

ARE SINNERS WINNERS?

A STUDY ON SIN STOCK PERFORMANCE BETWEEN 2020-2023

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Abstract:

This paper examines the performance of sin stocks listed on European stock exchanges during the time period 2020 to 2023. The purpose is to determine whether sin stocks yield abnormal returns during a period characterised by political and economic turmoil, compared to comparable utility stocks. To do so, sin portfolios are made on companies in the “Triumvirate of sin” which includes the tobacco, alcohol and gambling industry. The regression analysis applies the Fama-French three factor model to estimate portfolio alphas for each sin portfolio, the comparable portfolio, and the long-short portfolio, which takes a long position in sin stocks and a short position in comparable stocks. The study found no statistically significant over- or underperformance of sin stocks, which could be caused by the absence of factors that drive sin stock performance during the examined time frame. This suggests that investors may not have systematically favoured sin stocks as safe haven assets during the studied period. Despite the idiosyncratic characteristics of sin stocks, the performance was still influenced by overall market conditions, although sensitivity to the market decreased when executing a long-short investment strategy. The contrasting result from previous research underscores the variability in investor perceptions across different regions and time periods. Ultimately, the study provides insights into navigating economic and political uncertainty whilst capitalising on market conditions.

Keywords:

Sin stocks, Fama-French three factor model, Stock price performance, Sin premium, Economic turmoil

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1. Introduction

1.1 Research purpose

Can investing in sin stocks yield abnormal returns? A frequently studied topic in finance revolves around the drivers of stock price performance. Academics have contributed to this research topic from a multitude of angles. For example, research indicates that smaller firms have historically delivered higher risk-adjusted returns compared to larger firms (Banz, 1981). Additionally, the value investing strategy, drawing on the research of Rosenberg, Leid and Lanstein (1985) proposes that investors can achieve higher risk-adjusted returns by investing in value stocks, further enriches this area of study. This paper takes a different approach to understanding stock price performance by analysing the performance of sin stocks listed on European stock exchanges amidst recent political and economic turmoil, to determine whether investing in sin stocks yield abnormal returns compared to comparable stocks. Building upon existing literature, this study seeks to expand the research on sin stocks by analysing the European market during the time span 01-01-2020 to 31-12-2023. The sin industries which fall under the scope of the study are defined according to the “Triumvirate of sin” and encompasses the alcohol, tobacco, and gambling industries. The chosen perspective on stock price performance is motivated by the contextual background outlined in the following subsections.

1.2 Background

In recent years, the world has witnessed a surge in both political and economic instability, driven by a multitude of factors. On December 31, 2019, the Wuhan Municipal Health Commission reported the first cases of Covid-19, marking the beginning of a global health crisis (ECDC, 2020). The severity of the situation was underscored when, on March 11, 2020, the World Health Organization (WHO) officially declared the Covid-19 a global pandemic. Subsequently, on June 8, 2020, the World Bank forecasted that the pandemic could trigger a global recession caused by the implementation of containment measures which had started to negatively impact supply, demand, and trade (The World Bank, 2020). In the aftermath of the Covid-19 pandemic, the European region has dealt with heightened geopolitical tensions, rising energy prices, inflationary pressures, and interest rate hikes, largely driven by the Russia-Ukraine war that erupted on February 24, 2022. This has resulted in slower-than-expected economic recovery within the region, as evidenced by the European Commission’s 2023 Autumn Forecast. The initially forecasted gross domestic product (GDP) growth in the EU was 4.3% in 2022 and 2.5% in 2023, while the realised growth figures amounted to 3.5% for 2022 and 0.5% for 2023 (European Parliamentary Research Service, 2024). Moreover, on October 7, 2023, the longstanding conflict between Israel and Palestine erupted into an armed conflict, raising concerns about its potential negative effect on the global economy. These events have collectively contributed to heightened political and economic instability, which, from the perspective of the stock market, translates into increased volatility, poor performance, and a decline in trust in the market as a whole (Lins, Servaes, and Tamayo, 2017).

1.3 Financial Social Responsibility

Lately, there has been a notable increase in prioritising the integration of financial social responsibility into investment decisions. This involves considering Corporate Social Responsibility (CSR) in investments, whilst Socially Responsible Investments (SRI) has become a bridge between the financial world and society. For example by investing into environmentally sustainable companies or avoiding industries which engage with addictive

substances or activities such as alcohol, gambling and tobacco (Berry and Junkus, 2023). Consequently, the two core objectives of SRI are to generate financial returns while simultaneously making a positive social impact. Nonetheless, these objectives may not always be congruent. A socially responsible investment does not assure a favourable financial outcome, nor does a promising financial return guarantee a company's commitment to social consciousness. Additionally, socially responsible investing is often evaluated within the framework of the Environmental, Social and Governance (ESG) factors (Puaschunder, 2016).

1.4 Definition of Sin Stocks

In contrast to socially responsible stocks, “sin stocks” refer to companies which are engaged in activities considered unethical. The characterisation of sin stocks is subjective, lacking a universally accepted definition. Previous studies on sin stocks have identified the “Triumvirate of sin”, which encompasses the alcohol, tobacco, and gambling industries, due to the addictive nature of their offerings (Hong and Kacperczyk, 2009). This paper will adopt the same definition, consistent with previous academic research. Additionally, screening companies based on an industry level is straightforward and does not require arbitrary delimiting or judgements of company-level operations. Conversely, deciding whether a company is involved in ethically wrong or unsustainable activities often relies upon subjective judgements. Finally, funds which conduct SRI strategies often utilise negative screening methods to exclude specific companies or industries. Within this framework, the “Triumvirate of sin” is often featured among the criteria used for negative screening (Carlsson Reich, Wolff, Zaring, Zetterberg, Wråke, 2001).

The classification and judgement of sin stocks is also influenced by regional and social norms, which may differ significantly between countries and regions. For example, political affiliations may expand the definition of sin stocks to encompass industries such as the weapons industry. For some, all military contractors may be regarded as immoral investments, whereas others may perceive supporting the military as a patriotic duty. The question of whether it is inherently unethical to expand a nation's defence capabilities is a matter of contention, as opinions diverge widely. Lastly, it is important to acknowledge that the classification of sin stocks is dynamic and can evolve over time (Blitz and Fabozzi, 2017). Companies labelled as sinful today may undergo changes in their product offerings and revenue streams, potentially leading to reevaluation and reclassification in the future.

1.5 The Sin Stock Premium

In academia, research indicates that investors have yielded abnormally high returns from holding several well-known sin stocks (e.g. Ahrens, 2004; Waxler, 2004). The studies have primarily been centred around the *Vitium Global Fund* (formerly known as the *Vice Fund*), which was established in 2003 and specifically targets companies operating in the alcohol, tobacco, and gambling industries worldwide (USA Mutuals, 2020). The common explanation in the research papers for the anomalous returns observed in sin stocks is their systematic undervaluation. This undervaluation is typically attributed to investors deliberately avoiding these types of stocks due to their societal stigma. Consequently, investors willing to invest in sin stocks, despite societal norms, may potentially yield a premium associated with taking on reputational risk (Fabozzi, Ma, and Oliphant, 2008). Additionally, Hong and Kacperczyk (2009) note that the norm against funding companies that promote ethically questionable activities causes investors, subject to these norms, to incur a financial cost by refraining from sin stock investments. Statman and Glushkov (2009) further argue that the outperformance of sin stocks is “consistent with the ‘doing good but not well’ hypothesis, whereby the expected returns of socially responsible stocks are lower than those of conventional stocks”.

Previous research also offers other explanations for the sin stock premium. One theory posits that sin stocks may benefit from monopolistic advantages, while another suggests that sin stocks encounter increased litigation risks, for which investors are compensated. The high barriers to entry associated with sin industries, coupled with strict regulations and government monitoring, makes entering and sustaining a foothold in these industries challenging. Consequently, companies that successfully navigate these obstacles over time may achieve a monopolistic position, resulting in monopolistic stock returns (Fabozzi, Ma and Oliphant, 2008).

Lastly, additional justification for the return premium can be derived from the inherent characteristics of sin industries. Companies operating within these industries typically benefit from a steady customer base, leading to stable and secure cash flow. This is partly due to the addictive nature of the products and services offered by these companies, resulting in an inelastic demand. Hence, individuals tend to continue consuming these goods and services regardless of political and economic conditions, rendering companies operating in sin industries more resilient to recessions. Fabozzi, Ma and Oliphant (2008) provide empirical support for this, as their study showed that sin stocks outperformed the stock market during recessions and bear markets.

2. Literature Review

This section provides an overview of literature on the performance of sin stocks that is relevant to our research. Although somewhat limited, the most widely cited paper is authored by Hong and Kacperczyk (2009). They study the impact of social norms on financial markets, focusing on companies in the alcohol, gaming, and tobacco industries in the U.S. market from 1965 to 2006. The authors posit that investment managers, influenced by institutional and personal norms, face constraints on their investment choices. They observe that institutional investors tend to tilt their portfolios away from sin stocks, in contrast to natural arbitrageurs such as hedge funds and mutual funds. Hong and Kacperczyk (2009) construct an equal-weighted portfolio comprising a long position in sin stocks and a short position in non-sin stocks. After controlling for market, size, value, and momentum factors, they find that sin stocks consistently outperformed comparable stocks with a monthly excess return of 29 basis points. This outperformance is argued to be driven by greater litigation risk arising from the neglect of sin stocks among norm-constrained investors. Consequently, investors who abstain from sin stocks may experience a financial cost because of the sacrifice of higher risk-adjusted returns.

Additional research has provided further support to the findings of Hong and Kacperczyk (2009). Fabozzi, Ma, and Oliphant (2008) present empirical evidence demonstrating that sin stocks consistently outperform the market on a risk-adjusted basis. Their study utilises a sample of sin stocks across 21 national markets, encompassing six commonly recognised sin industries. They find that sin stocks generated an annual average return of 19.02% over the time span 1970 to 2007. The results not only confirm the economic benefit of investing in sin stocks, but also support their hypothesis that there is a link between the values observed in financial markets and in society. Moreover, the authors initiate a discussion on the necessity of investors to understand the economic implications of excluding companies involved in industries inconsistent with their social values, and whether investors' commitment to upholding social values is a worthwhile endeavour in terms of economic returns.

Luo and Balvers (2017) find that unrestricted investors, focused primarily on pecuniary benefits, tend to hold SRI-boycotted assets in excess. They observe that sin stocks are influenced by an additional source of risk captured by an investor boycott risk factor, which prompts unrestricted investors to demand compensation for the increased risk associated with holding sin stocks. Another notable finding of their study is that the boycott risk premium tends to rise with the popularity of SRI investing, and decline during recessions when restricted investors may be less inclined to prioritise their investment principles to uphold certain values.

Salaber (2009) contributes to the findings of Luo and Balvers concerning the time variation of the boycott risk premium by examining the behaviour of sin stocks across different phases of the business cycle. The author posits that the consumption patterns associated with addictive goods like alcohol, tobacco, and gambling, exhibit demand inelasticity because of the absence of close substitutes, thereby ensuring stable demand for sin stocks. Consequently, sin stocks are believed to exhibit lower sensitivity to market fluctuations relative to other stocks. Through cross-sectional analysis, she finds evidence supporting the view that sin stocks deliver abnormal returns over the market on a risk-adjusted basis during recessionary periods. This resilience of sin stocks is argued to be attributed to their earnings growth, which appears unaffected by economic downturns. Furthermore, the author highlights that despite sin stocks having historically outperformed during recessions, this hedging is not exclusive to the types of stocks. Similar characteristics can be found in industry-comparable stocks, including those in the food industry, which may also be considered non-cyclical.

3. Methodology

3.1 Research Design

In testing our hypothesis regarding the potential outperformance of sin stocks relative to comparable stocks, this study will adopt an investor's perspective by examining stock prices. This approach is suitable as it enables results to be replicated in the financial markets, and thereby providing practical insights for investors. Additionally, it aligns with previous studies on sin stock performance. This lends credibility to our chosen methodology as it ensures comparability with existing research on the topic.

Having established this perspective, we proceed by constructing portfolios relevant to our research. To conduct our study, we construct six different portfolios. The first portfolio comprises sin stocks, encompassing alcohol, tobacco, and gambling stocks listed on the European stock markets. Additionally, we create individual portfolios for each sin stock category defined: one for alcohol, one for tobacco, and one for gambling. Subsequently, a portfolio consisting of comparable stocks is created. Finally, in line with previous research on the subject, a long-short portfolio is created that takes a long position on sin stocks and a short position on comparable stocks, as seen in the methodology of Hong and Kacperczyk (2009). This research approach allows us to evaluate the effect by analysing the alpha of each portfolio and determine whether sin stocks exhibit any over-performance, both in terms of industry categorisation and the performance of the long-short strategy.

Furthermore, our method deviates slightly from that of Hong and Kacperczyk (2009), who utilised equal-weighted sin portfolios in their analysis. In contrast, we have opted for a value-weighted approach due to several reasons. Firstly, the rising demand for value-weighted portfolios in developed markets aligns well with the type of countries we intend to examine (Bhattacharya and Galpin, 2011). Secondly, value-weighted portfolios

allocate weights to assets proportional to their market capitalisation, resulting in that larger and more established companies may serve as a cushion against market volatility during economic downturns. Conversely, equal-weighted portfolios have proven to be particularly favourable during periods of economic prosperity and bull markets (Arshanapalli and Nelson, 2007). Lastly, and most importantly, a value-weighted portfolio is easier to replicate in a real-world setting, thereby providing practical relevance and applicability of the findings.

3.2 Fama-French Three Factor Model

To examine the potential correlation between excess return and sin stocks, it may be beneficial to include additional drivers of stock price performance in the regression analysis. This is because factors beyond industry categorisation could also influence the asset performance. The Capital Asset Pricing Model (CAPM), which draws on the research of Sharpe (1964), Lintner (1965) and Mossin (1966), offers a framework for examining stock price performance through a single factor model, which incorporates the relationship between an asset's expected return and the systematic risk it bears. The CAPM is expressed mathematically as follows:

$$(1) R_{it} - R_{ft} = \beta_i \times (R_{mt} - R_{ft}) + \varepsilon_{it}$$

Despite the widespread use of the CAPM among practitioners for estimating an asset's cost of capital (Graham and Harvey, 2001), the model has faced criticism for its reliance on overly simplistic assumptions and lack of empirical record (Fama and French, 2004). More recent research suggests that the CAPM may benefit from supplementary explanatory variables to more accurately measure an asset's risk and expected return, as proposed by Fama and French (1993). They found that employing a multivariate approach offers a more effective way for explaining the cross-sectional variation in stock returns. The Fama-French three factor model (FF3) introduces two additional explanatory variables. One is the Small-minus-Big (SMB) factor and represents the excess return of small-cap stocks compared to large-cap stocks. The other variable, High-minus-Low (HML), denotes the excess return of stocks with high book-to-market ratios over those with low book-to-market ratios. The FF3 is expressed mathematically as follows:

$$(2) R_{it} - R_{ft} = \beta_1 \times (R_{mt} - R_{ft}) + \beta_2 \times (SMB_t) + \beta_3 \times (HML_t) + \varepsilon_{it}$$

Where

R_{it} : The return of asset i

R_{ft} : The return of the risk-free rate

$\beta_1 \beta_2 \beta_3$: The factor loadings

R_{mt} : The return of the market portfolio

$R_{mt} - R_{ft}$: The excess return of the market portfolio

SMB_t : The size premium (defined as Small-minus-Big)

HML_t : The value premium (defined as High-minus-Low)

ε_{it} : The error term (residual)

The FF3 was chosen for the analysis because it effectively addresses some of the criticism surrounding the CAPM. For example, by incorporating the book-to-market factor, the FF3 addresses the contradiction raised by Banz (1981) regarding the tendency for stocks of firms with lower market capitalisation to yield higher returns. In addition to the FF3, there are other, more elaborate models that aim to explain stock returns by including additional variables, such as the Carhart Four-factor Model which expands upon the FF3 by adding a momentum risk factor (Carhart, 1997). However, for the purpose of our analysis, we find the FF3 to be sufficient.

4. Data

4.1 Selection of Sin Stocks

The data used in this study has been sourced from Capital IQ, a widely recognised research database in the financial industry known for its extensive offering of both quantitative and qualitative data sets. The database provides information about public company financials as well as industry categorisation. To select the data, the “Quick Screener” tool was used to filter companies according to the following criteria:

Company type: Public

Exchanges: All European Exchanges (primary and secondary listings)

Time Period: 2020-01-01 to 2023-12-31

Subsequently, the filtering was refined by selecting subcategories corresponding to industries relevant for the analysis. Companies operating in the alcohol industry were included if they fell under the industry categories “Brewers” and “Distillers and Vintners”. A similar methodology was applied to the other industries. Tobacco companies were sourced from the “Tobacco” category, and gambling companies were sourced from the “Casinos & Gaming” category, where both brick-and-mortar, online casinos, and lottery, bingo, and bookie companies were included in the dataset.

Table 1

Original Sin Stock Sample and Industry Classification

Table 1: Summary of the original sin stock sample sourced from Capital IQ, with their corresponding industry weights before cleansing the data

Original Sample

	Alcohol	Tobacco	Gambling	Total Sin Stock Portfolio
Number of Firms	93	26	73	192
% of Total Portfolio	48%	14%	38%	100%

Consideration was taken to companies that lacked data for the entire time period, either due to listings or delistings during the studied time period. Hence, companies with incomplete data for the entire time period were excluded from the sample. Similarly, companies with data irregularities due to trade suspensions were treated in the same manner. The final sample of sin stocks used in the analysis is summarised in the following table.

Table 2				
Final Sin Stock Sample and Industry Classification				
Table 2: Summary of the final sin stock sample, with their corresponding industry weights within the total sin stock portfolio				
Final Sample				
	Alcohol	Tobacco	Gambling	Total Sin Stock Portfolio
Number of Firms	66	17	53	136
% of Total Portfolio	49%	13%	39%	100%

4.1.1 Sin Stock Delimitations

The sin industry includes companies involved in or associated with activities that are considered unethical or immoral. For instance, one may also consider the weapons and defence industry to this category. However, it is difficult to distinguish between “an authentic need for weapons in situations of national danger” and “goals of a bloated war industry that lobbies politicians to engage in conflict” (Scott, 2016). Consequently, differing opinions regarding the classification of the weapons industry as sinful arise.

Additionally, one crucial aspect that sets weapons manufacturers apart is the nature of shocks that affect their business environment. Unlike tobacco, alcohol, or gambling, where market fluctuations are primarily influenced by consumer behaviour and regulatory changes, the weapons industry is intertwined with geopolitical factors and global conflicts (Capelle-Blanchard and Couderc, 2008). Hence, whilst sin industries may encounter fluctuations due to changes in consumer preferences or regulatory measures, weapons manufacturers are subject to industry shocks driven by geopolitical tensions, military conflicts and government policies. One may for example consider the Russia-Ukraine war or the Israel-Palestine conflict. These conflicts create a surge in demand for weapons, which causes a shift in the market dynamics. Moreover, peace initiatives or arms control agreements can substantially impact the industry’s outlook. As a result, the weapons market is more volatile as it is affected by the unpredictability of geopolitical events which adds an element of uncertainty, separating it from other sin industries characterised by more stable demand patterns. Therefore, the weapons industry is excluded from the analysis as it is primarily impacted by industry shocks, whilst the alcohol, tobacco, and gambling industries are subject to business cycle shocks.

4.2 Selection of Comparable Stocks

Consumer staples encompass industries that consumers rely on for everyday needs, which are largely unaffected by external factors. Companies that fall under this sector are distinguished by their non-cyclical behaviour, low volatility, low price elasticity of demand, and an overall low correlation to the market (Christensen and Russel, n.d.). Hence, the sensitivity to macroeconomic factors is relatively low for most consumer staples. On the other hand, alcohol and tobacco stand as exceptions to this trend, as research indicates that sales in these two industries often rise during economic downturns (Stone, 2022). Nonetheless, companies within both the consumer staples and the “Triumvirate of sin” are classified as defensive stocks due to their inherent stability in performance, irrespective of economic conditions (Morningstar, n.d.). In line with this reasoning, the comparable portfolio consists of utility

stocks which do not bear the negative stigma associated with sin stocks. Hence, comparing the stock price performance of sin stocks with consumer staples enables an analysis to determine whether a sin premium exists. Data relevant for this analysis was sourced from Capital IQ using the same approach as that for the sin stocks. Companies in the comparable portfolio were sourced from the “Soft Drinks and Non-alcoholic Beverages”, “Food Products”, “Household and Personal Products”, and the “Consumer Staples and Distribution Retail” categories. The original sample of consumer staples companies amounted to 748 companies. After cleaning the dataset from companies with incomplete data for the studied time period, the final sample consisted of 467 companies.

4.3 Collection of Financial Data

The financial data gathered for each company in the sample includes monthly stock prices and market capitalisation, with each data point representing the monthly adjusted closing price. Using the adjusted closing price is necessary to ensure comparability when analysing a stock’s historical performance, as it accounts for the effects of corporate actions such as rights issues, dividends, and stock splits. The formula used for calculating monthly stock returns based on stock prices is expressed mathematically as follows:

$$r_t = (P_t / P_{t-1}) - 1$$

Where

r_t : The return at time t

P_t : The stock price at time t

P_{t-1} : The stock price at time t-1

To ensure consistency and comparability in constructing the value-weighted portfolios for the regression analysis, all stock price and market capitalisation data were standardised to Euro. However, we acknowledge any potential limitations stemming from this currency conversion. During periods of economic instability and crisis, exchange rates tend to exhibit high volatility (Konstantakis, Melissaropoulos, Daglis, Michaelides, 2023), thereby potentially impacting investment returns through short-term currency fluctuations. Acknowledging these dynamics is important for the interpretation of our research findings.

4.4 Collection of Factor Data

The size (SMB) and value (HML) data needed for performing the Fama-French three factor regression was sourced from jkpfact.com, which is a website that provides comprehensive factor data for different countries and regions at daily and monthly frequencies. The construction of the factors follows the methodology outlined by Jensen, Kelly, and Pedersen (2023). The chosen factors for the regression analysis are the German value-weighted size and value factors.

The market excess return was computed by subtracting the risk-free rate, derived from the German 10-year Government Bund, from the market return of the European stock price index €Stoxx 600. The 10-year German Government Bund is a suitable proxy for estimating the risk-free rate in the Eurozone because German bond yields have historically represented euro area risk-free rates (European Central Bank, 2014). The €Stoxx 600 index was chosen as a

benchmark for the market return because it captures the dynamics of the European economic landscape through its representation of various countries and industries.

5. Empirical Results

5.1 Regression Results

This section presents the results of the FF3 regressions conducted on each portfolio. The regressions are computed using monthly data spanning from January 2020 to December 2023. Of particular interest in these results is the dependent variable “Intercept”, which denotes the excess return (alpha) of the respective portfolio. The excess return for each portfolio is computed by subtracting the risk-free rate from the estimated return based on the Fama-French factors.

5.1.2 Total Sin Stock Portfolio

The total sin stock portfolio generates a statistically insignificant negative alpha of -0.357%, as displayed in Table 3. Notably, the market risk premium factor is positive and statistically significant at the 0.1% level. This implies that the return of the sin stock portfolio tends to move in the same direction as the market risk premium, indicating that it is sensitive towards changes in the overall market. The size factor, denoted by SMB, is positive and statistically significant at the 5% level, indicating that the returns of the sin stock portfolio may be correlated to how different capitalisation stocks perform during the studied time periods. According to the FF3, the results imply that small-cap stocks are expected to outperform large-cap stocks by approximately 55.89%. The value factor, denoted by HML, is approximately 0.1583 and statistically insignificant.

The regression yields a multiple R-squared value of 0.7161, which means that 71.61% of the variation in the portfolio’s returns are explained by the factors included in the model. Yet, the lower adjusted R-squared value of 0.6968 suggests that some predictors might not be contributing to the regression model’s explanatory power.

Table 3					
FF3 Regression Results on Total Sin Stock Portfolio					
Table 3: Regression results from the Fama-French Three Factor Model. The total sin stock portfolio consists of companies operating in the alcohol, tobacco, and gambling industries					
Total Sin Stock Portfolio					
	Intercept	Rm-Rf		SMB	HML
Estimate	-0.00357	0.611519	***	0.55897	* 0.158358
Standard Error	0.003681	0.067765		0.264522	0.132547
P-value	0.3374	1.44E-11		0.0403	0.2386
Multiple R ²	0.7161				
Adjusted R ²	0.6968				
P-value	4.272E-12				
Significance Codes:	**** 0.001 *** 0.01 ** 0.05 * 0.1				

5.1.3 Alcohol Portfolio

Table 4 displays the regression results for the alcohol portfolio. During the studied time period, the alcohol portfolio generated a statistically insignificant negative alpha of -0.5411%. Furthermore, the market coefficient is positive and statistically significant at the 0.1% level, indicating that the return of the alcohol portfolio moves in tandem with the market. Consequently, the alcohol portfolio is sensitive to changes in the overall market. The size and value coefficients are approximately 0.356 and -0.038, and both are statistically insignificant. The multiple R-squared value reveals that 55.46% of the variance in the asset's returns is explained by the factors in the model. The adjusted R-squared value is 52.35%.

Table 4					
FF3 Regression Results on Alcohol Portfolio					
Table 4: Regression results from the Fama-French Three Factor Model. The alcohol portfolio consists of companies operating in the alcohol industry					
Alcohol Portfolio					
	Intercept	Rm-Rf	SMB	HML	
Estimate	-0.005411	0.684852 ***	0.356393	-0.003788	
Standard Error	0.005658	0.102841	0.402608	0.201427	
P-value	0.344	4.02E-08	0.381	0.985	
Multiple R ²	0.5546				
Adjusted R ²	0.5235				
P-value	1.131E-07				
Significance Codes: ***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1					

5.1.4 Gambling Portfolio

The gambling portfolio stands out as the sole sin stock portfolio to yield a positive alpha of 0.4171%, yet it is statistically insignificant. The market coefficient is approximately 0.9125 and is statistically significant at the 0.1% level. Additionally, the size and value coefficients are 0.526 and 0.2174, respectively, and both are statistically insignificant. The multiple R-squared value reveals that 60.05% of the variance in the asset's returns are explained by the factors included in the model. The slightly lower adjusted R-squared value at 57.32% indicates that some of the predictors are not adding significant explanatory power.

Table 5					
FF3 Regression Results on Gambling Portfolio					
Table 5: Regression results from the Fama-French Three Factor Model. The gambling portfolio consists of companies operating in the gambling industry					
Gambling Portfolio					
	Intercept	Rm-Rf		SMB	HML
Estimate	0.004171	0.91255	***	0.52597	0.217406
Standard Error	0.007073	0.130205		0.508255	0.254678
P-value	0.558	1.11E-08		0.306	0.398
Multiple R ²	0.6005				
Adjusted R ²	0.5732				
P-value	7.252E-09				
Significance Codes:	**** 0.001 *** 0.01 ** 0.05 * 0.1				

5.1.5 Tobacco Portfolio

The results from the regression analysis for the tobacco portfolio is displayed in Table 6. The tobacco portfolio generated a statistically insignificant negative alpha of -0.6207%. The market coefficient of approximately 0.41 is positive and statistically significant at the 0.1% level, which indicates that the return of the tobacco portfolio moves in the same direction as the market. Hence, this underscores the tobacco portfolio's sensitivity towards changes in the market. The size coefficient is 0.6572 and is statistically significant at the 5% level. Therefore, all else being equal, the smaller stocks within the tobacco portfolio exhibit higher returns compared to larger stocks in the portfolio. Moreover, the value coefficient is approximately 0.29 and is statistically significant at the 5% level. This implies that within the tobacco portfolio, the stocks with lower book-to-market ratios yield higher returns compared to those with higher book-to-market ratios. The regression result yields a multiple R-squared of 50.51%, and an adjusted R-squared of 47.13%

Table 6						
FF3 Regression Results on Tobacco Portfolio						
Table 6: Regression results from the Fama-French Three Factor Model. The tobacco portfolio consists of companies operating in the tobacco industry						
Tobacco Portfolio						
	Intercept	Rm-Rf		SMB		HML
Estimate	-0.006207	0.41043	***	0.657226	*	0.290543
Standard Error	0.004492	0.08269		0.322782		0.16174
P-value	0.174	1.09E-05		0.0478		0.0793
Multiple R ²	0.5051					
Adjusted R ²	0.4713					
P-value	7.446E-07					
Significance Codes:	****	0.001	***	0.01	**	0.05
			*	0.05	*	0.1

5.1.6 Comparable Portfolio

The comparable portfolio, with the regression results summarised in Table 7, generated a statistically insignificant positive alpha of 0.0703%. The market coefficient is approximately 0.4812 and is statistically significant at the 0.1% level. The size coefficient of 0.242 and the value coefficient of -0.221 are statistically insignificant. Furthermore, the regression result reveals a multiple R-squared of 49.68% and an adjusted R-squared of 46.25%.

Table 7					
FF3 Regression Results on Comparable Portfolio					
Table 7: Regression results from the Fama-French Three Factor Model. The comparable portfolio consists of companies operating in the consumer staples industry					
Comparable Portfolio					
	Intercept	Rm-Rf		SMB	HML
Estimate	0.000703	0.481253	***	0.241874	-0.221262
Standard Error	0.004083	0.07515		0.29335	0.146992
P-value	0.864	8.59E-08		0.414	0.139
Multiple R ²	0.4968				
Adjusted R ²	0.4625				
P-value	1.064E-06				
Significance Codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1					

5.1.7 Long-short Portfolio

The regression results from the long-short portfolio, which takes a long position in the Total sin stock portfolio and a short position in the comparable portfolio, is summarised in Table 8. The long-short portfolio generates a statistically insignificant alpha of -0.4273%. The market coefficient is 0.13 and is statistically significant at the 5% level. The size coefficient is 0.317 and statistically insignificant, while the value coefficient is 0.3796 and statistically significant at the 0.1% level. The regression generates a multiple R-squared of 43.88% and an adjusted R-squared of 40.05%.

Table 8				
FF3 Regression Results on Long-Short Portfolio				
Table 8: Regression results from the Fama-French Three Factor Model with the long-short portfolio strategy. The portfolio takes a long position in the total sin stock portfolio, and a short position in the comparable portfolio				
Long-Short Portfolio				
	Intercept	Rm-Rf	SMB	HML
Estimate	-0.004273	0.130266 *	0.317097	0.37962 ***
Standard Error	0.002971	0.054689	0.213479	0.10697
P-value	0.157424	0.021611	0.144574	0.000934
Multiple R ²	0.4388			
Adjusted R ²	0.4005			
P-value	1.109E-05			
Significance Codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1				

6. Discussion

Broadly speaking, the empirical results summarised in Table 3-8 suggest that sin stocks do not exhibit any statistically significant over- or underperformance after adjusting for market, size, and value factors. However, some degree of caution must be exerted when interpreting these results, particularly in assessing whether sin stocks are capable of earning alphas during turbulent times.

First, it is important to recognise that this study focuses on a relatively short and unstable period of 3 years. The study contrasts with the analysis by Hong and Kacperczyk (2009), who examined a time period of 41 years. This means that the observed results from our study may be influenced by short-term market sentiments rather than long-term fundamentals. For example, short-term events such as political developments, regulatory changes, or economic shocks could influence the performance of sin stocks within the timeframe, potentially skewing the results. This affects the generisability of the findings to other time periods, as they may not accurately reflect the performance of sin stocks on European stock exchanges over more extended periods. Moreover, a shorter sample contains less data points, which could introduce bias in the estimates of the model parameters. Considering that econometric models such as the FF3 rely on sufficient data to accurately estimate coefficients, a smaller sample may not fully capture the relationships between variables, and hence drive a statistically insignificant result. Finally, whilst previous research has shown that sin stocks generate excess returns, this does not necessarily mean that they will consistently generate abnormal returns across all periods. For instance, the return of sin stocks may be contingent on specific conditions, such as regulatory changes. Hence, if the examined time period of 3 years did not coincide with significant events impacting the sin industries, the returns generated by the portfolios may not be statistically significant during this time frame.

Moreover, past stock performance is not necessarily an indicator of future performance. Future changes in market dynamics, regulations, and consumer preferences may impact the performance of sin stocks in either direction. While this study analyses the stock performance

during times of uncertainty, the ongoing influence of such events on sin stock performance can be further explored in future research.

Turning to the empirical results presented in our research, all regressions conducted on each sin stock portfolio showed a statistically significant and positive relationship to the market factor. The positive correlation implies that sin stocks tend to move in the same direction as broader market trends which suggests that despite the unique characteristics of sin industries, their returns are still influenced by overall market conditions. The market having an impact on the returns is in line with what Hong and Kacperczyk (2009) found in terms of their long-short portfolio, which exhibited a statistically significant negative correlation to the market. Hence, investors seeking exposure to sin stocks should be aware of this relationship as it has implications for portfolio diversification and hedging strategies. This phenomenon can be attributed to various factors, including the consumer-driven nature of the sin industries. A similar reasoning can be extended to the comparable portfolio as it also exhibited a statistically significant and positive correlation to the market factor. Furthermore, the fact that both the sin stock portfolios and the comparable portfolio exhibited a positive and significant correlation to the market factor suggests that there is some degree of comparability between the two industries. Nonetheless, whilst this relationship between sin stocks and comparable stocks stands, idiosyncratic characteristics of sin stocks (such as litigation and reputational risk) may still markedly influence their performance, irrespective of broader market movements.

The aggregate sin stock portfolio exhibited a positive and statistically significant relationship to the size factor, indicating that smaller companies within the sin stock portfolio tend to have higher returns compared to larger companies, all else being equal. This phenomenon, known as the “small firm effect”, is consistent with empirical evidence suggesting that smaller companies outperform larger ones over the long term (Roll, 1981). The effect reflects a risk premium associated with investing in smaller companies within the sin industry, as those firms face higher financial risk, operational uncertainty, and liquidity constraints compared to larger, more established companies. Hence, investors may demand higher returns to compensate for these additional risks, leading to a positive size effect. However, this result could also be influenced by the substantial portion of the total market capitalisation represented by the tobacco portfolio. Considering that a value-weighted approach was employed in constructing the sin stock portfolio, the tobacco portfolio may be driving this result, as it also exhibited a positive and statistically significant effect from the size factor.

Although being statistically insignificant, among the four sin stock portfolios, only the gambling portfolio exhibited overperformance. It can be argued that if the gambling portfolio outperforms the other sin portfolios, the reasoning of Hong and Kacperczyk (2009) - that the overperformance of tobacco stocks was driven by “litigation risk and perhaps unexpectedly positive results from litigation” could apply only to the gambling industry. The overperformance of the gambling portfolio may also be influenced by the surge in gambling activity witnessed during the Covid-19 pandemic (Renard, Audette-Chapdelaine, Savard, Kairouz, Brodeur, 2022). Therefore, it is plausible to assume that if there is an excess return in the gambling portfolio, it could stem from increased cash flows.

The long-short portfolio exhibited a statistically significant positive exposure to the value factor. The stable cash flows of sin stocks and comparable stocks align with the characteristics of value stocks, typically known for their stable earnings and high cash flow-to-price ratios (Fama and French, 1998). This finding is consistent with Hong and

Kacperczyk (2009), where the long-short portfolio also showed a statistically significant positive exposure to the value factor. Furthermore, the portfolio exhibited a statistically significant exposure to the market factor, although this was smaller than the individual exposures observed in the sin stock and comparable portfolios. This suggests that implementing a long-short strategy reduces the overall impact of market movements on portfolio returns. Consequently, investors can mitigate market risk exposure more effectively through this investment strategy compared to investing in the individual industries separately.

7. Limitations

This study took the approach of only including companies with available data throughout the entire studied period. Nonetheless, it is important to acknowledge the concept of survivorship bias. Survivorship bias arises when only data from surviving or currently active companies are considered in the analysis, potentially leading to overestimation of performance metrics (Brown, Goetzmann, Ibbotson, Ross, 1992). Incorporating data for companies that were delisted or ceased their operations during the studied period could potentially offer a more comprehensive and nuanced view on the performance of sin stocks. Companies which have been delisted often exhibit different performance characteristics compared to active ones, and excluding these could potentially skew the results (Li, Liu, and Zhu, 2024).

The Fama-French three factor model was employed for the analysis, though there is a concern regarding omitted variable bias, as important risk factors that could influence the results may not have been accounted for. For example, both the Carhart four-factor model and the Fama-French five factor model incorporate additional factors such as momentum and profitability, which could offer a more comprehensive understanding of stock performance. Furthermore, Pastor and Stambaugh (2003) identified liquidity as an important factor in asset pricing and recommended its inclusion alongside the Fama-French three factor model. They argue that investors holding illiquid assets should be compensated for the additional risk they bear. Sin stocks, which may be more illiquid due to lower trading volume or lower interest stemming from their controversial nature, serve as an example. Therefore, the exclusion of a liquidity factor may have influenced the regression results.

8. Conclusion

Do sin stocks yield abnormal returns? This study investigates whether sin stocks - namely alcohol, tobacco and gambling stocks, outperform comparable stocks on European stock exchanges during a period characterised by economic and political turmoil. To do so, market data for companies with primary and secondary listings on European stock exchanges was collected for the time period 2020-01-01 to 2023-12-31. The data was subsequently organised into six value-weighted portfolios: one comprising all sin stocks, three for each sin stock subcategory, one comparable portfolio, and one long-short portfolio which involved taking a long position on sin stocks and a short position on comparable stocks. The Fama-French three factor model, presented in Equation 2, was applied to conduct regressions to estimate the alpha of each portfolio in the sample.

The study found no statistically significant overperformance or underperformance of sin stocks amidst economic and political turmoil. This could be caused by the absence of conditions which drive sin stock performance, within the examined period of 3 years. Consequently, investors may not have systematically favoured sin stocks as safe haven assets during this period. The contrasting results of this study, compared to previous research on sin

stocks (Hong and Kacperczyk, 2009), underscores the variability in investor perceptions across different regions and time periods. Yet, caution must be exerted as limitations related to the relatively short time frame may impact the generalisability of the results.

The empirical results suggest that the “sin premium” is explained by the sin stock’s exposure to the risk factors outlined by the Fama-French three factor model, at least during unstable times. For instance, the positive correlation to the market factor for all portfolios implies that despite the unique characteristics of sin stocks, their performance is still influenced by overall market conditions. Moreover, the long-short portfolio’s comparatively lower exposure to the market factor indicates that investors are able to reduce market risk exposure through adapting a long-short investment strategy. In essence, the study therefore contributes to a deeper understanding of financial markets by providing insights on navigating economic and political uncertainty as well as capitalising on market conditions.

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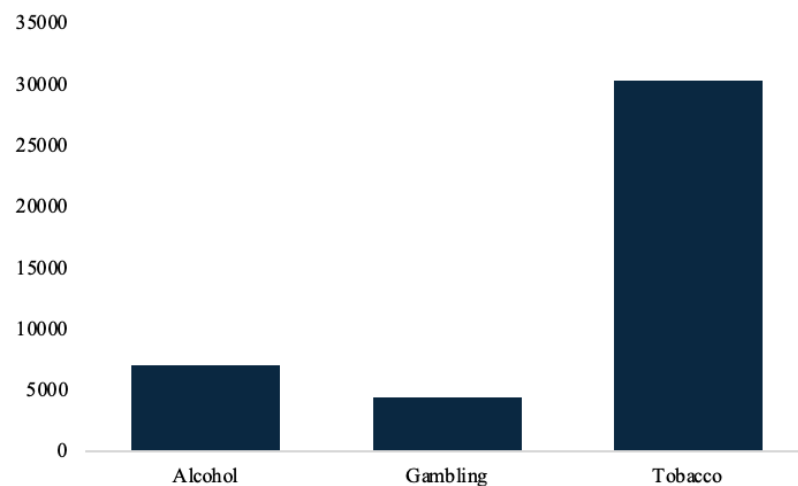
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10. Appendix

A1. Industry Characteristics

The bar chart illustrates the average market capitalisation for each defined sin industry. The average market capitalisation for the tobacco industry is higher compared to both the alcohol and gambling industries.

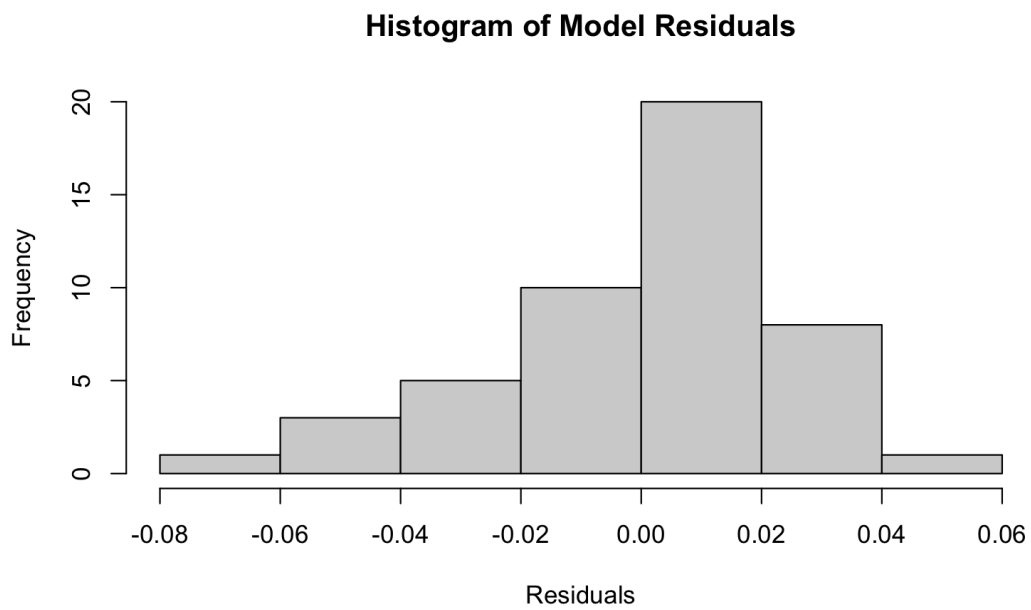
A1.1 Average Market Capitalisation by Industry (mEUR)



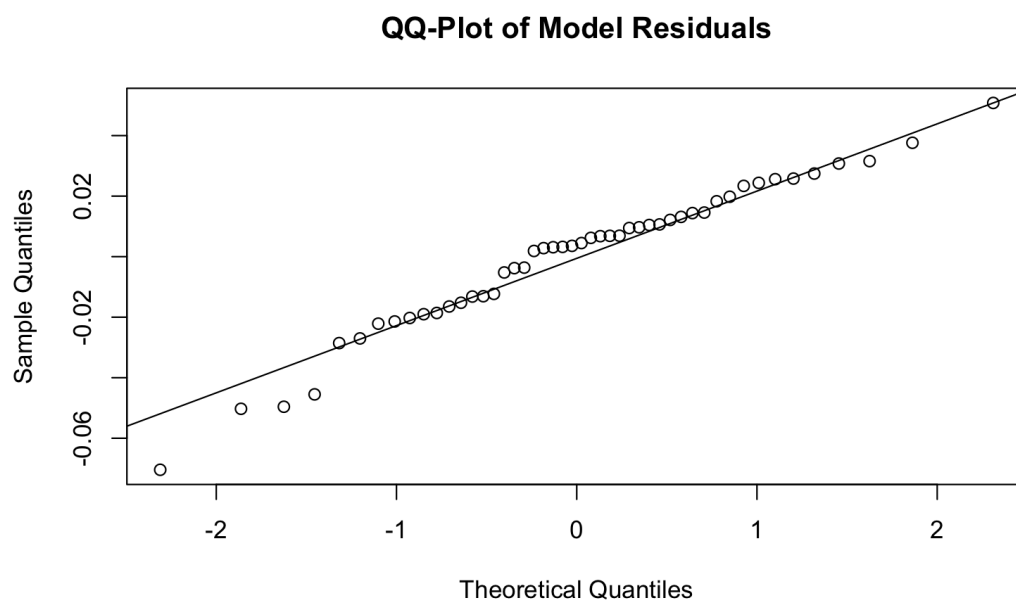
A2. Normal Distribution

The sin stock portfolio consisted of 136 companies, whilst the comparable portfolio consisted of 467 companies, which enables the application of the central limit theorem. To evaluate conformity to the normality assumption, histograms and QQ-plots were constructed. As seen in the figures, the data is normally distributed for most portfolios. The QQ-plots show straight lines for the plots with small tails. Deviations can be seen in the alcohol and comparables portfolios, where the histograms do not suggest normality.

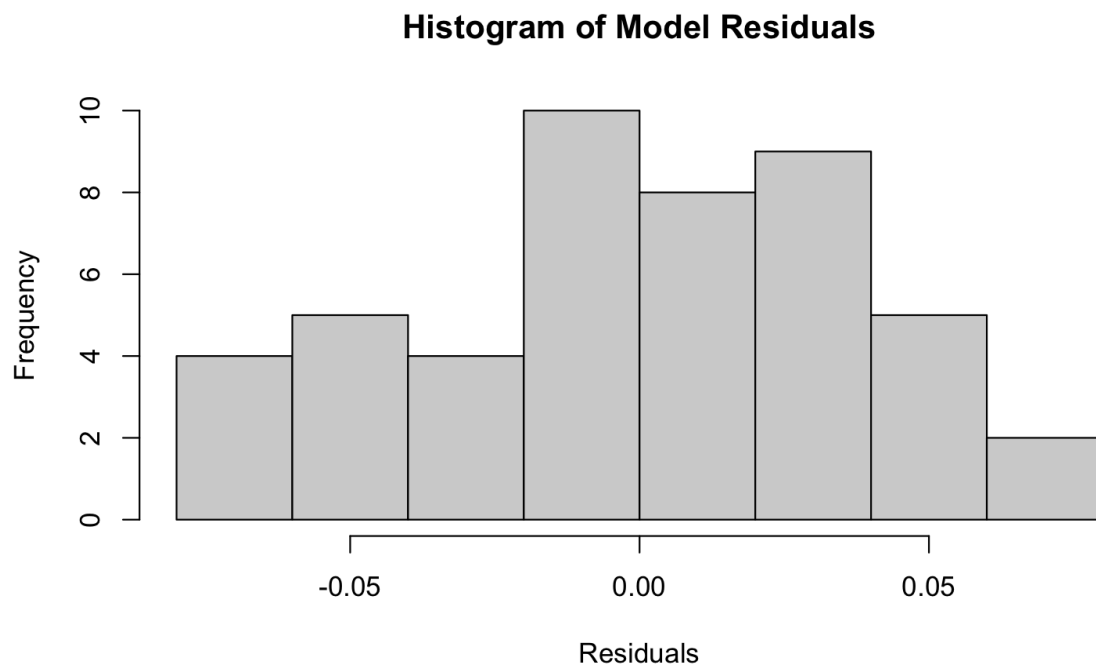
A2.1 Histogram of model residuals, Sin Portfolio



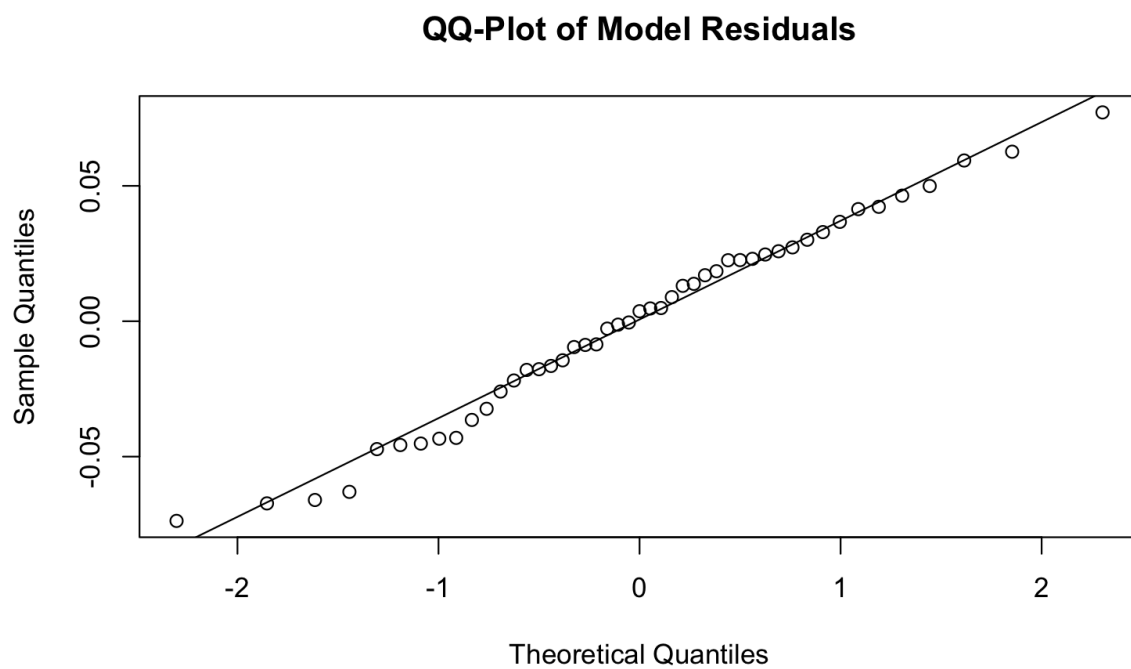
A2.2 QQ-Plot of model residuals, Sin Portfolio



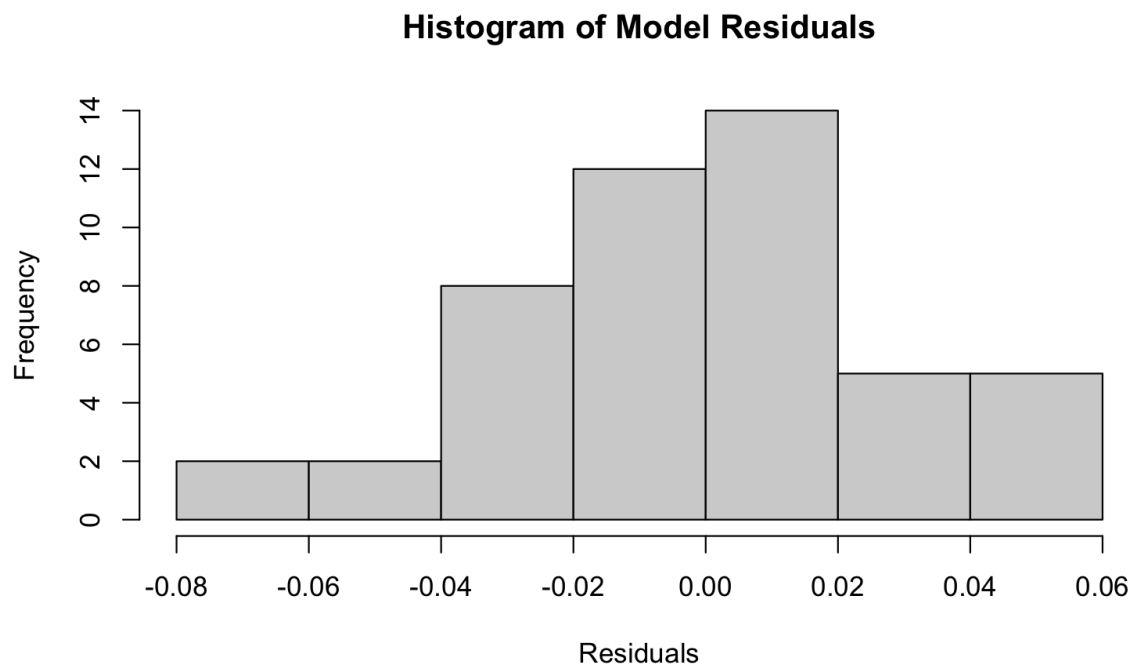
A2.3 Histogram of model residuals, Alcohol Portfolio



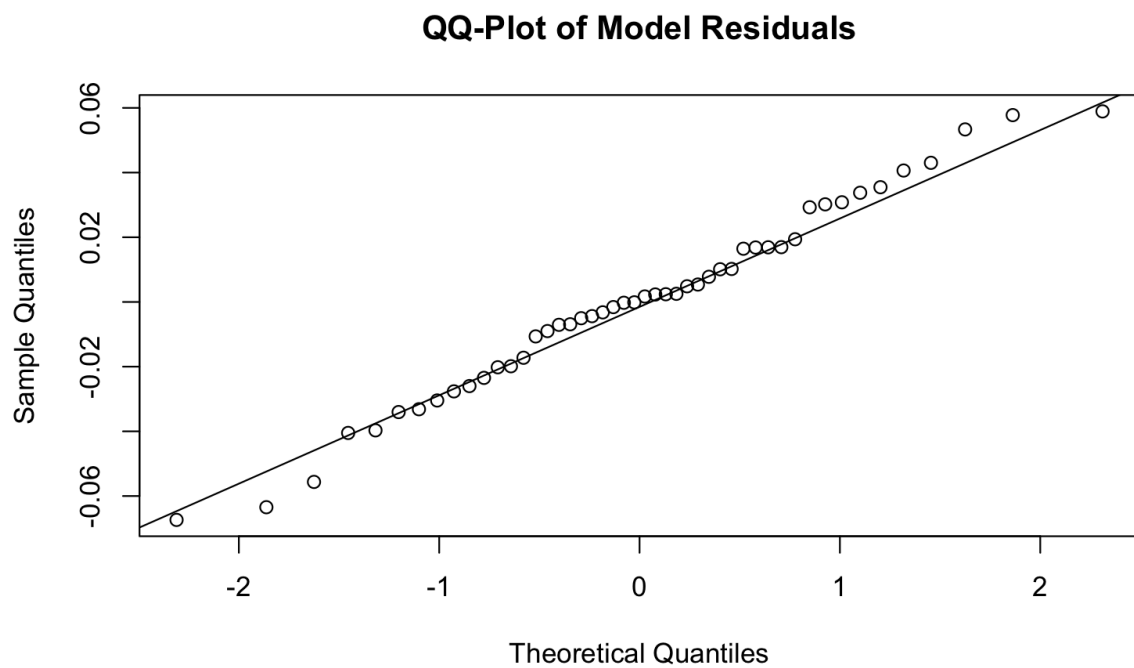
A2.4 QQ-Plot of model residuals, Alcohol Portfolio



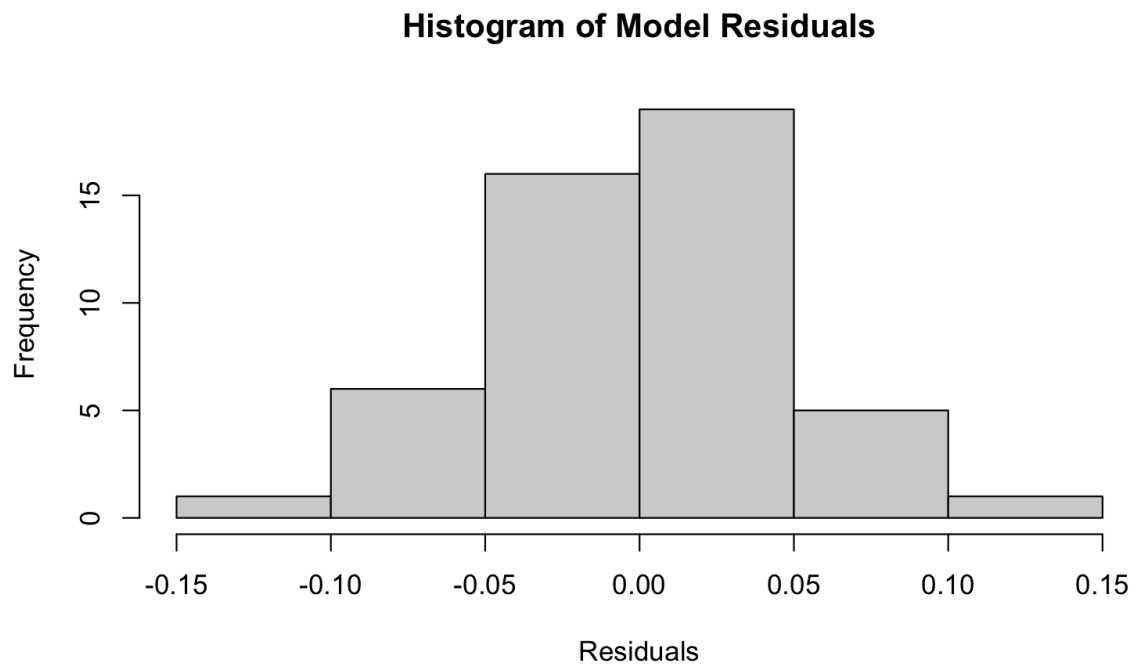
A2.5 Histogram of model residuals, Tobacco Portfolio



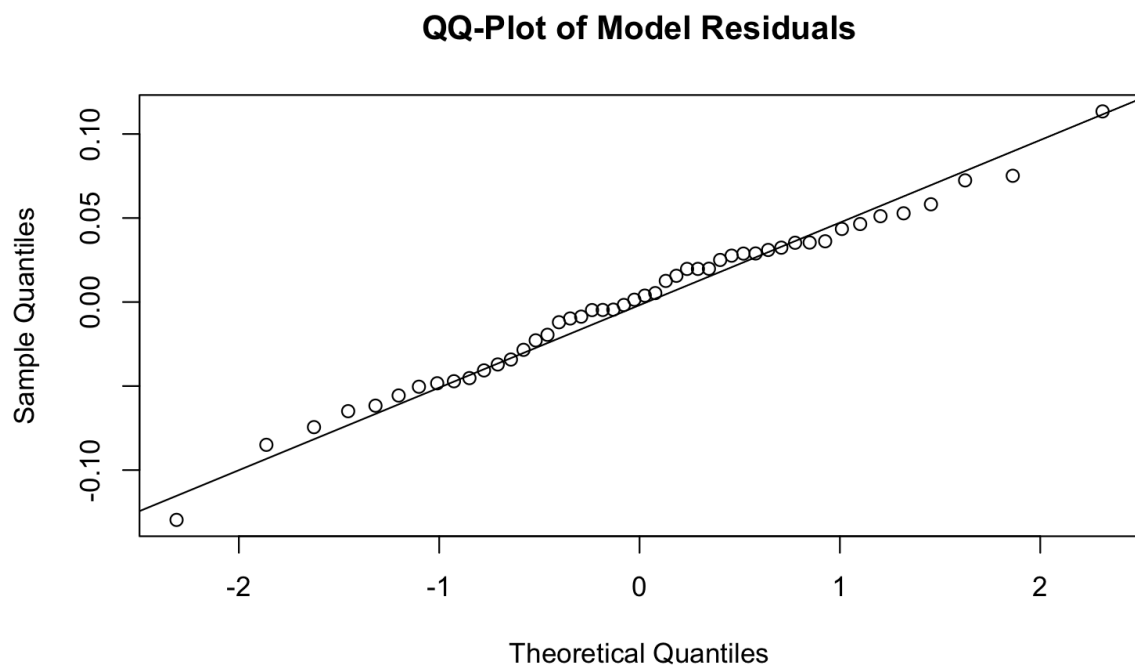
A2.6 QQ-Plot of model residuals, Tobacco Portfolio



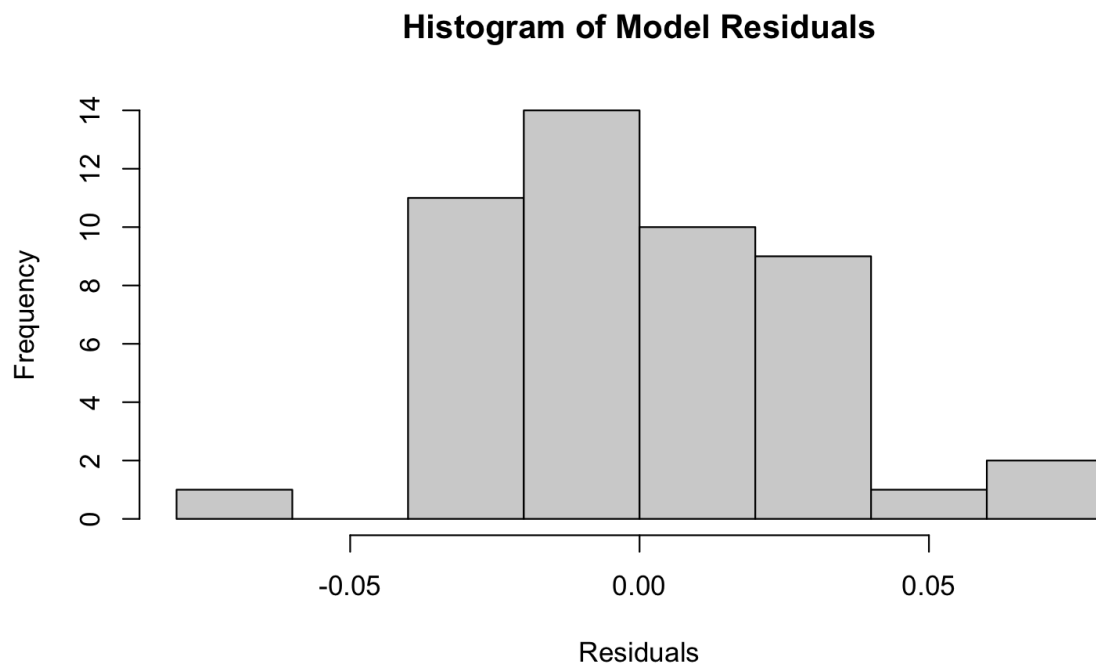
A2.7 Histogram of model residuals, Gambling Portfolio



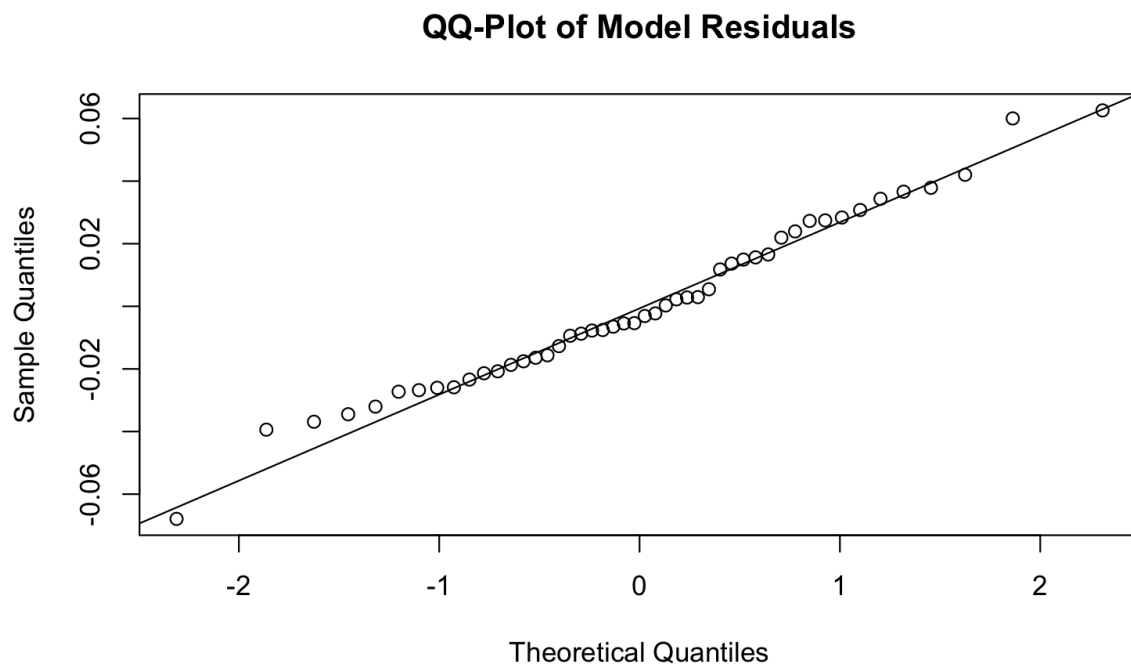
A2.8 QQ-Plot of model residuals, Gambling Portfolio



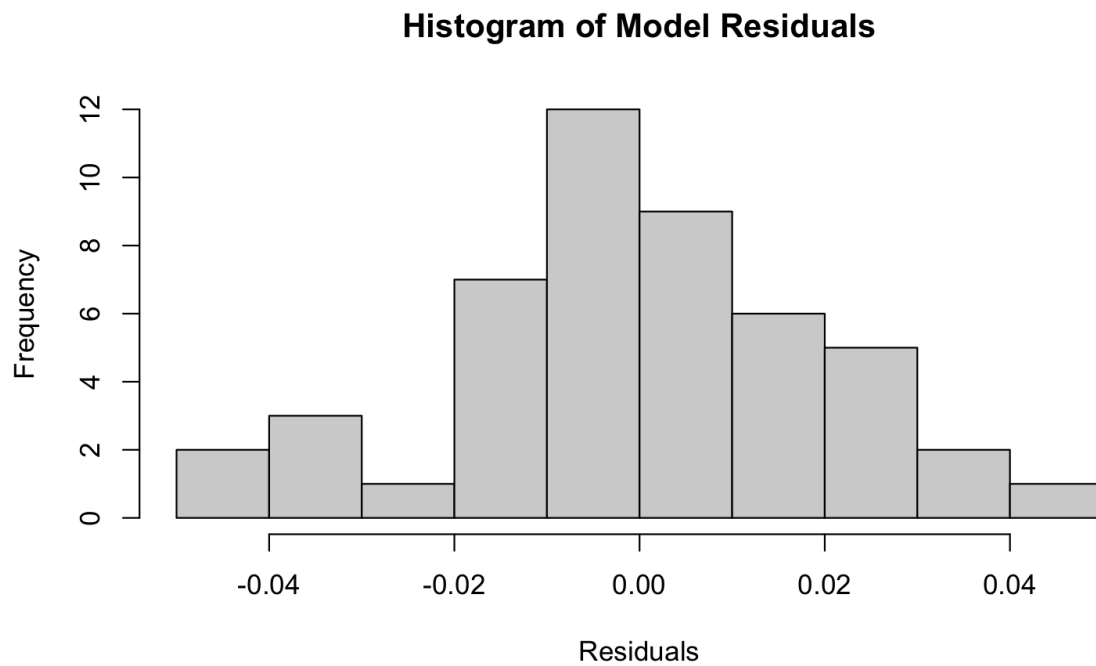
A2.9 Histogram of model residuals, Comparables Portfolio



A2.10 QQ-Plot of model residuals, Comparables Portfolio



A2.11 Histogram of model residuals, Long-Short Portfolio



A2.12 QQ-Plot of model residuals, Long-Short Portfolio

