. Tobin's separation theorem supports the notion that investors can find an optimal combination of risky and risk-free assets. At the same time, Sharpe's ratio offers a quantitative measure for comparing the performance of different investments by adjusting for risk. These academic models are essential for assessing whether whisky can enhance the risk-weighted return of a portfolio, especially in the context of South African investors who traditionally rely on more conventional asset classes.

Following the theoretical discussion, the chapter transitioned into a literature review on collectables as an alternative asset class. The analysis explored various types of collectables, including wine, classic cars, art, and even LEGO, to assess their performance relative to traditional investments. The findings showed that collectables could outperform more conventional assets in certain periods, and although they are expected to have lower risk, in some instances, like stamps, present higher risks. Collectables generally exhibit unique characteristics that can provide diversification benefits due to their low correlation with the broader financial markets.

The chapter then touched on the factors that impact the performance of whisky as an investment asset, including the historical context, industry dynamics, supply and demand, and pricing trends. It covers the history of whisky production, the role of distillers, and the evolution of market demand, mainly through exports and price fluctuations over time. The section highlights how supply constraints and increasing global demand have influenced whisky prices, especially for rare and aged varieties. Additionally, it considered the differences between retail and auction prices and the role of auction markets in determining whisky's value. The literature review provides insights into the volatility and liquidity challenges of whisky investments, laying the groundwork for understanding its potential as a portfolio diversification tool.

In conclusion, Chapter 2 lays a robust theoretical and empirical foundation for the subsequent analysis in this dissertation. By reviewing academic models, literature on collectables, and the specific market dynamics of whisky, the chapter establishes the key parameters needed to assess whether whisky can serve as a viable alternative investment class for South African investors. The evidence suggests that whisky's low correlation with traditional assets, combined with its potential for significant returns, makes it a promising candidate for portfolio diversification. However, investors must also consider the risks associated with its volatility and illiquidity. The insights gained from this review will inform the following empirical research, as it explores whether introducing whisky into a traditional portfolio can enhance risk-weighted returns and offer South African investors a better balance between risk and returns.

3. CHAPTER 3: THE RESEARCH QUESTION

Based on the research's purpose and the insight obtained from the literature review in the preceding chapter, this research aimed to answer the research question of whether whisky can provide a sufficient return and greater diversification mechanism, and if introduced into a portfolio of traditional investments, can it ensure a better risk-weighted return for South African Investors than that of only traditional portfolios?

The hypothesis is thus: The introduction of whisky into a traditional asset portfolio could increase a South African investor's risk-weighted return.

4. CHAPTER 4: RESEARCH METHODOLOGY AND DESIGN

4.1. Introduction

The current chapter describes the selected research methodology and design used to address the research question presented in the preceding chapter.

4.2. Choice of research design

The research is an explanatory study to determine whether to accept or reject the hypothesis that whisky can give South African investors a better risk-weighted return when introduced into a portfolio of traditional assets. As detailed below, it incorporates a positivistic research philosophy and a deductive approach. It applies longitudinal secondary data to the theoretical, quantitative models (mono method).

4.2.1. Explanatory study

Explanatory studies focus on studying a problem to explain the relationship between variables (Saunders & Lewis, 2017). The research studies whisky risk and returns to describe the relationship between the two variables and assess whether whisky could be introduced into a portfolio of traditional assets to generate a better risk-weighted return, as the literature review in Chapter 2 suggests.

4.2.2. Positivistic philosophy

Positivism uses highly structured methods to facilitate replication, resulting in law-like generalisations (Saunders & Lewis, 2017). The research, therefore, focuses on discovering observable and measurable facts and aims to quantify returns and measure risk to understand the causal relationship between risk and return. The research will assist South African investors in assessing whether and to what extent they could include whisky in their portfolio as an investment class.

4.2.3. Deductive approach

Secondary whisky data was collected, analysed, and reworked to obtain normalised prices, which were utilised to calculate returns, risk (also referred to throughout as volatility or the standard deviation), and risk-weighted returns. Returns, volatility, and risk-weighted returns were also calculated for traditional asset classes, indices, and

portfolios. Deductive reasoning was applied to the empirical observations of the outputs to deduce whether the hypothesis should be accepted or rejected.

4.2.4. *Mono method*

The researcher used secondary data to determine returns, volatility, and risk-weighted returns. Whisky price data was obtained from South African liquor retailers WhiskyBrother and Norman Goodfellas. Secondary data for traditional assets and AG mutual funds were obtained from Bloomberg's financial database. Other collectable data was obtained from the Knight Frank Wealth Reports. The secondary data was analysed to derive outcomes.

4.2.5. *Experiment strategy*

Saunders and Lewis (2017, p. 119) state that “the purpose of an experiment is to study the causal link between variables; to establish whether a change in one independent variable produces a change in another dependent variable.” The research aims to clarify what impact whisky (the independent variable) has on a portfolio of traditional investments and if the introduction thereof into such a portfolio could increase the portfolio's risk-weighted return (the dependent variable).

Although the experiment might indicate that whisky does not necessarily increase the recomposed portfolios' returns, it might suggest that whisky provides a greater diversification tool (by reducing risk), which would, therefore, support the hypothesis that the introduction of whisky into a portfolio of traditional investments could be a viable alternative investment class which could provide South African investors with a greater risk-weighted return if included in their investment portfolios.

4.2.6. *Longitudinal time horizon*

The researcher collected secondary whisky price data from 2015 to 2024 and secondary price data of traditional assets, indices, and portfolios over the same period. The information was analysed to test the hypothesis. The data enables the researcher to compare the outputs of traditional assets, indices, mutual fund portfolios, and other collectables to whisky over the longitudinal time horizon. It assisted the researcher in assessing if the whisky market has some abnormalities caused by inefficiencies in the short term or if these markets are more efficient in the

longer term, as collectables are vulnerable to calendar anomalies (Plastun et al., 2022).

The choice of research design is best suited to analysing and assessing the quantitative data to derive an outcome(s) that could be used to accept or reject the hypothesis.

4.3. Proposed research methodology

4.3.1. Population

The Scottish whisky market consists of over 150 distillers, which produced £7.1 billion gross value added (GVA) at the end of 2022 and saw an increase of 29% GVA since the last snapshot done by the Scotch Whisky Association in 2018 (Scotch Whisky Association, 2024d). GVA is defined as “the production, sales, and distribution of Scotch Whisky” (Scotch Whisky Association, 2024d, p. 6).

4.3.2. Unit of analysis

The unit of analysis used during the research will be the nominal rate of return of whisky (and other collectables) (i.e., the price change) and the total nominal rate of return of the traditional investments (i.e., the price change and dividends received, where applicable), where the nominal rate of return ignores inflation adjustments and expenses.

4.3.3. Sampling methods

A significant issue with most collectables is that it is difficult to obtain accurate pricing and, therefore, difficult to assess risk (volatility) and return. A considerable factor is liquidity, and the accuracy of whisky prices obtained in the market. To mitigate these risks, the study uses secondary data for the ten most liquid, 18-year-old Scotch whiskies (single malts and blends) over approximately ten years to derive normalised whisky prices. These will include Balvenie, Bunnahabhain, Dalmore, Glendronach, Glenfiddich, Glenlivet, Glenmorangie, Glen Grant, Lagavulin, and Macallan (collectively referred to as “the Sample”).

The study also compared the Sample to recognised whisky indices like Rare Whiskey 101's APEX1000 index (RW or APEX1000) and Whiskystats' whisky index, which measures the performance of rare and exclusive whisky. It also compared the Sample to the entry-level whisky price movements of Bells and Johnnie Walker Black Label (Johnnie Black) and WhiskyInvestDirect's Grain Index (WIDGI) and Malt Index (WIDMI).

The study further assesses the performance of traditional assets' risk and return by examining liquid and representative indices, which include the SATRIX40 index (for equity), the ALBI index (for bonds), the South African Listed Property index (for property), the Euro: Rand exchange rate (for currencies), and gold and oil (for commodities).

A sample of diversified investment portfolios, consisting of the AG Equity Fund and the AG Balanced Fund, other collectables, and liquor companies Diageo PLC (Diageo) and Pernot Ricard SA (Pernot Ricard), were also analysed.

4.3.4. Measurement instrument

Burton and Jacobsen (1999), Bonino (2017), and Lennon and Shofhi (2021) all state that there are three primary approaches to measuring collectable returns. The first approach is the use of a composite index. A composite index is created by selecting items whose prices will be measured and averaged over time (Burton & Jacobsen, 1999).

The second method of deriving a price index is to run a hedonic regression (Burton & Jacobsen, 1999), in which case the price of the whisky will be regressed based on core characteristics to be determined during the experiment. Burton and Jacobsen (1999, p. 198) state that "This method allows one to estimate the price gain over the period attributable solely to aging" and "has the advantage of allowing for quality differences in the various items comprising the index calculation."

The third method of calculating returns is to obtain data from historic sales where the whisky would have sold more than once during the sample period and then run a repeat-sale regression (Burton & Jacobsen, 1999).

Based on the secondary data obtained and the strengths and limitations of each method, the composite index method was elected, composed of the Sample, and named the “Composite 18 whisky index” for purposes of the research. Most important was that the outputs were reliable. Burton and Jacobsen (1999, p. 198) state that “it does not appear that any of these approaches will necessarily understate or overstate returns as compared to the other approaches”, and the researcher was therefore comfortable with the composite index method.

The returns of whisky and other assets were calculated and compared to each other. Risk, using the standard deviation, was then calculated for whisky and compared to the other asset classes. Betas of the asset classes were considered to assess correlation to the SATRIX index. Lastly, the Sharpe Ratio was calculated for whisky and the other asset classes to assess their respective risk-weighted returns. The return and risk assessments provide insight into the performance of whisky compared to that of other asset classes. (Please refer to the list of formulas for the calculation formulas).

Three hypothetical portfolios were created: one with no whisky exposure, one Regulation 28-compliant with whisky exposure, and one with slightly larger whisky exposure. Changes in the portfolios' returns and risk were then used to calculate the portfolios' Sharpe Ratios (risk-weighted return). To test the hypothesis, the Sharpe Ratios were used to assess whether whisky could increase a portfolio's risk-weighted return. An increase in the Sharpe Ratio would indicate that whisky could improve a portfolio's risk-weighted return.

4.3.5. Data gathering process

Secondary whisky price data was gathered by obtaining prices from local South African liquor retailers that specialise in whisky (WhiskyBrother and Norman Goodfellas, the largest sellers of the Sample within South Africa).

Traditional asset prices, such as the SATRX40 (equity), the ALBI (bonds), the South African Property Index (property), the EUR: Rand exchange rate, commodity prices (gold and oil), inflation data (South African and United Kingdom), mutual fund performance (AG Equity and Balanced Funds), and the share price performances

listed liquor groups (Diageo and Pernod Ricard), were obtained from Bloomberg's financial databases.

Prices for other whisky indices were obtained from their respective websites, and collectables data was obtained from the Knight Frank Wealth Reports from 2016 to 2023.

4.3.6. Analysis approach

As discussed above, the prices of each whisky in the Sample were obtained from the whisky retailers. The obtained prices were then used to prepare the Composite 18 whisky index. In the few instances where information was missing, the researcher used Google to find the latest retail price and average returns to complete the missing data.

Table 5: Composite 18 whisky index

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Balvenie 18 (Sherry Cask)	N/A	N/A	629	634	687	710	761	2,403	3,345	5,000
Bunnahabhain	1,070	1,500	1,500	1,800	1,900	1,900	2,128	2,383	2,100	3,390
Dalmore	N/A	1,330	1,993	1,954	1,954	2,161	2,291	5,501	5,950	6,669
Glendronach	N/A	1,320	1,470	1,610	1,610	1,926	2,303	2,755	3,296	3,942
Glenfiddich	1,390	1,452	1,311	1,348	1,375	1,394	1,470	1,596	1,875	1,945
Glenlivet	1,260	1,470	1,470	1,750	1,750	1,750	1,750	1,873	2,170	2,390
Glenmorangie	1,400	1,700	1,700	1,610	1,610	1,670	1,580	1,659	1,995	2,150
Glen Grant	N/A	N/A	1,309	1,410	1,466	1,504	1,564	1,627	1,635	1,700
Lugavulin (16 not 18)	1,090	1,250	1,250	1,360	1,450	1,450	1,390	1,473	1,820	1,970
Macallan (Fine Oak Cask)	N/A	N/A	2,900	2,900	2,987	3,130	4,425	6,255	8,842	12,499
Composite index price	1,242	1,432	1,553	1,638	1,679	1,759	1,966	2,752	3,303	4,166
Change in Composite index		15%	9%	5%	3%	5%	12%	40%	20%	26%
Composite 18 index price	100	114	115	122	126	131	142	208	247	314

Note: The table represents the Composite 18 whisky index, constructed from the researcher's own workings using price data from 2015 to 2024. The index was prepared using retail price data from WhiskyBrother and Norman Goodfellas.

Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024)

The Composite 18 whisky index was then measured against the prices of previous years to calculate a nominal annual return over the period (eight and a half years,

approximately nine years) up to June 2024. Annual prices of the traditional assets were obtained, and total nominal returns were calculated over the same period. Annual collectable returns were measured over a similar period. Still, due to the reports only being released annually, they were measured from December 2014 to December 2023. Knight Franks Wealth Reports only started covering rare and exclusive whisky in 2018, so 2014 to 2017 was estimated using the RW index, which is also their primary source of information.

Indices and prices were all based on 100 in the base year. Price relatives were then used to assess returns. Descriptive statistics was used to calculate and compare risk/volatility over the respective periods. The comparable information provides insight into whisky's risk and return profile compared to traditional assets, indices, and portfolios over the respective periods.

Sharpe Ratios were calculated for all assets. A hypothetical portfolio was created to reflect a balanced and diversified portfolio based on the Regulation 28 requirements (Portfolio 1). Equity was allocated the maximum 75% exposure, international assets the maximum 45% exposure, and bonds, property, and commodities the remaining 25% exposure. All traditional asset classes were allocated a minimum of 5% exposure. Where alternatives were available, the traditional assets with the highest Sharpe Ratio were preferred. The composition of the hypothetical portfolio was therefore constructed as follows:

Table 6: Constructed hypothetical portfolio – Portfolio 1

Asset class	Asset allocation
SA equity	30%
Bonds	15%
Property	5%
Commodities	5%
International assets	45%
Total	100%

Note: The table above represents a constructed portfolio created from the researcher’s own workings and based on Regulation 28 requirements. Source: (Bloomberg, 2024)

The Composite 18 whisky index was added to Portfolio 1 in two different ratios, and SA equity was reduced. In the first instance, 2.5% (considering Regulation 28 limitations) was included (Portfolio 2), and in the second instance, 15% (to illustrate the impact of a greater allocation of whisky) was included (Portfolio 3). The reconstructed portfolios, based on the inclusion of the Composite 18 whisky index, were constructed as follows:

Table 7: Constructed hypothetical portfolios – Portfolios 2 and 3

	Portfolio 2	Portfolio 3
Asset class	Asset allocation	Asset allocation
SA equity	30%	15%
Bonds	15%	15%
Property	5%	5%
Commodities	5%	5%
International assets	45%	45%
Composite 18 whisky index	2.5%	15%
Total	100%	100%

Note: The table represents two constructed hypothetical portfolios created whereby the Composite 18 whisky index was included based on the researcher's own workings. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

Using Markowitz’s Efficient Frontier principle, new Sharpe Ratios were calculated for all the portfolios to measure the diversified portfolios’ risk-weighted return. The new Sharpe Ratios of Portfolios 2 and 3 were compared to that of the Sharpe Ratio of Portfolio 1. If the Sharpe Ratio increases, it will illustrate that the hypothesis holds

and that South African investors could increase their risk-weighted return by including whisky in a traditional investment portfolio.

4.3.7. Quality control

18-year-old whisky was chosen because some, mostly older whiskies, are rare, expensive, and illiquid. It was also decided to look at retail prices, as auction prices differ widely. Eighteen-year-olds, in contrast, are more commercial and were assumed to be more reflective of actual prices in an attempt to eliminate any outliers that could skew the outputs. All whisky prices were checked for reasonability against multiple sources. For rare and exclusive whisky, multiple indices were assessed, and for entry-level whisky, the two most sold Scotch entry-level whiskies, i.e., Bells and Johnnie Black, were evaluated in conjunction with two 4-year-old indices.

To avoid selection bias, for traditional assets, indices were elected to represent traditional South African investment classes. The SATRIX 40 was considered suitable for equity, the ALBI for bonds, and the SA Property Index for bonds. The most renowned international equity indices were selected. Gold and oil are the most liquid and traded commodities and were therefore chosen. Diageo and Pernod Ricard are the two largest listed owners of whisky distillers and were, thus, deemed fit for inclusion. AG is one of the largest mutual fund managers in South Africa and is historically known for its flagship funds. AG was elected as their funds have clearly defined mandates and should reflect the varying risk profiles of traditional asset portfolios. All collectables within the Knight Frank Wealth Report were assessed.

4.3.8. Limitations

The analysis period of approximately nine years may not accurately represent whisky returns and volatility due to the limited availability of precise price information. Including only ten whisky distillers out of more than 150 in Scotland could also skew the results. However, based on his judgment, the researcher concluded that South African investors would likely invest in well-known liquid whisky brands. Therefore, using the ten whiskies included in the Composite 18 whisky index would represent a whisky portfolio that is more reflective of likely investment rather than focusing on rare and exclusive whiskies that are not freely available. Including every Scottish

distiller would also distort the data as investors would unlikely invest in all the different brands.

Limitations of the measurement unit. The research focuses on the nominal return on investment rather than real returns. It ignores costs like logistical costs, storage costs, certification costs, maintenance expenses, commissions, taxes and inflation. It also ignores the reasons or factors for whisky price changes. Such factors could include transaction price vs auction/ask price (Moroz & Pecchioli, 2019), scarcity, supply-and-demand, the type of whisky, the age of the whisky, the brand of the whisky, currency fluctuations, location/geography, legislation, holding periods, liquidity and the possibility to introduce leverage. The research focuses only on the nominal risk-weighted returns rather than trying to explain all factors impacting whisky prices.

Limitations of the measuring instruments. The Composite 18 whisky index is subject to biases and, therefore, sensitive to the choice of items in the index and might not reflect the total market (Burton & Jacobsen, 1999).

The major limitation of the Markowitz Efficient Frontier model is that it depends on historical data and assumes that investors have allocated all their portfolio assets at a single historical point in time (Markowitz, 1952).

Mistry and Shah (2013) propose that the major limitation of the Sharpe Ratio is that it is accentuated by investments that do not have a normal distribution of returns and that markets in the short term can be more or less volatile and, therefore, in theory, not have a normal distribution.

5. CHAPTER 5: ANALYSIS AND RESULTS

5.1. Introduction

This chapter presents the empirical analysis and results of whisky returns, risks/volatility, and risk-weighted returns measured using the Sharpe Ratio. It will also explore the returns, risk/volatility, and risk-weighted returns of more traditional assets such as equity, bonds, property, commodities, currency, and other collectables. Whisky has drawn much attention after recent publications by the Financial Times: Rare whisky: Better than liquid gold for investors (Livsey, 2023), Forbes: Whiskey investing in 2023 and beyond (Zhang, 2023), the Wall Street Journal: Kindred spirits: How to get into booze collecting (Carlson, 2024), KPMG: Cask whiskey investment landscape: An asset in demand (KPMG, 2024) and Moneyweb: Investing in wine and whisky as a hedge against the Rand (Ryan, 2024) – all making the case for whisky as alternative investment class.

The chapter starts by discussing the findings from implementing the data analysis techniques and methods discussed in Chapter 3. The results are then presented logically, and significant findings are discussed in more detail. It also incorporates any opinions or conclusions that could be drawn from the literature review in Chapter 2. Lastly, the reliability, validity, and limitations are examined.

5.2. Dataset

Firstly, a composite whisky index was created to assess Scotch whisky performance using the ten best-known and best-selling 18-year-old Scotch whiskies sold in South Africa (*except for Lagavulin, where a 16-year-old was used rather than an 18-year-old*). Please refer again to Sections 4.3.3 and 4.3.4 for the index's composition. The composite index's performance was compared to the performance of the bestselling, entry-level blends, i.e., Bells and Johnnie Walker Black Label, Whisky 101's APEX1000 Index¹ (rare and exclusive whisky), Whiskystats' whisky index (rare and exclusive whisky), and Whisky Invest Direct's malt and grain indexes (4-year-old whiskies).

¹It should also be noted that Knight Frank uses this index to measure its performance in its Wealth Report for rare and exclusive whisky, so the index is referred to interchangeably as the RW, Knight Frank, or APEX1000 index throughout the analysis.

This study then analysed and compared annual data of the SATRIX 40 (South African equity index), the S&P 400 (US equity index), the Dow Jones (US equity index), the FTSE (UK equity index), the DAX 30 (German equity index) and Nikkei 225 (Japanese equity index), the AG Equity Fund (South African mutual equity fund) and the AG Balanced Fund (South Africa mutual fund diversifying across multiple asset classes). The Composite 18 whisky index was compared to equity performances across multiple jurisdictions and geographies – as equity has historically been seen as the primary class of traditional investments. The indices and fund performance were assessed on a total return basis to ensure that dividends were included.

The study further analysed other traditional asset classes. The data analysed included the ALBI (South African bond index), the JSE Listed Property Index (South African property index), commodities (gold and oil), the Euro: Rand exchange rate (currency), UK and South African inflation rates, and lastly, data of other collectables (alternative assets).

The data of Diageo and Pernod Ricard were assessed and analysed to determine the performance of the liquor companies (and distiller owners) at a sector level. As previously discussed in Chapter 2 above, Diageo and Pernod Ricard are the two listed entities that control roughly two-thirds of the world's whisky supply, with the other three unlisted entities.

5.3. Asset returns

As seen Table 8 and Figure 13, the Composite 18 whisky index has delivered superior returns to the other whisky indices and indicators since 2015.

Table 8: Comparable whisky returns

Whisky index	From Dec 2015 (c.9 years)	From Dec 2019 (c.5 years)	From Dec 2021 (c.3 years)
Composite 18 whisky index	14%	23%	37%
Knight Frank/RW 101	13%	4%	3%
Whiskystats whisky index	5%	4%	-10%

Bells/Johnnie Black entry whisky's	4%	8%	12%
WIDMI	4%	7%	15%
WIDGI	2%	6%	14%

Note: The table above compares whisky returns across the different segments over nine, five, and three-year periods, based on the researcher's own analysis derived from price data obtained from Norman Goodfellas, WhiskyBrother, and whisky indices websites. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Rare Whisky 101, 2024; Whiskystats, 2024; WhiskyInvestDirect, 2024)

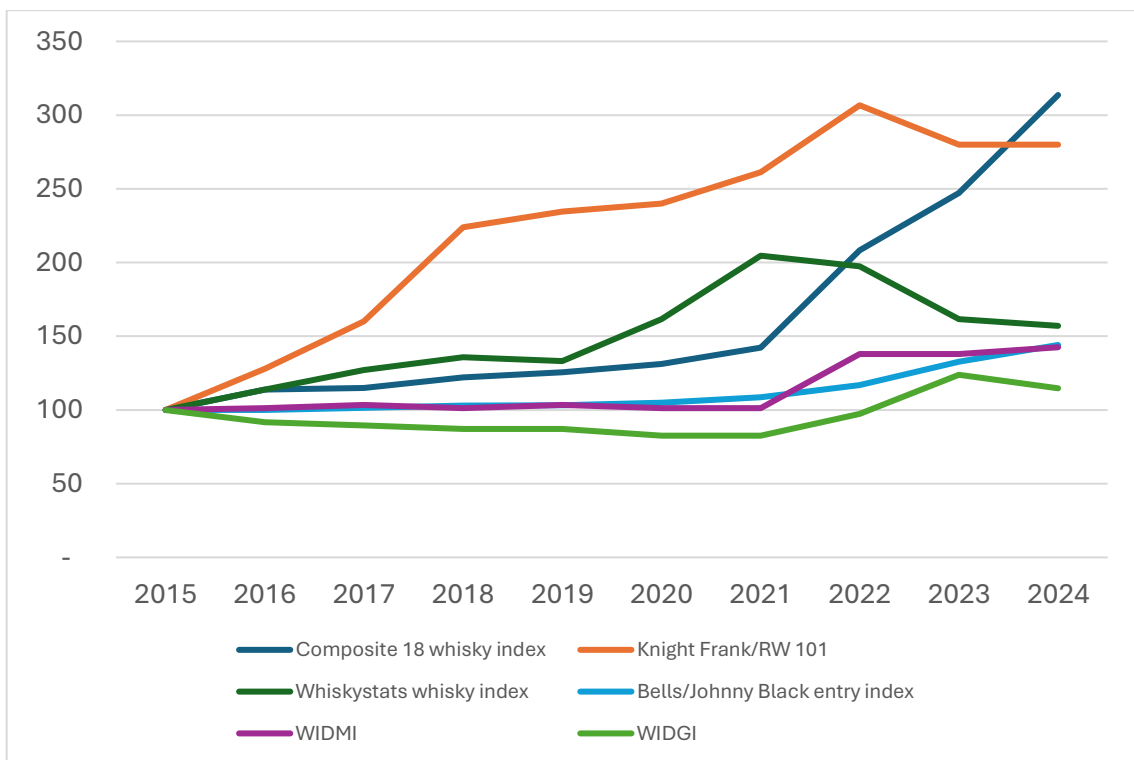


Figure 13: Composite 18 whisky index vs. rare and exclusive whisky vs. entry-level whisky

Note: The figure compares whisky across the different segments to each other from December 2015 based on the researcher's own analysis derived from price data obtained from Norman Goodfellas and WhiskyBrother and whisky indices websites.

Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Rare Whisky 101, 2024; Whiskystats, 2024; WhiskyInvestDirect, 2024)

Until 2022, rare and exclusive whisky outperformed other whisky but has seen a slowdown since then. The Composite 18 whisky index has grown by an annual compounded rate of 37% over the last three years, improving its returns and making it the best-performing index since 2015. When looking into the details of the Composite 18 whisky index, this performance can be explained by a couple of 18-year-old whisky's that have been either discontinued or have become much scarcer. Balvenie's price has seen the greatest increase, increasing by an annual compounded rate of 34% per year over the whole measurement period, compared to Glenfiddich and Glen Grant, which have only seen increases of 4% per year (more in line with entry-level whisky). It is essential to note the returns over the past three years relative to returns over the previous five and ten years, as it is clear that there has been a fundamental change in the returns of selected 18-year-olds.

Table 9 shows that entry-level whisky, both Bells/Johnnie Walker Black Label, measured as changes in South African retail prices, has tracked South African inflation since 2015. The two 4-year-old indices, i.e., the WIDMI and WIDGI indexes, measured in Euro, have grown by 5% and 2%, respectively, in line with the UK inflation over the same periods. Interestingly, if the Euro to Rand exchange rate were adjusted for (applying purchase power parity), the entry-level whisky metrics would have provided very similar returns. Although entry-level whisky retail prices have seen minimal changes between 2015 and 2022, there has also been a drastic increase in prices/over the past three years.

Table 9: Entry-level whisky returns

Entry-level whisky vs inflation and exchange rates	From Dec 2015 (c.9 years)	From Dec 2019 (c.5 years)	From Dec 2021 (c.3 years)
Bells/Johnnie Black entry whisky's	5%	7%	10%
SA inflation (average)	5%	5%	6%
WIDMI	5%	7%	13%

WIDGI	2%	6%	13%
UK inflation (average)	3%	5%	6%
EUR: RAND change	3%	6%	4%

Note: The table compares entry-level whisky returns from December 2015 relative to inflation based on the researcher’s own analysis derived from information obtained from Norman Goodfellas, WhiskyBrother, whisky indices websites, and Bloomberg. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; WhiskyInvestDirect, 2024; Bloomberg, 2024)

Although it is essential to understand the returns of different whisky classes, the research is focused primarily on the returns of more liquid 18-year-olds based on South African retail prices. Therefore, the comparison to other asset classes will use the Composite 18 whisky index to draw comparisons.

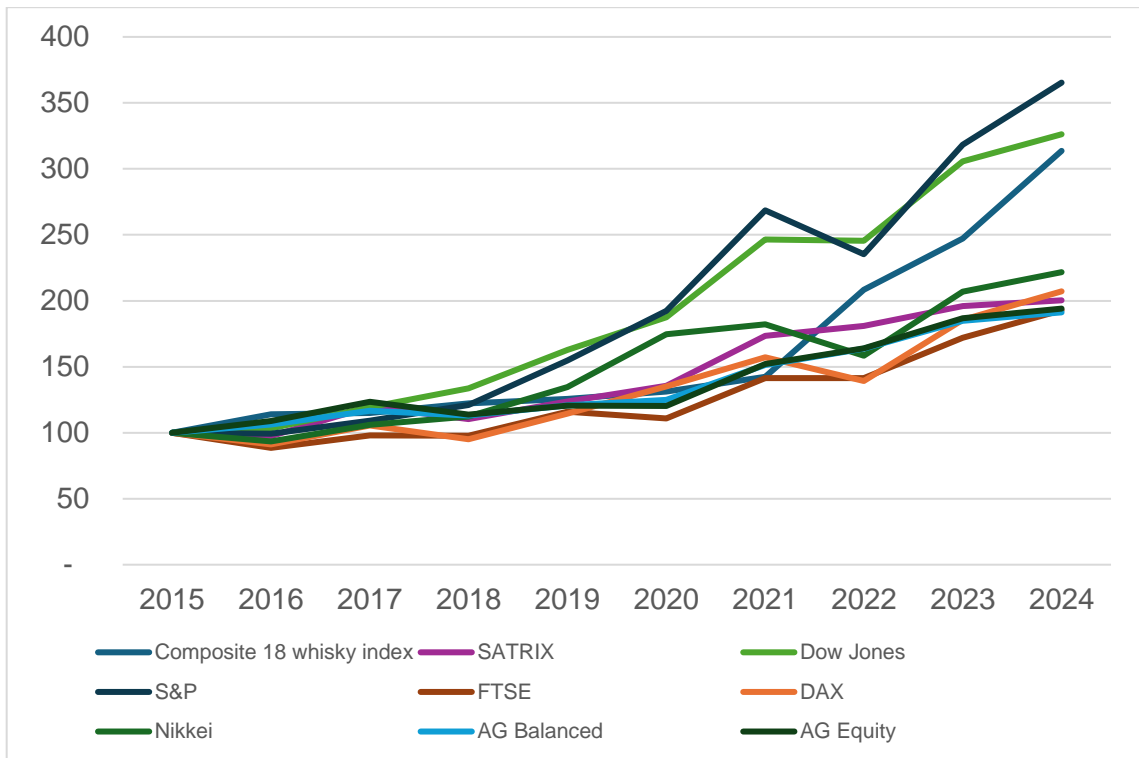


Figure 14: Composite 18 whisky index vs. equity indices and mutual funds

Note: The figure compares the returns of the Composite 18 whisky index to that of traditional equity indices and mutual funds from 2015 to 2024, based on the

researcher's own analysis derived from information obtained from Norman Goodfellas, WhiskyBrother, and Bloomberg. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

As seen in Figure 14, the Composite 18 whisky index has outperformed most equity indices and the selected South African mutual funds, with the exception of the US indices, which have seen superior performance since 2018. It should, however, be noted that the international indices have not been adjusted for exchange rate differences, which could provide a different picture. The South African index, the selected South African mutual funds, and other international indices have provided investors with annualised returns ranging between 8% and 10% since 2015. The Composite 18 whisky and United States indices have provided an additional 5% – 7% return.

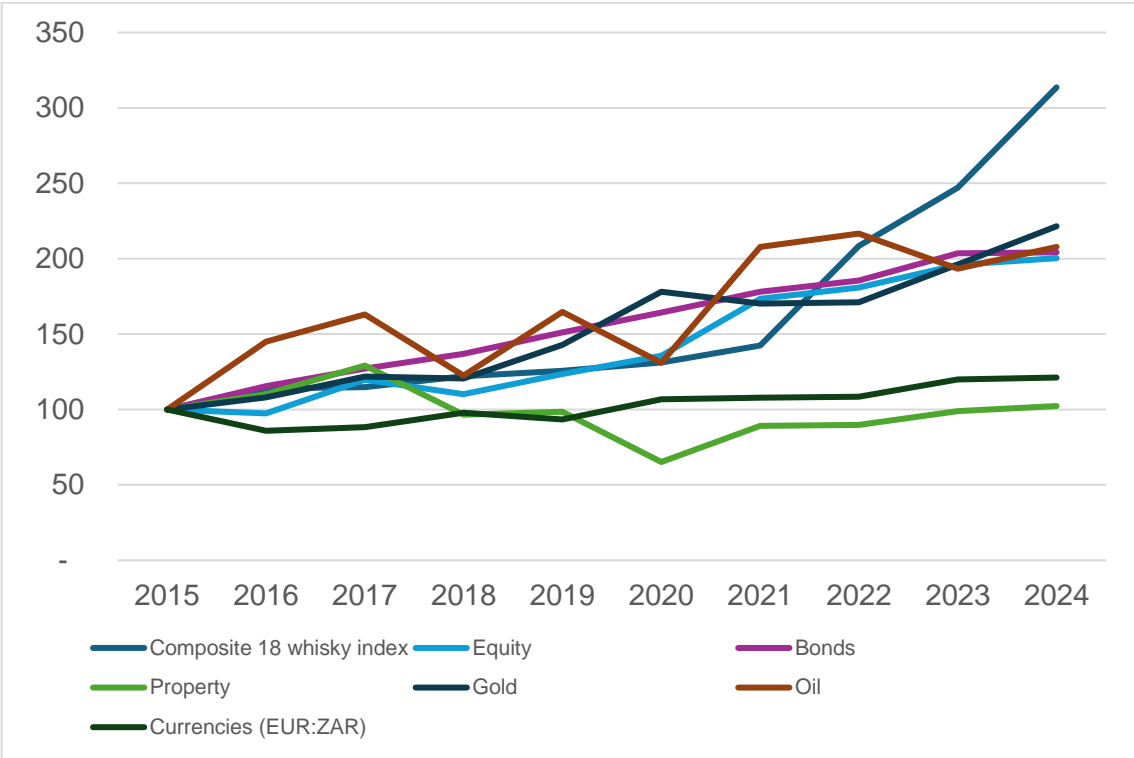


Figure 15: Whisky vs traditional asset classes

Note: The figure compares the returns of the Composite 18 whisky index to that of other traditional asset classes from 2015 to 2024, based on the researcher's own

analysis derived from information obtained from Norman Goodfellas, WhiskyBrother, and Bloomberg. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

Figure 15 shows that the Composite 18 whisky index has outperformed all other South African asset classes. Like the equity analysis above, most other traditional assets have provided investors with an annualised 8%–10% return, except property, which saw a couple of dips in 2018 and 2022 but has recovered to its 2015 position.

As shown in Figure 16, whisky outperformed all other collectables classes. Wine provided a compounded annualised return of 10%, and handbags a compounded annualised return of 9%, which aligns with most other traditional asset classes. All other collectables underperformed traditional asset classes over the measurement period. Diageo and Pernod Ricard also provided investors with a compounded annualised 5% and 6% return. Gold, oil, other collectables, and the listed liquor shares were again not adjusted to reflect currency movements. The Euro appreciated by an annualised 2% per year against the Rand since 2015.

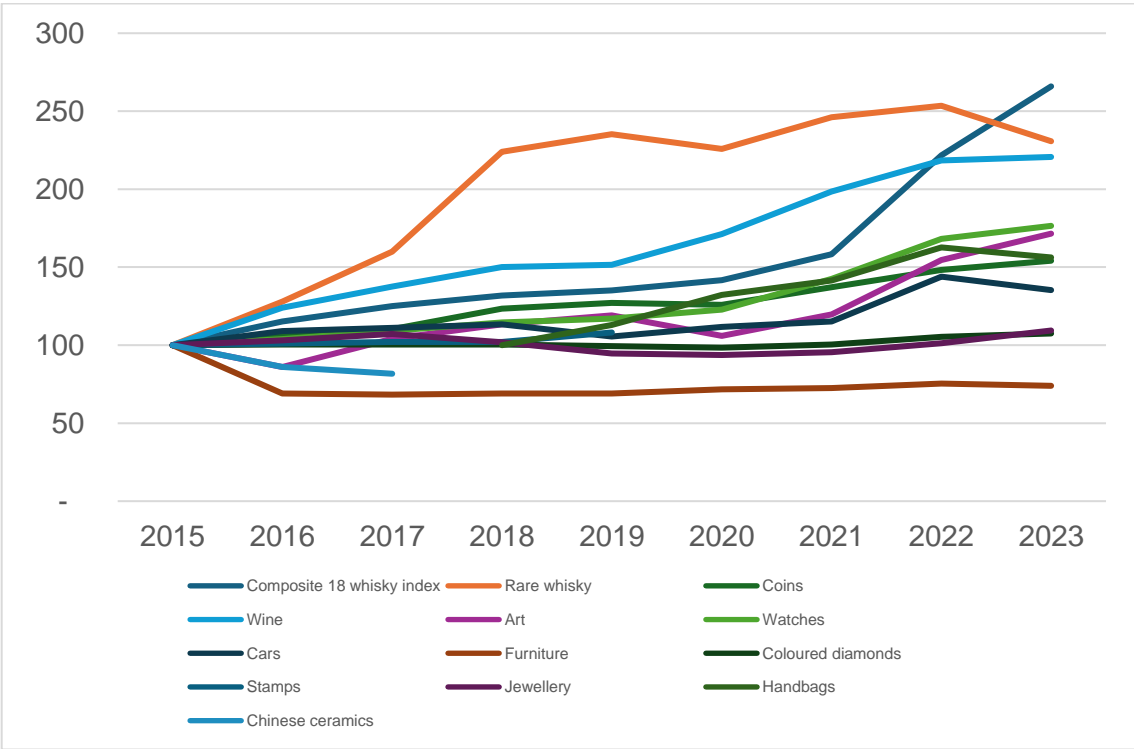


Figure 16: Whisky vs. other collectables

Note: The figure above shows the performance of whisky vs other collectables from 2015 to 2023, based on the researcher's own analysis derived from information obtained from Norman Goodfellas, WhiskyBrother, and the Knight Frank Wealth Reports from 2016 to 2024. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Rare Whisky 101, 2024; Knight Frank, 2016-2024)

The analysis above shows that rare and exclusive whisky outperformed most traditional asset classes up to 2022. The Composite 18 whisky index performance increased from 2022, and entry-level whisky tracked inflation. Looking at Figure 9, it can be seen that the number of whiskies traded at auction is declining (indicating a lesser demand for rare and exclusive whisky); looking at Figure 10 and Figure 11, it can be deduced that most of the whisky traded at auction represents 16 to 20-year-olds (therefore a greater demand for 18-year-olds which could explain recent price increases). Figure 12 also indicates that the discount of auction prices to retail prices is widening (therefore, suggesting that rare and exclusively whisky are not attracting historically high prices). This could explain why the Composite 18 whisky index outperformed the rare and exclusive indices since 2022.

As discussed in Chapter 2, the last factor to consider is that single malts only became premiumised at the end of the 1980s. Demand appears to be greater than supply, but with more distilleries opening up. The increase in supply volumes raises the question of whether an equilibrium has been reached, which could impact prices and whisky returns in the future.

5.4. Asset risk/volatility

Each asset's standard deviation was calculated using its annual price change to assess risk and volatility. Table 10 below shows the price movement of all the assets considered in the researcher's analysis.

Table 10: Risk/volatility of all asset classes based on annual asset price changes

Asset	2016	2017	2018	2019	2020	2021	2022	2023	2024
Composite 18 whisky index	14%	1%	6%	3%	5%	8%	46%	19%	27%
Knight Frank/RW 101	28%	25%	40%	5%	2%	9%	17%	-9%	0%
Whiskystats whisky index	14%	12%	7%	-2%	21%	27%	-4%	-18%	-3%
Bells/Johnnie Black entry-levels	0%	1%	2%	0%	2%	4%	8%	13%	9%
WIDMI	1%	2%	-2%	2%	-2%	0%	36%	0%	3%
WIDGI	-8%	-3%	-3%	0%	-5%	0%	18%	27%	-7%
SATRIX	-3%	23%	-8%	12%	10%	28%	4%	8%	2%
Dow Jones	3%	16%	12%	22%	15%	31%	0%	25%	7%
S&P	-1%	10%	11%	28%	24%	40%	-12%	35%	15%
FTSE	-11%	11%	0%	19%	-4%	27%	0%	22%	12%
DAX	-9%	16%	-10%	20%	18%	16%	-11%	33%	12%
Nikkei	-7%	13%	6%	20%	30%	4%	-13%	31%	7%
AG Balanced	6%	10%	-3%	7%	4%	21%	8%	13%	3%
AG Equity	9%	14%	-8%	6%	0%	27%	8%	14%	4%
ALBI (Bonds)	15%	10%	8%	10%	9%	8%	4%	10%	0%
SA Property Index	10%	17%	-25%	2%	-34%	37%	1%	10%	3%
EUR:RAND (Currency)	-14%	3%	11%	-5%	14%	1%	1%	11%	1%
Commodities (gold)	8%	13%	-1%	18%	25%	-4%	0%	15%	13%
Commodities (oil)	45%	12%	-25%	34%	-21%	59%	4%	-11%	7%
Coins	6%	4%	12%	3%	-1%	9%	8%	4%	N/A
Wine	24%	11%	9%	1%	13%	16%	10%	1%	N/A
Art	-14%	21%	9%	5%	-11%	13%	29%	11%	N/A
Watches	4%	5%	5%	2%	5%	16%	18%	5%	N/A
Cars	9%	2%	2%	-7%	6%	3%	25%	-6%	N/A
Furniture	-31%	-1%	1%	0%	4%	1%	4%	-2%	N/A
Coloured diamonds	0%	0%	0%	-1%	-1%	2%	5%	2%	N/A
Stamps	1%	1%	0%	6%					N/A
Jewellery	3%	4%	-5%	-7%	-1%	2%	6%	8%	N/A
Handbags				13%	17%	7%	15%	-4%	N/A
Chinese ceramics	-14%	-5%							N/A

Note: The figure shows the risk/volatility based on annual asset price changes from 2016 to 2024 for all assets assessed. The table was prepared using my analysis, derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data, whisky index websites, Bloomberg for traditional asset info, and the Knight Frank Wealth Report for collectables. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Rare Whisky 101, 2024; Whiskystats, 2024; WhiskyInvestDirect, 2024; Bloomberg, 2024; Knight Frank, 2016-2024)

Using the price changes, each asset's standard deviation (risk) and beta (correlation to the SATRIX 40) were calculated and are summarised in Table 11. First, the price change for each asset over the various periods was calculated. Then, the standard deviation was calculated by measuring the annual price changes as a percentage difference to the mean (refer to the list of formulas for the standard deviation calculation formula).

Beta is a statistic that measures the expected increase or decrease of an individual asset price in proportion to movements of the stock market as a whole, in this instance, the SATRIX. The covariance of the assets in relation to the SATRIX was divided by the variance of the SATRIX (refer to the list of formulas for the Beta calculation formula).

Table 11: Standard deviation and betas of all assets

Assets	Standard deviation	Beta relative to Satrix 40
Composite 18 whisky index	15%	-0.42
Knight Frank/RW 101	16%	-0.47
Whiskystats whisky index	14%	0.45
Bells/Johnnie Black entry index	5%	-0.02
WIDMI	12%	-0.11
WIDGI	12%	0.05
SATRIX	11%	1.00
Dow Jones	10%	0.61
S&P	17%	0.78
FTSE	13%	0.76
DAX	16%	0.82
Nikkei	15%	0.34
AG Balanced	7%	0.48
AG Equity	10%	0.67
ALBI (Bonds)	4%	0.03
SA Property Index	21%	1.15
EUR: RAND (Currency)	9%	0.02

Commodities (gold)	10%	0.03
Commodities (oil)	29%	1.20
Coins	4%	-0.10
Wine	8%	-0.04
Art	15%	0.43
Watches	6%	0.15
Cars	10%	-0.21
Furniture	12%	0.37
Coloured diamonds	2%	0.00
Stamps	3%	0.11
Jewellery	5%	0.09
Handbags	8%	-0.09
Chinese ceramics	6%	0.88

Note: The table shows the standard deviation and betas of all assets assessed using the researcher's own analysis, derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data, whisky index websites, Bloomberg for traditional asset information, and Knight Frank's Wealth Report for collectables information. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Rare Whisky 101, 2024; Whiskystats, 2024; WhiskyInvestDirect, 2024; Bloomberg, 2024; Knight-Frank, 2016-2024)

Property and oil have the most significant volatility, with a 21% and 29% standard deviation, respectively. Bonds with a volatility of 4% have the lowest risk, followed by some of the collectables. In contrast to the expected outcome after the literature review in Chapter 2, whisky has relatively high volatility. However, the betas of whisky and most other collectables indicate that it has very little correlation to price changes relative to the SATRIX 40 (South African equity index) and could, therefore, positively impact volatility if included with a portfolio of higher beta assets.

5.5. Risk-weighted returns

The Sharpe Ratio measures return relative to risk. It is calculated by dividing the assets' annualised returns by their standard deviation. A risk-free rate was ignored because the analysis attempts to measure all assets' risk-weighted returns, *ceteris paribus*. Table 12 below summarises the Sharpe Ratios of all the assets analysed. It was ranked from the highest Sharpe Ratio to the lowest to understand which asset or asset classes perform best.

Table 12: Sharpe Ratio of assets

Asset	Annualised returns	Standard deviation	Sharpe ratio
ALBI (Bonds)	9%	4%	2.1
Dow Jones	15%	10%	1.4
Coins	6%	4%	1.4
Wine	10%	8%	1.4
Watches	7%	6%	1.2
AG Balanced	8%	7%	1.2
Handbags	9%	8%	1.1
Commodities (gold)	10%	10%	1.0
Composite 18 whisky index	14%	15%	1.0
S&P	16%	17%	1.0
Bells/Johnnie Black entry-levels	4%	5%	0.9
AG Equity	8%	10%	0.8
Knight Frank/RW 101	13%	16%	0.8
SATRIX	9%	11%	0.7
Stamps	2%	3%	0.7
Nikkei	10%	15%	0.7
FTSE	8%	13%	0.6
DAX	9%	16%	0.6
Art	7%	15%	0.5
Coloured diamonds	1%	2%	0.5
Whiskystats whisky index	5%	14%	0.4
Cars	4%	10%	0.4

WIDMI	4%	12%	0.4
Commodities (oil)	9%	29%	0.3
EUR: RAND (Currency)	2%	9%	0.3
Jewellery	1%	5%	0.2
WIDGI	2%	12%	0.1
SA Property Index	0%	21%	0.0
Furniture	-4%	12%	-0.3
Chinese ceramics	-10%	6%	-1.5

Note: The table shows the Sharpe Ratio of all assessed assets, using the researcher's own analysis, derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data, whisky index websites, Bloomberg for traditional asset information, and Knight Frank's Wealth Reports for collectables information. The Sharpe Ratio is calculated by dividing the annualised returns by the standard deviation of each asset. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Rare Whisky 101, 2024; Whiskystats, 2024; WhiskyInvestDirect, 2024; Bloomberg, 2024; Knight Frank, 2016-2024)

SA bonds provided the best risk-weighted return in assessing specific assets and asset classes. This is due to the high-interest rate environment in South Africa and the low volatility of bonds in general. The Dow Jones has seen superior performance since 2018 and was, therefore, the second best-performing asset class, even before adjusting for exchange rate differentials. Coins, wine, watches, handbags, and the Composite 18 whisky index (all collectables), although lacking some of the traditional assets and asset classes in returns, are all in the top ten based on the Sharpe Ratio due to their lower volatility, which supports the findings in the literature review in Chapter 2 that indicates that collectables are suitable alternative investments to include in an investment portfolio due to their low volatility and low correlation to that of traditional assets. It should also be noted that entry-level whisky has very little volatility although it has a low return.

5.6. Impact of including whisky in a portfolio and Markowitz's Efficient Frontier

The average returns, standard deviation, and Sharpe Ratios were calculated to assess the impact of including whisky in a portfolio of traditional investments. The averages and risk-weighted averages metrics align with that of the AG Balanced Fund as per Table 12. Therefore, the researcher assumed it to be reflective of a diversified South African investment portfolio. As seen in Table 13 below, all metrics increase marginally if the Composite 18 whisky index is included when calculating average or weighted average metrics. Returns increased, but so did risk/volatility.

Table 13: Averages and weighted averages of assets

	Averages with whisky				Averages without whisky			
	Sharpe	Return	Std. dev	Weighting	Sharpe	Return	Std. dev	Weighting
SATRIX	0.7	9%	11%	30%	0.7	9%	11%	15%
ALBI (Bonds)	2.1	9%	4%	15%	2.1	9%	4%	15%
SA Property Index	0.0	0%	21%	5%	0.0	0%	21%	5%
Commodities (gold)	1.0	10%	10%	5%	1.0	10%	10%	5%
Dow Jones	1.4	15%	10%	45%	1.4	15%	10%	45%
Composite 19 whisky index	-	-	-	-	1.0	14%	15%	2.5%/15%
Total				100%				100%
Average	0.9	7%	9%		1.0	9%	12%	
Weighted averages	1.1	11%	10%		1.1	11%/1%	10%/1%	

Note: The table shows the averages and weighted averages of a combination of assets if Regulation 28 weighting requirements were used. It should be noted that the table shows the results before adjusting for portfolio diversification. The table was prepared using the researcher's own analysis derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data and Bloomberg for traditional asset info. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

As discussed in Chapter 4, three hypothetical portfolios were created to assess the impact of diversification and Markowitz's Efficient Frontier. Tables 14 to 16 detail the three hypothetical portfolios.

Table 14: Hypothetical reconstructed Portfolio 1

Reconstructed	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SATRIX	30	29	36	33	37	41	52	54	59	60
ALBI (Bonds)	15	17	19	21	23	25	27	28	31	31
SA Property Index	5	6	6	5	5	3	4	4	5	5
Commodities (gold)	5	5	6	6	7	9	9	9	10	11
Dow Jones	45	46	54	60	73	84	111	110	138	147
Composite 18 whisky index	-	-	-	-	-	-	-	-	-	-
Portfolio Value	100	104	121	125	145	162	203	206	242	254
Change in portfolio value		4%	17%	3%	16%	12%	25%	1%	18%	5%

Note: The table shows the weighted returns of assets, weighted according to Regulation 28 requirements, included in a hypothetically reconstructed portfolio based on the researcher's own analysis derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data and Bloomberg for traditional asset info. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

Table 15: Hypothetical reconstructed Portfolio 2 (whisky 2.5%)

Reconstructed	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SATRIX	28	27	33	30	34	37	48	50	54	55
ALBI (Bonds)	15	17	19	21	23	25	27	28	31	31
SA Property Index	5	6	6	5	5	3	4	4	5	5
Commodities (gold)	5	5	6	6	7	9	9	9	10	11
Dow Jones	45	46	54	60	73	84	111	110	138	147
Composite 18 whisky index	3	3	3	3	3	3	4	5	6	8
Portfolio Value	100	104	121	125	145	162	202	206	243	257
Change in portfolio value		4%	16%	3%	16%	11%	25%	2%	18%	6%

Note: The table shows the weighted returns of assets, after including 2.5% exposure to the Composite 18 whisky index, weighted according to Regulation 28 requirements, included in a hypothetically reconstructed portfolio based on the researcher's own analysis derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data and Bloomberg for traditional asset info. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

Table 16: Hypothetical reconstructed Portfolio 3 (whisky 15%)

Reconstructed	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SATRIX	15	15	18	17	19	20	26	27	29	30
ALBI (Bonds)	15	17	19	21	23	25	27	28	31	31
SA Property Index	5	6	6	5	5	3	4	4	5	5
Commodities (gold)	5	5	6	6	7	9	9	9	10	11
Dow Jones	45	46	54	60	73	84	111	110	138	147
Composite 18 whisky index	15	17	17	18	19	20	21	31	37	47
Portfolio Value	100	106	121	126	145	161	198	210	249	271
Change in portfolio value		6%	13%	5%	15%	11%	23%	6%	19%	9%

Note: The table shows the weighted returns of assets after including 15% exposure to the Composite 18 whisky index, where Regulation 28 requirements were ignored and assumed that investors would invest through a hedge fund or their portfolio, including in a hypothetically reconstructed portfolio based on the researcher's own analysis derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data and Bloomberg for traditional asset info. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

Table 17: Reconstructed portfolio returns, volatility, and Sharpe Ratio

	Portfolio 1 (no whisky)	Portfolio 2 (2.5% whisky)	Portfolio 3 (15% whisky)
Return	10.9%	11.0%	11.7%
Volatility (standard deviation)	8.3%	7.9%	6.2%
Sharpe Ratio	1.3	1.4	1.9

Note: The table shows the hypothetically reconstructed portfolio returns, volatility, and Sharpe Ratios for Portfolio 1, with no whisky exposure; Portfolio 2, with 2.5% whisky exposure; and Portfolio 3, with 15% whisky exposure. The table was prepared using the researcher's own analysis derived from information obtained from Norman Goodfellas and WhiskyBrother for whisky data and Bloomberg for traditional asset info. Sources: (Norman Goodfellas, 2024; WhiskyBrother, 2024; Bloomberg, 2024)

The portfolio returns, standard deviation, and Sharpe Ratios were calculated for the portfolios as a collective rather than using averages or weighted averages. As seen in Table 17, Portfolio 1's returns are consistent with the weighted average returns of the individual assets in Table 13, but the risk (volatility) reduced, and therefore, the risk-weighted return, i.e., the Sharpe Ratio, increased, illustrating the impact of diversification. By including whisky in the hypothetical portfolios, Portfolio 2 (2.5% whisky included) and Portfolio 3 (15% whisky included), it can be seen that the return, risk, and risk-weighted return metrics improved even further. Portfolio returns increased from 10.9% to 11.0% and 11.7%, respectively; volatility reduced from 8.3% to 7.9% and 6.2%, respectively; and the Sharpe Ratio increased from 1.3 to 1.4 and 1.9, respectively. These outputs indicate that by including whisky in a portfolio of traditional assets, based on the performance of the asset classes over the analysis period, a traditional portfolio's risk-weighted return could be increased.

5.7. Conclusion

Chapter 5 presents a detailed empirical analysis of whisky as an alternative investment, particularly focusing on its returns, risk, and potential portfolio diversification benefits. The analysis begins with exploring the dataset used, which includes a Composite 18 whisky index developed from ten of the best-selling 18-year-old Scotch whiskies in South Africa. This index, along with data on entry-level blends like Bells and Johnnie Walker Black Label, rare and exclusive whiskies from the Whisky 101 APEX1000 Index, and the WhiskyInvestDirect Malt and Grain indices, forms the basis of the comparative analysis with traditional asset classes and other collectables.

The chapter demonstrates that whisky has provided significant returns over the period analysed, outperforming the majority of the asset classes. Rare and exclusive whisky saw superior performance up to 2020, outperforming all other asset classes. Rare and exclusive whisky volumes and prices have, however, seen a slowdown from 2023. The Composite 18 whisky index has seen an increase in value over the past three years, driven primarily by price increases of the discontinued 18-year-olds included in the index. Entry-level whisky tracked inflationary returns.

The second part of the chapter delves into the risk and volatility of whisky investments. Using standard deviation as a proxy for volatility, it was found that whisky exhibits relatively higher volatility than other collectables but maintains a very low correlation with traditional assets. This low correlation underscores whisky's potential role as a diversification tool in an investment portfolio. The analysis also revealed that whisky's volatility is comparable to that of commodities like gold and oil. Still, its returns have been more stable when compared to other high-risk assets.

The third part of the chapter focuses on risk-weighted returns, which are measured using the Sharpe Ratio. The Sharpe Ratio calculation for the Composite 18 Whisky Index demonstrates that whisky provides a competitive risk-adjusted return compared to traditional asset classes. Though whisky's volatility is higher, the returns have historically compensated for this risk.

Finally, the analysis of portfolio diversification using Markowitz's Efficient Frontier suggests that including whisky in a portfolio of traditional investments can enhance the portfolio's risk-weighted returns. The research created three hypothetical portfolios: one without whisky, another with 2.5% whisky exposure, and a third with 15%. The results showed that adding whisky to these portfolios improved both returns and risk-weighted metrics, with the Sharpe Ratio increasing as whisky exposure increased. The analysis indicates that for South African investors, whisky can serve as a valuable alternative investment class by reducing portfolio volatility and enhancing risk-adjusted returns.

In conclusion, Chapter 5 provides robust empirical support for whisky's inclusion in a diversified investment portfolio, particularly for South African investors seeking to optimise risk-weighted returns. While whisky has higher volatility compared to some traditional assets, its low correlation and strong returns make it a promising diversification tool. The findings suggest that including whisky in a portfolio can result in better risk-adjusted returns. This supports the broader hypothesis that alternative investments, such as whisky, can enhance traditional investment strategies.

6. CHAPTER 6: DISCUSSION

6.1. *Introduction*

This chapter discusses the findings from the preceding chapter relative to the literature reviewed. It compares and contrasts the research findings with the literature reviewed in Chapter 2.

6.2. *Discussion of the research question*

The research was conducted to answer the research question of whether whisky can provide a sufficient return and greater diversification mechanism and whether, if introduced into a portfolio of traditional investments, it can ensure a better risk-weighted return for South African Investors than that of only traditional portfolios.

6.3. *Recap of conclusions of the literature review*

Chapter 2 provided a theoretical foundation by exploring literature on alternative investments, particularly collectables, specifically on whisky. The chapter reviewed key models of portfolio theory, such as Markowitz's Efficient Frontier and the Sharpe Ratio, to assess risk and return trade-offs. Markowitz's theory was instrumental in framing whisky as an asset that could potentially reduce portfolio volatility while improving risk-adjusted returns through diversification.

The chapter also explored the broader category of collectables, such as art, wine, and classic cars, which have been utilised as alternative investments to diversify portfolios. Whisky, as part of this collectables category, was shown to possess unique characteristics that could appeal to investors, including its low correlation with traditional financial markets. Moreover, due to scarcity and increasing global demand, the literature identified that rare and exclusive whisky had demonstrated substantial returns in the past decade.

Historical and macroeconomic factors, such as changes in whisky production and exports, were also discussed as important drivers of whisky's performance. Finally, the chapter concluded with a discussion of the volatility associated with whisky investments, particularly in auction markets where prices can fluctuate significantly.

6.4. *Recap of the conclusions of the analysis and results*

Chapter 5 presented the empirical analysis, focused on the performance of whisky as an alternative investment in comparison to traditional assets. Using the Composite 18 Whisky Index, the chapter measured the returns and volatility of whisky and compared them to other asset classes, such as equities, bonds, commodities and mutual funds.

One of the key findings was that whisky, particularly rare and exclusive bottles, had indeed performed well over the studied period, with significant returns. This is consistent with the literature reviewed in Chapter 2, where whisky was highlighted as an alternative asset class with the potential for high returns. However, unlike other collectables, whisky showed slightly higher volatility. Nonetheless, the empirical results indicated that whisky's low correlation with traditional assets could offer diversification benefits, thereby reducing overall portfolio risk, a key concept in Markowitz's portfolio theory.

Additionally, the chapter applied Markowitz's Efficient Frontier model to demonstrate how including whisky in a portfolio could improve its risk-adjusted returns. Three hypothetical portfolios were constructed, one Regulation 28 compliant portfolio with no whisky allocation and two with whisky allocated at different weights (2.5% and 15%), and the results showed that whisky enhanced portfolio performance by increasing returns and decreasing volatility, which aligns with the theoretical expectation outlined in Chapter 2.

6.5. *Discussion comparing the literature review and analysis*

6.5.1. *Alignment with the literature*

The findings in Chapter 5 largely align with the literature reviewed in Chapter 2, especially in terms of the diversification benefits that whisky can provide. Both chapters agree that whisky has a low correlation with traditional assets, making it an effective tool for reducing overall portfolio risk. Furthermore, the empirical results confirmed the literature's assertion that whisky has the potential for substantial returns, particularly rarer whiskies that have appreciated significantly over the past decade.

The concept of whisky's low volatility, mentioned in Chapter 2, also found empirical support in Chapter 5. Although whisky's volatility was higher compared to some traditional assets, it was still lower than other high-risk investments like certain equities and commodities. This finding is crucial as it suggests that whisky, when added to a portfolio, can enhance risk-weighted returns by providing stability during market downturns – a notion supported by literature on collectables as well.

Another area of alignment is the role of market dynamics such as supply constraints and increasing demand. Both chapters emphasised that these factors drive the performance of whisky as an investment. For example, Chapter 5's analysis of auction prices and supply-side limitations confirmed the theoretical perspectives outlined in Chapter 2 regarding how scarcity and brand prestige influence whisky's value.

6.5.2. Differences from the literature

While the findings align with much of the literature, some notable differences exist. Chapter 2 presented whisky as a relatively low-volatility asset in comparison to other collectables. However, the empirical analysis in Chapter 5 indicated that whisky's volatility, particularly in auction markets, could be higher than initially suggested.

Additionally, the literature in Chapter 2 did not provide an extensive analysis of the risk-weighted returns of whisky relative to traditional financial assets. Chapter 5, however, filled this gap by empirically calculating the Sharpe Ratio of whisky and comparing it to other assets. The results showed that whisky's Sharpe Ratio, while competitive, was not always superior to traditional assets like bonds or equities. This finding diverges from the literature's more optimistic view of collectables (and, by association, whisky) as a consistently superior alternative asset.

6.5.3. Conclusion

Whisky presents a compelling case as an alternative investment, particularly when analysed through four key lenses: returns, risk, risk-adjusted returns, and its impact on portfolio performance when included in a diversified portfolio.

Returns: Empirical evidence from Chapter 5 shows that whisky has delivered significant returns over the past decade, aligning with the literature in Chapter 2. The RW 101 index and Composite 18 whisky index outperformed the majority of traditional assets. This high return potential, driven by factors like rarity, brand prestige, and increasing global demand, supports the literature's claim that whisky can provide substantial capital appreciation.

Risk: While whisky offers impressive returns, the volatility associated with its pricing, especially in auction markets, introduces higher risk compared to other collectables. Chapter 2 suggested that whisky has lower volatility relative to traditional markets. Still, Chapter 5 revealed that this depends heavily on the type of whisky and market conditions. However, the overall risk of whisky remains manageable, particularly for investors seeking a hedge against traditional financial markets.

Risk-adjusted Returns: When considering risk-adjusted returns, whisky performs well but is not consistently superior to traditional assets, as seen through the Sharpe Ratio analysis in Chapter 5. This aligns with the literature, which suggests that while whisky can enhance risk-weighted returns, it may not always outperform other financial assets in every market cycle. However, its low correlation with traditional markets makes it a valuable asset for improving a portfolio's overall risk-adjusted performance, especially during periods of market instability.

Portfolio Performance: One of the strongest arguments for including whisky in a diversified portfolio comes from the portfolio performance analysis in Chapter 5. The empirical data supports the literature from Chapter 2, showing that whisky can improve portfolio returns through diversification. When added to a portfolio in small allocations (2.5% to 15%), whisky can increase the Sharpe Ratio, reduce volatility, and enhance overall portfolio stability. This confirms the literature's theory that alternative assets like whisky offer diversification benefits, particularly due to their low correlation with traditional financial markets.

In conclusion, whisky should be considered a valuable alternative investment, particularly for investors seeking to diversify their portfolios and improve risk-adjusted returns. Although volatility might be slightly higher than other assets, the

risk-adjusted return and diversification benefits make whisky a strong candidate for inclusion in a balanced investment strategy, as supported by the literature and the empirical analysis.

6.6. Outcome of the research question

The research experiment found that whisky could provide sufficient returns compared to traditional investment assets; if included in a portfolio of traditional assets, it could provide a greater diversification tool and, therefore, a greater risk-weighted return.

The hypothesis is thus confirmed: The introduction of whisky into a traditional asset portfolio can increase a South African investor's risk-weighted return.

7. CHAPTER 7: CONCLUSIONS

7.1. Introduction

This final chapter concludes with the principal conclusions of the research, which demonstrate the fulfilment of the research objective of understanding whether whisky, as an alternative investment, could increase South African investors' risk-weighted portfolio returns if included in a portfolio of traditional assets. The chapter further discusses the reasons for undertaking the research, the summary findings the research contributions.

The chapter draws to a close by identifying the study's limitations and making recommendations for future studies.

7.2. Reason for undertaking the research

The reason for undertaking this research was to understand if whisky could provide investors with sufficient returns. The research further attempts to analyse the risk profile and volatility of whisky, as rational investors require a greater return for more volatile and risky assets. Understanding both the return and the risk of whisky (relative to other asset classes) could then be assessed if whisky could provide South African investors with a better risk-weighted return if included in a portfolio of traditional assets. This study may give investors, wealth managers, hedge fund managers, and assets managers the necessary information to make a more informed decision in assessing whether they should include whisky in their portfolios.

7.3. Principal conclusions

The research concludes that including whisky as an alternative investment in a portfolio of traditional assets can enhance a South African investor's risk-weighted return. This conclusion is supported by the findings that whisky, particularly in the form of the Composite 18 whisky index, demonstrated competitive returns in comparison to traditional asset classes like equities, bonds, property, and commodities over the research period. While whisky's volatility was higher than some traditional investments, its low correlation with these assets provided substantial diversification benefits. Markowitz's Efficient Frontier model illustrated that portfolios that included a modest allocation of whisky (2.5%) improved their

Sharpe Ratios, indicating better risk-adjusted returns. The overall risk-adjusted returns were further enhanced when the whisky allocation was increased to 15%. This suggests that while whisky may introduce higher volatility, the diversification benefits should outweigh the risks for South African investors who seek to enhance their portfolios' performance.

Moreover, whisky's relatively low correlation with other assets, such as equities and bonds, reduces overall portfolio risk, making it a viable alternative investment. However, it is important to consider the limitations of this study, such as the illiquidity of whisky and the challenge of accurate pricing, which may impact the feasibility of the widespread adoption of whisky as a mainstream investment class. Nevertheless, the findings suggest that whisky holds promise as a niche investment that, when carefully managed, can contribute positively to a diversified portfolio.

7.4. Research contributions

The research contributes to the literature on collectables (specifically whisky) as an alternative investment. The research makes the following theoretical contributions:

- Investment in whisky is a relatively new theoretical concept and lacks empirical evidence. Although enthusiasts, financial magazines, and financial advisory organisations have covered the topic, it lacked academic research to prove its viability. The study advances knowledge of the topic and develops empirical evidence.
- To date, the limited information that supported whisky investment was based on returns of rare and exclusive whisky, mainly through whisky indices. The research assessed more commercial investment opportunities by analysing more commercially available whisky. It was found that whisky could give investors a suitable return, depending on their risk appetite. If investors were risk-averse and only wanted to protect their capital, they could include entry-level whisky, which has a low return but provides an inflation-adjusted return with very little volatility. Investors with a higher risk tolerance could include the Composite Whisky 18 index or rare and exclusive whisky in their portfolio, providing them with higher returns. Therefore, this study contributes to

academic literature and business, illustrating that whisky could provide suitable returns.

- Further, in analysing the proposition for whisky investment, risk and risk-weighted returns were assessed. In line with the academic literature, it was confirmed that some collectables (specifically whisky) have lower volatility and correlation to traditional assets. Including it in a portfolio of traditional assets would increase investors' risk-weighted return. This supports previous academic findings on collectable's risk and is a fundamental finding for investors looking to optimise and diversify their portfolios in an attempt to generate greater risk-weighted returns.
- The study further provides South African investors with hypothetical examples (Portfolio 2 and 3) of what the potential impact (or improvement) could be if whisky were to be included in their traditional investment portfolios. Therefore, this study provides investors with another potential alternative diversification asset to consider in an attempt to optimise their risk-weighted returns.

7.5. Limitations

The approach adopted in this study presented various limitations. Firstly, access to information. The data for 18-year-old whisky could only be obtained from selected South African whisky retailers, and access to the information was limited. This information was vital for this study which could not have been completed without it. The information obtained contained most of the required data. However, a few whiskies included in the Composite 18 whisky index were not sold annually, and some prices had to be estimated based on the price trajectory. If prices were missing in 2024, prices were obtained from online retail shops and websites (which could not be done for prior years). The whisky indices data obtained were only presented as line graphs and not in a table with yearly values. Therefore, the indices had to be visually extrapolated.

Secondly, the measurement period. Most of the whisky data could also only be obtained for eight to nine years as whisky as an investable asset class has only been drawing attention for a limited period and has only been covered over a short period. It should be noted that whisky prices and trends have changed substantially over the past three decades. Even if a more extended analysis period had been included, it

might not have reflected current market changes. The limitation should, therefore, be noted, but more recent market changes should also be considered.

Thirdly, the measurement instrument. The Composite 18 whisky index was subject to researcher bias and, therefore, sensitive to the choice of items in the index and might not reflect the total market.

Fourthly, the measurement unit. The analysis was based on nominal returns and did not include additional logistical, storage, certification, maintenance, commissions, taxes, and inflation costs, which could have impacted the analysis. The study should, therefore, be seen as indicative, and potential investors should consider the impact of these costs on their investment before considering investing in whisky.

Fifth asset allocation and portfolio analysis. The analysis was based on historical information and assumed normal distributions. Past events might not reflect future events, and readers and potential investors should consider this.

Lastly, the study did not consider what factors specific to whisky changed prices and returns. Notably, location of production (Scotch vs. other global regions or even areas within Scotland), age, scarcity, brand, and discontinuation of specific ranges severely impacted prices. These underlying factors remain unexplained and could potentially provide future research opportunities.

7.6. Recommendation for future studies

The research indicates that based on the historical analyses, whisky could be a viable alternative investment asset. However, there are underlying value drivers that should be better understood. Future research could, therefore, consider factors that specifically impact whisky price changes, which would hold great value to investors who are investing or considering investing in whisky.

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Annexure 1 – Map of Scotch whisky distilleries



MAP OF SCOTCH WHISKY DISTILLERIES

#DISCOVERSCOTCH

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DISCOVER THE WORLD OF SCOTCH WHISKY

Many countries produce whisky, but Scotch Whisky can only be made in Scotland. By law, Scotch Whisky must be distilled and matured in Scotland for a minimum of 3 years in oak casks, and made from just three natural ingredients - water, cereals and yeast - at distilleries located across the country.

Scotland is home to over 150 malt and grain distilleries, making it the greatest concentration of whisky production in the world. Many of the Scotch Whisky distilleries featured on this map bottle some of their production for sale as Single Malt (i.e. the product of one distillery) or Single Grain Whisky.

The majority of Scotch Whisky is consumed as Blended Scotch Whisky. This means as many as 60 of the different Single Malt and Single Grain Whiskies are blended together, ensuring that the individual Scotch Whiskies harmonise with one another and the quality and flavour of each individual blend remains constant over time.

Malt whisky is classified in one of five main categories - Highland, Lowland, Speyside, Islay and Campbeltown - according to the geographical location of the distillery in which it is made. In many ways, the geography and climate of each region influences the character of the whisky produced there.

HIGHLAND MALT

The Highland region is geographically the largest Scotch Whisky producing region in Scotland, covering 45% of the country's land area.

As a group, Highland distilleries are renowned for their vibrant and dry character, with a range of flavours from peaty to honey and pine. The majority of Highland whisky is produced in the Highlands, but some distilleries are located in the Lowlands and Speyside.

16. BUCHANAN	30. GLENROSE
17. ADAMSON	31. GLENROSE MALT
18. ARNOLD	32. GLENROSE MALT
19. BUCHANAN	33. GLENROSE MALT
20. BUCHANAN'S	34. GLENROSE MALT
21. BUCHANAN'S	35. GLENROSE MALT
22. BUCHANAN'S	36. GLENROSE MALT
23. BUCHANAN'S	37. GLENROSE MALT
24. BUCHANAN'S	38. GLENROSE MALT
25. BUCHANAN'S	39. GLENROSE MALT
26. BUCHANAN'S	40. GLENROSE MALT
27. BUCHANAN'S	41. GLENROSE MALT
28. BUCHANAN'S	42. GLENROSE MALT
29. BUCHANAN'S	43. GLENROSE MALT
30. BUCHANAN'S	44. GLENROSE MALT
31. BUCHANAN'S	45. GLENROSE MALT
32. BUCHANAN'S	46. GLENROSE MALT
33. BUCHANAN'S	47. GLENROSE MALT
34. BUCHANAN'S	48. GLENROSE MALT
35. BUCHANAN'S	49. GLENROSE MALT
36. BUCHANAN'S	50. GLENROSE MALT
37. BUCHANAN'S	51. GLENROSE MALT
38. BUCHANAN'S	52. GLENROSE MALT
39. BUCHANAN'S	53. GLENROSE MALT
40. BUCHANAN'S	54. GLENROSE MALT
41. BUCHANAN'S	55. GLENROSE MALT
42. BUCHANAN'S	56. GLENROSE MALT
43. BUCHANAN'S	57. GLENROSE MALT
44. BUCHANAN'S	58. GLENROSE MALT
45. BUCHANAN'S	59. GLENROSE MALT
46. BUCHANAN'S	60. GLENROSE MALT

ISLAY MALT

Islay is one of the most remote of the Scottish whisky producing regions, with a population of just 10,000 people. The island's rugged coastline and dramatic scenery are reflected in the character of the whisky produced there.

Islay is famous for its peaty, smoky whisky, which is produced from barley grown on the island. The peat is dried and used to smoke the malted barley, giving the whisky its characteristic flavour.

1. ARNOLD	11. GLENROSE
2. BUCHANAN	12. GLENROSE MALT
3. BUCHANAN'S	13. GLENROSE MALT
4. BUCHANAN'S	14. GLENROSE MALT
5. BUCHANAN'S	15. GLENROSE MALT
6. BUCHANAN'S	16. GLENROSE MALT
7. BUCHANAN'S	17. GLENROSE MALT
8. BUCHANAN'S	18. GLENROSE MALT
9. BUCHANAN'S	19. GLENROSE MALT
10. BUCHANAN'S	20. GLENROSE MALT

CAMPBELTOWN MALT

Campbeltown is one of the most remote of the Scottish whisky producing regions, with a population of just 10,000 people. The island's rugged coastline and dramatic scenery are reflected in the character of the whisky produced there.

Campbeltown is famous for its peaty, smoky whisky, which is produced from barley grown on the island. The peat is dried and used to smoke the malted barley, giving the whisky its characteristic flavour.

11. GLENROSE	21. GLENROSE MALT
12. GLENROSE MALT	22. GLENROSE MALT
13. GLENROSE MALT	23. GLENROSE MALT
14. GLENROSE MALT	24. GLENROSE MALT
15. GLENROSE MALT	25. GLENROSE MALT
16. GLENROSE MALT	26. GLENROSE MALT
17. GLENROSE MALT	27. GLENROSE MALT
18. GLENROSE MALT	28. GLENROSE MALT
19. GLENROSE MALT	29. GLENROSE MALT
20. GLENROSE MALT	30. GLENROSE MALT

LOWLAND MALT

The Lowland region is geographically the smallest Scotch Whisky producing region in Scotland, covering just 10% of the country's land area. The region is known for its light, clean whisky, which is produced from barley grown in the Lowlands.

The Lowland region is home to many of the most famous Scotch Whisky distilleries, including James Watson & Co., Johnnie Walker, and The Glenlivet.

101. JAMES WATSON & CO.	102. JOHNIE WALKER
103. THE GLENLIVET	104. THE GLENLIVET
105. THE GLENLIVET	106. THE GLENLIVET
107. THE GLENLIVET	108. THE GLENLIVET
109. THE GLENLIVET	110. THE GLENLIVET
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163. THE GLENLIVET	164. THE GLENLIVET
165. THE GLENLIVET	166. THE GLENLIVET
167. THE GLENLIVET	168. THE GLENLIVET
169. THE GLENLIVET	170. THE GLENLIVET
171. THE GLENLIVET	172. THE GLENLIVET
173. THE GLENLIVET	174. THE GLENLIVET
175. THE GLENLIVET	176. THE GLENLIVET
177. THE GLENLIVET	178. THE GLENLIVET
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191. THE GLENLIVET	192. THE GLENLIVET
193. THE GLENLIVET	194. THE GLENLIVET
195. THE GLENLIVET	196. THE GLENLIVET
197. THE GLENLIVET	198. THE GLENLIVET
199. THE GLENLIVET	200. THE GLENLIVET

SPEYSIDE MALT

The Speyside region is geographically the second largest Scotch Whisky producing region in Scotland, covering 25% of the country's land area. The region is known for its light, clean whisky, which is produced from barley grown in the Speyside.

The Speyside region is home to many of the most famous Scotch Whisky distilleries, including James Watson & Co., Johnnie Walker, and The Glenlivet.

101. JAMES WATSON & CO.	102. JOHNIE WALKER
103. THE GLENLIVET	104. THE GLENLIVET
105. THE GLENLIVET	106. THE GLENLIVET
107. THE GLENLIVET	108. THE GLENLIVET
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THE SCOTCH WHISKY ASSOCIATION
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 www.scotch-whisky.org.uk

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006/2024

Source: (Scotch Whisky Association, 2024a)

Annexure 2 – List of Scotch whisky distillers and distiller details

Malt Distillers

Distillery	Region	Year founded	Owner	Capacity / LPA
Glenlivet	Speyside	1824	Chivas Brothers Ltd. (Pernod Ricard)	21 500 000
Glenfiddich	Speyside	1886	William Grant & Sons	21 000 000
Macallan	Speyside	1824	The Edrington Group	15 000 000
Ailsa Bay	Lowlands	2007	William Grant & Sons	12 000 000
Glen Ord	Highlands	1838	Diageo	11 500 000
Roseisle	Highlands	2009	Diageo	10 800 000
Dalmonach	Speyside	2015	Chivas Brothers Ltd. (Pernod Ricard)	10 500 000
Teaninich	Highlands	1817	Diageo	10 200 000
Glenmorangie	Highlands	1843	LVMH	6 500 000
Caol Ila	Islay	1846	Diageo	6 400 000
Glen Keith	Speyside	1957	Chivas Brothers Ltd. (Pernod Ricard)	6 000 000
Miltoduff	Speyside	1824	Chivas Brothers Ltd. (Pernod Ricard)	6 000 000
Glen Moray	Speyside	1897	Glen Turner (La Martiniquaise)	6 000 000
Dufftown	Speyside	1896	Diageo	5 900 000
Glen Grant	Speyside	1840	Campari Group	5 800 000
Auchroisk	Speyside	1974	Diageo	5 700 000
Balvenie	Speyside	1892	William Grant & Sons	5 600 000
Glenrothes	Speyside	1878	The Edrington Group	5 500 000
Tomatin	Highlands	1897	Tomatin Distillery Co.	5 000 000
Dailuaine	Speyside	1852	Diageo	4 900 000
Tormore	Speyside	1958	Elixir Distillers	4 900 000
Ardmore	Highlands	1898	Suntory	4 900 000
Loch Lomond	Highlands	1965	Loch Lomond Group	4 750 000
Clynelish	Highlands	1967	Diageo	4 700 000
Longmorn	Speyside	1894	Chivas Brothers Ltd. (Pernod Ricard)	4 500 000
Kininvie	Speyside	1990	William Grant & Sons	4 400 000
Dalmore	Highlands	1839	Whyte & Mackay (Emperador)	4 300 000
Tamnavulin	Speyside	1966	Whyte & Mackay (Emperador)	4 300 000
Glenburgie	Speyside	1810	Chivas Brothers Ltd. (Pernod Ricard)	4 250 000
Allt-a-Bhainne	Speyside	1975	Chivas Brothers Ltd. (Pernod Ricard)	4 200 000
Braeval	Speyside	1973	Chivas Brothers Ltd. (Pernod Ricard)	4 200 000
Tamdhu	Speyside	1896	Ian Macleod Distillers	4 200 000
Speyburn	Speyside	1897	Inver House Distillers (Thai Beverages plc)	4 200 000
Craigellachie	Speyside	1891	John Dewar & Sons (Bacardi)	4 200 000
Royal Brackla	Highlands	1812	John Dewar & Sons (Bacardi)	4 100 000

Glentauchers	Speyside	1897	Chivas Brothers Ltd. (Pernod Ricard)	4 000 000
Glenfarclas	Speyside	1836	J. & G. Grant	4 000 000
Glenallachie	Speyside	1967	The Glenallachie Distillers Co.	4 000 000
Aberlour	Speyside	1826	Chivas Brothers Ltd. (Pernod Ricard)	3 900 000
Mortlach	Speyside	1823	Diageo	3 800 000
Linkwood	Speyside	1821	Diageo	3 700 000
Benrinnes	Speyside	1826	Diageo	3 600 000
Glendullan	Speyside	1897	Diageo	3 600 000
Macduff [Glen Deveron]	Highlands	1962	John Dewar & Sons (Bacardi)	3 400 000
Tomintoul	Speyside	1964	Angus Dundee Distillers	3 300 000
Cardhu	Speyside	1824	Diageo	3 300 000
Aberfeldy	Highlands	1896	John Dewar & Sons (Bacardi)	3 300 000
Laphroaig	Islay	1815	Suntory	3 275 000
Inchgower	Speyside	1871	Diageo	3 200 000
Aultmore	Speyside	1896	John Dewar & Sons (Bacardi)	3 200 000
Bunnahabhain	Islay	1881	Burn Stewart Distillers (Distell International)	3 000 000
Talisker	Highlands	1830	Diageo	3 000 000
Tullibardine	Highlands	1949	Picard Vins & Spiriteaux	2 950 000
BenRiach	Speyside	1897	Benriach Distillery Co. (Brown Forman)	2 800 000
Glenlossie	Speyside	1876	Diageo	2 800 000
Balmenach	Speyside	1824	Inver House Distillers (Thai Beverages plc)	2 800 000
Deanston	Highlands	1965	Burn Stewart Distillers (Distell International)	2 700 000
Highland Park	Highlands	1798	The Edrington Group	2 700 000
Glen Elgin	Speyside	1898	Diageo	2 600 000
Mannochmore	Speyside	1971	Diageo	2 600 000
Blair Athol	Highlands	1798	Diageo	2 500 000
Glenkinchie	Lowlands	1837	Diageo	2 500 000
Jura	Highlands	1810	Whyte & Mackay (Emperador)	2 500 000
Strathisla	Speyside	1786	Chivas Brothers Ltd. (Pernod Ricard)	2 450 000
Lagavulin	Islay	1816	Diageo	2 400 000
Fettercairn	Highlands	1824	Whyte & Mackay (Emperador)	2 300 000
Cragganmore	Speyside	1869	Diageo	2 200 000
Dalwhinnie	Highlands	1897	Diageo	2 200 000
Bowmore	Islay	1779	Suntory	2 200 000
Auchentoshan	Lowlands	1823	Suntory	2 150 000
Ben Nevis	Highlands	1825	Ben Nevis Distillery Ltd (Nikka, Asahi Breweries)	2 000 000

Strathmill	Speyside	1891	Diageo	2 000 000
Inchdairnie	Lowlands	2015	John Fergus & Co. Ltd	2 000 000
Bruichladdich	Islay	1881	Rémy Cointreau	2 000 000
Glendronach	Highlands	1826	Benriach Distillery Co. (Brown Forman)	1 800 000
Balblair	Highlands	1790	Inver House Distillers (Thai Beverages plc)	1 800 000
Knockdhu [AnCnoc]	Highlands	1893	Inver House Distillers (Thai Beverages plc)	1 800 000
Borders	Lowlands	2017	The Three Stills Co. Ltd	1 800 000
Glen Spey	Speyside	1878	Diageo	1 600 000
Bladnoch	Lowlands	1817	Bladnoch Distillery Ltd	1 500 000
Glencadam	Highlands	1825	Angus Dundee Distillers	1 400 000
Knockando	Speyside	1898	Diageo	1 400 000
Pulteney	Highlands	1826	Inver House Distillers (Thai Beverages plc)	1 400 000
Ardbeg	Islay	1815	LVMH	1 300 000
Glen Garioch	Highlands	1797	Suntory	1 300 000
Arran	Highlands	1993	Isle of Arran Distillers	1 200 000
Glengoyne	Highlands	1833	Ian Macleod Distillers	1 100 000
Bonnington	Lowlands	2020	John Crabbie & Co.	1 100 000
Glenglassaugh	Highlands	1875	Benriach Distillery Co. (Brown Forman)	1 000 000
Tobermory	Highlands	1798	Burn Stewart Distillers (Distell International)	1 000 000
Cairn	Speyside	2022	Gordon & MacPhail	1 000 000
Rosebank	Lowlands	2023	Ian Macleod Distillers	1 000 000
Scapa	Highlands	1885	Chivas Brothers Ltd. (Pernod Ricard)	900 000
Speyside	Speyside	1976	Speyside Distillers Co.	850 000
Brora	Highlands	1819	Diageo	800 000
Oban	Highlands	1794	Diageo	800 000
Lagg	Islands	2019	Isle of Arran Distillers	800 000
Glen Scotia	Campbeltown	1832	Loch Lomond Group	800 000
Falkirk	Lowlands	2020	Falkirk Distilling Co.	750 000
Ardnahoe	Islay	2017	Hunter Laing & Co.	750 000
Glengyle	Campbeltown	2004	J & A Mitchell	750 000
Springbank	Campbeltown	1828	J & A Mitchell	750 000
Aberagie	Lowlands	2017	The Perth Distilling Co.	750 000
Burn o'Bennie	Highlands	2020	Mike Bain & Liam Pennycook	690 000
Kilchoman	Islay	2005	Kilchoman Distillery Co.	625 000
Lone Wolf	Highlands	2016	Brewdog plc.	600 000
Ardnamurchan	Highlands	2014	Adelphi Distillery Ltd	500 000

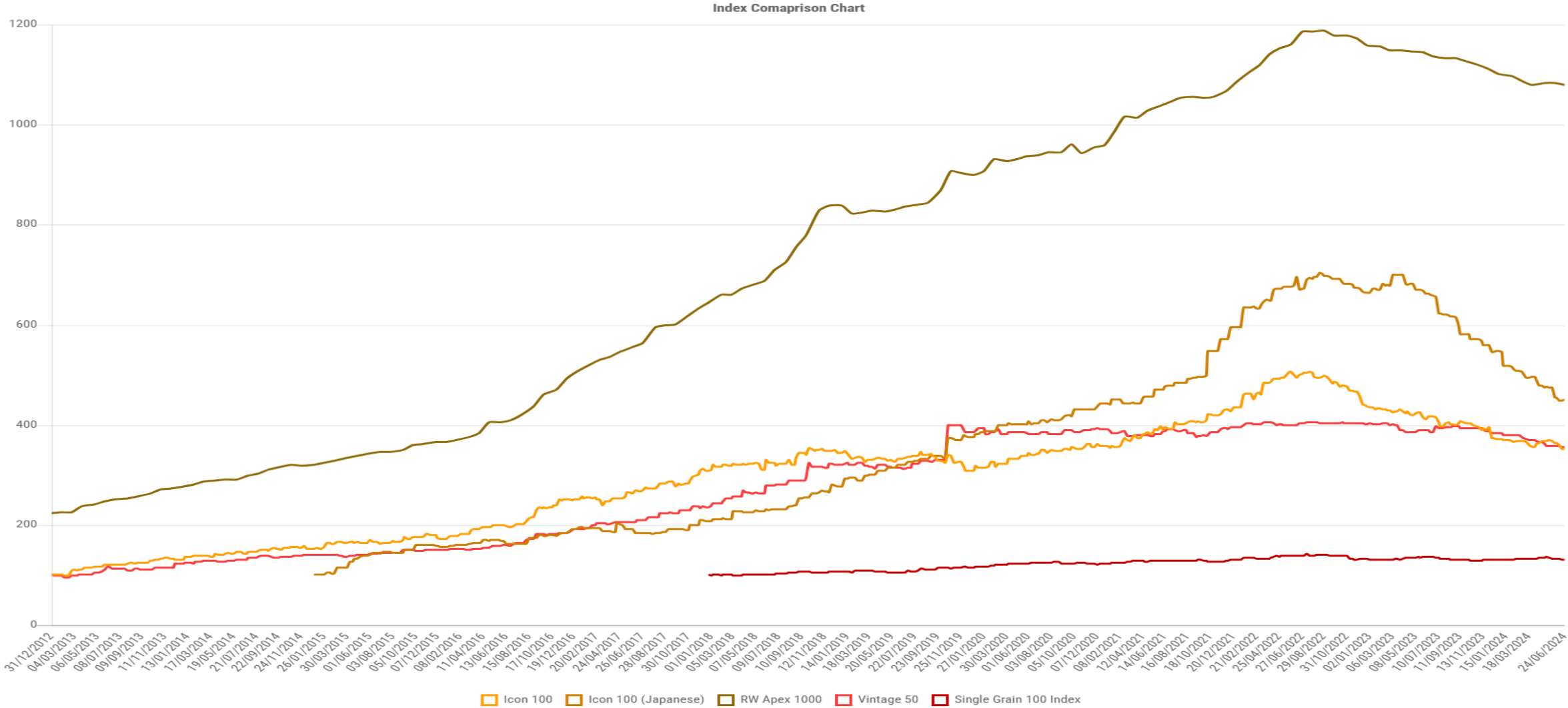
Royal Lochnagar	Highlands	1845	Diageo	500 000
Benromach	Speyside	1898	Gordon & MacPhail	500 000
Glenturret	Highlands	1775	Lalique Group	500 000
Clydeside	Lowlands	2017	Morrison Glasgow Distillers	500 000
Torabhaig	Highlands	2016	Mossburn Distillers	500 000
Glasgow	Lowlands	2015	The Glasgow Distillery Co.	440 000
Harris	Highlands	2015	Isle of Harris Distillers Ltd.	400 000
Eden Mill	Lowlands	2014	Paul Miller	300 000
Edradour No.2	Highlands	2018	Signatory Vintage Scotch Whisky Co. Ltd	270 000
Annandale	Lowlands	2014	Annandale Distillery Co.	260 000
Arbikie	Highlands	2015	Arbikie Distilling Ltd	250 000
Holyrood	Lowlands	2019	Holyrood Distillery Ltd.	250 000
Lindores Abbey	Lowlands	2017	The Lindores Distilling Co.	250 000
Kingsbarns	Lowlands	2014	Wemyss Vintage Malts	205 000
Dunphail	Speyside	2023	Dunphail Distillery	200 000
Isle of Raasay	Highlands	2017	R&B Distillers	190 000
Lochlea	Lowlands	2018	Lochlea Distilling Co.	180 000
Wolfburn	Highlands	2013	Aurora Brewing Ltd	175 000
GlenWyvis	Highlands	2017	GlenWyvis Distillery Ltd	150 000
Strathearn	Highlands	2013	Douglas Laing & Co	140 000
Edradour	Highlands	1825	Signatory Vintage Scotch Whisky Co. Ltd	135 000
Ballindalloch	Speyside	2014	MacPherson-Grant	100 000
Jackton	Lowlands	2020	RAER Scotch Whisky	100 000
Nc'nean	Highlands	2017	Nc'nean Distillery	100 000
Daftmill	Lowlands	2005	Francis Cuthbert	65 000
8 Doors	Highlands	2022	NCD 1 Ltd	60 000
Abhainn Dearg	Highlands	2008	Mark Tayburn	50 000
Stirling	Highlands	2023	Stirling Distillery	50 000
Uile-bheist	Highlands	2023	Glen Mhor	28 000
North Point	Highlands	2020	North Coast Distillers	26 000
Dornoch	Highlands	2016	Phil & Simon Thompson	25 000
Total litre/annum				403 339 000

Grain distillers

Distillery	Region	Year founded	Owner	Capacity / LPA
Cameronbridge	Lowlands	1826	Diageo	110 000 000
Girvan	Lowlands	1963	William Grant & Sons	110 000 000
North British	Lowlands	1885	Lothian Distillers	72 000 000
Strathclyde	Lowlands	1927	Chivas Brothers	39 000 000
Invergordon	Highlands	1961	Whyte & MacKay	36 000 000
Starlaw	Lowlands	2010	La Martiniquaise	25 000 000
Loch Lomond	Highlands	1993	Loch Lomond Group	18 000 000
Reivers	Lowlands	2021	Mossburn Distillery Co.	100 000
Total litre/annum				410 100 000

Source: (Whisky Invest Direct, 2024)

Annexure 3 – Other whisky indices



Source: (Rare Whisky 101, 2024)