Vice as a Haven? An Empirical Analysis of Sin Stock Performance during Economic Downturns

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Abstract

This paper examines whether European sin stock firms in alcohol, tobacco, gambling, and defense, deliver positive abnormal returns relative to broad market benchmarks during the last three recessions (2008, 2011, and 2019). Using a sample of 550 publicly listed companies, where 26 of them are sin stocks, across sixteen national indices and the STOXX Europe 600, I compute cumulative abnormal returns over two event windows [–10,10] and [–30,10], days relative to my non-sin sample.

Under CAPM, sin stocks show no statistically significant outperformance in any recession or pooled window. In contrast, the richer Fama-French Five-Factor Model uncovers a robust sin penalty. Non-sin firms outperform sin peers by 2.6 percentage points in the three-week window and 5.8 points in the six-week window, with the penalty roughly doubling as the window lengthens.

These findings contradict prior evidence of a sin stock premium and suggest that sin stocks in Europe are not recession-proof.

Keywords: Sustainable Finance, Sin Stocks, Recessions

Resumo

Este artigo analisa se as empresas europeias de ações pecaminosas nos setores do álcool, tabaco, jogo e defesa apresentam retornos anormais positivos em relação aos benchmarks de mercado amplos durante as últimas três recessões (2008, 2011 e 2019). Utilizando uma amostra de 550 empresas cotadas publicamente, em que 26 delas são ações pecaminosas, em dezasseis índices nacionais e no STOXX Europe 600, calculo os retornos anormais cumulativos em duas janelas de eventos [–10,10] e [–30,10], dias em relação à minha amostra não pecaminosa.

Segundo o CAPM, as ações pecaminosas não apresentam um desempenho superior estatisticamente significativo em nenhuma recessão ou janela agrupada. Em contraste, o modelo mais rico de cinco fatores de Fama-French revela uma penalização de pecado robusta. As empresas que não praticam pecado superam as empresas que praticam pecado em 2,6 pontos percentuais na janela de três semanas e 5,8 pontos na janela de seis semanas, sendo que a penalização praticamente duplica à medida que a janela aumenta.

Estas conclusões contradizem as provas anteriores de um prémio de ações pecaminosas e sugerem que as ações pecaminosas na Europa não são à prova de recessão.

Palavras-chave: Finanças Sustentáveis, Ações Pecaminosas, Recessões

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List of Abbreviations

AR_{it}	Abnormal Return of security i at time t
β_i	Beta Coefficient for security i
CMA_t	Conservative Minus Aggressive at time t
CAR_t	Cumulative Abnormal Return at time t
ESG	Environmental, Social and Governance
ϵ_i	Error term
ETF	Exchange Traded Funds
β_{iM}, β_{iSMB}, β_{iHML}, β_{iRMW}, β_{iCMA}	Factor loadings for security i
HML_t	High Minus Low at time t
α_i	Intercept
R_{Mt}	Market Return at time t
R_{it}	Return of security i at time t
RMW_t	Robust Minus Weak at time t
SMB_t	Small Minus Big at time t
SRI	Socially Responsible Investment
SRR	Socially Responsible Rating
SDG	Sustainable Development Goals

1 Introduction

Beneath the fanfare of the Paris Climate Agreement and every COP summit that has followed lies a quiet, paradoxical story in the investment landscape. Firms whose products conflict with the spirit of the agreement have continued to intrigue investors, especially when the larger economy stumbles. If certain stocks are more resilient to recession than others, that resilience becomes an attractive attribute. When the economy tanks, such stocks can act as a shock absorber, helping investors incur smaller losses when most of the market is falling. Sin stocks are a potential headliner. Here, sin stocks are defined as publicly listed firms that have operations in alcohol, tobacco, gambling, or defense. Existing literature suggests that such firms will have stable cash flows even in times of high volatility due to their inelastic demand Lohia (2025). However, investors now face a trade□off that was less prominent ten years ago. Sin stocks may still offer refuge when recessions hit, yet tightening climate rules and ESG standards steadily drive up funding costs and regulatory risks. It remains unclear whether these new pressures are eroding the 'sin premium' or if it is temporary.

In the context of sustainable finance, the debate about sin stocks has increased over the last decade. This increase may be driven by the United Nations Sustainable Development Goals (SDGs). SDGs now serve as a common yardstick for policymakers, investors, and corporations. Presented as a blueprint for prosperity within the planetary boundaries, the SDGs call for good health (SDG3), responsible production and consumption (SDG12), and urgent climate action (SDG13). These objectives clash with the core business of tobacco, alcohol, gambling, and defense firms. These industries are under scrutiny as more capital is directed toward SDG-aligned projects through green bonds, sustainable index mandates, and stewardship codes. For example, tobacco producers, retailers with more than five percent tobacco revenue, and any firm involved in controversial weapons are automatically ineligible for sustainable status under the MSCI EU Taxonomy (MSCI Inc., 2024). Investment committees are questioning whether high dividend yields can justify holding stocks that hinder progress toward achieving net zero. Regulators are exploring carbon pricing schemes that could erode future profitability. In the EU, carbon pricing has proven efficient. Since the EU Emissions Trading System launch in 2005 (European Commission, n.d.), the EU share of global emissions is down to 7 percent, with a positive outlook. These efforts are aligned with the Paris Climate Agreement, which aims to limit increase in global temperatures to 1.5 degrees Celsius. Examining how sin stocks behave in recessions is no longer a purely financial exercise. It also shows whether investors will trade short-term safety for the bigger long-term benefits of the SDGs. According to Morningstar (2025), global sustainable funds experienced a sharp reversal of capital in the first quarter of 2025. Approximately €7.6 billion left the fund after attracting €16 billion the quarter prior, driven by geopolitical shifts and ESG backlash. U.S. funds bled cash for the tenth straight quarter, losing about €5.4 billion, while Europe recorded its first quarterly outflow since 2018

as investors withdrew around €1 billion. This implies that investors remain divided on the long-term value of sustainable investments.

Still, even when sin stocks have a clear misalignment with the common perspective on sustainability, investors are still attracted to such stocks. Behavioral finance research helps explain this contradiction (Thaler, 1999; Tversky & Kahneman, 1992). First, loss aversion makes steady high dividend payers look especially attractive when markets are volatile; the fear of losing money outweighs the discomfort of holding an 'unsustainable' company. Second, mental accounting leads many investors to treat ethical screens as a separate decision from portfolio insurance. Hence, a single holding that smooths returns feels acceptable even if it breaches ESG ideals. Using the taste□based discrimination theory from Becker (2010), those who avoid sin stocks act as though they attach a moral penalty to owning them. They willingly sacrifice part of their expected return to satisfy an ethical preference. Because a market segment refuses to hold these companies, the shares must offer a higher expected payoff, creating the sin premium. Put differently, behavioral forces, such as loss aversion and mental accounting, explain why many investors still buy sin stocks despite sustainability concerns. Becker's framework may describe how the resulting supply-demand imbalance transforms this behavior into persistent excess return.

The results of this paper offer several takeaways. A recession-by-recession analysis supports the perception of the 'sin stocks as a safe haven' narrative: in eight of twelve instances, the portfolios of alcohol, tobacco, gambling, and defense exhibit a higher mean return than their non-sin counterpart. Although the t-statistics fall short of conventional significance thresholds, there is still a 66 percent likelihood that vice firms will outperform when volatility spikes. However, zooming out changes the picture. When pooling all recessionary windows into a single panel, the advantage diminishes. The performance reverses, with non-sin firms beating the sinners. Again, the results are not significant. Nonetheless, the progressive regression table using FF5 for the [-30,10] window supports this trend. This underperformance is consistently significant at the 0.1 percent level. Taken together, the results suggest a transition. Tightening ESG rules erodes the traditional sin stock premium, a shift with implications for future portfolio construction.

By examining the performance of European sin stocks during the three most recent recessions, this paper assesses whether the sin premium continues to exist in a world increasingly focused on sustainability. Factors such as carbon pricing, ESG disclosures, and exclusion lists created by investment funds are now more relevant than they were two decades ago. These results contribute to our understanding of investment decisions and portfolio construction.

2 Research Question

Do European sin stocks in alcohol, tobacco, gambling, and defense earn positive abnormal returns relative to their local indices during the last three recessions?

This study investigates whether sin stocks, firms involved in alcohol, tobacco, gambling, and defense, systematically outperform a European equity universe comprising sixteen broad market indices during periods of economic contraction. Motivated by prior evidence that 'sinners' persistently outperforms the market (Fabozzi et al., 2008; Hong & Kacperczyk, 2009), this paper tests whether this performance remains statistically significant during the 2008-2009 Global Financial Crisis, the 2011-12 Euro area sovereign debt crisis, and the 2019-2020 COVID-19 recession. It further assesses whether holding sin stocks can serve as a practical investment strategy for diversified portfolios in downturns.

Because the label 'sin' is culturally constructed, investor behavior and expected returns depend on local norms and the stigma attached to these activities. Goffman (1963) defines stigma as an 'attribute that is deeply discrediting,' referring to human attributes. However, stigma can also apply to the perception of other subjects. Sin stock activities are often associated with stigma, and this is central to classifying a firm as a sin stock or not. Consequently, this study does not filter companies by ESG scores or carbon emission metrics, which are sometimes used to define corporate 'sin.' Instead, it follows the traditional focus on alcohol, tobacco, gambling, and defense. By expanding a literature base that is mainly US-centric, this paper uses a region-wide multi-index, multi-window design to test whether the sin stock premium persists in Europe's three most recent recessions.

The topic was selected due to its relevance in the rapidly growing field of sustainable finance and investments. Although accelerating climate change remains an urgent global concern, the companies examined here are not necessarily the worst emitters. Instead, they are firms whose products are often viewed as harmful to human health or that they exploit human vulnerabilities. Despite facing strict regulatory scrutiny, they employ millions of people and continue to attract capital. Therefore, understanding how these companies perform during economic downturns carries both academic and practical significance.

The rise in sea levels and the growing frequency of extreme weather events, such as droughts and tsunamis, can be partly attributed to how we treat the planet (Cazenave & Cozannet, 2014; Reid & Mooney, 2023; Vicente-Serrano et al., 2022). These physical impacts have made climate change an urgent topic rather than a distant scientific debate. This have pushed policymakers, investors and everyday consumers to look harder at the real-world costs of business practices. As a result, during the last 15 years, ESG has become substantially more prominent. Reporting frameworks such as the Global Reporting Initiative and the European Sustainability Reporting Standards have moved from voluntary guidelines to actual expectations on large listed firms.

The sample, of 550 companies in 2008, 24.5 percent did not report ESG. In contrast, by 2019, out of the same sample, only 6 percent failed to report ESG. This increase illustrates how quickly the disclosure norms have tightened. Therefore, I hypothesize that the tightening ESG rules erode the traditional sin stock premium. As most of the literature is before 2025, this report seeks to determine whether there is a change in sin stock performance during downturns.

This study asks whether sin stocks perform better than the European market in economic downturns. Clarifying this relationship will expand the knowledge about sin stock behavior. An event study methodology is employed, where cumulative abnormal returns serve as a reference point. This study also contributes to the literature by focusing exclusively on European markets and extending the time frame to include the most recent downturns, thus capturing evolving ESG disclosures and regulatory landscapes.

3 Literature Review

3.1 Sin Stocks

Over the last two decades, ESG, SRI, and green investments have attracted considerable attention from investors (Lioui & Tarelli, 2022; Principles for Responsible Investment, 2021). This surge drives an increased awareness of sustainability and the desire for returns beyond financial gains. However, the rise in responsible investing has also reignited the debate about 'sin stocks.' Sin stocks or 'sinners' are companies that operate in industries such as tobacco, alcohol, and gambling. This "Triumvirate of Sin," labeled by Hong and Kacperczyk (2009), can be further expanded to include sectors such as defense, adult entertainment, or oil and gas. Being a sinner stems from their operations or due to their extensive release of carbon emissions. Their activities fall into the category of unethical or immoral. However, the debate is divided. The perception of being a sinful firm or not is contingent on local norms and sentiments. For example, alcohol is viewed as a routine consumer good in most of Europe but is strictly prohibited in several Middle Eastern jurisdictions. Some argue that sinners are companies that capitalize on human weaknesses. Robbing us for cash while we drink, smoke, and gamble ourselves into bad health and cardiac arrest. Others believe that supporting army contractors is patriotic and a necessity. A nation's armed forces provide a place to work, a purpose to serve, and values to live by. Despite this disagreement, sin stocks have generally been found to be companies with relatively steady cash flow, making them attractive investment opportunities. Moreover, driven by their inelastic demand, companies appear more robust when considering economic downturns (Salaber, 2009).

Yet, this resilience does not eliminate headwinds. Sin companies often face higher litigation

risk and closer regulatory scrutiny than their non-sin counterparts, which can suppress their valuations (Hong & Kacperczyk, 2009). In such instances, undervaluation is driven by an increased spread between market price and value. Berman (2002) attributes these lower valuations partly to stricter oversight, leading to more conservative accounting practices. For the investor, this translates into excess return potential. Hong and Kacperczyk (2009) likewise show that sin stocks trade at lower valuation ratios compared to similar firms over the period 1965–2006. They rationalize this using the Gordon growth model to find the return investors must demand. The results imply that sin stocks are priced to deliver about 2 percent higher excess returns per year than comparables. Durand et al. (2013) find that sinners are cheaper than saints, supporting the view of Hong and Kacperczyk (2009). Further, Fauver and McDonald IV (2014) find that in countries that perceive specific industries as 'sinful,' the average sin firm's Tobin's Q[1] is statistically 8 percent lower than that of a comparable non-sin firm. By contrast, no significant difference in Tobin's Q emerges between sin and non-sin firms in nations where these industries are not viewed as sinful. For example, when accounting for common firm valuation determinants, sin stocks in the United States exhibit a roughly 12 percent lower valuation than their non-sin counterparts. Whereas in China, they command a 5 percent higher valuation. The authors suggest that this observation is society-driven. Similar observations are undertaken by Durand et al. (2013), who find that, on average, investors in Asia-Pacific pay more for sin stocks than for other firms.

Hong and Kacperczyk (2009) hypothesize that avoidance of sin stocks in portfolios is driven by societal norms, which should increase the upside potential of sin stocks, resulting in higher returns due to their risk profile. As societal norms partly explain ownership, they find that institutional ownership is lower than stocks with the same characteristics for 1980-2006. For example, Norway's €1.65 trillion Government Pension Fund Global has enforced a blanket ban on tobacco producers since January 19, 2010, and its exclusion list (last updated May 11, 2025) still bars Altria, Philip Morris International, British American Tobacco, and two dozen other manufacturers (Norges Bank Investment Management, 2025). Luo and Balvers (2014) use the term "boycott risk factor", which suggests that SRIs neglect sin companies. Simultaneously, mutual and hedge funds are yielding on such opportunities, as they can play the role of arbitrageurs and buy sin stocks if they are ignored and priced cheaply. Both papers from Hong and Kacperczyk (2009) and Fabozzi et al. (2008) find that their sin stock sample outperforms comparable stocks and standard benchmarks in annualized returns. On a different note, Fabozzi et al. (2019) investigate whether sin bonds are overvalued compared to corporate bonds. They find this to be true, resulting in sin bonds underperforming compared to their counterparts. They do not conclude why sin stocks are undervalued and sin bonds are overvalued. Yet, one of their potential explanations is that sin bonds offer greater recession protection, and investors are, therefore, willing to pay a premium for the bond.

[1] A valuation metric that measures the relationship between market value and intrinsic value.

3.2 The Financial Cost

Blitz and Swinkels (2023) state that investors increasingly exclude stocks from their portfolios due to factors other than financial returns. However, this exclusion reduces the pool of investable assets, which can lead to under-diversification. Under-diversification means you might take on extra risk that does not necessarily bring higher returns. Such constraint exposes an investor to concentration risk, the probability of a sector, industry, or company dragging the whole portfolio down. As the portfolio consists of too few distinct companies, the portfolio's volatility is driven by idiosyncratic shocks instead of larger market movements. However, this depends on the portfolio composition and is illustrated as a strict scenario. Further, Meehan and Corbet (2025) contradicts the belief that sin stocks are resilient during economic downturns. They find that SRI ETFs outperform sinners in terms of returns and volatility. Yet, this was only demonstrated during the COVID-19 pandemic. Similar findings are presented by Omura et al. (2021), highlighting that loyal shareholders in ESG-oriented firms support the share price during downturns. They find that the outperformance of SRI indices increased during the COVID-19 pandemic compared to conventional MSCI indices. However, they find that ESG ETFs do not outperform benchmarks similarly. A clear distinction between the studies of Meehan and Corbet (2025) and Omura et al. (2021) is that they have different benchmarks. Yet, both studies highlight that ESG factors play a significant role in investor sentiment. This implies that investment criteria change, and the historical robustness of sin stocks is questionable for future periods with higher market volatility. Looking back, from 1992-2004, Kempf and Osthoff (2007) find that a long-short strategy, where long means high SRR and sell low SRR, yields at best a positive four-factor alpha of up to 8.7 percent a year. Even when accounting for transaction costs, the abnormal returns remain significant. Kempf and Osthoff (2007) use different types of screening[2], where the only approach that does not earn high abnormal returns is the one where they exclude sinners entirely, implying that such stocks are a necessity in their dataset to obtain solid returns. Salaber (2009) finds the opposite of Meehan and Corbet (2025) and highlights that sin companies are great performers in recessions due to fewer fluctuations in earnings. She further suggests that socially responsible investors sacrifice some return to satisfy their ethical preferences by leaving sin stocks out of their portfolios.

3.3 Market Reactions during Recessions

During recessionary periods, equity markets typically sell off hard at the start as earnings expectations are lowered and volatility jumps. Kroencke (2022) finds that in 42 recessions since 1951,

[2]Negative screening excludes all companies involved in controversial business practices. Positive screening does not exclude all companies associated with controversial business areas but rates all companies based on a set of criteria. Best-in-class screening follows a similar approach to positive screening, but it also ensures that the portfolio is balanced across various industries.

in the first four quarters of a downturn, dividends fall by 13 percent, whereas equity markets typically plunge closer to 30 percent (Tiwari, 2024). This sustained period of contraction often involves a decline in GDP, employment rates, and business investments. However, according to Gvozdeva et al. (2023), stock market returns have been positive in more than half of the US recessions since the Civil War. Yet, this observation accounts for the whole period, not only the event date itself. With an average lasting downturn of 16 months, equity markets will have time to regain confidence from investors and capitalize on overreactions. Factors like monetary stimulus and forward-looking pricing are potential drivers for a positive outcome. Park (2021) finds that stock prices overreact to a recession; therefore, buying stocks at the trough price would produce significant abnormal returns. Still, buying the dips throughout the period based on a simple percentage-drop rule will not yield similar returns.

While equity prices often get the headlines, the bond market usually signals recession first. The signal most watched is an inverted Treasury yield curve, where short-term rates rises above long□term rates. Since 1960, the 3 month/10 year spread has inverted before every US recession, with only one false positive in 1966. Historically, the median lead is 12–16 months, long enough for equity investors to reposition before earnings start to fall. However, Dimensional Fund Advisors (2022) finds that equity returns were still positive three years later in 10 of 14 inversions across five developed markets. This implies that long-term investors may consider holding their assets. This study, conducted from 1985 to 2014, amounting to a 77 percent likelihood of positive returns after three years. Still, the returns have a large dispersion.

4 Data & Methodology

4.1 Data

4.1.1 Sample Construction

To construct the dataset for this study, data were sourced primarily from LSEG Datastream and the Kenneth R. French website. Datastream provides a robust collection of firm-specific metrics, including stock prices, total assets, quick ratios, leverage ratios, and ESG scores. The most recent metric, ESG score, had a coverage of 94 percent in 2019. Stock prices were computed into returns, which in turn were calculated into excess returns. All data were obtained in euros to ensure comparability across countries. For estimation purposes, stock prices were collected for a period of 252 trading days preceding the event window.

Furthermore, Datastream was utilized to classify stocks into sin and non-sin categories under the NACE classification system. The Kenneth R. French website delivered essential factor re-

turns, including the risk-free rate for the relevant trading days. Factor returns are SMB, HML, RMW, and CMA, described in detail in Table 12. This information forms the basis of the event study methodology outlined in section 4.2, which centers on assessing cumulative abnormal returns (CAR) for individual companies across three periods. These CARs were computed using the Capital Asset Pricing Model (CAPM) and the Fama-French Five-Factor Model (FF5). I estimate each stock's expected return using the CAPM, regressing the stock's historical excess returns on the market's excess returns to obtain its intercept and slope coefficient. For robustness, I estimate expected returns with FF5, which extends CAPM's market factor with size, value, profitability, and investment factors. Two event windows were utilized for analysis: a short-term spanning [-10,10] days and a long-term window covering [-30,10] days. The dataset concentrated on the leading indices from 15 European countries, including Norway and the Stoxx Europe 600. The selection criteria required valid stock prices for 2008, 2011, and 2019, excluding stocks with missing data and duplicates. This amounts to a sample of 550 firms for each period. Although historical prices were accessible for most firms, some displayed stagnant prices over long periods. No change in stock price for more prolonged durations could skew the results. Therefore, these firms were eliminated in the final data cleaning process, resulting in a cumulative total of 1,650 observations, of which 76 observations were sin stocks. Additionally, I removed duplicate observations, and investment trusts were excluded from the analysis. In Table 1, I have categorized all the non-sin firms by their operating sector.

Sector	N
Communication Services	24
Consumer Discretionary	52
Consumer Staples	28
Energy	18
Financials	103
Health Care	47
Industrials	111
Information Technology	31
Materials	57
Real Estate	24
Utilities	29

Table 1: Number of companies by sector

4.1.2 Explanatory Variable

The explanatory variable in the analysis is a dummy variable that takes a value of 1 if the investigated company is classified as a sin stock and 0 if it is not. This allows for a clear distinction in examining the effects of being a sin stock on CARs, facilitating my analysis of how the characteristics associated with sin stocks might influence investor behavior and market performance

during recessionary periods. In this paper, sin stocks are classified by their operations. While the the traditional 'triumvirate of sin,' the classification is expanded to include industries related to defense and weaponry. Although not traditionally included in the 'triumvirate of sin,' the defense category is added because weapon manufacturing is perceived as controversial and highly polluting (Causevic et al., 2022). Companies obtain the dummy value of 1 if they have activities in (i) tobacco manufacturing or distribution, (ii) production or retailing of alcoholic beverages, (iii) commercial gambling (including casinos, online betting, and lotteries), or (iv) defense and weapons systems (e.g., armaments, military aircraft, or munitions). Table 2 reports a count of the sin stocks in my sample.

Sector	N
Alcohol	8
Defense	12
Gambling	4
Tobacco	2

Table 2: Sample count by operations

4.1.3 Control Variables

The control variable Size is included in the analysis to account for the fundamental economic differences between larger and smaller firms. Larger firms benefit from mature product lines, higher analyst coverage, and lower idiosyncratic risk (Barth et al., 2001; Bartram et al., 2018). In simpler terms, it means being a robust firm with great experience. They tend to trade more frequently (Barinov, 2014), which impacts event window returns. This is because trading frequency is a proxy for liquidity and speed of price discovery. Smaller firms, by contrast, suffer wider bid-ask spreads (Amihud & Mendelson, 1986) which can magnify price swings. Size is represented by the natural logarithm of total assets for the corresponding year. This transformation addresses two key issues. Firstly, it mitigates the influence of extreme scale, preventing larger firms from disproportionately affecting the model. Secondly, it reduces skewness and heteroskedasticity, resulting in a more symmetrical distribution with constant error variance.

Liquidity is assessed using the acid test, or quick ratio, calculated as (Cash & Equivalents + Net Receivables) / Current Liabilities, using annual data sourced from LSEG Datastream. This measure reflects a firm's capability to meet short-term obligations without the need for inventory liquidation. Incorporating liquidity is essential, as firms with tight liquidity may react more drastically to adverse economic shocks, magnifying their CARs. Usually, a quick ratio of $>$ 1 is considered healthy. However, this will vary based on the industry in which the company operates.

Leverage is captured by the debt-to-equity ratio, calculated as Total Interest-Bearing Debt di-

vided by Shareholders' Equity. A high value signals that the firm has less equity than debt to withstand economic shocks. This raises the firm's default probability and, therefore, its levered beta. Highly leveraged firms may experience larger negative CARs following adverse news (due to increased default risk) and correspondingly larger positive CARs in response to favorable information. This phenomenon is referred to as the leverage effect.

Finally, Return on Assets (ROA) is included to proxy for operational quality, defined as Net Income divided by Average Total Assets. ROA provides insight into how effectively a firm can convert its assets into profit. Firms with higher ROA typically enjoy stronger internal cash generation and greater flexibility to fund operations internally. A solid ROA should assist them in recessionary shocks.

Collectively, these control variables enrich the regression models by accounting for critical firm-specific characteristics that may influence CARs. Such influence is elaborated in the Results section. Table 3 presents a list of all variables along with their descriptive statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
TotalAsset	1646	7.150×10^7	2.520×10^8	6.797×10^3	3.040×10^9
QuickRatio	1299	1.086	1.037	0.030	18.320
DebtToEquity	1646	122.549	632.039	−22 583.330	5496.070
ROA	1633	6.141	9.780	−55.890	221.720
ESGScore	1362	60.605	20.158	3.840	95.290
SinDummy	1650	0.047	0.212	0.000	1.000
CARCAPM1010	1642	−0.028	0.082	−0.522	0.318
CARCAPM3010	1631	−0.024	0.116	−0.560	0.399
CARFF51010	1639	0.026	0.102	−0.472	0.573
CARFF53010	1633	0.030	0.153	−0.554	0.592

Table 3: Descriptive statistics for all sample variables and CARs

4.1.4 ESG Score

Refinitiv's ESG Score assesses a company's performance across the three ESG pillars: Environmental (e.g., carbon intensity), Social (e.g., workforce safety), and Governance (e.g., management) into a single figure from 0 (worst) to 100 (best). Leveraging one of the world's most extensive ESG□data operations, Refinitiv analysts continuously harvest public sources such as regulatory filings, CSR reports, company websites, and news sources. These inputs feed more than 870 measures, which roll into the composite score. While the underlying data points are refreshed throughout the year, the ESG Score is published annually (LSEG, n.d.).

According to Li et al. (2021), the ESG principle was introduced 21 years ago, in 2004. Emphasizing that the principle is viewed as a strategy by investors to evaluate corporate behavior and future financial performance. The metric relies on the pillars in the paragraph above and

serves as a complex signal in investment analysis and decision-making. In maturing, ESG has experienced a series of developing factors, such as ”establishing the ESG evaluation system, the ESG disclosure standards, and the ESG index system” (Li et al., 2021). Still, even with this remarkable rise in attention and effort, its significance may be overvalued. Edmans (2023) describes ESG as extremely important and nothing special. In his paper, he highlights that ESG has developed from a niche subfield into a mainstream practice. Further, he slashes the idea of ESG investing and prefers the term ESG analysis. The reasoning is that the investors are not driven by ESG principles or worrying about long-term value due to regulatory mandates or client pressure. Their objective is to beat the market, and that can be achieved by capitalizing on information that has not yet been priced in. Pedersen et al. (2021) highlights that one reason for potentially higher expected returns is that a high ESG score serves as a positive indicator of a company's fundamentals. If investors who overlook ESG factors fail to recognize this signal, its impact may not be fully reflected in the stock's price.

Table 4 illustrates the increasing efforts to achieve better ESG scores over a span of 15 years. Three of the four sin-sector groups show consistent gains in ESG scores during the recession periods of 2008, 2011, and 2019. Tobacco is the only exception, having recorded a relatively strong score as early as 2008, with little change thereafter.

Sector	2008	2011	2019
Alcohol	47.23	57.50	59.82
Defense	43.09	50.00	71.35
Gambling	42.36	42.72	59.96
Tobacco	78.96	84.44	82.82
Non-Sin	53.26	58.48	67.04

Table 4: Average ESG scores by sector and year

4.2 Methodology

4.2.1 Event Study Methodology

An event study was conducted using a series of progressive regressions, adjusted for three different timeframes and two types of event windows. The analysis focuses on the four major European economies: France, Germany, Italy, and the United Kingdom. The Organisation for Economic Development (OECD) determines when the countries enter a recession. The rationale behind this analysis is that the simultaneous economic downturn in these significant economies likely indicates broader recessionary conditions in Europe. Based on figures from World Bank (2023), Germany, UK, France and Italy is ranked 3rd, 6th, 7th and 8th, respectively, in terms of

GDP on the world scale. Implying that they drive most of the continent's cross□border trade and financial flows in Europe. A contraction in all four usually spills into the rest of the continent.

A multi-window event study design is employed to quantify how equity markets in these countries (and the larger continent) respond to the onset of recession. The analysis compares each firm's abnormal return, defined as the difference between its actual return and a model-implied "normal" return, around the event date. This leads to the calculation of CAR, represented as:

$$CAR_{i(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{it} \tag{1}$$

To more accurately capture the effect of the recession, CARs are examined over two event windows: [-10,10] and [-30,10] trading days. The shorter window (10 days prior and 10 days post the recession date) minimizes variance from unrelated shocks. However, a small window may overlook gradual price adjustments. Also, news leaks or anticipated downturns can be excluded in such a window. Expanding the window by adding 20 days contributes to capturing these adjustments and potential drifts. Still, the cost of increased noise appears when the calculation period is extended. Similarly, both periods maintain a 10-day lag to avoid confounding influences from news unrelated to the recession. After establishing the event windows, excess returns for each stock are calculated based on 252-day estimation period, alongside market excess returns, to derive the intercept and beta coefficient in the first model, the CAPM:

$$E\big(R_{it}\big) = \alpha_i + \beta_{iM}\, R_{mt} \tag{2}$$

Using CAPM to obtain expected returns enables the computation of abnormal returns as:

$$AR_{it} = R_{it} - E\big(R_{it}\big) \tag{3}$$

This methodology is then applied to the FF5 model, which incorporates additional factors (size, value, profitability, and investment) reflected as:

$$E\big(R_{it}\big) = \alpha_i + \beta_{iM}\, R_{mt} + \beta_{iSMB}\, \mathrm{SMB}_t + \beta_{iHML}\, \mathrm{HML}_t + \beta_{iRMW}\, \mathrm{RMW}_t + \beta_{iCMA}\, \mathrm{CMA}_t \tag{4}$$

This approach also necessitates computing factor loadings based on six value-weighted portfolios from the Fama and French website. This allows for the assessment of the sensitivity of stock returns to each systematic risk factor. Employing CAPM and FF5 enables the eval-

uation of whether any recession-related valuation effect persists after controlling for broader risk premiums. This approach ensures that the measured CARs accurately reflect event-specific information, thereby mitigating potential omitted-factor bias.

4.2.2 Regression Analysis

A series of regression models were employed to analyze how various firm characteristics influence CARs, each incorporating explanatory variables individually. These models aim to explore the relationship between specific firm characteristics during a given period and their corresponding CARs at that same time. The regression equations are structured as follows:

$$CAR_t = \alpha + \beta_1 \, Dummy_i + \beta_2 \, Size_i + \varepsilon_i \tag{5}$$

$$CAR_t = \alpha + \beta_1 \, Dummy_i + \beta_2 \, Size_i + \beta_3 \, Liquidity_i + \varepsilon_i \tag{6}$$

$$CAR_t = \alpha + \beta_1 \, Dummy_i + \beta_2 \, Size_i + \beta_3 \, Liquidity_i + \beta_4 \, Leverage_i + \varepsilon_i \tag{7}$$

$$CAR_t = \alpha + \beta_1 \, Dummy_i + \beta_2 \, Size_i + \beta_3 \, Liquidity_i + \beta_4 \, Leverage_i + \beta_5 \, ROA_i + \varepsilon_i \tag{8}$$

$$\begin{aligned} CAR_t = \alpha &+ \beta_1 \, Dummy_i + \beta_2 \, Size_i + \beta_3 \, Liquidity_i + \beta_4 \, Leverage_i + \beta_5 \, ROA_i \\ &+ \beta_6 \, ESG_i + \varepsilon_i \end{aligned} \tag{9}$$

The strength of a regression model lies in its ability to demonstrate how changes in the dependent variable, CAR, are influenced by the independent and control variables included in the analysis (Sykes, 1993). Through this repetitive approach, the aim is to identify the significant predictors of CAR and understand their relative impact on firm performance.

Before estimating the panel regressions, I conducted a Hausman test to compare the fixed-effects and random-effects models. The test results did not reject the null hypothesis of no systematic difference in coefficients (p-value = 0.7739), leading me to choose the random effects model. The Hausman test helps determine whether it is appropriate to treat each firm's unobserved effects as a random draw.

The random effects model utilizes both within-firm and between-firm variations in the data, effectively implementing a Generalized Least Squares (GLS) regression. The standard errors reported in parentheses are robust to heteroskedasticity and clustered by firm.

5 Results

In this chapter and the following subsections, the empirical evidence for the research will be presented. This will include analyses of t-tests and progressive regression models, focusing on both aggregated and disaggregated recessionary periods. To facilitate comparison, the results are organized into separate sections. First, outcomes of the disaggregated t-tests are presented. Next, recessionary periods are pooled to identify any emerging patterns. For the regression analysis, the short window is examined first, followed by the long window. The rationale behind this approach is to see how the models (CAPM and FF5) differ when additional layers are incorporated. The results from these analyses will provide the evidence needed to address the research question outlined in Chapter 2.

5.1 T-Tests

This subsection reports on an independent two-sample t-test to evaluate the mean differences in CAR between sin and non-sin stocks. This approach is utilized due to its ability to see whether the mean CARs are different in a way that's unlikely to be due to random chance. P-values are applied to uncover significance levels. Tests were conducted for both CAPM and the FF5 during each recession, resulting in twelve unique observations. The goal is to determine whether sin stocks exhibit different reactions and whether they provide better average returns.

The results are presented in Table 5. No statistical significance was found for either the period in 2008 or 2019. However, sin stocks exhibited slightly higher CARs than the control group in 8 out of the 12 periods, demonstrating greater returns in the short event window, regardless of the model used. When not considering 2011, the average CARs for sin stocks is outperforming the control group in 7 out of 8 periods. The results flip when considering 2011. When we disaggregate the events, it becomes evident that recessionary periods exhibit different behaviors and characteristics.

		Non-Sin		Sin			
Year	**Window**	Obs	Mean Return	Obs	Mean Return	Mean Diff	p-value
2008	CAPM[-10,10]	523	−0.054	25	−0.042	0.012	0.514
	CAPM[-30,10]	523	−0.020	25	−0.001	0.019	0.523
	FF5[-10,10]	523	0.008	25	0.020	0.012	0.173
	FF5[-30,10]	523	−0.024	25	−0.003	0.021	0.475
2011	CAPM[-10,10]	520	−0.011	25	0.012	0.023	0.092
	CAPM[-30,10]	513	−0.039	25	−0.070	−0.031	0.113
	FF5[-10,10]	518	0.096	25	0.041	−0.055	0.004**
	FF5[-30,10]	513	0.149	25	−0.063	−0.212	0.000***
2019	CAPM[-10,10]	523	−0.020	26	0.012	0.032	0.585
	CAPM[-30,10]	519	0.014	26	0.001	−0.013	0.507
	FF5[-10,10]	522	−0.021	26	0.017	0.038	0.743
	FF5[-30,10]	521	−0.024	26	−0.012	0.012	0.504

Mean CARs for Non□Sin and Sin stocks across two event windows and two benchmarking models.

Table 5: Mean CARs for Non-Sin and Sin Stocks

In 2011, non-sin firms performed better than sin firms in three out of four instances. Furthermore, the results from that year are statistically significant at the 1 and 0.1 percent level, highlighting a clear divergence between sin and non-sin equities during this period. However, this is only for two of the four observations. Using the CAPM [-10,10], non-sin firms experienced an average CAR of -1.1 percent, while sin stocks gained +1.2 percent over the same 21-day window. The difference of 2.3 percentage points resulted in a p-value of 0.092, indicating that it is not statistically significant. Still, it suggests that vice stocks modestly outperformed their peers during the recession. However, when extending the analysis to a time window of [-30, 10], non-sin stocks demonstrate greater resilience, showing a difference of 3.1 percentage points.

When applying the more comprehensive FF5 model, the disparity becomes even larger and more precise. For the shorter window [-10,10], the mean CAR for non-sin firms increased to +0.96 percent, while sin stocks showed a gain of only +0.41 percent, resulting in a significant percentage point gap of 5.5 (p = 0.004). Expanding the window to [-30,10] magnifies this contrast, with non-sin CARs rising to +14.9 percent compared to -6.3 percent for sin firms, yielding a substantial 21.2 percentage point difference with a p-value below 0.001.

The evidence from the event study paints an essentially null picture with one clear exception. Across both the Global Financial Crisis (2008) and the pre-COVID slowdown (2019), sin stocks behave much like their counterparts. In most cases, sinners post a marginally higher average CAR, yet never by a statistically credible margin. Economically speaking, the differences are

minor. Only the 2011 sovereign debt crisis breaks the pattern. The two-sample tests reveal a pronounced and significant gap, with non-sin firms outperforming vice stocks in three instances.

Table 6 combines the three recessionary episodes into a cross-sectional analysis, comparing sin and non-sin stocks within the model and event windows. The pooled sample now consists of approximately 1,560 observations for the benchmark group and 76 for the sin cohort.

	Non-Sin		Sin			
Window	Obs	Mean	Obs	Mean	Mean Diff	p-value
CAPM[-10,10]	1 566	−0.029	76	−0.014	0.015	0.122
CAPM[-30,10]	1 555	−0.024	76	−0.024	0.000	0.972
FF5[-10,10]	1 563	0.027	76	0.001	−0.026	0.028*
FF5[30,10]	1 557	0.033	76	−0.025	−0.058	0.001***

Mean CARs for Non-Sin and Sin stocks across two event windows and two benchmarking models, pooled.

Table 6: Means of CAR for Non-Sin and Sin Stocks

Under CAPM, sin and non-sin returns remain statistically insignificant, mirroring the disaggregated recession findings. The mean differences are small, with -1.5 percentage points in the short window and zero percentage points in the long window. Effectively washing out the perceived sin premium. However, by switching to the FF5, the picture flips. Non-sin stocks outperform sin stocks by 2.6 percentage points in the short [-10,10] window and 5.8 percentage points in the long [-30,10] window, both significant at conventional levels. Such differences in mean returns are also to be considered economically significant. This observation supports the findings of the 2011 disaggregated values, which are also significant.

The pooled tests reveal two important lessons. First, there is no universally recession-proof advantage to owning sin stocks. In a basic market model, these stocks often perform no better, and sometimes worse, than comparable firms. Second, when expanding the model to include additional factors, the returns on sin stocks lag behind those of ordinary stocks. This behavior is also noted by Sagbakken and Zhang (2022) and Blitz and Fabozzi (2017), both of whom emphasize that the excess returns disappear when controlling for factors such as profitability and investment exposure.

5.2 Regressions

All subsequent results are presented as progressive regression tables, incorporating pooled observations. This means that I consider the three recessionary periods within a single analysis.

5.2.1 Short Event Window

Table 7 presents estimates from random-effects panel regressions of CARs within the [-10,10] window. Column (1) indicates that firms involved in sin industries earn approximately 1.5 percentage points more than comparable non-sin firms when no other controls are included. The Sin Dummy is positive, yet, not significant throughout the model. However, once factors such as liquidity, leverage, profitability (ROA), and ESG scores are added in columns (3) through (6), the coefficient for the Sin Dummy diminishes towards zero and gradually loses economic contribution. This indicates that the earlier observed performance difference is fully explained by standard firm fundamentals.

	$[-10, 10]$					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Sin Dummy	0.015	0.015	0.012	0.012	0.011	0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)
Size		-0.000	0.001	0.001	0.002	-0.002
		(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Liquidity			-0.003	-0.003	-0.004*	-0.002
			(0.002)	(0.002)	(0.002)	(0.002)
Leverage				-0.000	-0.000	0.000
				(0.000)	(0.000)	(0.000)
ROA					0.001**	0.001**
					(0.000)	(0.000)
ESG						0.022**
						(0.009)
cons	-0.029***	-0.022	-0.038	-0.038	-0.053*	-0.082*
	(0.002)	(0.017)	(0.022)	(0.022)	(0.022)	(0.036)
N	1642	1640	1293	1293	1292	1045
R^2	0.002	0.002	0.003	0.003	0.015	0.024

Dependent Variable is CAR. Robust Standard Errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: CAPM Short Event Window

The coefficient for ROA is positive and significant at the 1 percent level. A one percentage point increase in ROA results in an increase in CARs of approximately 0.1 to 0.2 percentage points. The economic impact is still small. Additionally, firms with higher ESG scores tend to perform better; those in the top ESG decile earn about 2 percentage points more than comparable companies ($p < 0.01$). In contrast, the variables Size and Leverage are small and insignificant in this model. From this, conclusion are that CARs are not influenced by the size of the firm. This suggests that there is no evidence to support the existence of a size premium for this sample. This point is particularly relevant given the ongoing debate about the size effect on equity returns. Van Dijk (2011) emphasizes that recent empirical studies indicate the size effect has disappeared since the early 1980s. During recessions, as indicated in Table 7, markets do not provide a systematic premium for sin stocks. Instead, investors seem to prioritize profitability and ESG indicators, which supports the resilience evidence presented by Gao and Geng (2024).

Table 8 presents the progressive panel regressions, but this time it replaces the CAPM with the FF5 model. In all six specifications, sin stocks consistently perform worse than non-sin stocks. This 'penalty' remains robust even with the inclusion of firm controls throughout the entire model.

	$[-10, 10]$					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Sin Dummy	-0.026**	-0.030**	-0.023*	-0.023*	-0.024*	-0.030**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)
Size		0.004***	0.001	0.001	0.001	0.004
		(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Liquidity			-0.002	-0.002	-0.003	-0.002
			(0.003)	(0.003)	(0.003)	(0.004)
Leverage				-0.000	-0.000	-0.000
				(0.000)	(0.000)	(0.000)
ROA					0.001*	0.001*
					(0.000)	(0.000)
ESG						-0.010
						(0.009)
cons	0.028***	-0.031	0.011	0.011	0.002	0.000
	(0.002)	(0.017)	(0.024)	(0.024)	(0.025)	(0.040)
N	1639	1637	1290	1290	1289	1045
R^2	0.003	0.009	0.004	0.004	0.007	0.012

Dependent Variable is CAR. Robust Standard Errors in parentheses.
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 8: Five-Factor Model Short Event Window

Even without any firm-level controls (column 1), sin stocks underperform their peers by 2.6 percentage points over the three-week window. This negative gap remains substantial and statistically significant even after accounting for factors such as size, liquidity, leverage, profitability, and ESG controls. When Size is introduced in column (2), the coefficient is highly significant. However, this behavior does not persist and Size loses explanatory power when other controls are introduced. Further, profitability emerges as the strongest positive driver, demonstrating similar characteristics to the CAPM short window. Profitablity, explained as Return on Assets, have been researched a lot in existing literature. Nadyayani and Suarjaya (2021) finds that the higher the ROA, tend to produce stronger stock returns. Further, Haghiri and Haghiri (2012) find that across every industry examined, ROE and ROA show a strong correlation with stock

returns, making them reliable predictors of share-price performance.

In contrast to the CAPM short windows, where ESG had a clear positive impact, in this model, the ESG effect is minimal and insignificant. Interestingly, similar findings are demonstrated by Nsibande and Sebastian (2023). They use a sample of the 40 largest JSE-listed companies, with data from 2015 to 2019, to observe the predicting power of the FF5. They find that that equity returns are not significantly influenced by ESG scores.

In contrast to previous literature that documented a positive sin premium under the CAPM or three-factor tests, the findings from the FF5 model reveal a consistent sin penalty (Fabozzi et al., 2008; Richey, 2017). Richey (2017) identified a positive and significant alpha for sin stocks throughout the sample period using CAPM, the Fama-French three-factor model, and the Carhart four-factor model. However, when the profitability factor (RMW) and the investment factor (CMA) were added to the model, the significance of the alpha disappeared. In conclusion, vice stocks tend to deliver systematically lower abnormal returns during recessions under the conditions presented.

5.2.2 Long Event Window

Table 9 presents six progressive specifications over a longer, 41-day event window. In all six columns, the Sin Dummy remains close to zero and never reaches a level of significance. The extended event window fails to reveal any sin premium or sin penalty. Additionally, extending the event window increases the amount of noise in the data. A larger window is likely to capture more stock price drifts influenced by news and investor sentiment. These sentiments can drive prices above or below fundamental values and play a significant role in determining how abnormal returns behave during volatile periods. Since sentiment-driven movements do not always align with underlying cash-flow realities, they can create behavioral anomalies. Such anomalies can lead to irrational investment decisions, such as fire sales or noise trading, and may cause stock prices to fluctuate in either direction.

	$[-30, 10]$					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Sin Dummy	0.001	0.001	0.002	0.002	0.000	-0.003
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)
Size		-0.004*	-0.003	-0.003	-0.002	-0.008**
		(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Liquidity			-0.000	-0.000	-0.002	-0.001
			(0.003)	(0.003)	(0.003)	(0.004)
Leverage				-0.000***	-0.000***	-0.000***
				(0.000)	(0.000)	(0.000)
ROA					0.002***	0.001*
					(0.000)	(0.000)
ESG						-0.002
						0.010
cons	-0.024***	0.037	0.023	0.022	-0.002	0.117*
	(0.003)	(0.027)	(0.041)	(0.041)	(0.040)	(0.048)
N	1631	1629	1282	1282	1281	1045
R^2	0.000	0.005	0.002	0.005	0.020	0.034

Dependent Variable is CAR. Robust Standard Errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: CAPM Long Event Window

In reviewing the leverage data presented in Table 9, the coefficients are statistically significant ($p < 0.001$) across all regression models. This suggests that firms with higher levels of debt tend to underperform, although modestly, during the extended observation period. This underperformance may be attributed to the market penalizing balance sheet risk around the event dates.

This finding is consistent with established trade-off theory, which suggests that an increase in leverage, or the use of debt to finance operations, can elevate distress costs associated with financial obligations. While the overall economic impact of leverage may be categorized as moderate, the market tends to view high levels of debt unfavorably. This negative perception

often leads to a risk discount in the pricing of these firms' securities.

Investors may infer that companies carrying substantial debt burdens possess diminished resilience against economic shocks or downturns, which can adversely affect their financial health. Such beliefs can translate into a reduced willingness to pay for the stock, thereby penalizing the firm through lower stock prices. This negative sentiment is further substantiated by the consistency observed across all four regression tables in the analysis. The data indicate that, irrespective of the observation period or the specific modeling approach employed, firms with higher leverage consistently exhibit lower CARs compared to their less leveraged counterparts. This trend highlights the pervasive impact of capital structure on investor perceptions and ultimately on firm valuation. Further, in contrast to the short event window, size is now exhibiting a consistent negative behavior. This observation suggests that larger companies experience lower abnormal returns around the event than smaller companies. However, the evidence lacks credibility as the coefficients are mostly insignificant.

Table 10 presents six progressive specifications for a longer 41-day event window. Utilizing the FF5 model, the table clearly demonstrates a strong and consistent sin penalty.

	$[-30, 10]$					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Sin Dummy	-0.058***	-0.060***	-0.047***	-0.047***	-0.048***	-0.053***
	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)
Size		0.009***	0.004	0.004	0.005	0.002
		(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Liquidity			0.003	0.003	0.002	0.001
			(0.004)	(0.004)	(0.004)	(0.004)
Leverage				-0.000***	-0.000***	-0.000***
				(0.000)	(0.000)	(0.000)
ROA					0.001*	0.001
					(0.000)	(0.000)
ESG						-0.023*
						0.011
cons	0.033***	-0.111***	0.040	0.041	-0.057	0.081
	(0.003)	(0.028)	(0.041)	(0.041)	(0.042)	(0.052)
N	1633	1631	1284	1284	1283	1045
R^2	0.006	0.023	0.008	0.009	0.014	0.018

Dependent Variable is CAR. Robust Standard Errors in parentheses.
$^{*}\ p < 0.05,\ ^{**}\ p < 0.01,\ ^{***}\ p < 0.001$

Table 10: Five-Factor Model Long Event Window

In the initial analysis presented in column (1), the coefficient for the Sin Dummy is -0.058 ($p < 0.001$). This statistic indicates that, on average, vice stocks underperform compared to their non-sin counterparts by 5.8 percentage points. This underperformance suggests that investors may perceive these stocks as riskier or less desirable compared to their non-sin counterparts.

When introducing size, the analysis reveals that larger firms experience a modest yet statistically significant advantage, with a coefficient of +0.9 percentage points ($p < 0.001$). This finding implies that larger companies might benefit from economies of scale or exhibit flight-to-quality

behavior during economic downturns, as investors tend to favor established firms with more stable revenue streams. However, it is noteworthy that the significance of the size coefficient diminishes when further control variables are introduced, indicating that size alone may not be a robust predictor of performance.

The role of liquidity in explaining CARs appears inconsistent, as no clear patterns have emerged from the data. In contrast, the profitability metric have demonstrated statistical significance across the analyses. The ROA highlights the importance of maintaining healthy profit margins for firms, pointing to the correlation between operational efficiency and financial performance. Despite these significant statistical results, the practical economic impact of profitability seems limited, suggesting that while profitable firms are statistically favored, their advantage in real-world terms may not be substantial.

Importantly, even after adjusting for firm-level control variables, the Sin Dummy retains a significantly negative value, ranging between -4.7 and -6.0 percentage points. This finding maintains its statistical significance at the 0.1 percent level, reinforcing the evidence that vice stocks consistently underperform compared to their non-sin counterpart. This supports the conclusions drawn from the pooled t-tests, underscoring the robustness of the observation that the sin stock anomaly persists despite various controls and adjustments in the analysis.

6 Conclusion

To address the question posed at the beginning of the paper: European sin stocks do not earn positive abnormal returns relative to their local indices during the last three recessions. They do exhibit higher average cumulative abnormal returns in eight of twelve instances when isolated to a single recession. However, the relevant returns are not significant. Previous studies have explored how sin stocks perform during economic downturns, and the results have varied widely, with some studies supporting the notion that sin stocks outperform the market, while others argue the opposite. For instance, Salaber (2009) suggests that sin stocks outperform the market during downturns, whereas Meehan and Corbet (2025) found that SRI ETFs outperform sin stocks in terms of both returns and volatility. However, it's important to note that Salaber's study focused only on U.S. stocks, while Meehan and Corbet concentrated on the COVID-19 pandemic. This discrepancy highlights that the literature can vary significantly based on circumstances, time periods, variables, methodologies, and other factors. Despite these differences, this paper aims to uncover the performance of sin stocks during the last three economic recessions in Europe.

A single-factor CAPM fails to identify any systematic penalty for sin stocks when normal firm characteristics are taken into account. In contrast, the FF5 model reveals a clear and persistent negative effect. Both the [-10,10] and [-30,10] windows display consistent statistically signific-

ant results, although with varying economic significance. Another notable observation is that, in the FF5 models, expanding the time window causes the penalty to nearly double. This suggests that sin stocks begin to underperform well before the event date and continue to lag shortly after, a trend that would go unnoticed in a narrower time frame. It remains difficult to pinpoint the causal effect of this behavior. However, a potential explaination is that information leakage and news coverage are potential drivers.

ROA is positive in all models, exhibiting varied significance levels, with only one insignificant exception. The consistent positive profitability measure indicates that more profitable firms navigate adverse events more effectively. Leverage shows strong significance in both longer time windows, with negative coefficients; however, it does not demonstrate a meaningful economic effect. This implies that highly leveraged firms are more sensitive to negative shocks.

The fit of the model is low, with R^2 values of less than 3.4 percent across all regression models. However, a low R^2 does not undermine the validity of the coefficients. Instead, it indicates that most of the variation in the CARs is driven by idiosyncratic shocks and noise that the regressors do not capture. In conclusion, sin stocks underperform compared to non-sin stocks when using the FF5 model. This contradicts the belief that their inelastic demand and solid cash flows would provide a safe haven during economic downturns. Therefore, it appears that the sin premium is eroding due to increased awareness of ESG, resulting in the emergence of a sin penalty.

7 Limitations and Future Research

The limitations of this study are a critical aspect of the research. I recognize that certain areas require further attention to draw stronger conclusions. While the dataset includes approximately 550 publicly traded firms across three recessionary periods, only 26 of these firms fall into the sin categories (alcohol, tobacco, gambling, and defense). This uneven distribution limits statistical power and means that a few extreme returns in the sin group could improperly affect the results.

Future research could expand the scope by incorporating additional vice-related industries, such as adult entertainment and fossil fuels, or by including private or small-cap firms to increase the sample size of sin stocks. The stock selection is based on indices from the largest markets in Europe. This choice is closely linked to the hypothesis, as these markets should be efficient and capable of reacting to recession news from the four major markets. A potential avenue for future research is to include companies with ESG scores below 50. However, as shown in Table 4, sinful firms typically do not exhibit extremely low ESG scores, which would lead to a fundamentally different research focus.

The regression analysis examines all three recessions as a single scenario. Generally, a larger sample size provides more statistical power because the variation in the sampling distribution

decreases. However, pooling the regressions can lead to a loss of heterogeneity, as each recession has its own distinct characteristics and causes. Therefore, it may be more beneficial to analyze each recession individually to gain a clearer understanding of how sin stocks behave during those periods.

The definition of recession used in this study is based on the OECD Recession Indicator for four major European countries. The OECD indicates the month in which the economy shifts from growth to recession or vice versa; however, it does not specify an exact calendar day for this transition. Given the use of daily data, a specific date is required. Therefore, the researchers arbitrarily select one date within that month. The ”through” method is employed, which defines a recession as starting on the first calendar day of the month following the peak and continuing through the last day of the month in which the trough occurs. I adopt the trough method because it eliminates any risk of look-ahead bias by starting the recession only after the peak month is fully known. For future work, this approach could be refined by using country-specific recession data. Potential metrics for this include declines in real income, employment, or sales. Alternatively, recession flags could be created using a statistical filter, such as the Hodrick-Prescott filter, employing the quarterly real GDP series. Either approach would enable a more precise attribution of abnormal returns to local macroeconomic shocks. One drawback of this method is that some countries have a very low number of sinners, which may result in the rejection of specific markets.

Lastly, regarding the event windows, the cutoff for +10 days is relatively short compared to the duration of recession anxiety, which may persist for an extended period. Policy announcements, workforce layoffs, and earnings updates often take place over several months. Concluding the analysis after only 10 days may result in overlooking significant effects on share prices. Future research could consider extending both the lag and the overall event window to capture price movements before the recession date.

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AI Disclosure

This thesis does not contain any text generated or suggested by AI. However, I have utilized both ChatGPT and Grammarly to enhance the quality of the writing. These tools have provided grammatical suggestions and spelling corrections, which I have critically reviewed and selectively accepted or rejected. Additionally, ChatGPT assisted me in creating the tables presented in this thesis; however, the tables themselves were entirely produced by me using Excel.

Appendix

Index	Country
AEX	Netherlands
ATX	Austria
Athex Composite	Greece
Bel-20	Belgium
CAC 40	France
DAX	Germany
FTSE 100	UK
FTSE MIB	Italy
IBEX 35	Spain
OBX Index	Norway
OMX Copenhagen 25	Denmark
OMX Helsinki 25	Finland
OMX Stockholm 30	Sweden
PSI 20	Portugal
STOXX Europe 600	Pan-European
Swiss Market	Switzerland

Table 11: Major European Stock Market Indices

Category	Variable	Definition	Data Source
Independent Variable			
	Sin dummy	1 if firm's core business is alcohol, tobacco, gambling, or defense; 0 otherwise	NACE industry codes
Control Variables			
	Size	Natural log of Total Assets	LSEG Datastream
	Liquidity	Quick ratio = (Cash & Equivalents + Net Receivables) / Current Liabilities	LSEG Datastream
	Leverage	Total Interest-Bearing Debt / Shareholders' Equity	LSEG Datastream
	ROA	Net Income / Average Total Assets	LSEG Datastream
	ESG	ESG percentile score (0–100)	LSEG Datastream
Factor Returns			
	SMB	Average return on the nine small stock portfolios minus the average return on the nine big stock portfolios	Kenneth R. French library
	HML	Average return on the two value portfolios minus the average return on the two growth portfolios	Kenneth R. French library
	RMW	Average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios	Kenneth R. French library
	CMA	Average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios	Kenneth R. French library

Table 12: Summary of Variables