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Non-sustainable stocks, a sin?

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Non-sustainable stocks, a sin?

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Abstract

In this paper, I analyse the effect of social norms and environmental concerns on the financial market by investigating possible similarities in stock returns between the Triumvariate of sin stocks (alcohol, tobacco and gaming) and the non-sustainable air travel, fashion and meat stocks. This research is based on previous literature of Hong and Kacperzyck (2009) that find an outperformance of the Triumvariate of sin stocks. I hypothesize that the air travel, fashion and meat industries can be seen as new sin industries. However, against expectation, the results indicate that the 'new sin stocks' do not show an outperformance as similar to the original sin stocks. Nonetheless, when combining the new sin stocks and the original sin stocks, they do outperform other non-sin stocks. Thus, the new sin stocks could be seen as complementary stocks to the Triumvariate of sin. These results are mainly seen for the air travel stocks, to a lesser extent for the fashion stocks and not for the meat stocks. Moreover, the results suggest that as time evolves, the new sin stocks are seen as more sinful, which is in line with the growing environmental concerns.

Contents

1 Introduction

A lot of activities can be seen as sinful behaviour. Sinning is defined in multiple ways, the oldest one is described in the bible as *"The lack, a deficiency, a falling short of the standard of God's perfect goodness"* (Deuteronomy 32:4). The Cambridge dictionary defines a sin as *"the offence of breaking, or the breaking of, a religious or moral law"*.

Certain stocks are seen as sinful in the literature. For example, Waxler (2004) uses the term "vice stock", which he describes as *"Any company that makes at least* 25*% of its revenues from politically incorrect products in one of four sectors: tobacco, gambling, defense/weapons, and liquor"*. Moreover, Leventis et al. (2013) define sin firms as *"Companies that promote vice, such as those companies involved in alcohol, firearms, gambling, military, nuclear power and tobacco industries"*. Jo and Na (2012) use the term controversial industries, which they define as *"publicly traded stocks in the gaming, tobacco, alcohol and adult entertainment"*. Nonetheless, the most commonly known definition for sin industries is defined as the "Triumvariate of sin" and mainly used in the sin stock literature (Blitz et al., 2017; Hong & Kacperzyck, 2009; Lobe & Walkshausl, 2016). The Triumvariate of sin consists of the alcohol, tobacco and gaming industries, which are considered very addictive and to have negative consequences for society (Hong & Kacperczyk, 2009). Chava (2014) argues that with the growing environmental concerns, multiple other industries can also be seen as very bad for the society and thus possibly as sin industries. Likewise, Hiselius and Rosqvist (2016) imply that global warming is influencing the decision-making process for both the investor and the manager. Concerns about the environment started in the early 90's according to Dunlap et al. (1993). The impact of the industrialization on the environment was questioned by the public for the first time. Multiple researchers argued that as more information and knowledge became available, so did the involvement of people regarding the topic "sustainability" (Olli et al., 2001; Vicente-Molina et al., 2013). Especially millennials alter their behaviour in order to limit climate changes and protect our earth (Parfitt, 2020). Correspondingly, Kuthe et al. (2019) disclose that millennials behave the most sustainable.

Egbeleke (2014) connects the growing environmental concerns with the growing importance of social behaviour in financial markets. He argued that this correlation was one of the main drivers for the implementation of corporate social responsibility (CRS), that is characterized by the environmental improvement of operations on the day-to-day business. With CRS, firms no longer just target profits and performances but also try to meet social goals (Barnea & Rubin, 2010). This is connected with socially responsible investing (SRI) where investors encounter corporates that pursue a certain level of CRS (Muñoz-Torres et al., 2004).

A lot of research has been done regarding sin firms and sin industries. Hong and Kacperczyk (2009) conclude that sin firms outperform the market in the United States, as well as outside the United States. Hong and Kacperzyck (2009) base their results on the alcohol, tobacco and gaming industries. Likewise, the outperformance of sin stocks is considered abnormal by multiple authors as they cannot explain it with

traditional models (Durand et al., 2013; Hong & Kacperczyk, 2009; Fabozzi & Oliphant, 2008; Fama & French, 1993). Apart from the outperformance of sin stocks, Chalabi (2019) and Chava (2014) report that sin firms deal with lower costs of debt. Furthermore, Hong and Kacperczyk (2009) find that firms that operate in sinful industries have 18% less institutional shareholders than comparable firms. A possible explanation for this finding is that institutional investors have a certain reputation to pursue and investing in sinful industries is not in favour of their reputational status (Hong & Kacperczyk, 2009). Hong and Kacperczyck (2009) refer to this phenomenon as the "neglect effect" of sin stocks.

This paper is combining previous literature on sin industries with the growing environmental concerns by predicting that multiple industries can be seen as harmful for the environment and thus for society. The industries of interest are the non-sustainable air travel, fashion and meat industries. These industries have damaging characters for the environment and are considered non-sustainable by multiple authors (Dobers & Strannegard, 2005; Hedenus et al., 2014; Mrazova, 2014). Based on the idea that Chava (2014) pleads that environmental damaging industries should be seen as sin industries, I argue that the environmental damaging air travel, fashion and meat industries can be seen as a new type of sin industry, whereas their stock returns should show similar patterns as the original sin industries. The examination of possible similarities between these new sin industries, and the original Triumvariate of sin (alcohol, tobacco and gaming) is based on their equity returns. The research question is as follows:

"Can air travel, fashion and meat stocks be seen as the new generation sin stocks based on similarities between the equity returns of these stocks and the equity returns of the original sin stocks in the United States?"

First, it is important to reckon why sin firms outperform the market. As Hong and Kacperzyck (2009) argue, the sin stocks outperform the market for several reasons, however, the main explanation used is that sin firms are shunned by large institutions as they are associated with a reputational risk. This results in a lower market valuation of the sin stocks, relative to their fundamental value. Investors that do, however, invest in sin stocks can earn excess returns that compensate for the reputational damage (Gompers & Metrick, 2001). Thus, in order for the new sin stocks to outperform the market, they should be seen as sinful by the public and institutions. Considering the environmental damaging nature of the three industries, and the fact that social norms are upcoming in financial markets, as seen in the implementation of CRS, SRI and ESG performance (Chava, 2014 Egbeleke, 2014; Eccles & Klimenko, 2019), I suspect that the air travel, fashion and meat stocks are seen as sinful. However, not to the degree the original sin stocks are seen as sinful. Furthermore, because the aviation sector is already part of the "Sustainability Goals" agreed upon in the 2030 Agenda for Sustainability (United Nations, 2020), I expect the aviation sector to show the most similarities in returns as to the original sin stocks.

Another reason why sin stocks outperform the market are the higher litigations risks sin firms face (Hong & Kacperzyck, 2009). This litigations risk results in a larger risk for investors for which they should be compensated. Social norms amplify these risks (Statman & Glusgkoc, 2009). Tamimi and Sebastianelli (2017) conclude that firms associated with pollution or seen as sinful publish more transparent performance reports to compensate for higher associated litigations risks. Furthermore, Orr and Kempf (2015) find an increase in lawsuits files by investors and consumers, as they claim to be harmed by misleading or false sustainable reporting. The environmental damaging nature, the poor labour conditions in the fashion industry (Forum for the Future, 2020) and the poor animal conditions in the meat industry (Sloan, 2019) result in higher litigation risks for these industries (Fashion Revolution, 2020; Kassahun et al., 2013). Three different hypotheses are used to answer the research question. The associated hypotheses are as follows:

1. *Air travel stocks can be seen as sin stocks because air travel stocks have similar return patterns as Triumvariate of sin stocks in the United States.*

2. *Fashion stocks can be seen as sin stocks because fashion stocks have similar return patterns as Triumvariate of sin stocks in the United States.*

3. *Meat stocks can be seen as sin stocks because meat stocks have similar return patterns as Triumvariate of sin stocks in the United States.*

The analysis is done using US firm data, with various variables gathered from the databases CRSP, Compustat and the Kenneth R. French Library. The overall sample period is from 1965 to 2019. The original sin industries and the new sin industries are identified on the basis of the Fama and French (1997) classification of industries. This results into 50 different industry groups. Two different panel regressions are used in order to evaluate the stock performance. The first panel regressions are based on the CAPM-model and control for various well-known portfolios, whereas the second panel regressions control for different firm characteristics. Different steps are taken in the analysis in order to give an adequate answer to the research question. First, an examination of the original sin stock performance is executed, as this functions as a foundation for the rest of the analysis. The found results are in line with the sin stock outperformance stated by Hong and Kacperzyck (2009). Then, the returns of the "new sin stocks" are analysed. The results indicate an outperformance of the air travel stocks, an underperformance of the fashion stocks, and ambiguous results for the meat stocks. Moreover, these returns are not similar to the outperformance of Triumvariate of sin stocks. Time is also taken into account by adding a time trend variable into the regressions. Moreover, the sample period is divided into four different time periods based on the US history of sustainability. Lastly, the performance of

the new sin stocks is investigated relative to the original sin stock performance. For the aviation sector can be concluded that the air travel stocks combined with the original sin stocks do outperform the market and that this is not because of a more general industry effect. In addition, the fashion stocks are slightly influenced by the sin effect, which indicates that they show some similarities to the original sin stocks. Nonetheless, the meat stocks do not show similarities to the Triumvariate of sin stocks, nor do they act as complementary stocks to the sin stocks. Thus, the air travel stocks indicate the most similarities as to the original sin stocks, the fashion stocks to a lesser extent and the meat stocks the least. This is in line with the prediction that the aviation sector is seen as most harmful for the environment. Furthermore, the trend variable indicates that as time evolves, the new sin stocks are more compatible to the original sin stocks, based on their equity returns. Also, the highest similarities and combined outperformance of the new sin stocks and the original sin stocks are only seen in the last period 2015-2019. This is in line with the increasing awareness of the public regarding environmental issues.

2 Literature Review

2.1 Enviromental concerns and the financial market

Households account for 72% og total CO_2-emissions, therefore multiple researchers conclude that environmental issues are mainly the result of human behaviour (Dutta, 2017; Hertwich & Peters, 2009; Steg & Vlek, 2009). Gifford and Nilsson (2014) highlight the fact that if people do not change their behaviour, the environmental problems could become unavoidable.

Dunlap et al. (1993) argue that the society started to worry about the environment in the 1990s, when the industrialization was upcoming. Olli et al. (2001) and Vicente-Molina et al. (2013) plead that information was an important factor in getting people involved with the topic "sustainability". United Nations Environmental Programme (2008) described sustainable production and consumption as *"The production and use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations"*. Multiple researchers conclude that sustainable behaviour is related with being an altruistic individual (Maaya et al., 2018; White et al., 2019; Yuriev et al., 2020). Acting in the interest of the environment is seen by Sara (2014) as a trade-off between individual and collective goals. White et al. (2019) elaborate on the problem that in order to achieve the collective goal of sustainability, people have to withhold certain behaviour now to realize this goal in the future. However, Sara (2014) finds that people act selfish when it comes to collective sustainable behaviour.

2.1.1 Sustainability and financial markets

A more social based approach is also pursued in financial markets. Milton Friedman (1970) explained in 1970 that public companies do not have ethical and social accountability. In addition, Murphy (1994) highlights the fact that managers should not forget their most important task, making profits for the company. However, Brigham et al. (1999) disagrees, they plead that a successful business strategy should include social targets.

Akerlof (1980) and Becker (1957) suggest that individuals are likely to follow social norms, unless they can gain financially. Fama and French (2007) advocate that sustainability has influenced the financial market as well. They argue that financial markets are influenced by preferences and opinions, which means that asset prices are affected by the preference for social responsibility nowadays. In line with this result, Lui et al. (2014) find strong evidence for an interaction effect between social norms and financial incentives.

The growing importance of social behaviour in financial markets has led to the implementation of corporate social responsibility (CRS) according to Egbeleke (2014). Fulton et al. (2012) define CRS as *"an approach to business which takes economic, social, environmental and ethical impacts into account to mitigate risk, decrease costs and improve brand image and competitiveness"*. Even in 1994, Drumwright already highlights the fact that CRS can generate a profitable strategy that gives advantage over competitors. According to Haigh and Hazelton (2004) CRS often leads to better performances, lower costs and higher institutional ownership. CRS can also provide an opportunity to counter set the bad reputation of these so-called "sin firm" (Oh et al., 2017).

Whenever investors base their investment decisions on the level of CRS a firm pursues, they encounter socially responsible investment (SRI) (Muñoz-Torres et al., 2004). In the last two decades, there was an enormous increase in SRI according to Chava (2014). In line with this increase in SRI, the implementation of "The UN-backed Principles for Responsible Investment" (PRI) was managed in 2006, where 63 investment companies made a commitment to implement Environmental, Social & Governance issues into their investment strategies (Eccles & Klimenko, 2019). In 2018, the number of companies involved had grown to 1715 firms with a total of 81.7 trillion assets under management (AUM). Moreover, shareholder activism is rising according to Eccles and Klimenko (2019) and above all for their attentiveness for tje ESG implementation. Executives will be held accountable for reporting ESG performance by their shareholders. The shareholder activism is noticed by the number of environmental and social resolutions filed in 2018 by shareholders. These resolutions are mainly based on environmental and climate change concerns, human rights and a fair workforce (Eccles & Klimenko, 2019).

2.1.2 Sustainability and financial performance

Most recently, a lot of research has been done regarding sustainability and financial performance. Chava (2014) concluded that investors demand higher expected returns from stocks associated with environmental

concerns than from stocks that are not associated with these concerns. Various authors clarify this phenomenon by explaining that investors do not want to invest in these non-sustainable firms (Gollier & Pouget, 2009; Heinkel et al., 2001; Merton, 1987). Nonetheless, Ng and Zheng (2018) find that both green and non-green stocks outperform a market benchmark. Mallet and Michelson (2010) find an increase in funds and other equities that are associated with socially responsible investing and green investing. However, in the late 20s, social screening used by mutual funds did not lead to higher risk-adjusted returns (Goldreyer & Dilz, 1999; Statman, 2000). In contrast, Cohen et al. (1995) state that green companies actually do generate positive abnormal returns. Boulatoff and Boyer (2009) also find that green investing is increasing, as well as their economic influence on the market (Heinkel et al., 2001; Inderst et al., 2012). Performance based, King and Lenox (2001) find evidence that high environmental performance of firms is correlated with higher returns. For example, companies that join the Chicago Climate Exhange's emission reduction program boost their stock prices according to Boulatoff et al. (2012).

2.2 The United States and sustainability

The Environmental Performance Index is used to compare different countries based on their efforts of sustainability. In 2018 the last ranking has been done. This ranking is mainly based on the quality of air, water and ecosystem. The United States ranks number 27 in 2018, out of 180 countries, whereas the top ten countries are all European countries. The US scores really positive on environmental health, however relatively low on ecosystem vitality (Natran, 2020).

According to Tsui (2020), the current most important environmental issues in the United States are deforestation, air pollution, global warming, water pollution and natural resources depletion. These climate changes are seen in the current heat waves, coastal flooding, drought and the increase in extreme weather. Davenport and Pierre-Louis (2018) explain that these climate changes are also harmful for the economy as they cause a lot of costs, for example repairment costs. Xiao and Dunlap (2007) find that consumers attention for health and environmentalism has increased in the US and in order to stay competitive, companies experience that it is no longer an option not to include sustainability in their business strategy (QSR, 2014). In line with these findings, Nielsen (2018) concludes that 48% of the US consumers say that they would adjust their consumption habits in order to contribute to environmental concerns. As reported by the Natural Market Institute, 30% of all adults in the US make conscious decisions when purchasing goods. They base their decisions mainly on health, environmental, social justice, and sustainable values. Su et al. (2019) argue that as a result of this new sustainable consumer behaviour, opportunities for a new market segment arise, the "green market". For example, Nielsen (2018) states that in 2018 128.5 billion dollars were spent in the US on sustainable fast-moving consumer goods (FMCG) and that this number is expected to increase every year. These numbers are very promising for the involvement of consumers regarding sustainability. However, only certain groups seem to really contribute and be aware of sustainability (Nielsen, 2018). The millennials

(age 21 till 34) are twice as likely to adapt their habits than the baby boomers (age 50-64). Despite recent contribution and awareness to the environment, the US is still below in sustainable indices in comparison with their peer countries as Nielsen (2018) suggests. He also elaborates that Americans are less likely to say that it is important for companies to implement good environmental policies (68% vs 81%). Anyhow, in the end, Nielsen (2018) pleads that the sustainable concerned consumers still make up for a significant portion of total consumers in the United States.

2.3 History of sustainability in the United States

The first steps into more environmental awareness were taken when Nixon created the Environmental Protection Agency (EPA) in December 1970, which was the first independent federal agency of the United States. This agency was created to regulate the protection of national health and a healthy environment on a national level. Since the EPA was created, the core business of the agency was to sustain natural systems as Grossarth and Hecht (2007) explain. Nixon was looking for an agency that would *"make a coordinated attack on the pollutants which debase the air we breathe, the water we drink, and the land that grows our food"* (Lewis, 1985). The first ten years, the agency was mainly occupied with protecting earth's resources in order to provide for the humanly needs and to protect human life itself (Grossarth & Hecht, 2007). During that same period multiple national laws were implemented, such as the Clean Air Act, the Clean Water Act, Resource Conservation and the Recovery Act and the Toxic Substances Control Act. These new laws were an evolution of a dominant federal role in regulating sustainable issues, whereas before, states could abide local laws themselves (the Sustainable Alliance, 2020). This new evolution was in line with the upcoming role environmental issues played on our basic health, as for example the EPA report that the exposure of toxic chemicals could lead to cancer (Grossarth & Hecht, 2007).

Reilly (1990a) highlighted the need to *"stabilize and protect the life support systems of the planet itself"* and then *"restore and protect the natural systems of the United States, on which all activity, depends"*. Grossarth and Hecht (2007) elaborate that this new thinking in the 1990s implied that not only human health was important, but also the health of earth itself. This was in accordance with the thought that in order to have a thriving economy, a country should have healthy natural systems. A sustainable future would not only cost money but could also bring money to the table. Thus, Reilly (1990c) called for a change in human behaviour where the Americans needed to change their lifestyles to accomplish a better future for themselves. Moreover, the EPA implemented the National Environmental Education Act to increase the environmental literacy in 1990. Also, the important act: Pollution Prevention Act was realized in the 90s. Grossarth and Hecht (2007) argue that building on these ideas of Reilly, a more voluntarily approach became the standard. Instead of being enforced to comply to certain environmental rules, communities implemented multiple programs deliberately. At the same time, more public and private organizations were adopting environmental management systems (EMS) (Grossarth & Hecht, 2007).

In 2015, all members of the United Nations supported the 2030 Agenda for Sustainable Development, which called for a collaboration on a global level between multiple countries (United Nations, 2020). Apart from the Agenda, 2015 was also an important year for multilateralism and international policy normalization across countries as several agreements were adopted: The Sendai Framawork for Disaster Risk Reduction (March 2015), The Addis Ababa Action Agenda on Financing for Development (July 2015) and the Paris Agreement on Climate Change (December 2015) (United Nations, 2020). Obama signed the Paris Agreement in 2016. The Paris agreement was the first agreement that was signed where nations would combat a change and take actions towards a sustainable future together, especially a low-carbon future (United Nations, 2020). However, Donald Trump, the president of the Unites States as of 20 January 2017, does simply not believe in climate change, thus additional solutions and programs concerning sustainability were not implemented since then. He also announced in June 2017 to withdraw from the Paris Agreement, as this agreement would lead, in his opinion, to declining economic activity. The withdrawal of the agreement became official in 2020 (Tsui, 2020).

2.4 Related sin stock literature

2.5 The original sin industries

A lot of research has been done on sin stocks. However, society's opinion on what is seen as sinful behaviour fluctuates over time. Hong and Kacperzyck (2009) argue that including other industries than the Triumvariate of sin is arbitrary. However, Lobe and Walkshausl (2019) include nuclear power and biotech into their sin stock investigation. Their results indicate that it is still unclear what the public sees as sinful activity. Especially ambiguous is the weapon industry, as the United States does not define this industry as sinful whereas other parts of the world disagree (Hong & Kacperzyck, 2009). Lastly, Fabozzi and Oliphant (2008) explore the adult industry as sin industry, but they do not find significant results. In the end, most sin stocks research is based on the Triumvariate of sin, which consists of the alcohol, tobacco and gaming stocks.

The gambling and the alcohol industries were long seen as sinful (Hong & Kacperzyck). Apart from the deregulation of casino's from 1990 to 1999, in order to raise tax revenues as the American Economy was tumbling in that period (Chen Bin, 2001)). Nonetheless, tobacco was not seen as sinful by the public until the 1960s (Hong & Kacperzyck, 2009). Tobacco came to Europe in the 16^{th} century (CNN, 2020). However, the negative health effects of tobacco were not known back then, it was even seen as a medicine by European doctors. Smoking became more popular in the 20^{th} century, as well as the articles warning about their negative effects. In 1947, The American Cancer Society highlighted the possible health issues of tobacco. As counter-marketing, multiple doctors published assuring articles regarding the health effects of the most popular tobacco brands. Gardner (2006) reports a peak of adults smoking in 1964. This changed quickly when the Surgeon General's Advisory Committee concluded that smoking was related to various types of

cancer and other health consequences (Alberg et al., 2014). In 1965, all tobacco packages were standardized to have a warning description on them and several years later, all marketing of smoking products was illegal (CNN, 2020).

2.5.1 Why do sin stocks outperform the market?

Most important for this paper is the research concerning the returns of the sin stocks. Hong and Kacperczyk (2009) find an outperformance of sin stocks in the US market, as well as outside the United States. But why do sin stocks outperform the market? The most common explanation is that sin stocks are systematically shunned by large investors because of reputational reasons (Blitz & Fabozzi, 2017). Hong and Kacperczyk (2009) indeed find evidence that sin firms have 18% lower institutional investors and highlight the fact that these institutional shareholders are subject to social pressure and exposed to public scrutiny. The share of institutional ownership affects both the stocks prices (Gompers & Metrick, 2001) and stock return volatility (Bushee & Noe, 2000; Harjoto & Kim, 2017). As sin firms are shunned by institutions, the market value of these sin firms is valued lower than their fundamental value (Kumar & Page, 2014). The under-pricing of sin stocks eventually leads to abnormal returns according to Fauver and McDonald (2014).

Fabozzi et al. (2018) then argues that an investor that is willing to go against these social standards, and thus invest in sin stocks, can earn excess returns as this entails a reputation risk premium. At the same time, as the investor can gain from investing in sin stocks, companies pay a financial cost because they forgo to invest in them (Fabozzi et al., 2018). Statman and Glusgkoc (2009) point out that this is connected with the "doing-good-but-not-well" hypothesis. This hypothesis presumes that the expected returns of the socially responsible stocks are indeed lower than the returns of conventional stocks. Another explanation for the outperformance is connected with the higher litigation risks these firms face. This increased litigation risk is further heightened by social norms (Hong & Kacperczyck, 2009; Statman & Glusgkoc, 2009). Merton (1987) explains that the litigation risk in combination with limited risk sharing, which is a result of the lower institutional ownership, leads to higher idiosyncratic risk and lower exposure to market CAPM. This risk should be compensated by higher returns. Other explanations for the excess returns consist of the possible monopolistic benefits (Fabozzi et al., 2008), great dividends and conservative accounting (Berman, 2002).

Nonetheless, Blitz and Fabozzi (2017) find the solution for the sin stock outperformance. When controlling for the returns with the newly found variables by Fama and French (2015): investment (CMA) and profitability (RMW), the outperformance of the sin stocks disappears completely. Blitz and Fabozzi (2017) explain that this means that when other stocks are positively related to the variables CMA and RWM, they should have the same returns as sin stocks. However, they still advocate that the raw expected returns of sin stocks exceed the market returns. For portfolio purposes, removing the sin stocks from your portfolio can lead to lower performance when not adapting portfolio exposure to certain factors (Blitz & Fabozzi, 2017).

Apart from their abnormal returns, sin firms also enjoy a deviated capital structure. Chalabi (2019)

elaborates in her paper that because sin firms are shunned in the equity market, they have to find another way to finance their activities. They tend to choose the bank debt market as this is a less transparent market. Contrary to expectations, Chalabi (2019) finds that sin firms pay a significantly lower spread on their debt financing. This is in line with the finding of Hong and Kacperzyck (2009) that sin firms have higher leverage ratios. Sin firms are also known for multiple other characteristics, such as providing high financial reporting quality that is designed to reduce information asymmetry, reduce their costs of capital and increase their liquidity (Kim & Venkatachalam, 2011). Ahrens (2004) discusses that sin firms pay out higher dividends, which makes them a profitable investment as well.

2.6 New sin industries

2.6.1 The aviation industry

In general, aviation plays a critical part in the transportation of people and goods over the whole world, which is an essential part of global economic growth (Bird, 1983; Waitx et al., 2004). Airportwatch (2014) states that transport in total accounts for 27% of total CO_2 emissions, and is expected to grow double by 2050. The air travelling justified in 2018 for approximately 2% of the total global CO_2-emissions according to the International Air Transport Association (IATA, 2018). As reported by Mrazova (2014), air travelling also produces other harmful greenhouse emission gases such as oxide nitrogen, water vapour (H_2O), sulphate and soot practices. Transport and Environmental (2013) blame aviation emissions for about 5% of the total global warming problems.

Furthermore, global air travelling contributed to 8% of the World GDP of economic activity (Abdullah et al., 2016). IATA (2011) names globalization as one of the prime reasons that the air travel industry has expended in the last 40 years. Almeida (2011) states that as of 1997, the liberalisation of air transport through the European Union altered the flying conditions. As a result of these changes, the costs of airline companies declined and there was an expansion seen in travel destinations. The lower costs of travelling can be seen as one of the main drivers for the air traffic increase (Randler & Mander, 2009). Randler and Mander (2009) also name another reason why air travelling increased. At first, air travelling was seen as an extraordinary experience, whereas now it is seen as a common event. This resulted in a more global social circle, more business trips and an increase in tourism. Urry (2010) suggests that the growing capitalism of the Western World has also led to the increase of tourism. Frequent flying is especially popular in the higher income groups (Randles & Mandler, 2009). Moreover, the distance tourists carry out has increased according to Burns and Bibbings (2009), as tourists are determined to see every part of the world. Burns and Bibbings (2009) even argue that people are addicted to travelling and compulsively collect holiday destinations. They describe this phenomenon as ”binge flying”.

With the increase in awareness and concerns about the environment, a change in the behaviour of con-

sumers is established according to Barr et al. (2010). This behaviour is mostly seen in daily efforts such as water use reduction, energy reduction and buying more ethical products. Nonetheless, this behaviour is not seen concerning their holidays. Becken (2007) explains that this holiday behaviour corresponds with the ideal of a vacation being a get-away from their real life and commitments. In contrast, Rosenthal (2010) states that there exists a flyers dilemma, and describes this dilemma as *"the balancing act between privileges of frequent air travel and awareness of its growing social stigmatisation"*. Furthermore, in 2018 the word "vliegschaamte" (flying shame) became part of the Dutch dictionary and this concept referred to the feelings of shame individuals may have when they choose to travel by airplane when they could also choose alternative, less harmful, means of transportation (Van Dale, 2018). The European Regions Airline Associations see an increase in this flying shame (ERA, 2019).

The aviation industry as a whole is already making big steps towards a more sustainable industry. For example, the recent development of green airline, that is described by Abdullah et al. (2016) as follows: *"green airline aims to provide green society with a transport system that reduces carbon footprint, uses renewable energy and produces less CO_2 and other harmful pollutants"*. Abdullah et al. (2016) also agree that in order to establish further growth in the aviation sector, improvement and pursuing environmental sustainability is necessary. Hwang and Choi (2018) agree that this environmental management is already seen in the airline industry, for example within the Asian airlines. In addition, the aviation sector is part of the big United Nations 2030 Sustainable Development Goals (SDGs) (United Nations, 2020). The Aviation Benefits Beyond Borders (2020) report that almost 40.000 commercial flights have used sustainable aviation fuel (SAF), which is 80% less carbon intensive. Apart from this, 90% of aircraft can be recycled. Lastly, especially of importance for the climate change concerns, an average flight produces 54% less CO_2 relative to 30 years ago (Aviation Benefits Beyond Borders, 2020).

2.6.2 The fashion industry

As the Earth Pledge described in 2008 *"Fashion uses more water than any industry other than agriculture. At least 8.000 chemicals are used to turn raw materials into textiles and 25% of the world's pesticides are used to grow non-organic cotton. This causes irreversible damage to people and the environment, and still two thirds of a garment's carbon footprint will occur after it is purchased"* (Amnon, 2019). Chen and Burns (2006) estimate the textile consumption to be 30 million tons a year. Considering that the fashion supply chain makes extensive use of chemicals and exhausts a lot of land and water, Brito et al. (2007) mention the alarming consequences for the earth. In line with the above-mentioned resource exhaustion needed to produce fashion, Dobers and Strannegard (2005) plead that the massive production of fashion has a big negative impact on sustainability.

Moreover, Forum for the Future (2020) has seen a change in the locations where fashion is produced. At first, clothing was produced in all parts of the world. However, as of 2000, the production has become

concentrated in China, Pakistan, Bangladesh, India, Mexico, Romania, Cambodia and Turkey, as this leads to economic advantages for the large fashion brands. As a result of this clustering of production, a lot of extra transportation miles need to be made, "fashion miles" (Forum for the Future, 2020). Apart from the exhaustion of resources and the "fashion miles", the consumer patterns surrounding buying clothes have recently changed as well according to Jones et al. (2005). They argue that providing yourself with clothing is no longer seen as a necessary good but as a luxury good, especially in the Western World. Whereas the traditional clothing lines were based on a two-season approach, now mass-market retailers such as H&M, present on average 20 clothing lines per year (Christopher et al., 2004; Levy & Weitz, 2008; Sull & Turconi, 2008). Hall (2018) suggests that this results in shorter lifecycle clothing and more frequent shopping, which can be summarized in one description, "fast fashion". Fast fashion captures the latest trends of the catwalks, against the lowest prices, supplied by mass-market retailers, and is characterized by their fast production (Sull & Turconi, 2008). In addition, Chapling and John (2007) report that fast fashion satisfies the changing customer needs, seen in "the more-is-better" trend of consumption. Forum for the Future (2020) plead that this trend eventually results in pressured suppliers and customers, considering the shorter time a piece of clothing is fashionable. Eventually, clothes are thrown away more easily (Murphy, 2005). The H&M, Zara, Topshop, UNIQLO, Primark and Forever21 are considered the biggest fast-fashion companies by multiple authors (Barnes & Lea-Greenwood, 2006; Bhardwaj & Fairhurst, 2010; Birtwistle & Moore, 2007; Jung & Jin, 2016; Kim et al., 2013; Rauturier, 2018). Apart from the described environmental concerns of fashion, Forum for the Future (2020) mentions that the poor labour conditions used to produce these clothes are alarming as well.

McKelvey and Munslow (2009) state that as sustainable concerns heighten, designers and fashion retailers select stricter adjustments in order to become sustainable. For example, H&M has produced a sustainable product line "H&M Conscious" (Hennes & Mauritz AB, 2015). This is in line with the demand for sustainable clothing that has doubled per year as reported by McKelvey and Munslow (2009). Likewise, Milburn (2017) discusses a counter-movement against fast fashion, "slow fashion". Clark (2008) describes slow fashion as: *"sustainable fashion solutions, based on the re-positioning of strategies of design, production, consumption, use and reuse, which are emerging alongside the global industry of fast fashion and are challenging it"*.

2.6.3 The meat industry

Thirdly, a lot of researchers conclude that reducing animal product consumption must be a valid target for the sustainability concerns (Hedenus et al., 2014; Machovina et al., 2015; Recanati, et al., 2015; Stoll-Kleemann & Schmidt, 2017) as well as for health concerns (Friel et al., 2009; McMichael et al., 2007). These researchers mainly base their conclusions on the fact that animal farming leads to a lot of biodiversity loss, deforestation and ultimately climate changes. Barnosky et al. (2011) declare that the production of meat leads to the extinction of one sixth of total species. In 1991, Durning and Brough suggest that the meat production is a

leading cause of a lot of environmental problems. Moreover, Bellarby et al. (2008) find that one third of the total emissions of greenhouse gases is induced by the agricultural sector. Bellarby et al. (2008) plead that especially cattle breeding is responsible for ten percent of the greenhouse emissions as result of their direct release of nitrogen oxide and their methane emission. MeKonnen and Hoekstra (2012) state that the animal production is liable for 29% of total water pollution. Cattle breeding is mainly responsible for deterioration of the water quality in certain regions according to Stoll-Kleemann and O'Riordan (2015). The production of other animal products, for example milk or eggs, are significantly less detrimental for the environment than is the meat production as reported by de Vries and Boer (2010).

In 2006, the Food and Agriculture Organization of the United States (FAO) reports that in order to produce animal products, 70% of all agricultural land and 30% of land in general used (FAO, 2006). During the 20^{th} century, meat was the primary source of protein in the daily diet of high-income countries (Grigg, 1999). Between 1990 and 2009, the consumption of aggregate meat increased with nearly 60% (FAO, 2014). In addition, Gerber et al. (2013) argue that together with the growing population, the increase in demand for meat is expected to grow 70% over the next 30 years. Delgado (2003) mainly discusses the rising numbers in developing countries, which tripled between the early 1970s and the mid-1990s. According to Meade and Rosen (2013) this is above all a result of the increase in incomes in these countries. In the US, a person eats on average 117 kg of meat per year (FAOSTAT, 2014). As comparison, the Food and Agriculture Organization of the United States (FAO) report in 2014 that this is only 4 kg for an average Indian person per year.

Apart from the exhaustion of the world's resources, Garnett (2014) pleads that high meat consumption is considered harmful for human health as well. McGuire recommends in 2010 in The Dietary Guidelines for Americans that an adult man only needs 56 gram of meat per day, and an adult female 46 gram. According to Tilman and Clark (2014) large meat consumption can result in various health issues such as: overweight and obesity, cancer, heart diseases, diabetes type 2, hypertension and gout. The high saturated fat component and cholesterol components in meat are the main cause of the mentioned health effects (Key et al., 1999). Red meat is especially dangerous as it contains L-carnitine that leads to narrowed arteries as discussed by John Hopkins in 1999 (Key et al., 1999). Also, Campbell and Campbell (2005) are deeply concerned regarding the high levels of antibiotics, pharmaceutical residues and hormones that meat contains.

Another issue regarding the meat industry are the poor animal conditions. Sloan (2018) discussed that this is most often the reason why consumers demand more transparency regarding the production process of animal products and why they prefer sustainable and green label products.

Several methods to reduce the meat intake are suggested by multiple authors. Such as, advertising for meatless days (Laesadius et al., 2013), national "Meatless Mondays" (Parker, 2011), a reduction in portion size (Sutton, 2013) and promoting biological processed meat and the vegetarian lifestyle (de Boer et al., 2009; Latvala et al., 2020)

Despite the fact that there is more and more awareness and critics towards the meat industry, the level of

consumption has stayed constant over the last couple of years as Dagevos et al. (2018) find in the Netherlands. Moreover, Voedingscentrum (2017) find that the level of consumption is still larger than the recommended amount a consumer should eat to maintain a healthy lifestyle. Macdiarmid et al. (2016) identify that this is mainly the case because consumers do not see how their individual adjustment can make a difference in the matter of this big problem. Also, Tobler et al. (2011) suggests that people experience meat consumption as least harmful for environment. Especially, the consumers that eat meat most frequently underestimate the damaging nature of the meat production. Furthermore, Hrynowki (2019) reports that in the United states, 5% of the adults consider themselves vegetarians and that this group consists especially of the younger adults. The Study of Schubert et al. (2010) report that there is a significant demand for green restaurants in America. In fact, customers are willing to pay extra for these types of restaurants. Also, the number of vegans in the US has increased with 600% from 2015 till 2018 (Zacks Equity Research, 2019). Moreover, 32% of the American population considers themselves a flexitarian, which means that they avoid most meat products and consume alternative plant-based meat products. As the demand for these products is increasing, so are the restaurants and grocery stores that sell these plant-based meat products. According to Zacks Equity Research (2019) this increase is also seen on the stock market, where plant-based stocks are outperforming the Zack Meat stocks in 2019.

2.6.4 Why should these new sin stocks outperform the market?

The original sin stocks outperform the market as due to several reasons. As discussed earlier, the most commonly used explanation is that sin firms are shunned by the institutions because of reputational reasons as the public considers drinking, smoking and gaming sinful activities (Hong & Kacperzyck, 2009). Thus, in order to be shunned as a sector by the big corporations, public opinions must change regarding a particular sector. The public opinion about sustainability has definitely changed, especially for millennials (Kuthe et al., 2019). Consumers are more concerned about health issues and environmentalism (Xiao & Dunlap, 2007). As a response, companies act on these changing consumer patterns by including sustainability in their business strategy (QRS, 2014). Also, on a global level several steps are taken towards a healthier environment, for example with the 2030 Agenda for Sustainable Development (United Nations, 2020). Various developments are seen in the aviation sector, in order to achieve the Sustainable Development Goals where the aviation sector is part of. Moreover, fashion companies are launching more sustainable clothing lines (Hennes & Maurits AB, 2015) and the concept slow fashion had become more known (Milburn, 2019). Furthermore, the number of vegans and vegetarians has increased in the last couple of years in the US and there is an increase in demand for plant-based meat products (Zacks Equity Research, 2019; Nielsen, 2018). A lot of financial institutions also try to contribute by implementing ESG issues into their investment strategy (Eccles & Klimenko, 2019). For example, Robeco avoids financing companies that are not aligned with the SDG(s) (Robeco, 2020).

Second, a possible explanation for the high sin stock returns are the higher litigation risks sin firms face. This litigation risk results in a larger risk for investors for which they should be compensated. Social norms amplify these risks (Statman & Glusgkoc, 2009).

Orr and Kempf (2015) find that an increase is seen in lawsuits filed by investors or consumers, where they claim to be harmed by misleading or false sustainable reporting. In addition, these false statements lead to financial losses for the companies (Orr & Kempf, 2015). Shareholders pressure companies to disclose sustainable reports as environmental concerns (Orr & Kempf, 2015) and shareholders activism is increasing (Eccles & Klimenko, 2019). Likewise, various stakeholders and regulators are asking for more transparent reporting from institutions (Inness & Hamilton-Foyn, 2018). However, companies that do publish their sustainable performance tend to have a higher overall value, mainly because this concerns their reputation (Loh et al., 2017). Orr and Kempf (2015) plead that there is an increased litigation risk for organisations that deal with sustainability doubts by the public, as consumers and investors become more attentive towards this type of reporting. There are various organisations, for example NGOs, that analyse whether the sustainable performance numbers are also seen in practice (Inness & Hamilton-Foyn, 2018). Moreover, Tamimi and Sebastianelli (2017) argue that companies that are associated with pollution or seen as sinful publish more transparent reports. Tamimi and Sebastianelli (2017) also plead that this is a result of the higher associated litigation risk of these industries.

The Fashion Transparency Index rates 250 of the biggest fashion companies regarding the transparency of their whole supply chain with reference to their social and environmental practices (Fashion Revolution, 2020). Nonetheless, they dispute that transparency is not equal to sustainability, enclosing that sustainable reporting does not mean that companies act on them. Their results indicate that more than half of these large brands fail to publish transparent reports with respect to their social and environmental impact (Fashion Revolution, 2020).

Thakur et al. (2011) disclose that most transparency reports do not show the entire supply chain of the meat production. Likewise, Kassahun et al. (2013) argue that most transparency systems are not adequately enclosing all the information. Moreover, Kassahun et al. (2013) plead that the meat industry should improve this, as consumer awareness is rising, also due to major meat scandals (such as the mad cow disease and the bad animal conditions). Brom (2000) and Schiefer (2011) find that consumers want to know where their products come from, and how they are processed, in order continue to consume them.

As a concluding remark, in order for the new sin stocks to act as the original new stocks, the public opinion about these sectors should be aligned with their harmful effect on environment. Which should lead to the fact that certain sectors are shunned by the large institutions as this is the main reason of the sin stock outperformance. Because the sustainable development of the aviation sector is already part of the SDGs, my prediction is that the public opinion regarding this industry is clearer, and thus shows the most similarities in returns with the original sin stocks. The public opinion also changed for fashion and meat stocks, only in

my opinion, to a lesser extent. Sin stocks also outperform the market due to a higher associated litigation risks, which could be a reason why the fashion and meat sectors also show certain similarities in return as to the Triumvariate of sin stocks. The fashion and meat industry have heightened litigation risk, mostly due to the poor labour conditions in the fashion industry (Forum for the Future, 2020) and poor animal conditions in the meat industry (Sloan, 2018). Moreover, consumers and investors expect better sustainable reporting for these industries (Tamimi & Sebastianelli, 2017). In order to limit this litigation risk, good reporting and transparency should be in place (Orr & Kempf, 2015), however, this is not the case for the fashion and meat industries according to Fashion Revolution (2020) and Thakur et al. (2011).

3 Data

I base my main data collecting and methodology on the paper of Hong and Kacperczyk (2009), who investigate the returns of sin stocks as well.

Various databases are used to gather all the data. The CRSP database offers different stock characteristics used in the regressions. The data collected from CRSP are the stock-prices at the end of the month, value-weighted and equal-weighted returns at the end of the month, the common shares outstanding and trading volumes of the stocks. Only CRSP share code 10 and 11 are of interest, which excludes foreign, ADRs, REIT and Closed End Funds from the sample. Data on CRSP is available from 1965 till 2019. Furthermore, Compustat is used to gather fundamental accounting variables of companies. These variables are retrieved on a quarterly basis. The variables retrieved are the following: $PERMNO$, the $NAICS$ and SIC-codes and the book-value price per share. Lastly, the Kenneth R. French Library is used to retrieve multiple variables used in the first panel regression analysis. This database contains 48 portfolios based on the Fama and French (1997) industry classification. The variables gathered from this database are the market portfolio, the risk-free rate, SMB, HML, RMW and CAM. The data is available from July 1963. The overall sample period is from 1965 to 2019, as all the variables retrieved from the different databases are available in this timeframe.

3.1 Selection of the original and new sin stocks

Firstly, it is important to compose a definite sin stock list following the method of Hong and Kacperczyk (2009) and followed by various other papers. In this paper, sin stocks are defined as the Triumvariate of sin which contain the alcohol, tobacco and the gambling industries. They adopt the Fama and French (1997) classification of stocks based on SIC-codes that divide the market into 47 different industries. This classification identifies group 4 as the beer and alcohol group and group 5 as the smoke or tobacco group. Moreover, it is somewhat more difficult to identify the gaming stocks, as the Fama and French (1997) identification does not distinguish gaming from other entertainment stocks such as hotel stocks. To identify

gambling stocks Hong and Kacperczyck (2009) use specific $NAICS$-codes and manufacture a new category. The $NAICS$-codes used to identify the gaming stocks are 7132, 71312, 713210, 71329, 713290, 72112 and 721120 and assemble category 48 in this paper.

For every sin industry a comparable industry group is matched. This comparable group acts as a control variable that accounts for a more general industry effect. Besides, sin stocks are mostly consumer goods, which can have different returns relative to non-consumer goods. The comparable variable controls for this as well. Moreover, the comparable group is also used to generate an easy to interpret performance coefficient. Again, the Fama and French (1997) categorization is used to identify the different industry groups. Soda (3) is matched as the comparable group for alcohol, food (2) is the comparable group for tobacco and the industry groups fun (7) and meals (44) are the comparable group for gaming.

Secondly, the same method is used to identify the stocks that belong to the industries air travel, fashion and meat. The air travel industry is defined as the category aircraft (25) combined with the SIC-codes: $4500 - 4599$ within the transportation-group (41) that assemble the transportation by air stocks. Together this leads to the manufactured category group air travel 49. The comparable industry is the transportation industry (41), without the SIC-codes: $4500 - 4599$. In addition, the fashion industry is identified as the group clothes (10) with complementary group consumer goods (9). Next, the meat industry is constructed by the SIC-codes: $2011 - 2015$ that assemble meat production companies within the food (2) group. The comparable industry for meat is food (2), without the SIC-codes $2011 - 2015$. An overview of the industry classification based on Fama and French (1997) is shown in Table 1 in the Appendix. In the overall sample, the SIC-codes $4900 - 4999$ and $6000 - 6999$ are excluded, as these represent the service industry, following the Hong and Kacperzyck (2009) methodology.

The overall sample contains 164 unique firms classified as sin stocks, and 556 firms that represent the new sin stocks: the air travel, fashion and meat industries. Table 2.1 shows the distribution per category for the overall sample. An increase in the number of firms over time can suggest that the public is more acceptant regarding this sin industry. The original sin stocks beer and smoke are quite constant throughout the years. However, the gaming industry has increased a lot since 1990. This is in line their history, as the gambling industry was deregulated as of the 1990s. The air travel industry has decreased in number of firms as of 2000, which could indicate that the public opinion has changed as of 2000. However, a lot of other factors could have caused this decrease as well. The fashion industry also declined a lot since 2000. In contrast, the meat industry stayed quite constant, with a slight decrease seen since 2000.

Table 2.2 reports the market betas per industry using Fama and French (1997) data. The industry beta illustrates to what degree a stock is affected by market movements. More volatile stocks are associated with higher risk and generate in theory higher returns. The alcohol and tobacco betas are lower than other industries (0.84 and 0.68), which is in line with previous literature (Hong & Kacperzyck, 2009). The meat industry has a compatible beta to these stocks of (0.88). The gaming, air travel and fashion industry have

higher betas (1.15, 1.12 and 1.21), which could suggest that they are more volatile and provide higher returns.

Table 2.1: Distribution of original and new sin stocks.

This table reports the distribution per group on a year-to-year basis. The groups of interest are; the alcohol, tobacco, gaming, air travel, fashion and meat industry. The table is based on the sample period 1965-2019.

Year	Trium			New sin		
	Beer	Smoke	Gaming	Air travel	Fashion	Meat
1965	8	8	0	37	38	9
1966	9	8	1	45	48	12
1967	9	6	1	47	52	11
1968	10	6	1	53	56	14
1969	11	6	1	56	63	14
1970	11	6	2	55	70	15
1971	10	6	2	56	72	17
1972	10	6	2	54	75	16
1973	18	6	4	68	111	29
1974	18	6	4	68	106	28
1975	18	6	4	68	104	29
1976	17	6	4	66	96	31
1977	17	6	4	66	94	32
1978	16	6	4	66	87	28
1979	16	6	9	67	83	28
1980	15	5	10	67	74	25
1981	15	5	9	72	66	22
1982	14	4	11	76	67	24
1983	14	4	12	84	69	22
1984	16	4	14	88	62	19
1985	16	3	15	80	59	18
1986	14	3	13	74	58	18
1987	14	3	15	71	62	21
1988	13	4	14	66	61	23
1990	15	3	16	65	58	23
1991	14	3	17	62	59	24
1992	14	3	19	55	65	22
1993	16	3	30	54	75	23
1994	14	3	45	60	81	24
1995	16	4	45	61	85	24
1996	22	5	45	68	89	24
1997	24	6	41	68	86	21
1998	24	4	36	69	82	17
1999	23	4	31	62	80	16
2000	23	3	28	60	72	16
2001	19	3	27	56	64	13
2002	19	3	26	55	61	13
2003	19	3	27	53	58	12
2004	18	3	28	54	56	12
2005	16	3	27	51	51	13
2006	16	2	30	53	53	11
2007	16	3	27	55	52	10
2008	14	3	27	53	45	11
2009	14	4	25	48	44	10
2010	15	4	23	44	42	11
2011	15	4	22	43	39	10
2012	15	4	23	41	35	11
2013	16	4	22	41	32	9
2014	15	4	19	43	28	9
2015	15	3	18	44	26	8
2016	15	4	17	41	28	8
2017	15	3	18	39	27	7
2018	15	3	16	40	25	7
2019	9	3	14	32	15	6

Table 2.2: Industry beta of original new sin stocks.

This table reports the market beta per industry. These betas are calculated using time-series of the monthly returns on the portfolios categorized using the Fama and French (1997) industry classification together with the 48th, 49th and 50th portfolios which are handmade. The table reports the sample period 1965-2019.

	Industry	Beta		Industry	Beta
	Industry	**Beta**			
1	Agriculture	0.91	26	Defense	0.94
2	Food	0.81	27	Precious Metals	0.78
3	Soda	0.95	28	Nonmetical Mining	1.03
4	**Beer**	**0.84**	29	Coal	1.17
5	**Smoke**	**0.68**	30	Pertoleum and Natural Gas	1.12
6	Toys	1.16	31	Utilities	0.97
7	Fun	1.10	32	Telecommunication	1.37
8	Books	1.01	33	Personal Services	1.03
9	Consumer Goods	1.08	34	Business Services	1.41
10	**Fashion**	**1.12**	35	Computers	1.47
11	Healthcare	1.11	36	Electronic Equipment	1.51
12	Medical Equipment	1.09	37	Measuring and Control Equip	1.26
13	Drug	1.38	38	Business Supplies	1.02
14	Chemicals	1.13	39	Shipping Containers	1.07
15	Rubber	1.01	40	Transportation	0.99
16	Textiles	1.08	41	Wholesale	1.07
17	Building materials	1.24	42	Retail	1.14
18	Construction	1.26	43	Restaurants, Hotel, Motel	0.99
19	Steel	1.16	44	Banking	0.93
20	Fabricated products	1.11	45	Insurance	1.07
21	Machinery	1.20	46	Real Estate	1.00
22	Electrical Equipment	1.12	47	Trading	1.13
23	Miscellaneous	1.22	48	**Gaming**	**1.15**
24	Automobiles and Trucks	1.21	49	**Air travel**	**1.21**
25	Shipbuilding, Railroad Eq	1.39	50	**Meat**	**0.88**

3.2 Variable description

Different variables act as control variables in the stock analysis used in this paper. The variables are explained below. First of all, the dependent variable used in both panel regressions is $EXMRET$. $EXMRET$ is the return of stock i, net of the risk-free rate. For the first panel regressions various portfolios are used as well-known return predictors and are gathered from the Kenneth R. French Library. The variable $mktrf$ is the monthly return of the CRSP value-weighted portfolio in month t, net of the risk-free rate, and acts as the market portfolio in the $CAPM$-model. SMB is the monthly return of a portfolio that is long on small stocks and short on large stocks. HML is the monthly return of a portfolio that is long on high book-to-market stocks and short on low book-to-market stocks. RMW is the return of a portfolio with high operating profitability stocks minus the return of a portfolio with low or negative operating profitability stocks. CAM is defined as the return of a portfolio with minimum capital investment to maintain and grow their business stocks minus the return of a portfolio that contains stocks that require maximum ongoing capital investment.

In the second panel regression various firm characteristics are used as control variables. $LOGSIZE$ is the natural logarithm of the monthly market capitalization of a firm. $LOGMB$ is the natural logarithm of market-to-book ratio of a firm at the end of the month. RET contains the returns of the last 12 months including month t. $BETA$ is the time-varying beta of industry to which firm i belongs with a rolling window

of two years. $TURN$ is the monthly share turnover during the past 12 months calculated at the end of month. $LOGAGE$ is the firms' age calculated as the number of years there is data available in CRSP. The variables described above are summarized in Table 3 Panel A for the overall sample. The overall mean of the returns is negative, which means that a typical stock in a typical year has a negative return of 0.385% per month, with a standard deviation of 0.326%. The different portfolios $mktrf$, SMB, HML, RMW and CMA all gather positive monthly returns on average. As seen in Panel B of Table 3, sin stocks outperform their comparables with 0.050% when looking at the descriptive statistics of the variable $EXMRET$. This result is in line with the prediction and previous literature that sin stocks outperform comparable industries. Furthermore, air travel stocks underperform their comparables slightly with 0.014% (Panel C). Fashion stocks underperform their comparables with 0.041% (Panel D), and meat stocks underperform their comparables with 0.027% (Panel E). These descriptives give a first impression of stock returns. As expected, the returns of the air travel stocks are the most similar to the returns of the sin stocks, relative to the fashion and meat stocks. The regressions in the next part of this paper give a more extensive conclusion regarding the performance of the stocks.

Table 3: Summary statistics

This table reports the summary statistics for the various variables used in the different regressions. The statistics consist of the mean, the standard deviation and the number of observations within the sample. The variable of interest is the $EXMRET$, the return of stock i net of the risk-free rate. Panel A shows the summary statistics of the whole sample. Panel B to Panel F show the summary statistics per sin industry. The column sin-comp represents the mean difference between the $EXMRET$ of the sin stocks and their comparable stocks.

Panel A: Summary statistics whole sample

VARIABLES	N	Mean	St. Dev.
EXMRET(%)	2161772	-0.385	0.326
mktrf(%)	2161772	0.548	0.451
SMB(%)	2161772	0.168	0.308
HML(%)	2161772	0.331	0.293
RMW(%)	2161772	0.304	0.233
CMA(%)	2161772	0.314	0.205
logSIZE('000)	1765494	12.06	20.00
logMTB	1686083	0.743	0.936
RET(%)	2144494	0.023	0.108
BETA	2144232	1.226	0.177
TURN(%)	1984039	0.118	0.211
logAGE	2144232	18.73	11.83

Panel B: Summary statistics Triumvariate of sin stocks

VARIABLES	N	Mean	St. Dev.	sin-comp
EXMRET(%)	24454	-0.344	0.309	0.050
mktrf(%)	24454	0.590	0.442	
SMB(%)	24454	0.171	0.307	
HML(%)	24454	0.290	0.292	
RMW(%)	24454	0.298	0.237	
CMA(%)	24454	0.282	0.204	
logSIZE('000)	21988	12.78	23.32	
logMTB	20807	0.767	0.971	
RET(%)	24304	0.023	0.091	
BETA	24297	1.01	0.191	
TURN(%)	23387	0.976	0.169	
logAGE	24297	20.55	11.57	

Panel C: Summary statistics air travel stocks

VARIABLES	N	Mean	St. Dev.	sin-comp
EXMRET(%)	38196	-0.412	0.310	-0.014
mktrf(%)	38196	0.492	0.453	
SMB(%)	38196	0.210	0.306	
HML(%)	38196	0.344	0.286	
RMW(%)	38196	0.281	0.218	
CMA(%)	38196	0.310	0.202	
logSIZE('000)	33628	12.50	21.95	
logMTB	31571	0.483	0.813	
RET(%)	38011	0.022	0.084	
BETA	37975	1.282	0.068	
TURN(%)	36601	1.092	0.269	
logAGE	37975	22.15	11.44	

Panel D: Summary statistics fashion stocks

VARIABLES	N	Mean	St. Dev.	sin-comp
EXMRET(%)	40819	-0.421	0.300	-0.041
mktrf(%)	40819	0.452	0.456	
SMB(%)	40819	0.241	0.319	
HML(%)	40819	0.389	0.291	
RMW(%)	40819	0.239	0.225	
CMA(%)	40819	0.343	0.206	
logSIZE('000)	33790	11.27	20.04	
logMTB	32499	0.352	0.831	
RET(%)	40573	0.025	0.089	
BETA	40553	1.188	0.006	
TURN(%)	37475	0.934	1.703	
logAGE	40553	20.06	11.35	

Panel E: Summary statistics meat stocks				
VARIABLES	N	Mean	St. Dev.	sin-comp
EXMRET(%)	11431	-0.440	0.294	-0.027
mktrf(%)	11431	0.474	0.453	
SMB(%)	11431	0.254	0.309	
HML(%)	11431	0.391	0.283	
RMW(%)	11431	0.241	0.211	
CMA(%)	11431	0.335	0.198	
logSIZE('000)	8641	11.94	21.80	
logMTB	8482	0.332	0.778	
RET(%)	11367	0.022	0.088	
BETA	11365	0.937	0.0372	
TURN(%)	9811	0.663	0.108	
logAGE	11365	21.21	0.137	

Panel F: Summary statistics non-sin stocks			
VARIABLES	N	Mean	St. Dev.
EXMRET(%)	1853819	-0.383	0.329
mktrf(%)	1853819	0.550	0.451
SMB(%)	1853819	0.166	0.307
HML(%)	1853819	0.329	0.294
RMW(%)	1853819	0.308	0/234
CMA(%)	1853819	0.315	0.205
logSIZE('000)	1512160	12.06	20.86
logMTB	1444688	0.764	0.940
RET(%)	1838855	0.024	0.110
BETA	1838698	1.252	0.168
TURN(%)	1700446	0.122	0.228
logAGE	1838699	18.68	11.83

4 Methodology

In order to answer the research question and reject or accept the hypotheses set in the introduction a couple of steps need to be made. In the first place, the returns of the original stocks need to be investigated. Hereby I expect the alcohol, tobacco and gaming stocks to outperform the market, as seen in previous sin stock literature (Hong & Kacperzyck, 2009). Then the returns of the new sin stocks are investigated in order to establish whether they have significantly different returns relative to their comparable stocks. I predict that they should outperform their comparables, as I suspect the new sin stocks to act in a similar way as the original sin stocks do. Next, the performance of the air travel, fashion and meat stocks will be investigated relative to the Triumvariate of sin stock performance. As predicted, I expect these returns to be similar to some degree. I do not expect them to be the same, as the public opinion about the damaging nature of the Triumvariate of sin is not the same as the public opinion regarding the air travel, fashion and meat stocks. Lastly, I investigate the performance of the new sin stocks combined. Furthermore, I forecast that as time evolves, the original and new sin stock performance becomes more similar. In order to take time into account, a time trend will be added to the regressions. The analysis will be done using two different panel regressions with different control variables, in order to give the most adequate answer to the research question.

4.1 Panel 1 Analysis

In the first panel analysis different performance models are used to review the stock returns. The performance of stocks is investigated while adjusting for various well-known stocks return predictors, such as the market portfolio in the first $CAPM$-model. This first regression investigates whether each stock outperforms the market. This leads to the first performance model regression:

$$EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_3 mktrf_i + \epsilon_{it}. \quad (1)$$

In this first panel regression $EXMRET$ is the return of stock i, net of the risk-free rate. $SINDUM_i$ is a dummy variable which represents a certain stock industry i. The sin dummy takes unity if the stock is categorized as an original sin stock (Triumvariate of sin), or as one of the new sin stocks and zero otherwise. To control for a more general industry effect the dummy variable $COMP_i$ is introduced, which entails the industry group matched as the comparable to the sin stock that is investigated in that regression. Furthermore, adding the comparable industry dummy variable allows for an immediate comparison between the sin stock returns and the returns of their comparable industry. For example, when investigating the air travel stock performance, the $AIRT$ dummy variable represents the $SINDUM_i$ variable. The comparable dummy variable matched with the sin dummy variable is the $COMPairt$ dummy variable. This dummy variable equals one if the stock is considered either an air travel stock or if the stock is considered the comparable industry matched to the air travel stock. The variable $mkrtf$ is discussed in the variable description section and ϵ_{it} is the error term.

Then taken the estimates from the monthly cross-sectional regressions I follow the Fama and Macbeth method (1973). Hereby I use the time-series means and standard deviations, using Newey and West (1987) standard errors, because of the cross-sectional and time-series dependence of the panel data.

The coefficient of interest in this regression is β_1, this coefficient measures the abnormal returns of the sin stock. When β_1 is positive and significant, the outperformance of the sin stocks relative to their comparable stocks can be concluded. The coefficient β_2 explains whether the sin stocks combined with the comparable industry stocks outperform other non-sin stocks. In order to explore whether time plays a factor in the returns, a trend variable is added to the regressions. This leads to the following regression:

$$EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 COMP + \beta_3 mktrf_i + \beta_4 SINDUM_i \# yeareffect + \epsilon_{it}. \quad (2)$$

The variable $yeareffect$ is manufactured as zero for the first year in the sample, one for the second, etc. This interaction term between $SINDUM_i$ and $yeareffect$ explains the influence of time for the performance of the specific sin stock. Thus, β_4 measures the influence of time of one extra year specific for the sin stock return effect. Comparing regression (1) and (2) gives an indication of the effect of time on the returns.

In order to get the best estimated coefficient for the sin stock performance, multiple performance models are used. The variables SMB and HML are added to the initial model to obtain the three-factor model.

Moreover, a five-factor model is determined which includes the variables RMW and CAM to the regression. This five-factor model is of particular interest, as Blitz and Fabozzi (2019) found that when including the factors RMW and CAM to the model, the outperformance of sin stocks disappeared. This leads the three- and five-factor model regressions:

$$EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 COMP + \beta_3 mktrf + \beta_S MB + \beta_5 HML + \epsilon_{it}, \tag{3}$$

$$\begin{aligned} EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 COMP + \beta_3 mktrf + \beta_4 SMB \\ + \beta_5 HML + \beta_6 RMW + \beta_7 CAM + \epsilon_{it}. \end{aligned} \tag{4}$$

In the first place, the returns of the Triumvariate of sin stocks are investigated using the regressions (1)-(4). Then the same method is applied to examine the returns of the new sin stocks separately.

After concluding whether the new sin stock categories under- or outperform the market, their performance relative to the Triumvariate of sin is examined. Thus, for the second part of this analysis the returns between the new sin stocks and the Triumvariate of sin stocks is compared. This leads to the following regression:

$$EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 TRIUMDUM_i + \beta_3 mktrf + \epsilon_{it}. \tag{5}$$

$EXMRET_{it}$ entails again the return of stock i, net of the risk-free rate. $SINDUM_i$ is the dummy variable introduced as the new sin stock category i. The dummy variable $TRIUMDUM_i$ equals one if the stocks are categorized as a new sin stock or if they belong to either the alcohol, tobacco or the gaming industry, and zero otherwise. The coefficient in front of the $SINDUM$ indicates whether the new sin stocks outperform the original sin stocks. The loading in front of the $TRIUMDUM$ illustrates a possible outperformance of the new sin stocks combined with the original sin stocks relative to other non-sin stocks. Again, a time trend variable is added to the regression.

In order not to reject the hypotheses, the coefficient β_1 should be close to zero and significant. Then can be concluded that the returns of the new sin industries are similar to the Triumvariate of sin industries. Furthermore, to take into account a more general industry effect the following regression is executed:

$$EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 TRIUM2DUM_i + \beta_3 mktrf + \epsilon_{it}. \tag{6}$$

The comparable industries are added in this model to control for the more general industry effect, while comparing the new sin industry returns to the original sin industry returns. Thus, $TRIUM2DUM_i$ takes unity if the stock is considered the particular sin stock in that analysis, or if the stocks represents a Triumvariate of sin stock, or if the stock is considered to be the comparable industry matched with the particular sin stock. Thus, to give an example, when analysing the air travel stocks the $TRIUM2DUM$ takes unity if the stocks belong to the air travel industry, the alcohol, tobacco or gaming industry, or if the stocks belongs to the transportation industry.

The coefficient in front of the $SINDUM$ now tells whether the sin stocks out- or underperformance the Triumvariate of sin stocks, while controlling for possible industry effects. To accept the hypothesis stated in the introduction, this coefficient should be close to zero and significant. Again, this analysis is also done using the three- and five-factor model and is used to analyse the three different industries air travel, fashion and meat. Lastly, the return performance of the new sin stocks combined is examined. This analysis follows the same methodology as well.

Apart from the trend variable, another method is used to investigate the development of the returns in more detail. Therefore, all the regressions are done in different time periods. These time periods are divided in accordance with the sustainable history of the US as reviewed in the literature review. The first period is from 1965 until 1969, because in 1970 the first steps were taken to sustainable legislation on a national level. The second period is from 1970 until 1989. This is because since 1990 not only the health of the American population was important, but also that of earth itself. In addition, a more voluntarily approach became the standard in stimulating sustainability. The third period is from 1990 until 2014. In 2015, sustainability was implemented not only on a national level, but also on a global level as multiple international agreements were adopted. Thus, the last period is from 2015 until 2019.

4.2 Panel 2 Analysis

For the second part of the analysis various firm characteristics are included in the regressions to give the best estimation of the stock performance relative to similar firms, while controlling for these different firm characteristics. The method is very similar as to the first panel regressions, but with different well-known return predictors. The most controversial regression is as follows:

$$\begin{aligned} EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 LOGSIZE_{t-1} + \beta_3 LOGMB_{t-1} + \beta_4 RET_{t-1} + \beta_5 COMPDUM_i \\ + \beta_6 BETA_{t-1} + \beta_7 TURN_{t-1} + \beta_8 LOGAGE_{t-1} + \epsilon_{it}. \end{aligned} \tag{7}$$

This regression investigates the performance of a particular sin stock i. $EXMRET_{it}$ is the return of stock i, net of the risk-free rate. $SINDUM_i$ is the dummy introduced, and the dummy equals one if the stock is defined as the analysed sin stock i and zero otherwise. The firm characteristics are lagged variables. This is because the estimates of the coefficients are executed for time t using the information that is available, which is the information at time $t-1$. The firm characteristic variables are discussed in the variable description section. Then to control for industry effects the dummy $COMP_i$ is included, which takes unity if the stock is considered the particular sin stock i, or if the firm is considered a comparable stock to the particular sin stock. Similar to the first panel regression, adding this comparable dummy to the regression gives an immediate comparison between the performance of the sin stock and similar firms.

Then taken these estimates from the monthly cross-sectional regressions I follow the Fama and Macbeth

method (1973). Hereby I use the time-series means and standard deviations, using Newey and West (1987) standard errors, because of the cross-sectional and time-series dependence of the panel data.

The coefficient of interest in this regression is β_1 (as similar to the Panel 1 analysis), this coefficient measures the abnormal returns of the sin stocks relative to their comparable stocks while controlling for all the firm characteristics. When β_1 is positive and significant, the outperformance of the stock relative to their comparable stocks can be concluded. The loadings before the different firm characteristic variables declare the influence of that variable on the estimation of the return. For example, the coefficient of size presents the impact of a firm's size on their stock returns. Similar to the first panel regression, a trend variable is added in order to examine the influence of time on the sin effect resulting in the following regression:

$$\begin{aligned} EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 LOGSIZE_{t-1} + \beta_3 LOGMB_{t-1} + \beta_4 RET_{t-1} + \beta_5 COMPDUM_i \\ + \beta_6 BETA_{t-1} + \beta_7 TURN_{t-1} + \beta_8 LOGAGE_{t-1} + \beta_9 SINDUM_i \# yeareffect + \epsilon_{it}. \end{aligned} \tag{8}$$

After investigating whether the original sin stocks and the new sin stocks outperform or underperform the market, possible similarities between the original and the new sin stocks are analysed. This leads to the following regressions that applies the same method as the Panel 1 regressions:

$$\begin{aligned} EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 LOGSIZE_{t-1} + \beta_3 LOGMB_{t-1} + \beta_4 RET_{t-1} + \beta_5 TRIUMDUM_i \\ + \beta_6 BETA_{t-1} + \beta_7 TURN_{t-1} + \beta_8 LOGAGE_{t-1} + \epsilon_{it}, \end{aligned} \tag{9}$$

$$\begin{aligned} EXMRET_{it} = \beta_0 + \beta_1 SINDUM_i + \beta_2 LOGSIZE_{t-1} + \beta_3 LOGMB_{t-1} + \beta_4 RET_{t-1} + \beta_5 TRIUM2DUM_i \\ + \beta_6 BETA_{t-1} + \beta_7 TURN_{t-1} + \beta_8 LOGAGE_{t-1} + \epsilon_{it}. \end{aligned} \tag{10}$$

The dummy variables $TRIUMDUM$ and $TRIUM2DUM$ are composed in the same manner as in the first panel regressions. Also, the interpretation of the various coefficients follows the same methodology. Similarly, the regressions are done in the different time periods: 1965-1969, 1970-1989, 1990-2014, 2015-2019, to look at the influence of time in more detail.

5 Results

5.1 Returns of the original sin stocks

As a valid benchmark to compare the new sin stocks with the original sin stocks, the stock performance of the Triumvariate of sin should be reviewed. An outperformance of the original sin stocks should be found relative to their comparable stocks in order to be aligned with previous literature (Hong & Kacperzyck, 2009). The

coefficient of interest is the coefficient in front of the $TRIUM$ dummy variable. The first panel regressions in Table 4 Panel A column (2-4) indeed show a significant monthly outperformance of 0.295%. This is in line with the findings of Hong and Kacperzyck (2009) whom find an outperformance of the original sin stocks of 0.29% per month. Also, Panel 2 regressions, where the returns are analysed while controlling for several firm characteristics, show similar results. Column (8) in Table 4 Panel B reports an outperformance of 0.297% per month.

Table 4: Return performance of Triumvariate of sin stocks

This table reports the results of Fama and Macbeth (1973) panel regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, on various well-known performance predictors and firm characteristics. The variable of interest is the sin dummy variable $TRIUM$. Adding the comparable dummy variable $COMPtrium$ to the model allows for an immediate test of difference between the Triumvariate of sin industry and their comparable industry. The table reports the sample period 1965-2019. Panel A shows the results of the first panel regressions, Panel B shows the results of the second panel regressions.

Panel A: Panel 1 regression analysis				
VARIABLES	**1**	**2**	**3**	**4**
TRIUM	0.117	0.295**	0.295**	0.295**
	(0.002)	(0.001)	(0.001)	(0.001)
mktrf	0.053	0.068	-0.380	-0.372
	(0.007)	(0.007)	(0.001)	(0.001)
COMPtrium		-0.189*	-0.189*	-0.189*
		(0.001)	(0.001)	(0.001)
SMB			-0.104	-0.358
			(0.003)	(0.003)
HML			-1.000***	-0.677***
			(0.003)	(0.003)
RMW				-0.776***
				(0.002)
CMA				-0.637***
				(0.002)
Constant	-0.059***	-0.059***	-0.012***	-0.003**
	(0.007)	(0.007)	(0.003)	(0.001)
Observations	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.001	0.002	0.002	0.002
Number of groups	660	660	660	660

Panel B: Panel 2 regression analysis								
VARIABLES	1	2	3	4	5	6	7	8
TRIUM	0.117	0.318**	0.197	0.216	0.341**	0.318**	0.310**	0.297**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGSIZE		-0.198***	-0.093**	-0.097**	-0.097**	-0.092**	-0.101**	-0.109**
		(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB			-0.832***	-0.827***	-0.826***	-0.850***	-0.835***	-0.813***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RET				-0.417	-0.469	-0.554	0.0696	-0.609
				(0.011)	(0.011)	(0.010)	(0.010)	(0.011)
COMPtrium					-0.133	0.081	0.094	0.108
					(0.001)	(0.001)	(0.001)	(0.001)
BETA						0.811***	0.832***	0.862***
						(0.290)	(0.268)	(0.263)
TURN							-0.063	-0.060
							(0.001)	(0.001)
LOGAGE								0.054*
								(0.000)
Constant	-0.369***	-0.346***	-0.353***	-0.352***	-0.352***	-0.363***	-0.362***	-0.363***
	(0.014)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)
Observations	2,161,772	1,765,494	1,669,409	1,660,509	1,660,509	1,659,879	1,659,661	1,651,622
R-squared	0.001	0.017	0.027	0.034	0.036	0.041	0.047	0.049
Number of groups	660	660	660	660	660	659	659	659

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

5.2 Returns of the new sin stocks

The returns of the air travel, fashion and meat industry are examined in Table 5 and 6. As explained in the methodology, I expect them to have significantly different returns relative to their comparable industries, as I expect them to act partially as the original sin stocks analysed in Table 4. The coefficient of interest is the coefficient in front of a new sin stock dummy variable ($AIRT$, $FASHION$ or $MEAT$).

5.2.1 Air travel stocks

Table 5 Panel A shows that air travel stocks do not have significantly different returns as to their comparables. However, when the time trend is introduced in Panel A column (5-8), air travel stocks do outperform the market and similar stocks. The outperformance relative to comparables is 0.131% per month, and significant at a 5% level. The time trend variable indicates that as time evolves, this outperformance is slightly decreasing (-0.028% per year). Panel 2 regressions are reported in Table 6. A significant outperformance of 0.298% is seen in column (5) that is quite similar to the outperformance found for the Triumvariate of sin stocks. However, when controlled by the time trend variable this outperformance decreases. This suggests that the time trend variable explains the outperformance partly. Furthermore, Panel 2 regressions show similar results as compared to Panel 1 regressions, with an outperformance of 0.096% in column (9).

As the results also find an outperformance for the air travel stocks, this could mean that they slightly act as sin stocks, as these Triumvariate of sin stocks also outperform the market. On the other hand, other factors could also cause the higher returns in the aviation sector. For example, because of the lower cost development (Randler & Mahler, 2009), excess demand due to of globalisation (IATA, 2011) and the growing

capitalism (Urry, 2010).

5.2.2 Fashion stocks

The results for the fashion stocks are seen in Table 5 Panel B. Similar to the air travel stocks, no outperformance is found when the time trend variable is not added to the regression. Panel B column (5-8) show an underperformance of 0.156% per month at a 1% significance level. The time trend variable indicates that as time evolves, this underperformance decreases, however this result is not significant. Panel 2 regressions in Table 6 show similar returns as found in the Panel 1 regressions. Thus, the fashion stocks are underperforming relative to their comparable industry group consumer goods. A possible explanation for these findings can be the recent, the "more-is-better-consumption" trend, that holds for both clothing and consumer goods (Chapling & John, 2007). Moreover, the wealth increase in the Western World does not only positively effect the fashion industry, hence also effects the other consumer good sectors (Jones et al, 2005).

5.2.3 Meat stocks

Table 5 Panel C indicates that meat stocks outperform their comparables with 0.283% per month (column 2-4). However, when the time trend is added these results disappears. This suggests that meat stocks do not differ in returns relative to similar industry stocks when time is taken into account. They do, however, outperform the market when the time trend variable is added (column 5). Panel 2 regressions in Table 6 Panel C illustrate contrasting results. An underperformance of the meat stocks is found when the time trend is added to the regression, as found in column (6-9). This underperformance is 0.096% per month in the most conservative regression (column 9). Thus, the meat stocks show ambiguous results in the two different panel regressions. The outperformance of the meat stocks can be explained by the growing wealth, especially in developing countries, which leads to an increase of meat consumption worldwide (Delgado, 2003). Nonetheless, the underperformance can be explained because of the increase of vegetarians, vegans and flexitarians in the US (Zack Equity Research, 2019) that results in an outperformance of the plant-based meat product industry relative to the meat industry.

5.2.4 Control variables

The variables in the Panel 1 regressions SMB, HML, RMW and CAM provide no additional explanation for the coefficient of interest, as this coefficient does not change when these variables are added or eliminated in the tables. This is against most recent research of Blitz and Fabozzi (2017). They find that the variables RMW and CAM explain the sin effect. The other control portfolios act aligned with previous literature. Further examination of the returns will be done using the simplest $CAPM$-model, where only market portfolio is used as a control variable.

Furthermore, the most conservative model in the Panel 2 regressions will be used in further examination of the returns. This builds on the fact that the coefficient of interest does alter when adding additional explanatory variables to the regression. Hence, all the variables are needed to adequately estimate the sin stock effect. Furthermore, the control variables are generally in line with previous literature (Hong & Kacperzyck, 2009). $LOGSIZE$ shows to have a negative effect on stock returns, meaning that small stocks outperform large stocks. $LOGMB$ suggests that overvalued stocks generate lower returns than undervalued stocks. Moreover, the past 12-month returns have either a positive or a negative effect on the returns. The share turnover ($TURN$) reports that more liquid shares generate lower returns. Furthermore, $LOGAGE$, used as an indication of firms' profitability, has a positive effect on the stock performance. Nonetheless, the significant positive beta variable shows contradicting results as to the insignificant beta findings of Hong and Kacperzyck (2009). This result suggests that in the analysis in this paper the market does predict stock returns to a certain degree. The significant positive beta coefficient is also found for the Triumvariate of sin stocks (Table 4).

Table 5: Panel 1 regression results of the return performance of various sin stocks

This table reports the results of Fama and Macbeth (1973) Panel 1 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, using the $CAPM$-model. Panel A illustrates the results regarding the air travel return performance. The $AIRT$ dummy variable is the variable of interest. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry. Panel B and C report the results for the fashion and meat industry, and follow the same method as Panel A. The table report the sample period 1965-2019. Moreover, a distinction is made between the models with and without the time trend to analyse the effects of time on the coefficients.

Panel A: Air travel stocks

VARIABLES	without time trend				with time trend			
	1	2	3	4	5	6	7	8
FASHION	0.032	0.160	0.160	0.160	0.081**	0.131**	0.131**	0.131**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)
mktrf	0.050	0.054	-0.385	-0.377	0.050	0.054	-0.385	-0.377
	(0.007)	(0.007)	(0.004)	(0.004)	(0.007)	(0.007)	(0.004)	(0.004)
AIRT#yeareffect					-0.036**	-0.028*	-0.028*	-0.028*
					(0.002)	(0.000)	(0.000)	(0.000)
COMPfashion		-0.130	-0.130	-0.130		-0.130	-0.130	-0.130
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
SMB			-0.108	-0.360			-0.108	-0.360
			(0.003)	(0.003)			(0.003)	(0.003)
HML			-1.000***	-0.677***			-1.000***	-0.677***
			(0.003)	(0.002)			(0.003)	(0.002)
RMW				-0.774***				-0.774***
				(0.002)				(0.002)
CMA				-0.636***				-0.636***
				(0.002)				(0.002)
Constant	-0.059***	-0.059***	-0.0123***	-0.003**	-0.059***	-0.059***	-0.0123***	-0.003**
	(0.007)	(0.007)	(0.003)	(0.001)	(0.007)	(0.007)	(0.003)	(0.001)
Observations	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.001	0.002	0.002	0.002	0.001	0.002	0.002	0.002
Number of groups	660	660	660	660	660	660	660	660

Panel B: Fashion stocks

VARIABLES	without time trend				with time trend			
	1	2	3	4	5	6	7	8
FASHION	-0.573	-0.278	-0.278	-0.278	-0.028	-0.156***	-0.156***	-0.156***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)
mktrf	0.052	0.052	-0.387	-0.378	0.052	0.052	-0.387	-0.378
	(0.007)	(0.007)	(0.004)	(0.004)	(0.007)	(0.007)	(0.004)	(0.004)
FASHION#yeareffect					0.010	0.017	0.017	0.0172
					(0.000)	(0.000)	(0.003)	(0.003)
COMPfashion		0.275*	0.275*	0.275*		0.275*	0.275*	0.275*
		(0.002)	(0.002)	(0.002)		(0.001)	(0.002)	(0.002)
SMB			-0.111	-0.364			-0.111	-0.364
			(0.003)	(0.003)			(0.003)	(0.003)
HML			-1.000***	-0.677***			-1.000***	-0.677***
			(0.003)	(0.003)			(0.003)	(0.002)
RMW				-0.774***				-0.774***
				(0.002)				(0.002)
CMA				-0.637***				-0.637***
				(0.002)				(0.002)
Constant	-0.059***	-0.059***	-0.0123***	-0.003**	-0.059***	-0.059***	-0.0123***	-0.003**
	(0.007)	(0.007)	(0.003)	(0.001)	(0.007)	(0.007)	(0.003)	(0.001)
Observations	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.001	0.002	0.002	0.002	0.001	0.002	0.002	0.002
Number of groups	660	660	660	660	660	660	660	660

Panel C: Meat stocks

VARIABLES	without time trend				with time trend			
	1	2	3	4	5	6	7	8
MEAT	0.167	0.283*	0.283*	0.283*	-0.083**	-0.040	-0.040	-0.040
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
mktrf	0.052	0.060	-0.382	-0.374	0.052	0.060	-0.382	-0.374
	(0.007)	(0.007)	(0.004)	(0.004)	(0.007)	(0.007)	(0.00378)	(0.00338)
MEAT#yeareffect					0.032*	0.041**	0.041**	0.041**
					(0.000)	(0.000)	(0.000)	(0.000)
COMPmeat		-0.121	-0.121	-0.121		-0.121	-0.121	-0.121
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
SMB			-0.105	-0.359			-0.105	-0.359
			(0.003)	(0.003)			(0.003)	(0.003)
HML			-1.000***	-0.677***			-1.000***	-0.677***
			(0.003)	(0.002)			(0.003)	(0.002)
RMW				-0.774***				-0.774***
				(0.002)				(0.002)
CMA				-0.637***				-0.637***
				(0.002)				(0.002)
Constant	-0.059***	-0.059***	-0.0123***	-0.003**	-0.059***	-0.059***	-0.0123***	-0.003**
	(0.007)	(0.007)	(0.003)	(0.001)	(0.007)	(0.007)	(0.003)	(0.001)
Observations	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Number of groups	660	660	660	660	660	660	660	660

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

Table 6: Panel 2 regression results of the return performance of various sin stocks

This table reports the results of Fama and Macbeth (1973) Panel 2 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, on various lagged firm characteristics that are known to predict stock performance. Panel A illustrates the results regarding the air travel return performance. The $AIRT$ dummy variable is the variable of interest. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry. Panel B and C report the results for the fashion and meat industry, and follow the same method as Panel A. The table reports the sample period 1965-2019. Moreover, a distinction is made between the models with and without the time trend to analyse the effects of time on the coefficients.

Panel A: Air travel stocks

VARIABLES	without time trend					with time trend			
	1	2	3	4	5	6	7	8	9
AIRT	0.032	0.207	-0.011	0.012	0.298*	0.116**	0.096**	0.096**	0.096**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
AIRT#yeareffect						-0.008	-0.013	-0.011	-0.010
						(0.000)	(0.000)	(0.000)	(0.000)
LOGSIZE		-0.198***	-0.093**	-0.097**	-0.096**	-0.096**	-0.091**	-0.100**	-0.108**
		(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB			-0.832***	-0.825***	-0.827***	-0.827***	-0.848***	-0.833***	-0.811***
			(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RET				-0.479	-0.507	-0.507	-0.575	0.0524	-0.629
				(0.011)	(0.011)	(0.011)	(0.001)	(0.001)	(0.011)
COMPairt					-0.290***	-0.290***	-0.150	-0.156	-0.154
					(0.001)	(0.001)	(0.001)	(0.001)	(0.011)
BETA							0.711**	0.725***	0.752***
							(0.277)	(0.255)	(0.250)
TURN								-0.062	-0.059
								(0.001)	(0.000)
LOGAGE									0.055*
									(0.000)
Constant	-0.369***	-0.346***	-0.353***	-0.352***	-0.352***	-0.352***	-0.362***	-0.361***	-0.361***
	(0.014)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)
Observations	2,161,772	1,765,494	1,669,409	1,660,509	1,660,509	1,660,509	1,659,879	1,659,661	1,651,622
R-squared	0.001	0.018	0.028	0.035	0.036	0.036	0.041	0.047	0.049
Number of groups	660	660	660	660	660	660	659	659	659

Panel B: Fashion stocks

VARIABLES	without time trend					with time trend			
	1	2	3	4	5	6	7	8	9
FASHION	-0.057	-0.120	-0.338**	-0.308**	-0.491**	-0.156***	-0.168***	-0.173***	-0.172***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
FASHION#yeareffect						-0.017	-0.170	-0.005	-0.006
						(0.000)	(0.000)	(0.000)	(0.000)
LOGSIZE		-0.198***	-0.094**	-0.0976**	-0.097**	-0.097**	-0.091**	-0.100**	-0.109**
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB			-0.835***	-0.829***	-0.832***	-0.832***	-0.854***	-0.839***	-0.816***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
RET				-0.455	-0.499	-0.499	-0.588	0.036	-0.645
				(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)
COMPfashion					0.185	0.185	0.254	0.261	0.274*
					(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
BETA							0.714**	0.729***	0.757***
							(0.277)	(0.254)	(0.249)
TURN								-0.061	-0.057
								(0.001)	(0.001)
LOGAGE									0.056*
									(0.000)
Constant	-0.369***	-0.346***	-0.352***	-0.352***	-0.352***	-0.352***	-0.362***	-0.361***	-0.361***
	(0.014)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Observations	2,161,772	1,765,494	1,669,409	1,660,509	1,660,509	1,660,509	1,659,879	1,659,661	1,651,622
R-squared	0.001	0.017	0.027	0.035	0.036	0.036	0.041	0.047	0.049
Number of groups	660	660	660	660	660	660	659	659	659

Panel C: Meat stocks									
VARIABLES	without time trend					with time trend			
	1	2	3	4	5	6	7	8	9
MEAT	0.167	0.214	-0.129	-0.099	-0.141	-0.093***	-0.098***	-0.098***	-0.096***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
MEAT#yeareffect						0.006	0.003	0.005	0.006
						(0.000)	(0.000)	(0.000)	(0.000)
LOGSIZE		-0.198***	-0.093**	-0.097**	-0.100**	-0.097**	-0.092**	-0.101**	-0.109**
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB			-0.833***	-0.827***	-0.828***	-0.828***	-0.852***	-0.838***	-0.816***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
RET				-0.424	-0.456	-0.456	-0.513	0.100	-0.575
				(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)
COMPmeat					0.040	0.0404	0.374***	0.383***	0.376***
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BETA							0.825***	0.843***	0.867***
							(0.286)	(0.264)	(0.259)
TURN								-0.056	-0.053
								(0.001)	(0.001)
LOGAGE									0.053*
									(0.000)
Constant	-0.369***	-0.346***	-0.353***	-0.352***	-0.352***	-0.352***	-0.363***	-0.362***	-0.363***
	(0.014)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)
Observations	2,161,772	1,765,494	1,669,409	1,660,509	1,660,509	1,660,509	1,659,879	1,659,661	1,651,622
R-squared	0.000	0.017	0.027	0.034	0.035	0.035	0.040	0.046	0.048
Number of groups	660	660	660	660	660	660	659	659	659

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

5.3 Returns of the original and new sin stocks in different time periods

To look in more detail to the impact of time on the sin industries, the sample period is divided into four different periods. Again, a differentiation is made between the regressions with and without the time trend. Table 7 Panel A shows the results for the Triumvariate of sin stocks, which is again used as a benchmark. The results indicate that the outperformance of original sin stocks increased in the different periods, with an initial underperformance found in the first period. The outperformance in the last period is especially large, namely 1.230% per month which equals an outperformance of 15.8% per year. Similar results are seen in the Panel 2 regressions Table 8 Panel A column 4, that report an outperformance of 1.16% per month. The results are in line with the idea that the Triumvariate of sin stock outperformance is mainly driven by the tobacco industry (Hong & Kacperzyck, 2009), as public opinion regarding the tobacco industry did change a lot over the sample period. The tobacco industry was only seen as slightly sinful in the first sample period (1965-1969). Whereas now tobacco is seen as very harmful for society (Alberg et al., 2014).

The air travel stocks only show an outperformance relative to their comparables in the first and last period if the time trend is added to the regressions (Table 7 Panel B). The outperformance in the first period matches the post-World War II increase in globalisation. The last period returns are in line with the expectations that only most recently the aviation sector is seen as sinful. This is also in line with the fact that aviation sector became part of the SDGs of the 2030 Agenda for Sustainable Development in 2015 (United Nations, 2020). Similar results are found in the second panel regressions (Table 8 Panel B).

Regarding the fashion stocks, a significant underperformance is found in the first and third period, however

not in the last period (Table 7 Panel C). Similar results are found in the Panel 2 regressions (Table 8 Panel C).

In general, all the tables show an increasing outperformance of the meat stocks as time evolves, however these results are not significant. Nonetheless, an outperformance in the last period is seen in the Panel 1 regressions in Table 7 Panel D of 1.180% per month (column 4). Yet, this outperformance disappears when the time trend variable is added. These results are in line with the ambiguous results found in Panel C in Table 5 and 6.

Table 7: Panel 1 regression results of the return performance of various sin stocks over time

This table reports the results of Fama and Macbeth (1973) Panel 1 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, using the $CAPM$-model. Panel A illustrates the results regarding the air travel return performance. The $AIRT$ dummy variable is the variable of interest. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry. Panel B and C report the results for the fashion and meat industry, and follow the same method as in Panel A. Moreover, a distinction is made between the models with and without the time trend to investigate the effect of time on the coefficients. Secondly, the sample period is divided into different time periods to investigate the effect of time further. They are divided into the following time periods: 1965-1969, 1970-1989, 1990-2014, 2015-2019.

Panel A: Triumvariate of sin stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
TRIUM	-0.559*	0.053	0.474**	1.230**	-0.342*	-0.047**	0.096*	0.518*
	(0.003)	(0.002)	(0.002)	(0.005)	(0.002)	(0.001)	(0.001)	(0.003)
mktrf	1.030	1.191	-0.744	-1.330**	1.030	1.191	-0.744	-1.330**
	(0.020)	(0.015)	(0.007)	(0.006)	(0.020)	(0.015	(0.007)	(0.006)
TRIUM#yeareffect					-0.142	-0.001	0.068*	0.305*
					(0.001)	(0.000)	(0.000)	(0.001)
COMPtrium	0.024	0.130	-0.375**	-0.278	0.024	0.012	-0.375**	-0.278
	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)	(0.003)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.000**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,9152	160,783	80,736	779,338	1,140,9152	160,783
R-squared	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
Number of groups	60	240	300	60	60	240	300	60

Panel B: Air travel stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
AIRT	0.554	0.083	0.106	0.350	1.350**	-0.145	-0.082**	0.550*
	(0.007)	(0.003)	(0.002)	(0.005)	(0.005)	(0.001)	(0.001)	(0.003)
mktrf	1.010	1.181	-0.761	-1.340**	1.010	1.181	-0.761	-1.340**
	(0.021)	(0.015)	(0.007)	(0.006)	(0.021)	(0.015	(0.007)	(0.006)
AIRT#yeareffect					-0.271**	0.046	-1.017	-0.096
					(0.001)	(0.000)	(0.000)	(0.001)
COMPairt	-857***	0.075	-0.071	-0.520	-857***	0.075	-0.071	-0.520
	(0.003)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)	(0.004)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.000**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,9152	160,783	80,736	779,338	1,140,9152	160,783
R-squared	0.006	0.002	0.001	0.001	0.006	0.002	0.001	0.001
Number of groups	60	240	300	60	60	240	300	60

Panel C: Fashion stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
FASHION	-1.300	-0.177	-0.291	0.402	-1.250**	0.100	-0.243***	-0.082
	(0.010)	(0.003)	(0.003)	(0.006)	(0.005)	(0.001)	(0.001)	(0.004)
mktrf	1.020	1.171	-0.760	-1.330**	1.020	1.171	-0.760	-1.330**
	(0.021)	(0.015)	(0.007)	(0.006)	(0.021)	(0.015	(0.007)	(0.006)
FASHION#yeareffect					0.170	-0.042	-0.001	0.218
					(0.003)	(0.000)	(0.000)	(0.002)
COMPfashion	1.191	0.332	0.113	-0.063	1.191	0.332	0.113	-0.063
	(0.009)	(0.003)	(0.002)	(0.004)	(0.09)	(0.003)	(0.002)	(0.004)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.000**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,9152	160,783	80,736	779,338	1,140,9152	160,783
R-squared	0.003	0.002	0.002	0.001	0.003	0.002	0.002	0.001
Number of groups	60	240	300	60	60	240	300	60

Panel D: Meat stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
MEAT	0.280	-0.049	0.370	1.180*	-0.422	0.079	0.026	0.252
	(0.006)	(0.002)	(0.003)	(0.006)	(0.003)	(0.001)	(0.001)	(0.004)
mktrf	1.030	1.191	-0.757	-1.330**	1.030	1.191	-0.757	-1.330**
	(0.020)	(0.015)	(0.007)	(0.006)	(0.020)	(0.015	(0.007)	(0.006)
MEAT#yeareffect					0.379**	-0.036	0.040*	0.330*
					(0.002)	(0.001)	(0.000)	(0.002)
COMPmeat	-0.624**	0.228	-0.314	-0.047	-0.624**	0.228	-0.314	-0.047
	(0.003)	(0.002)	(0.003)	(0.005)	(0.003)	(0.002)	(0.003)	(0.005)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.000**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,9152	160,783	80,736	779,338	1,140,9152	160,783
R-squared	0.003	0.001	0.001	0.001	0.003	0.001	0.001	0.001
Number of groups	60	240	300	60	60	240	300	60

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

Table 8: Panel 2 regression results of the return performance of various sin stocks over time

This table reports the results of Fama and Macbeth (1973) Panel 2 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, on various lagged firm characteristics that are known to predict stocks performance. Panel A illustrates the results regarding the air travel return performance. The $AIRT$ dummy variable is the variable of interest. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry. Panel B and C report the results for the fashion and meat industry, and follow the same method as in Panel A. Moreover, a distinction is made between the models with and without the time trend to investigate the effect of time on the coefficients. Secondly, the sample period is divided into different time periods to investigate the effect of time further. They are divided into the following time periods: 1965-1969, 1970-1989, 1990-2014, 2015-2019

Panel A: Triumvariate of sin stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
TRIUM	-0.056	0.224	0.253	1.16**	-0.112	0.027	0.052	0.466
	(0.003)	(0.002)	(0.002)	(0.005)	(0.001)	(0.001)	(0.000)	(0.003)
TRIUMyear					0.005	0.003	0.034	0.302**
					(0.001)	(0.003)	(0.000)	(0.001)
LOGSIZE	-0.430***	-0.041	-0.158**	0.182**	-0.430***	-0.041	-0.158**	0.182**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.105	-0.791***	-1.06***	-0.591***	0.105	-0.791***	-1.06***	-0.591***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	7.220**	-1.940	-0.532	-3.380	7.220**	-1.940	-0.532	-3.380
	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.0140)	(0.0253)
COMPtrium	0.259	0.156	0.019	0.208	0.259	0.156	0.019	0.208
	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)	(0.0014)	(0.001)	(0.003)
BETA	1.028	0.233	1.214**	1.456**	1.028	0.233	1.214**	1.456**
	(0.643)	(0.349)	(0.469)	(0.641)	(0.643)	(0.349)	(0.469)	(0.641)
TURN	-0.191	-0.186	0.062	-0.038	-0.191	-0.186	0.062	-0.038
	(0.003)	(0.002)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)
LOGAGE	0.012	0.029	0.102**	-0.044	0.012	0.029	0.102**	-0.044
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.355***	-0.600***	-0.229***	-0.111***	-0.355***	-0.600***	-0.229***	-0.111***
	(0.026)	(0.021)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.076	0.057	0.040	0.034	0.076	0.057	0.040	0.034
Number of groups	59	240	300	60	59	240	300	60

Panel B: Air travel stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
AIRT	0.652	0.219	-0.040	0.149	1.01**	-0.146	-0.014	0.693**
	(0.005)	(0.003)	(0.002)	(0.005)	(0.004)	(0.001)	(0.001)	(0.003)
AIRTyear					-0.082	0.046	-0.043	-0.226*
					(0.001)	(0.001)	(0.000)	(0.001)
LOGSIZE	-0.431***	-0.040	-0.158**	0.183**	-0.431***	-0.040	-0.158**	0.183**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.113	-0.788***	-1.06***	-0.584***	0.113	-0.788***	-1.06***	-0.584***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	6.58**	-1.85	-0.525	-3.35	6.58**	-1.85	-0.525	-3.35
	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.014)	(0.025)
COMPairt	-0.478	-0.101	-0.040	-0.748	-0.478	-0.101	-0.014	-0.748
	(0.003)	(0.002)	(0.002)	(0.005)	(0.003)	(0.002)	(0.002)	(0.005)
BETA	0.785	0.098	1.188***	1.162*	0.785	0.098	1.188***	1.162*
	(0.559)	(0.306)	(0.458)	(0.639)	(0.559)	(0.306)	(0.458)	(0.639)
TURN	-0.215	-0.179	0.063	-0.038	-0.215	-0.179	0.063	-0.038
	(0.003)	(0.002)	(0.001)	(0.000)	(0.003)	(0.002)	(0.001)	(0.00)
LOGAGE	0.010	0.027	0.103**	-0.034	0.010	0.027	0.103**	-0.034
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.352***	-0.593***	-0.229***	-0.107***	-0.352***	-0.593***	-0.229***	-0.107***
	(0.026)	(0.020)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.080	0.058	0.040	0.033	0.080	0.058	0.040	0.033
Number of groups	59	240	300	60	59	240	300	60

Panel C: Fashion stocks

VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
FASHION	-1.49	-0.459	-0.567*	0.301	-1.33***	0.090	-0.270***	-0.302
	(0.009)	(0.004)	(0.003)	(0.006)	(0.005)	(0.002)	(0.001)	(0.004)
FASHIONyear					0.006	-0.059	-0.031	0.239
					(0.003)	(0.001)	(0.000)	(0.001)
LOGSIZE	-0.437***	-0.039	-0.158**	0.179**	-0.437***	-0.039	-0.158**	0.179**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.114	-0.801***	-1.06***	-0.580***	0.114	-0.801***	-1.06***	-0.580***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	6.87**	-1.92	-0.570	-3.32	6.87**	-1.92	-0.570	-3.32
	(0.032)	(0.021)	(0.014)	(0.025)	(0.032)	(0.021)	(0.014)	(0.025)
COMPfashion	0.869	0.326	0.132	0.188	0.869	0.326	0.132	0.188
	(0.008)	(0.003)	(0.002)	(0.004)	(0.008)	(0.003)	(0.002)	(0.004)
BETA	0.868	0.115	1.155**	1.223*	0.868	0.115	1.155**	1.223*
	(0.580)	(0.314)	(0.453)	(0.615)	(0.580)	(0.314)	(0.453)	(0.615)
TURN	-0.192	-0.180	0.063	-0.038	-0.192	-0.180	0.063	-0.038
	(0.003)	(0.002)	(0.000)	(0.003)	(0.003)	(0.002)	(0.005)	(0.00)
LOGAGE	0.009	0.033	0.103**	-0.0418	0.009	0.033	0.103**	-0.042
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.352***	-0.594***	-0.228***	-0.108***	-0.352***	-0.594***	-0.228***	-0.108***
	(0.025)	(0.021)	(0.018)	(0.020)	(0.025)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.077	0.058	0.040	0.033	0.077	0.058	0.040	0.033
Number of groups	59	240	300	60	59	240	300	60

Panel D: Meat stocks								
VARIABLES	without time trend				with time trend			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8
MEAT	-0.357	-0.484*	-0.172	0.983	-0.741**	0.017	0.012	0.237
	(0.005)	(0.003)	(0.003)	(0.0622)	(0.003)	(0.001)	(0.001)	(0.004)
MEATyear					0.207	-0.105*	-0.039	0.269
					(0.001)	(0.001)	(0.000)	(0.002)
LOGSIZE	-0.427***	-0.0403	-0.158**	0.178**	-0.427***	-0.040	-0.158**	0.178**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.111	-0.797***	-1.06***	-0.582***	0.111	-0.797***	-1.06***	-0.582***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	6.92**	-1.80	-0.527	-3.28	6.92**	-1.80	-0.527	-3.28
	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.014)	(0.025)
COMPmeat	-0.158	0.339**	0.498**	0.446	-0.158	0.339**	0.498**	0.446
	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)
BETA	0.764	0.216	1.315***	1.327**	0.764	0.216	1.315***	1.327**
	(0.622)	(0.312)	(0.478)	(0.632)	(0.622)	(0.312)	(0.478)	(0.632)
TURN	-0.174	-0.171	0.062	-0.039	-0.174	-0.171	0.062	-0.039
	(0.003)	(0.002)	(0.001)	(0.000)	(0.003)	(0.002)	(0.000)	(0.00)
LOGAGE	0.003	0.026	0.103**	-0.042	0.003	0.026	0.103**	-0.042
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.352***	-0.595***	-0.230***	-0.109***	-0.352***	-0.595***	-0.230***	-0.109***
	(0.026)	(0.021)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.076	0.057	0.040	0.033	0.076	0.057	0.040	0.033
Number of groups	59	240	300	60	59	240	300	60

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

5.4 Returns of the new sin stocks relative to original sin stocks

The stock returns of the air travel, fashion and meat industry are examined relative to Triumvariate of sin stock returns in this final analysis in order to accept or reject the hypothesis set in the introduction. As predicted, the most similarities in returns should be seen for the air travel stocks, and to a lesser extent for the fashion and meat stocks. The results are shown in Table 9 and 10.

5.4.1 Air travel stocks

Table 9 Panel A shows the results for the air travel stocks using Panel 1 regressions. The outperformance of air travel stocks relative to the market and to their comparables is shown in column 5 and 6 as a reference. Most importantly, an outperformance is found relative to the original sin stocks, of 0.146% per month in column (7). However, when controlling for possible industry effects in column (8), these results decrease and show large similarities to column (6). This indicates that adding the "sin effect" to the regression does not influence the results, as the outperformance for the air travel stocks did not change a lot. Table 10 illustrates the analysis for air travel stocks relativeto sin stocks using the Panel 2 regressions. Also, this table shows quite similar results between column 6 and 8 in Panel A. Concluding, the air travel stocks do not show similar returns to the Triumvariate sin stocks. Moreover, the coefficient in front $TRIUMairt$ illustrates whether the air travel stocks combined with the original sin stocks outperform the market. Column (7) of Table 10 Panel A shows that they do outperform the market with 0.380% at a significance level of 1%. This combined

outperformance is not seen when the comparable industry transportation is added in the dummy variable $TRIUM2AIRT$. This suggests that the combined outperformance is not because of more general industry effects. Additionally, these results indicate that air travel stocks could be seen as new sin stocks, moreover, as complementary stocks to the original sin stocks. Thus hypothesis 1 cannot be rejected. The tables without the time trend show no significant results, which is in line with previous results.

5.4.2 Fashion stocks

Table 9 Panel B shows that fashion stocks only outperform their comparables significantly in column (6). However, when the Triumvariate of sin stocks are added to the regression, this result disappears. There is no significant difference found in returns between the fashion stocks and the Triumvariate stocks of sin in column 7 and 8. Which could indicate that they have similar returns. However, this could also simply be the result of a lack of explanatory power, which is very reasonable considering that the regressions have a very low R^2. Indeed, Panel 2 regressions do illustrate a difference between the fashion and original sin stocks in column (7) of Table 10 Panel B. Column (6) illustrates a significant underperformance of the fashion stocks relative to their comparables of 0.172%, whereas column (8) reports a significant underperformance of 0.084% relative to the original sin stocks and their comparables. This indicates that adding the sin stock effect to the regressions explains part of the underperformance of fashion stocks.

Noteworthy is the coefficient in front of the $TRIUMfashion$ dummy variable in column (7). This coefficient suggests that the fashion stocks combined with the Triumvariate of sin stocks outperform the market with 0.371%, while controlling for various firm characteristics. Moreover, when the comparable stocks are added to the dummy variable $TRIUM2fashion$ in column 8, this combined outperformance is still seen. This suggests that the combined outperformance of the fashion and the original sin stocks was partly because of industry effects. This is in line with previous results, that state that fashion stock returns do not differ from their comparable stock returns. However, the results still indicate that the fashion stock performance is slightly influenced by a possible sin effect. Thus, hypothesis 2 cannot be rejected.

5.4.3 Meat stocks

Table 9 Panel C shows no significant result of a difference in performance between the meat stocks and the original sin stocks. However, Panel 2 regressions do show significant results in Table 10 Panel C when the time trend is added. The meat stocks underperform the original sin stocks by 0.100% per month. Adding the Triumvariate of sin stocks to the regression did not change the underperformance of meat stocks a lot, when comparing column (6) with column (8). This indicates that the sin effect does not influence the performance of the meat stocks. Furthermore, the coefficient in front of the $TRIUMmeat$ dummy variable illustrates that the meat stocks combined with the Triumvariate of sin stocks outperform the market significantly with 0.379% per month. Anyhow, this combined outperformance, does not alter a lot when the comparable in-

dustry effects are taken into account. The coefficient in front of the dummy variable $TRIUM2meat$ is 0.393 (column 8). This indicates that the combined outperformance is partly because of industry effects. Given that the outperformance does not change when sin stocks are added to the regression, and that the combined outperformance is mainly because of industry effects, hypothesis 3 can be rejected.

Table 9: Panel 1 regression results of the return performance of new sin stocks relative to Triumvariate of sin stocks

This table reports the results of Fama and Macbeth (1973) Panel 1 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, using the $CAPM$-model. Panel A illustrates the results regarding the air travel performance. The variable of interest is the dummy variable $AIRT$. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry, as shown in column 2 and 6. Moreover, the dummy $TRIUMairt$ is added to the model in column 3 and 7 and allows for an immediate test of difference between the air travel and the Triumvariate of sin industry. Furthermore, adding the the dummy variable $TRIUM2airt$ in column 4 and 8 results in an immediate test of difference between the air travel industry and the Triumvariate of sin industry while controlling for a more general industry effect. Panel B and C report the results for the fashion and meat industry, and follow the same method as Panel A. The table reports the sample period 1956-2019. Moreover, a distinction is made between the models with and without the time trend to investigate the effect of time on the coefficients.

Panel A: Air travel stocks								
VARIABLES	**without time trend**				**with time trend**			
	to market	**comp**	**trium**	**comp/trium**	**to market**	**comp**	**trium**	**comp/trium**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
AIRT	0.032	0.160	-0.084	0.049	0.081**	0.131**	0.146**	0.137**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)
mktrf	0.050	0.054	0.053	0.056	0.050	0.054	0.053	0.056
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
AIRT#yeareffect					-0.036**	-0.028*	-0.035*	-0.031*
					(0.000)	(0.000)	(0.000)	(0.000)
COMPairt		-0.130				-0.130		
		(0.001)				(0.001)		
TRIUMairt			0.117				0.117	
			(0.002)				(0.002)	
TRIUM2airt				-0.018				-0.018
				(0.001)				(0.001)
Constant	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Number of groups	660	660	660	660	660	660	660	660

Panel B: Fashion stocks

VARIABLES	without time trend				with time trend			
	to market	comp	trium	comp/trium	to market	comp	trium	comp/trium
	1	2	3	4	5	6	7	8
FASHION	-0.006	-0.278	-0.120	-0.138	-0.028	-0.156***	0.041	-0.004
	(0.001)	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)
mktrf	0.052	0.052	0.055	0.055	0.052	0.052	0.055	0.055
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
FASHION#yeareffect					0.010	0.017	0.010	0.009
					(0.000)	(0.000)	(0.000)	(0.000)
COMPfashion		0.275*				0.275*		
		(0.002)				(0.002)		
TRIUMfashion			0.115				0.115	
			(0.002)				(0.002)	
TRIUM2fashion				0.135				0.135
				(0.001)				(0.001)
Constant	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Number of groups	660	660	660	660	660	660	660	660

Panel C: Meat stocks

VARIABLES	without time trend				with time trend			
	to market	comp	trium	comp/trium	to market	comp	trium	comp/trium
	1	2	3	4	5	6	7	8
MEAT	0.167	0.283*	0.051	0.180	-0.083**	-0.040	-0.014	-0.034
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
mktrf	0.052	0.060	0.0548	0.0630	0.052	0.060	0.055	0.063
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
MEAT#yeareffect					0.032*	0.041**	0.031	0.038**
					(0.000)	(0.000)	(0.000)	(0.000)
COMPmeat		-0.121				-0.121		
		(0.001)				(0.001)		
TRIUMmeat			0.017				0.017	
			(0.002)				(0.001)	
TRIUM2meat				-0.017				-0.017
				(0.001)				(0.001)
Constant	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***	-0.059***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772	2,161,772
R-squared	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Number of groups	660	660	660	660	660	660	660	660

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

Table 10: Panel 2 regression results of the return performance of new sin stocks relative to Triumvariate of sin stocks

This table reports the results of Fama and Macbeth (1973) Panel 2 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, on various lagged firm characteristics that are known to predict stock performance. Panel A illustrates the results regarding the air travel performance. The variable of interest is the dummy variable $AIRT$. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry, as shown in column 2 and 6. Moreover, the dummy $TRIUMairt$ is added to the model in column 3 and 7 and allows for an immediate test of difference between the air travel and the Triumvariate of sin industry. Furthermore, adding the the dummy variable $TRIUM2airt$ in column 4 and 8 results in an immediate test of difference between the air travel industry and the Triumvariate of sin industry while controlling for a more general industry effect. Panel B and C report the results for the fashion and meat industry, and follow the same method as Panel A. The table reports the sample period 1965-2019. Moreover, a distinction is made between the models with and without the time trend to investigate the effect of time on the coefficients.

Panel A: Air travel stocks

VARIABLES	without time trend				with time trend			
	to market	comp	trium	comp/trium	to market	comp	trium	comp/trium
	1	2	3	4	5	6	7	8
AIRT	-0.020	0.134	-0.398**	-0.098	0.083**	0.096**	0.076*	0.090**
	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
AIRTyeareffect					-0.020	-0.0101	-0.0398**	-0.023
					(0.000)	(0.000)	(0.000)	(0.000)
COMPairt		-0.154				-0.154		
		(0.001)				(0.001)		
TRIUMairt			0.380***				0.380***	
			(0.001)				(0.001)	
TRIUM2airt				0.080				0.080
				(0.001)				(0.001)
LOGSIZE	-0.108**	-0.108**	-0.109**	-0.109**	-0.108**	-0.108**	-0.109**	-0.109**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB	-0.810***	-0.811***	-0.810***	-0.810***	-0.810***	-0.811***	-0.810***	-0.810***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RET	-0.601	-0.629	-0.619	-0.621	-0.601	-0.629	-0.619	-0.621
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
BETA	0.766***	0.752***	0.807***	0.790***	0.766***	0.752***	0.807***	0.790***
	(0.248)	(0.250)	(0.249)	(0.250)	(0.248)	(0.250)	(0.249)	(0.250)
TURN	-0.060	-0.059	-0.061	-0.060	-0.060	-0.059	-0.061	-0.060
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGAGE	0.055*	0.055*	0.054*	0.055*	0.055*	0.055*	0.054*	0.055*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.362***	-0.361***	-0.362***	-0.362***	-0.362***	-0.361***	-0.362***	-0.362***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Observations	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622
R-squared	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049
Number of groups	659	659	659	659	659	659	659	659

Panel B: Fashion stocks

VARIABLES	without time trend				with time trend			
	to market	comp	trium	comp/trium	to market	comp	trium	comp/trium
	1	2	3	4	5	6	7	8
FASHION	-0.262**	-0.531**	-0.627***	-0.541***	-0.056***	-0.172***	-0.061**	-0.084***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)
FASHIONyeareffect					-0.017	-0.001	-0.036**	-0.029*
					(0.000)	(0.000)	(0.000)	(0.000)
COMPfashion		0.274*				0.274*		
		(0.002)				(0.002)		
TRIUMfashion			0.371***				0.371***	
			(0.001)				(0.001)	
TRIUM2fashion				0.288***				0.288***
				(0.001)				(0.001)
LOGSIZE	-0.110**	-0.109**	-0.110**	-0.110**	-0.110**	-0.109**	-0.110**	-0.110**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB	-0.813***	-0.816***	-0.813***	-0.816***	-0.813***	-0.816***	-0.813***	-0.816***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RET	-0.602	-0.645	-0.619	-0.630	-0.602	-0.645	-0.619	-0.630
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
BETA	0.747***	0.757***	0.787***	0.797***	0.747***	0.757***	0.787***	0.797***
	(0.249)	(0.249)	(0.249)	(0.249)	(0.249)	(0.249)	(0.249)	(0.249)
TURN	-0.057	-0.057	-0.058	-0.059	-0.057	-0.057	-0.058	-0.059
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGAGE	0.056**	0.056**	0.055*	0.057**	0.056**	0.056**	0.055*	0.057**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.361***	-0.361***	-0.362***	-0.362***	-0.361***	-0.361***	-0.362***	-0.362***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Observations	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622
R-squared	0.035	0.049	0.049	0.049	0.048	0.049	0.049	0.049
Number of groups	660	659	659	659	659	659	659	659

Panel C: Meat stocks

VARIABLES	without time trend				with time trend			
	to market	comp	trium	comp/trium	to market	comp	trium	comp/trium
	1	2	3	4	5	6	7	8
MEAT	0.140	-0.197	-0.223	-0.197	-0.096***	-0.096***	-0.100**	-0.100***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
MEATyeareffect					0.016	0.006	-0.004	0.004
					(0.000)	(0.000)	(0.000)	(0.000)
COMPmeat		0.376***				0.376***		
		(0.001)				(0.001)		
TRIUMmeat			0.379***				0.379***	
			(0.001)				(0.001)	
TRIUM2meat				0.393***				0.393***
				(0.001)				(0.001)
LOGSIZE	-0.108**	-0.109**	-0.109**	-0.109**	-0.108**	-0.109**	-0.109**	-0.109**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOGMB	-0.812***	-0.816***	-0.813***	-0.816***	-0.812***	-0.816***	-0.813***	-0.816***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RET	-0.574	-0.575	-0.591	-0.585	-0.574	-0.575	-0.591	-0.585
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
BETA	0.764***	0.867***	0.806***	0.908***	0.764***	0.867***	0.806***	0.908***
	(0.250)	(0.259)	(0.251)	(0.259)	(0.250)	(0.259)	(0.251)	(0.259)
TURN	-0.053	-0.053	-0.054	-0.052	-0.053	-0.053	-0.054	-0.052
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGAGE	0.054*	0.053*	0.053*	0.053*	0.054*	0.053*	0.053*	0.053*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.362***	-0.363***	-0.362***	-0.363***	-0.362***	-0.363***	-0.362***	-0.363***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Observations	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622	1,651,622
R-squared	0.048	0.048	0.048	0.049	0.048	0.048	0.048	0.049
Number of groups	659	659	659	659	659	659	659	659

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

5.5 Returns of the new sin stocks relative to original sin stocks in different time periods

Table 11 and 12 separate the sample period into four periods to look into more detail of when certain return similarities were formed. The time trend is added in all the regressions as the time variable does influence the stock performance coefficient significantly as seen in the previous regressions.

Significant results for the aviation sector, similar to the results found in tables 9 and 10, are also seen in this tables. However, only for the last time period. This is in line with the expectations that the air travel stocks are seen as more sinful in the most recent period because environmentalism most recently became more popular.

Panel B Table 11 shows the results for the fashion stocks. Most importantly, the combined outperformance of the fashion and original sin stocks is found in the last time period (column 8). This effect disappears in column 12 when industry effects are added. This indicates that fashion stocks could be complementary to sin stocks and that this is true for the most recent time period, this result was not found for the overall sample period in Table 9.

Panel C reports no significant results in the first panel regressions (Table 11). However, Panel 2 regressions (Table 12 Panel C) find an underperformance of the meat stocks relative to the Triumvariate of sin stocks in the first time period. Moreover, adding the sin effect to the regression does not change the meat coefficient significantly. This is in line with the results previously found that suggests that the public does not consider meat a sinful product.

Table 11: Panel 1 regressions results of the return performance of new sin stocks relative to Triumvariate of sin stocks over time

This table reports the results of Fama and Macbeth (1973) Panel 1 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, using the $CAPM$-model. Panel A illustrates the results regarding the air travel performance. The variable of interest is the dummy variable $AIRT$. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry, as shown in column (1-4). Moreover, the dummy $TRIUMairt$ is added to the model in column (5-8), this allows for an immediate test of difference between the air travel and the Triumvariate of sin industry. Furthermore, adding the the dummy variable $TRIUM2airt$ in column (9-12) results in an immediate test of difference between the air travel industry and the Triumvariate of sin industry while controlling for a more general industry effect. Panel B and C report the results for the fashion and meat industry, and follow the same method as Panel A. Moreover, a distinction is made between the models with and without the time trend to investigate the effect of time on the coefficients. Secondly, the sample period is divided into different time periods to investigate the effect of time further. They are divided into the following time periods: 1965-1969, 1970-1989, 1990-2014, 2015-2019.

Panel A: Air travel stocks

VARIABLES	comp				trium				comp/trium			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12
AIRT	1.35**	-0.145	-0.082	0.550*	1.44**	0.042	-0.123*	-0.543	1.39**	-0.079	-0.098	0.011
	(0.005)	(0.001)	(0.001)	(0.003)	(0.006)	(0.002)	(0.001)	(0.004)	(0.006)	(0.001)	(0.001)	(0.003)
mktrf	1.01	1.18	-0.761	-1.34**	1.02	1.18	-0.763	-1.34**	1.02	1.18	-0.757	-1.34**
	(0.021)	(0.015)	(0.007)	(0.006)	(0.021)	(0.015)	(0.007)	(0.006)	(0.021)	(0.015)	(0.007)	(0.006)
AIRTyeareffect	-0.271**	0.046	-0.017	-0.096	-0.368**	0.034	-0.046	-0.259	-0.310***	0.040	-0.027	-0.176**
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.001)
COMPairt	-0.857***	0.075	-0.071	-0.520								
	(0.003)	(0.002)	(0.002)	(0.004)								
TRIUMairt					-0.544	0.068	0.120	0.957*				
					(0.004)	(0.002)	(0.003)	(0.005)				
TRIUM2airt									-0.752***	0.084	0.003	0.206
									(0.003)	(0.002)	(0.002)	(0.003)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.009**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,915	160,783	80,736	779,338	1,140,915	160,783	80,736	779,338	1,140,915	160,783
R-squared	0.005	0.001	0.001	0.000	0.006	0.002	0.001	0.001	0.006	0.002	0.001	0.001
Number of groups	60	240	300	60	60	240	300	60	60	240	300	60

Panel B: Fashion stocks

VARIABLES	comp				trium				comp/trium			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12
FASHION	-1.25**	0.100	-0.243***	-0.082	0.254	0.122	-0.108	-0.900**	0.095	0.077	-0.210***	-0.403
	(0.005)	(0.001)	(0.001)	(0.004)	(0.003)	(0.002)	(0.001)	(0.004)	(0.002)	(0.001)	(0.001)	(0.003)
mktrf	1.02	1.17	-0.760	-1.33**	1.02	1.18	-0.760	-1.34**	1.02	1.17	-0.756	-1.34**
	(0.021)	(0.015)	(0.007)	(0.006)	(0.020)	(0.015)	(0.007)	(0.006)	(0.021)	(0.015)	(0.007)	(0.006)
FASHION#yeareffect	0.170	-0.042	-0.001	0.218	0.169	-0.043	-0.074	0.045	0.015	-0.045	-0.015	0.144
	(0.003)	(0.000)	(0.000)	(0.002)	(0.002)	(0.000)	(0.000)	(0.002)	(0.002)	(0.000)	(0.000)	(0.002)
COMPfashion	1.19	0.332	0.113	-0.063								
	(0.009)	(0.003)	(0.002)	(0.004)								
TRIUMfashion					-0.538	0.065	0.116	0.962**				
					(0.004)	(0.002)	(0.003)	(0.005)				
TRIUM2fashion									-0.273	0.229	0.097	0.357
									(0.003)	(0.002)	(0.002)	(0.003)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.009**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,915	160,783	80,736	779,338	1,140,915	160,783	80,736	779,338	1,140,915	160,783
R-squared	0.002	0.001	0.001	0.001	0.003	0.002	0.001	0.001	0.003	0.002	0.002	0.001
Number of groups	60	240	300	60	60	240	300	60	60	240	300	60

Panel C: Meat stocks

VARIABLES	comp				trium				comp/trium			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12
MEAT	-0.422	0.079	0.026	0.252	-0.273	0.102	-0.043	-0.094	-0.384	0.084	0.002	0.090
	(0.003)	(0.001)	(0.001)	(0.004)	(0.003)	(0.001)	(0.001)	(0.004)	(0.003)	(0.001)	(0.001)	(0.004)
mktrf	1.03	1.19	-0.757	-1.33**	1.02	1.18	-0.762	-1.34**	1.03	1.19	-0.753	-1.34**
	(0.020)	(0.015)	(0.007)	(0.006)	(0.021)	(0.015)	(0.007)	(0.006)	(0.020)	(0.015)	(0.007)	(0.006)
MEAT#yeareffect	0.379**	-0.036	0.041	0.330*	0.322*	-0.010	-0.051	0.031	0.365**	-0.029	0.007	0.182
	(0.002)	(0.000)	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.000)	(0.000)	(0.002)
COMPmeat	-0.624**	0.228	-0.314	-0.047								
	(0.003)	(0.002)	(0.003)	(0.005)								
TRIUMmeat					-0.536	0.065	0.120	0.962**				
					(0.004)	(0.002)	(0.003)	(0.005)				
TRIUM2meat									-0.619*	0.175	-0.144	0.450
									(0.003)	(0.002)	(0.002)	(0.004)
Constant	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.009**	-0.071***	-0.098***	-0.035***	-0.009**
	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	80,736	779,338	1,140,915	160,783	80,736	779,338	1,140,915	160,783	80,736	779,338	1,140,915	160,783
R-squared	0.003	0.001	0.000	0.001	0.002	0.001	0.001	0.001	0.004	0.002	0.001	0.001
Number of groups	60	240	300	60	60	240	300	60	60	240	300	60

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

Table 12: Panel 2 regressions results of the return performance of new sin stocks relative to Triumvariate of sin stocks over time

This table reports the results of Fama and Macbeth (1973) Panel 2 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, on various lagged firm characteristics that are known to predict stock performance. Panel A illustrates the results regarding the air travel performance. The variable of interest is the dummy variable $AIRT$. Adding the comparable dummy variable $COMPairt$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry, as shown in column (1-4. Moreover, the dummy $TRIUMairt$ is added to the model in column (5-8), this allows for an immediate test of difference between the air travel and the Triumvariate of sin industry. Furthermore, adding the the dummy variable $TRIUM2airt$ in column (9-12) results in an immediate test of difference between the air travel industry and the Triumvariate of sin industry while controlling for a more general industry effect. Panel B and C report the results for the fashion and meat industry, and follow the same method as Panel A. Moreover, a distinction is made between the models with and without the time trend to investigate the effect of time on the coefficients. Secondly, the sample period is divided into different time periods to investigate the effect of time further. They are divided into the following time periods: 1965-1969, 1970-1989, 1990-2014, 2015-2019.

Panel A: Air travel stocks

VARIABLES	comp				trium				comp/trium			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12
AIRT	1.01**	-0.146	-0.014	0.693**	1.01**	-0.021	-0.071	-0.870*	1.03***	-0.107	-0.034	-0.025
	(0.004)	(0.001)	(0.000)	(0.003)	(0.004)	(0.001)	(0.001)	(0.004)	(0.004)	(0.001)	(0.000)	(0.003)
AIRT#yeareffect	-0.082	0.046	-0.043	-0.226*	-0.311**	-0.006	-0.080*	-0.387**	-0.173	0.028	-0.061*	-0.337***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.001)
COMPairt	-0.478	-0.101	-0.013	-0.748								
	(0.003)	(0.002)	(0.002)	(0.005)								
TRIUMairt					0.137	0.344	0.269	1.32**				
					(0.003)	(0.002)	(0.003)	(0.005)				
TRIUM2airt									-0.258	0.085	0.107	0.256
									(0.002)	(0.001)	(0.001)	(0.003)
LOGSIZE	-0.431***	-0.0400	-0.158**	0.183**	-0.431***	-0.041	-0.158**	0.183**	-0.430***	-0.040	-0.158**	0.182**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.113	-0.788***	-1.06***	-0.584***	0.119	-0.788***	-1.05***	-0.588***	0.114	-0.787***	-1.05***	-0.584***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	6.58**	-1.85	-0.525	-3.35	6.64**	-1.82	-0.538	-3.35	6.60**	-1.83	-0.532	-3.33
	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.014)	(0.025)
BETA	0.785	0.098	1.188***	1.162*	0.840	0.140	1.221***	1.378**	0.772	0.129	1.220***	1.302*
	(0.559)	(0.306)	(0.458)	(0.639)	(0.548)	(0.311)	(0.454)	(0.633)	(0.557)	(0.309)	(0.457)	(0.651)
TURN	-0.215	-0.179	0.063	-0.038	-0.219	-0.182	0.062	-0.038	-0.216	-0.181	0.062	-0.038
	(0.003)	(0.002)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)
LOGAGE	0.010	0.027	0.103**	-0.034	0.010	0.027	0.103**	-0.0416	0.010	0.029	0.103**	-0.038
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.352***	-0.593***	-0.229***	-0.107***	-0.352***	-0.593***	-0.229***	-0.107***	-0.352***	-0.593***	-0.229***	-0.107***
	(0.026)	(0.021)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.080	0.058	0.040	0.033	0.080	0.058	0.040	0.033	0.080	0.058	0.040	0.033
Number of groups	59	240	300	60	59	240	300	60	59	240	300	60

Panel B: Fashion stocks

VARIABLES	comp				trium				comp/trium			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12
FASHION	-1.33***	0.090	-0.270***	-0.302	-0.305*	0.009	-0.075	-0.913*	-0.466**	0.022	-0.210***	-0.549
	(0.005)	(0.002)	(0.001)	(0.004)	(0.002)	(0.001)	(0.001)	(0.005)	(0.002)	(0.001)	(0.000)	(0.004)
FASHION#yeareffect	0.006	-0.059	-0.031	0.239	-0.160	-0.095*	-0.132***	-0.035	-0.141	-0.081*	-0.055	0.124
	(0.003)	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.002)	(0.000)	(0.000)	(0.002)
COMPfashion	0.869	0.326	0.132	0.188								
	(0.008)	(0.003)	(0.002)	(0.004)								
TRIUMfashion					0.115	0.333	0.259	1.33**				
					(0.003)	(0.002)	(0.002)	(0.005)				
TRIUM2fashion									0.258	0.359*	0.160	0.672**
									(0.003)	(0.002)	(0.001)	(0.003)
LOGSIZE	-0.437***	-0.389	-0.158**	0.179**	-0.439***	-0.041	-0.159**	0.180**	-0.439***	-0.040	-0.158**	0.180**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.114	-0.801***	-1.06***	-0.580***	0.119	-0.794***	-1.06***	-0.584***	0.118	-0.801***	-1.06***	-0.584***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	6.87**	-1.92	-0.570	-3.32	6.96**	-1.90	-0.533	-3.37	6.94**	-1.93	-0.538	-3.35
	(0.032)	(0.021)	(0.014)	(0.025)	(0.032)	(0.021)	(0.014)	(0.025)	(0.032)	(0.021)	(0.014)	(0.025)
BETA	0.868	0.115	1.155**	1.223*	0.869	0.133	1.183***	1.349**	0.909	0.156	1.181***	1.331**
	(0.580)	(0.314)	(0.453)	(0.615)	(0.571)	(0.317)	(0.452)	(0.626)	(0.573)	(0.319)	(0.453)	(0.622)
TURN	-0.192	-0.180	0.063	-0.038	-0.189	-0.182	0.063	-0.038	-0.188	-0.185	0.063	-0.038
	(0.003)	(0.002)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)
LOGAGE	0.009	0.033	0.103**	-0.042	0.012	0.030	0.103**	-0.045	0.008	0.034	0.105***	-0.044
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.352***	-0.594***	-0.228***	-0.108***	-0.352***	-0.594***	-0.228***	-0.108***	-0.352***	-0.594***	-0.228***	-0.108***
	(0.025)	(0.021)	(0.018)	(0.020)	(0.025)	(0.021)	(0.018)	(0.020)	(0.025)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.077	0.058	0.040	0.033	0.076	0.057	0.040	0.033	0.076	0.057	0.040	0.033
Number of groups	59	240	300	60	59	240	300	60	59	240	300	60

Panel C: Meat stocks

VARIABLES	comp				trium				comp/trium			
	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12
MEAT	-0.741**	0.017	0.012	0.237	-0.686*	-0.047	0.032	-0.159	-0.718**	0.001	0.020	0.056
	(0.003)	(0.001)	(0.001)	(0.004)	(0.003)	(0.001)	(0.001)	(0.005)	(0.003)	(0.001)	(0.001)	(0.004)
MEAT#yeareffect	0.207	-0.105*	-0.039	0.269	0.093	-0.078	-0.042	0.045	0.178	-0.097	-0.035	0.161
	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.000)	(0.002)
COMPmeat	-0.158	0.339**	0.498**	0.446								
	(0.002)	(0.002)	(0.002)	(0.004)								
TRIUMmeat					0.126	0.329	0.277	1.34**				
					(0.003)	(0.002)	(0.002)	(0.005)				
TRIUM2meat									-0.100	0.354**	0.412***	0.941**
									(0.003)	(0.001)	(0.001)	(0.004)
LOGSIZE	-0.427***	-0.040	-0.158**	0.178**	-0.429***	-0.041	-0.158**	0.180**	-0.427***	-0.042	-0.159**	0.178**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	0.111	-0.797***	-1.06***	-0.582***	0.111	-0.793***	-1.06***	-0.584***	0.111	-0.796***	-1.06***	-0.589***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	6.92**	-1.80	-0.527	-3.28	6.98**	-1.83	-0.542	-3.35	6.94**	-1.83	-0.519	-3.32
	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.014)	(0.025)	(0.031)	(0.021)	(0.014)	(0.025)
BETA	0.764	0.216	1.315***	1.327**	0.849	0.115	1.233***	1.389**	0.755	0.258	1.333***	1.535**
	(0.622)	(0.312)	(0.478)	(0.632)	(0.574)	(0.313)	(0.457)	(0.637)	(0.630)	(0.320)	(0.473)	(0.652)
TURN	-0.174	-0.171	0.062	-0.039	-0.173	-0.173	0.062	-0.038	-0.176	-0.168	0.062	-0.038
	(0.003)	(0.002)	(0.000)	(0.000)	(0.003)	(0.001)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)
LOGAGE	0.003	0.026	0.103**	-0.042	0.007	0.026	0.103**	-0.0449	0.005	0.028	0.103**	-0.046
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.352***	-0.595***	-0.230***	-0.109***	-0.353***	-0.594***	-0.229***	-0.110***	-0.352***	-0.595***	-0.230***	-0.112***
	(0.026)	(0.021)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)	(0.026)	(0.021)	(0.018)	(0.020)
Observations	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741	61,772	449,68	995,429	144,741
R-squared	0.076	0.057	0.040	0.033	0.076	0.056	0.040	0.033	0.077	0.057	0.040	0.033
Number of groups	59	240	300	60	59	240	300	60	59	240	300	60

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

5.6 Returns of the new sin stocks combined

Table 13 is illustrated using the same format as Table 11, nonetheless, the full sample period is also included. The table reports whether the returns of the air travel, fashion and meat stocks combined are compatible to the original Triumvariate of sin in order to conclude if these industries can be seen as a new sin industry. This does not mean that the original sin industries are not still seen as sinful. The coefficient of interest is the coefficient in front of the $NEWSIN$ dummy variable.

Relative to their comparables, the new sin stocks do slightly outperform (on a 10% significance level) in the overall sample period (column 1 Table 13), however this outperformance is not seen in the Panel 2 regressions. Ambiguous results are also found for the different time periods. A comparison between returns of the new sin stocks and the Triumvariate sin stocks is reported in column (6-10). The Panel 1 regressions show a significant discrepancy between the returns for the overall sample period, and in the first and last period. These results suggest that as time evolves, the new sin stocks underperform the Triumvariate of sin stocks. An underperformance of the new sin stocks is also seen in the Panel 2 regressions in Table 14 for the time period 1990-2014.

The overall sample period results suggest that new sin stocks outperform their comparables to a higher degree when the sin effect is added, as without (when comparing column 1 and 11 in Table 13). This is against prediction that a certain "sin effect" is responsible for the outperformance of the stocks. This indicates that other factors have a bigger influence on the returns than does the sin effect. These results are also seen in the period 1965-1969 and 1990-2014. Panel 2 regressions in Table 14 do not report the same results for the overall sample period as did the Panel 1 regressions. They find no significant difference in returns between the new sin stocks and the original sin stocks, even when controlling for possible industry effects in column (11-15). Thus, no clear conclusion can be made regarding similarities between the returns using these findings.

Noteworthy, the time trend is significantly negative in the overall sample period (column 6 and 11 of Table 15). This suggests that the difference between the original and new sin stocks is significantly decreasing with time.

Nonetheless, the $TRIUMnewsin$ dummy variable, which combines the returns of the Triumvariate of sin stocks and the new sin stocks is significantly outperforming non-sin stocks in the time period 2015-2019 in both panel regressions (0.963% and 1.33% per month) (Table 14 and 15 column 10). This result disappears in column 15 when the comparable industries are added to the regression, which means that the outperformance is not because of a more general industry effect. Hence, this means that the new sin stocks can be seen as complementary stocks to the original sin stocks, as already found for the air travel and fashion stocks separately.

Table 13: Panel 1 regression results of the return performance of the new sin stocks combined

This table reports the results of Fama and Macbeth (1973) Panel 1 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, using the $CAPM$ model. The variable of interest is the dummy variable $NEWSIN$, that combines the new sin stocks air travel, fashion and meat. Adding the comparable dummy variable $COMPnewsin$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry, as shown in column 1-5. Moreover, the dummy $TRIUMnewsin$ is added to the model in column 6-10, this allows for an immediate test of difference between the air travel and the Triumvariate of sin industry. Furthermore, adding the the dummy variable $TRIUM2newsin$ in column 11-15 results in an immediate test of difference between the air travel industry and the Triumvariate of sin industry while controlling for a more general industry effect. The table reports the overall sample period 1965-2019, as well as the sample period divided into the four groups.

VARIABLES	comp					trium					comp/trium				
	1965-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NEWSIN	0.048*	0.547*	0.002	-0.137**	0.119	0.081**	0.710**	0.088	-0.103	-0.622*	0.053*	0.577*	0.014	-0.132**	-0.037
	(0.000)	(0.003)	(0.001)	(0.001)	(0.002)	(0.000)	(0.004)	(0.001)	(0.001)	(0.003)	(0.000)	(0.003)	(0.001)	(0.001)	(0.002)
mktrf	0.066	1.03	1.18	-0.741	-1.33**	0.056	1.02	1.18	-0.757	-1.34**	0.069	1.04	1.18	-0.737	-1.33**
	(0.007)	(0.020)	(0.015)	(0.007)	(0.006)	(0.007)	(0.021)	(0.015)	(0.007)	(0.006)	(0.007)	(0.020)	(0.015)	(0.007)	(0.006)
NEWSIN	-0.002	0.015	-0.024	0.008	0.082	-0.008	-0.045	-0.013	-0.062	-0.124	-0.003	0.005	-0.022	-0.001	0.035
#yeareffect	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
COMPnewsin	-0.035	-0.658**	0.207	-0.076	-0.172										
	(0.001)	(0.003)	(0.001)	(0.002)	(0.003)										
TRIUMnewsin						0.116	-0.553	0.070	0.117	0.963*					
						(0.002)	(0.004)	(0.002)	(0.003)	(0.005)					
TRIUM2newsin											-0.007	-0.660**	0.187	-0.045	0.081
											(0.001)	(0.003)	(0.001)	(0.002)	(0.003)
Constant	-0.059***	-0.071***	-0.098***	-0.035***	-0.009**	-0.059***	-0.071***	-0.098***	-0.035***	-0.009**	-0.059***	-0.071***	-0.098***	-0.035***	-0.009**
	(0.007)	(0.017)	(0.016)	(0.006)	(0.004)	(0.007)	(0.017)	(0.016)	(0.006)	(0.004)	(0.007)	(0.017)	(0.016)	(0.006)	(0.004)
Observations	2,161,772	80,736	779,338	1,140,915	160,783	2,161,772	80,736	779,338	1,140,915	160,783	2,161,772	80,736	779,338	1,140,915	160,783
R-squared	0.002	0.005	0.002	0.002	0.001	0.002	0.004	0.002	0.002	0.001	0.002	0.005	0.002	0.002	0.001
Number of groups	660	60	240	300	60	660	60	240	300	60	660	60	240	300	60

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

Table 14: Panel 2 regression results of the return performance of the new sin stocks combined

This table reports the results of Fama and Macbeth (1973) Panel 2 regressions of $EXMRET$, which is the monthly return of stock i net of the risk-free rate, on various lagged firm characteristics that are known to predict stock performance. The variable of interest is the dummy variable $NEWSIN$, that combines the new sin stocks air travel, fashion and meat. Adding the comparable dummy variable $COMPnewsin$ to the model allows for an immediate test of difference between the air travel industry and their comparable industry, as shown in column 1-5. Moreover, the dummy $TRIUMnewsin$ is added to the model in column 6-10, this allows for an immediate test of difference between the air travel and the Triumvariate of sin industry. Furthermore, adding the the dummy variable $TRIUM2newsin$ in column 11-15 results in an immediate test of difference between the air travel industry and the Triumvariate of sin industry while controlling for a more general industry effect. The table reports the overall sample period 1965-2019, as well as the sample period divided into the four groups.

VARIABLES	comp					trium					comp/trium				
	1965-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-2019	1965-1969	1970-1989	1990-2014	2015-2019	1965-2019	1965-1969	1970-1989	1990-2014	2015-2019
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NEWSIN	0.005	0.169	-0.020	-0.128***	0.003	-0.006	0.236	-0.008	-0.049	-0.805**	-0.009	0.155	-0.023	-0.109***	-0.172
	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)	(0.000)	(0.002)	(0.001)	(0.000)	(0.004)	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)
NEWSIN	-0.016*	-0.031	-0.055**	-0.041*	-0.007	-0.034**	-0.192*	-0.056	-0.104**	-0.251	-0.016*	-0.020	-0.056**	-0.057**	-0.068
#yeareffect	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
COMPnewsin	0.157*	-0.233	0.247**	0.195	-0.007										
	(0.001)	(0.002)	(0.001)	(0.001)	(0.003)										
TRIUMnewsin						0.372***	0.125	0.334	0.260	1.33**					
						(0.001)	(0.003)	(0.002)	(0.002)	(0.005)					
TRIUM2newsin											0.214***	-0.183	0.283**	0.214*	0.328
											(0.001)	(0.002)	(0.001)	(0.001)	(0.003)
LOGSIZE	-0.108**	-0.428***	-0.040	-0.158**	0.180**	-0.109**	-0.428***	-0.040	-0.158**	0.181**	-0.109**	-0.427***	-0.041	-0.158**	0.179**
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
LOGMB	-0.815***	0.105	-0.795***	-1.06***	-0.580***	-0.814***	0.111	-0.792***	-1.06***	-0.585***	-0.816***	0.106	-0.796***	-1.06***	-0.583***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
RET	-0.649	6.93**	-1.93	-0.582	-3.31	-0.618	7.00**	-1.92	-0.530	-3.36	-0.642	6.94**	-1.94	-0.556	-3.33
	(0.011)	(0.032)	(0.021)	(0.014)	(0.025)	(0.011)	(0.031)	(0.021)	(0.014)	(0.025)	(0.011)	(0.032)	(0.021)	(0.014)	(0.025)
BETA	0.838***	0.773	0.245	1.251***	1.211*	0.799***	0.887	0.139	1.197***	1.366**	0.887***	0.771	0.297	1.283***	1.382**
	(0.258)	(0.631)	(0.322)	(0.470)	(0.640)	(0.249)	(0.575)	(0.318)	(0.452)	(0.627)	(0.259)	(0.640)	(0.328)	(0.468)	(0.654)
TURN	-0.053	-0.175	-0.171	0.062	-0.039	-0.054	-0.176	-0.174	0.063	-0.038	-0.053	-0.176	-0.171	0.062	-0.039
	(0.001)	(0.003)	(0.002)	(0.000)	(0.000)	(0.001)	(0.003)	(0.002)	(0.000)	(0.000)	(0.001)	(0.003)	(0.002)	(0.000)	(0.000)
LOGAGE	0.057**	0.015	0.032	0.105***	-0.039	0.055**	0.013	0.030	0.104***	-0.043	0.058**	0.015	0.034	0.106***	-0.042
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	-0.363***	-0.352***	-0.595***	-0.229***	-0.108***	-0.362***	-0.353***	-0.594***	-0.229***	-0.110***	-0.363***	-0.352***	-0.596***	-0.230***	-0.110***
	(0.016)	(0.026)	(0.021)	(0.018)	(0.020)	(0.015)	(0.026)	(0.021)	(0.018)	(0.020)	(0.015)	(0.026)	(0.021)	(0.018)	(0.020)
Observations	1,651,622	61,772	449,68	995,429	144,741	1,651,622	61,772	449,68	995,429	144,741	1,651,622	61,772	449,68	995,429	144,741
R-squared	0.049	0.078	0.057	0.040	0.033	0.049	0.077	0.057	0.040	0.033	0.049	0.078	0.057	0.040	0.033
Number of groups	659	59	240	300	60	659	59	240	300	60	659	59	240	300	60

Note. Standard errors are in parentheses; *** 1% significance; **5% significance and * 10% significance.

6 Conclusion

This paper investigates whether sustainability has a certain impact on the financial market. The paper builds on the previous findings of Hong and Kacperzyck (2009), that find an outperformance of the alcohol, tobacco and gaming stocks (Triumvariate of sin). Combining these findings, and the increasing environmental concerns on an international level, I analyse whether the aviation, fashion and meat industry can be seen as sinful industries. The stock returns of these industries are examined, in order to conclude similar return patterns as found for the original sin stocks. I conclude that the new sin industries do not separately outperform the market like original Triumvariate of sin stocks do. However, combining the new sin stocks and the original sin stocks, they do outperform other non-sin stocks. These results are mainly seen for the air travel stocks, to a lesser extent for the fashion stocks, and not for the meat stocks. This is in line with the statement of Tobler et al. (2011) that the public evaluates eating meat as least harmful for society. Moreover, the trend variable indicates that as time evolves the new sin industries are seen as more sinful by the public, as the results illustrate more return similarities to the original sin stocks. Hence, the new sin stocks should be seen as complementary stocks to the Triumvariate of sin stocks. Noteworthy, the results show the highest similarities and complementary outperformance of the new sin stocks and the original sin stocks in the last period 2015-2019. Furthermore, the results should be interpreted with caution as there are some limitations in this paper. First of all, the statistical significance of the panel regression models, especially the $CAPM$-model, is very low. This lack of statistical power could lead to endogeneity and omitted variable bias. Secondly, instead of investigating similarities in stock returns, one could analyse what drives these returns to act similar as sin stocks and to exclude possible other factors that influence the stock returns. For example, to investigate whether the air travel, fashion and meat industries are indeed shunned by large institutions. Moreover, for future research it could be interesting to include different sectors that are non-sustainable, such as fuel oil. Also, I would recommend using firms vested in different parts of the World, as I believe that the United States is not a representative sample population for the whole world. Especially, because the Environmental Performance Index (2018) suggests that top 10 most sustainable countries are all European countries and that the United States rates only number 27 on this Index. This could influence the public opinion on what sectors are seen as environmental harmful and possibly considered sinful.

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A Appendix

Table 1: Industry classification

This table reports the industry groups as categorised by the Fama and French (1997) classification. The table represents the 50 industry groups used in the paper, where the groups gaming, air travel and meat are handmade and do not follow the classification of Fama and French (1997).

	Industry group	SIC-codes	NAICS-codes
1	Agriculture	100-799	
2	Food	2000-2046, 2050-2063, 2070-2079, 2090-2095, 2098-2099	
3	Soda	2064-2068, 2086-2087, 2096-2097	
4	**Beer**	2080 - 2085	
5	**Smoke**	2100-2199	
6	Toys	900-999, 3650-3652, 3732, 3930-3949	
7	Fun	7800-7841, 7900-7999	
		2047, 2391-2392, 2510-2519, 2590-2599, 2840-2844, 3160-3199, 3229-3231, 3260,	
		3262-3263, 3269, 3630-3639, 3750-3751, 3800, 3860-3879, 3910-3919, 3960-3961,	
8	Books	3991, 3995	
		2047-2047, 2391-2392, 2510-2519, 2590-2599, 2840-2844, 3160-3199, 3229-2321,	
		3260-3260, 3262-3263, 3269-2369, 3630-3639, 3750-3751, 3800-3800, 3860-3879,	
9	Consumer Goods	3910-3919, 3960-3961, 3991-3991, 3995-3995	
10	**Fashion**	2300-2390, 3020-3021, 3100-3111, 3130-3159, 3965-3965	
11	Healthcare	8000-8099	
12	Medical Equipment	3693, 3840-3851	
13	Drugs	2830-2836	
14	Chemicals	2800-2829, 2850-2899	
15	Rubber	3000, 3050-3099	
16	Textiles	2200-2295, 2297-2299, 2393-2395, 2397-2399	
17	Building materials	800-899, 2400-2499, 2450-2459, 2490-2499, 2950-2952, 3200-3259, 3261, 3264	
18	Construction	1500-1549. 1600-1699, 1700-1799	
19	Steel3300-3369, 3390-3399		
20	Fabricated products	3400, 3443-3444, 3460-3479	
21	Machinery	3510-3536, 3580-3599	
22	Electrical Equipment	3600-3621, 3623-3629, 3640-3646, 3648-3649, 3660, 3691-3692, 3699	
23	Miscellaneous	3900, 3990, 3999, 9900-9999	
24	Automobiles and Trucks	2296, 2396, 3010, 3011, 3537, 3647, 3694, 3700-3716, 3790-3792, 3799, 3720-3729	
25	Shipbuilding, Railroud Eq	3730-3731, 3740-3743	
26	Defense	3730-3731, 3740-3743	
27	Precious Metals	1040-1049	
28	Nonmetical Mining	1040-1049	
29	Coal	1200-1299	
30	Pertoleum and Natural Gas	1310-1389, 2900-2911, 2990-2911, 2990-2999	
31	Utilities	4900-4999	
32	Telecommunication	4900-4999	
33	Personal Services	7020-7021, 7030-7039, 7200-7212, 7215-7299, 7395, 7500, 7520-7549,	
		7600-7699, 8100-8199, 8200-8299, 8300-8399, 8400-8499, 8600-8699, 8800-8899	
34	Business Services	2750-2579, 3993, 7300-7372, 7374-7394, 7397, 7399, 7510-7519, 8700-8748, 8900-8999	
35	Computers	3570-3579, 3680-3689, 3695, 7373	
36	Electronic Equipment	3622, 3661-3679, 3810, 3812	
37	Measuring and Control Equip	3811, 3820-3830	
38	Business Supplies	2520-2549, 2600-2639, 2670-2699, 2760-2761, 3950-3955	
39	Shipping Containers	2520-2549, 2600-2639, 2670-2699, 2760-2761, 3950-3955	
40	Transportation	4000-4099, 4100-4199, 4200-4299, 4400-4499, 4500-4599, 4600-4699	
41	Wholesale	5000-5099, 5100-5199	
42	Retail	5200-5299, 5300-5399, 5400-5499, 5500-5599, 5600-5699, 5700-5799, 5900-5999	
43	Restaurant, Hotel, Motel	5800-5813, 5890-5890, 7000-7019, 7040-7049, 7213-7213	
44	Banking	6000-6099, 6100-6199	
45	Insurance	6300-6399, 6400-6499	
46	Real Estate	6500-6553	
47	Trading	6200-62999	
48	**Gaming**	5800-5813, 5890-5890, 7000-7019, 7040-7049, 7213-7312	7132, 71312, 713210, 71329, 713290, 72112, 721120
49	**Airtravel**	3720-3729, 4500-4599	
50	**Meat**	2011-2015	