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The difference in institutional ownership between sin stocks and normal stocks

Bachelor Thesis Finance

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Abstract

This thesis examines 'sin stocks' in the United States in 2015. Sin stocks are publicly traded companies involved in the alcohol, tobacco, gambling, or controversial weapon industry. I provide evidence for the difference in the institutional ownership percentage between sin stocks and normal stocks. The main research question for this thesis is: '*What is the difference in institutional ownership between normal stocks and sin stocks in the United States in 2015?*' In line with the main hypothesis, sin stocks have a lower institutional ownership percentage than control stocks. For a second hypothesis I looked at the difference in institutional ownership in sin stocks between less and more socially constrained investors. I hypothesized that more socially constrained investors, like universities, have a lower institutional ownership percentage in sin stocks than less socially constrained investors, like mutual funds. I did not find evidence to accept this hypothesis in my research. This thesis is based on the research done by Hong and Kacperczyk (2009), who used data till 2004. The results of their research are compared with the results of my thesis. They had the same result for the first hypothesis and a different result for the second hypothesis.

Keywords: Sin stocks; Institutional ownership; Environmental, social, and governance criteria; Socially responsible investing

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1. Introduction

Traditionally all investors aimed for was profit, but in the past decades this has changed. Modern institutional investors also care about the positive or harmful effects a company, in which they invest, can have on society. For example, investment companies like *Robeco, MN, ABN AMRO* and *Aegon* have '*Environmental, Social and Governance*' (ESG) criteria and exclusion lists. On these lists are companies in which they do not invest, because they think these companies have a harmful effect on society. Companies in the alcohol, tobacco, gambling or controversial weapon industry are frequently on these lists. The stocks of these companies are often referred to as *'sin stocks'*.

Academic researchers have extensively studied the returns for these sin stocks. The majority of studies found abnormal returns for sin stocks. The explanation for these abnormal returns can be the fact that owners of these stocks require higher returns, because they are holding a stock of a company with harmful effects on society. In this research I will look at the ownership data of these stocks. The main research question for this thesis is: '*What is the difference in institutional ownership between normal stocks and sin stocks in the United States in 2015?*'

Hong and Kacperczyk (2009) tried to answer a comparable question for US stocks in the period 1962-2004. They found that sin stocks have a lower institutional ownership percentage than normal stocks. I found comparable results with data from 2015, 11 years after the end of the sample period of their dataset. In their research Hong and Kacperczyk (2009) also looked at the difference between institutional investors who are more socially constrained and those who are less socially constrained. In this research I also looked at this difference and found a different result than they found with data from 21 years after the sample period. They found a significant lower institutional ownership percentage for more socially constrained companies compared to less socially constrained companies for sin stocks. I found no significant difference for more socially constrained companies and a significant difference for less socially constrained companies.

For the rest of this research I used the Thomson Reuters 13-F filings database as the main source of data. Furthermore, the CRSP database is used to select sin stocks based on SIC and NAICS codes. I will use different regressions, a *paired T-test,* and a *Wilcoxon signed-rank test* to research the question above. This research contributes to the current academic literature on sin stock investments.

The remainder of this paper is organized as follows. The next section in this thesis reviews existing literature of socially responsible investing, sin stocks and institutional ownership. Section 3 describes the dataset and the methodology for this research. Section 4 presents the results of this thesis. In section 5 I discuss the results and compare them with earlier research on this topic. In section 6 the conclusion and limitations of this thesis are presented.

2. Current state of the literature

2.1 Socially responsible investing and sin stocks

Socially responsible investing (SRI) is a widespread and broadly studied subject. The first source writing about SRI defined the topic as "the obligation of businessmen to pursue the policies and follow the lines of action which adhere to the objectives and values of the society" (Bowen, 1953). Nowadays there are different definitions on what socially responsible investing is. 'Investment decisions where not only profit is important, but also doing social or environmental good' is a broad definition. More and more investment companies have a set of standards that they use to screen potential investments called 'Environmental, Social and Governance' (ESG) criteria (Hong & Kacperczyk, 2009).

A specific example of stocks that do not pass most of these screenings are 'sin stocks'. There are different definitions of a 'sin stock' used in past literature. For example, Hong and Kacperczyk (2009) use publicly traded businesses that operate in the alcohol, tobacco and gambling industry, which they collectively call the 'Triumvirate of Sin'. These products are known as sinful by most people, because they are addictive and bad for individuals when consumed excessively. Visaltanachoti, Zheng, and Zou (2009) also used alcohol, tobacco and gambling in their sin stock research focused on the Asian market. Durand, Koh and, Tan (2013) used the work of Hong and Kacperczyk (2009) as the foundation for their research in the Pacific-Basin area. They used alcohol, tobacco, gambling, and weapons as their sin stock industries.

However, there are also researchers that use broader groups. Fabozzi, Ma, and Oliphant (2008) classified sin stocks as: alcohol, tobacco, defense, biotech, gambling, and adult services industries. They described that they had difficulties with selecting sin companies in the defense and biotech industry, because a lot of these companies also make many other products next to their sin products. For instance, commercial airplane manufacturers that produce military aircrafts as well. They also write about a relative new sin stock category: marijuana stocks. Lobe and Walkshäusl (2011) used what they call the 'Sextet of Sin': adult entertainment, alcohol, gambling, nuclear power, tobacco, and weapons. To my knowledge, they are the only researchers who include nuclear power in their sin portfolio. Blitz and Fabozzi (2017) used four categories: alcohol, tobacco, gambling, and weapons. They did not include the adult industry, because there are not a lot of companies in this category that have stocks on the public market. There is also a specific fund only containing

sin stocks, called the 'Vice Fund'. This fund contains stocks mostly from the alcohol, tobacco, defense and gambling industries (USA Mutuals, 2018).

2.2 Abnormal returns in sin stocks

There are different studies that conduct research on abnormal returns for sin stocks. Hong and Kacperczyk (2009) found, with the use of the CAPM, that US 'Triumvirate of Sin' stocks outperform comparable companies, even when taking various control variables into account. Visaltanachoti et al. (2009) found outperformance of the sin stocks compared to a control group in China and Hong Kong, while the operating performances of the groups were the same. Salaber (2007) found that the returns of European sin stocks depend mostly on cultural and legal differences. In this research is described that differences in religion, taxation and litigation risk between countries cause different returns for sin stocks. For instance, Protestants are more 'sin averse' than Catholics and require a higher premium on these stocks. Fabozzi et al. (2008) also found that sin stocks from 21 countries yield abnormal returns and outperform other stocks. Other research found, with the 'Sextet of Sin', no significant difference in financial performance between sin stocks and normal stocks (Lobe & Walkshäusl, 2011). However, this sample was mainly dominated by the nuclear power industry with 46% of the total sin portfolio. Blitz and Fabozzi (2017) found comparable abnormal returns for sin stocks as previous studies when using control factors size, value and momentum. When they added beta, profitability and investment factors they did not find any significant abnormal returns for sin stocks.

2.3 Institutional ownership

This research is based on the assumption that the financial markets are populated partly by rational investors and partly by irrational investors. Furthermore, institutional investors tend to belong to the rational group rather than the irrational group (Nagel, 2005)

In the years before World War II, households held 85% of corporate stocks in the US market (Friedman, 1995). After this period, ownership of shares in the US has changed from individuals to various kinds of institutions. In the mid-1990s individuals owned less than 50% of the US stock market capitalization (Poterba, Samwick, Shleifer, & Shiller, 1995). By the end of 2010, institutional ownership reached 67% (Blume & Keim, 2014). The investment strategy stayed the same for institutional investors, namely trading in stable, larger stocks compared to individual investors. Hartzell and Starks (2003) also found that institutional ownership grew in the past decades. They examine whether institutional investors influence

corporate governance by studying the relation between institutional ownership and the compensation of firms' executives. They used, among others, market capitalization as a control variable in their research. Gompers and Metrick (2001) analyzed institutional investors' preferences in stocks. They found that institutional investors tend to invest more in companies with a larger market capitalization.

Durand et al. (2013) used a proxy for institutional ownership in their research on the effects of sin. The proxy they used was *substantial holdings*: owners who hold more than 5% of a company. They used this proxy because the data that Hong and Kacperczyk (2009) used for the institutional ownership percentage is not available in the countries they research. They found that in India, Malaysia, and Singapore sin stocks did not differ significantly from normal stocks in substantial holding percentage. For New Zealand, Japan, Australia, and South Korea they did find significant differences between sin companies and control companies. They conclude that the cultural differences between the countries, such as individualism and collectivism, are the main reason for the different results for sin stock ownership.

2.4 This research

In this thesis I will look at the institutional ownership percentages of the 'Triumvirate of Sin' as described by Hong and Kacperczyk (2009). Part of the research of Hong and Kacperczyk (2009) will be the guideline for this research. I also included 'controversial weapons' as a category of sin stocks in my dataset. The dataset is comparable with the dataset that Blitz and Fabozzi (2017) used. I will look at alcohol, tobacco, gambling, and controversial weapon industries. These categories of companies are selected, because they are seen as sinful by the majority of researchers, as stated in section 2.1. These categories also appear on most ESG exclusion lists of investment companies. Because of the lack of publicly traded companies in the sex industry, I did not include this category in my dataset. Furthermore, the category of nuclear power is not used, because most researchers do not necessarily see this industry as sinful.

Earlier research found that investing in sin companies can result in abnormal returns. However, a lot of institutional investors have something like ESG criteria, but does that mean that in reality they own less sin stocks? In other words: do sin stocks have a lower percentage of institutional stock owners compared to other stocks? Hong and Kacperczyk (2009) answered a similar question for data from the period 1962-2004 and found that sin stocks

have less (around 3.3 percentage points) institutional ownership. In this research I will investigate if, 11 years after the end of their dataset, there is still a cross sectional difference in institutional ownership between normal stocks and sin stocks.

2.5 Hypotheses

The first hypothesis of this thesis is: *'Sin stocks have less institutional ownership than normal stocks in 2015.'* This is in line with results from earlier research (Hong & Kacperczyk, 2009). Most institutional investors also have ESG criteria that exclude sin stocks from their portfolio. This should lead to a lower percentage of institutional investors for sin stocks.

The second hypothesis of this thesis is: '*Institutional investors that are more constrained by social norms have a lower ownership percentage for sin stocks than institutional investors that are less constrained by social norms in 2015.'* This hypothesis is based on the research of Hong and Kacperczyk (2009). They found that institutions like banks and universities, which are more constrained by social norms, have a lower ownership percentage for sin companies than institutions like mutual funds.

3. Research design

3.1 Data

In this section the data selection process will be discussed.

3.1.1 Sin stock selection

For this research the following industries of sin stocks were used: alcohol, tobacco, gambling and controversial weapons. I only used United States stocks in my research, because of the availability of data and because this way a more accurate comparison can be made with the results of Hong and Kacperczyk (2009). The use of the first three industries as sin stocks is common, as seen in section 2.1. These industries are used, because most people see these products as sinful, since they are addictive and bad for individuals when consumed excessively. Hong and Kacperczyk (2009) call these stocks the 'Triumvirate of Sin'. I selected companies that operate in these first three industries by looking at Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. I used SIC codes for alcohol and tobacco (2082-2085 and 2100-2199) and NAICS codes (713210, 713290 and 72112) for gambling. This way, I retrieved 37 sin companies from the *CRSP/Compustat* database, which contains diverse US stock data.

Furthermore, I compared my list of sin stocks with ESG exclusion lists of investment companies like *Robeco, MN, ABN AMRO* and *Aegon*. All the US sin companies that they listed (mostly tobacco) were already in the dataset, except the stocks from the category 'controversial weapons'. This category includes companies that partake in the production of cluster munition, nuclear weapons or white phosphorus. This category of companies led to seven new sin companies, based on the exclusion lists of above investment companies, and these were added to my dataset.

Other researchers include the sex industry in their sin stock dataset. As stated earlier, I did not include this category in my dataset, because of the lack of publicly traded companies in this industry. This is in line with other literature on this subject (Hong & Kacperczyk, 2009; Blitz & Fabozzi, 2017).

Next, I checked if all the companies that I retrieved from the *CRSP/Compustat* database actually have their headquarters in the US and if it is truly a US stock. For 9 sin stocks I have found that they do not classify as a US stock and these have been deleted from the dataset. After this check, the dataset contained 35 sin companies.

3.1.2 Institutional investor data and other variables

The Thomson Reuters 13-F filings database contains data from institutional investors managing assets of at least 100 million dollars. All common stock positions greater than 10,000 shares or $200,000 are available in this database. From the database the share price and amount of shares outstanding were retrieved. I used the most recent, fully complete dataset, which is from 31/03/2015. Furthermore, only US stock data is used because of the availability of data. Additionally, with this dataset it is possible to compare my research with the research of Hong and Kacperczyk (2009), with a dataset of 11 years after the end of their sample period. They also used US stock data in their research with a dataset till 2004.

Moreover, the institutional ownership data that are necessary to conduct this research are listed in this database. For every company the number of shares hold by an investor managing at least 100 million dollars can be found. A total amount of stocks held by institutional owners is retrieved per company. Furthermore, an institutional ownership percentage is calculated by dividing the total amount of shares held by institutional investors by the total amount of shares outstanding. This percentage is also compared with recent data from a financial data source online to check the validity (Yahoo, 2018)[1]. Finally, the market capitalization is calculated by multiplying total shares outstanding with share price.

Furthermore, the Thomson Reuters 13-F filings database also makes a distinction in types of institutional investors. All holders have a number from 1 till 5 that places them in a category of institutional investors. To compare the different categories, I also included ownership percentages per category in my dataset. The categories are as follows:

1. Banks
2. Insurance companies
3. Investment companies
4. Independent investment advisors
5. All others (including pension funds and university endowments)

These five types of institutional investors will be split in two groups. Group 1, companies that are more constrained by social norms, consisting of type 1, 2 and 5. Group 2, companies that are less constrained by social norms, consisting of type 3 and 4. The mean institutional ownership percentage per group can be found in table 1. This splitting in two groups is further explained in the section on methodology, specifically section 3.2.4.

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[1] Yahoo data from 2018 has an average 12 percentage points higher institutional ownership percentage than the 2015 dataset. Data of stocks from the 2015 database are 15 percentage points higher to 25 percentage points lower than the Yahoo data. Big differences occur because of events like mergers in the years 2015-2018.

Table 1
Mean institutional ownership percentage per group

Group	Sin companies	Control companies	Total
Group 1	33.08%	41.24%	38.52%
Group 2	12.90%	17.75%	16.13%

Note: the different groups are further explained in section 3.1.2 and 3.2.4

3.1.3 Control companies

Earlier research has found that institutional investors tend to invest more in companies with a larger market capitalization (Gompers & Metrick, 2001). More recently, others conclude that this effect is different (Blume & Keim, 2014). They write that institutional investors tend to invest more in smaller companies and that earlier research contained errors. Based on the dataset I use, the most relevant results are the findings nearest to 2015 on this topic by Blume and Keim (2004). Their dataset ranged from 1980 till 2010. The market capitalization should be considered for the dataset, otherwise the results may be biased and the research will not lead to trustworthy results. Therefore, the control companies are selected systematically on market capitalization size. For every sin stock, two control stocks were selected and matched, based on the size of the sin company. One matched company has a slightly higher market capitalization and the other one has a slightly lower market capitalization compared to the sin company.

For alcohol stocks I first tried to retrieve the control companies from the soft drink industry (SIC: 2050-2080 and 2086), because these industries have a lot in common and Hong and Kacperczyk (2009) used a comparable method. I found seven companies in the soft drink industry that matched the size of a sin stock. The remaining control variables are matched only by size. This selection led to a control group of 70 companies, two matched control companies per sin company. For all these companies the share price, the number of shares outstanding and institutional ownership data were gathered from the Thomson Reuters 13-F filings database. The institutional ownership percentage and market capitalization were calculated as stated earlier. Additionally, a mean institutional ownership percentage of the two control companies per sin stock was calculated.

3.1.4 Book value of equity

From the *CRSP/Compustat* database the value of "total shareholders' equity" per company in 2015 is retrieved. This value is used to calculate the book-to-market ratio (BM ratio) by dividing it by the market capitalization. The BM ratio is used as a control variable in

this research, because institutional investors tend to invest more in companies with a lower BM ratio (Hong & Kacperczyk, 2009). For some companies this data were not available or I was not sure if it was correct in the *CRSP/Compustat* database. For these cases I looked in the 2015 annual report of the companies to determine the correct book value of equity.

Five companies had a negative book value of equity. These companies, of which 3 were sin companies, were removed from the dataset. This is done, because these negative values are not common under normal circumstances and therefore not suitable for this research. Including these variables, which are hard to interpreted, had an undesirable effect on the regression results. The control variables that were removed were replaced by comparable companies with a positive book value of equity.

3.1.5 Company beta

The last variable that is included in the dataset is the company beta. The company beta is a measure for systematic risk for a specific stock. The betas are included as control variable in the regression that is conducted in this research, because institutional investors tend to invest more in stocks with a higher beta (Hong & Kacperczyk, 2009). These betas for 2015 are retrieved from the *CRSP/Compustat* database. For each company a beta value is included in the dataset.

In table 2 descriptive statistics for the control stocks are shown. In table 3 all sin companies and descriptive statistics of these stocks are presented.

Table 2
Descriptive statistics control companies

Variable	Mean	SD	Min	Max
IOpercentage	58.99%	26.02%	0.16%	99.76%
marketcapmln	10,514	19,827	11	99,979
BMratio	0.563	0.635	0.063	3.585
Beta	0.9074	0.3649	0.0202	1.9798

Note: N = 64, SD = standard deviation, IOpercentage = institutional ownership percentage, marketcapmln = market capitalization in millions, BMratio = book-to-market ratio, Beta = systematic risk per company

Table 3

List of sin companies and descriptive statistics

Company name	IOpercentage	marketcapmln	BMratio	Beta
ALTRIA GROUP INC	46.96%	98,389	0.029	0.621
BOSTON BEER CO INC	78.73%	2,674	0.172	0.873
BOYD GAMING CORP	62.30%	1,562	0.325	1.385
BROWN-FORMAN CORP	80.38%	7,626	0.250	0.691
CAESARS ENTERTAINMENT CORP	62.78%	1,527	1.462	0.489
CASTLE BRANDS INC	2.85%	220	0.096	0.973
CENTURY CASINOS INC	45.57%	131	0.973	0.313
CHURCHILL DOWNS INC	51.49%	2,069	0.298	0.589
CONSTELLATION BRANDS	73.23%	19,756	0.298	0.766
CRAFT BREW ALLIANCE INC	26.93%	259	0.458	0.930
DOVER DOWNS GAMING & ENT	17.07%	21	5.461	0.340
ELDORADO RESORTS LLC	26.95%	236	1.145	0.490
EMPIRE RESORTS INC	4.03%	216	0.127	0.910
FULL HOUSE RESORTS INC	30.76%	29	1.970	0.242
GENERAL DYNAMICS CORP	79.49%	43,406	0.247	0.901
GOLDEN ENTERTAINMENT INC	1.06%	199	1.058	0.119
ISLE OF CAPRI CASINOS INC	38.54%	562	0.042	0.930
LAS VEGAS SANDS CORP	35.31%	43,977	0.191	1.650
LORILLARD INC	73.75%	23,526	0.124	0.603
MGM RESORTS INTERNATIONAL	64.47%	10,326	0.753	1.860
MGPI PROCESS	22.49%	242	0.479	0.566
MOLSON COORS BREWING CO	64.81%	12,135	0.582	0.782
MONARCH CASINO & RESORT INC	39.33%	325	0.627	0.966
NATIONAL PRESTO INDUSTRIES	42.82%	444	0.765	0.878
NEVADA GOLD & CASINOS INC	17.68%	23	1.311	0.329
ORBITAL ATK INC	75.43%	4521	0.395	1.088
PINNACLE ENTERTAINMENT INC	84.68%	2,165	0.168	0.759
REYNOLDS AMERICAN INC	40.65%	36,660	0.498	0.623
TEXTRON INC	69.48%	12,279	0.404	1.277
TRUETT-HURST INC	38.17%	12	1.346	0.829
WILLAMETTE VALLEY VINEYARDS	5.01%	30	0.906	0.685
WYNN RESORTS LTD	68.10%	12,840	0.002	1.699
Mean	45.98%	10,575	0.718	0.817
SD	25.62%	20,382	0.992	0.413

Note: N = 32, SD = standard deviation, IOpercentage = institutional ownership percentage, marketcapmln = market capitalization in millions, BMratio = book-to-market ratio, Beta = systematic risk per company

3.2 Methodology

Three categories of tests are used to test the hypothesis. Firstly, a regression is composed to test the overall effect of sin on the institutional ownership percentage. Secondly, I used a *paired T-test* to compare the sin stocks and the matched control stocks directly. Finally, a *Wilcoxon signed-rank test* was done to compare the sin stocks and the matched control stocks nonparametric.

3.2.1 Regression

The following regressions were used to test the effect of a sin stock dummy on the institutional ownership percentage.

(1) $IOpercentage = a_0 + \beta_1 * Sindum + \varepsilon$

(2) $IOpercentage = a_0 + \beta_1 * Sindum + \beta_2 * BMratio + \varepsilon$

(3) $IOpercentage = a_0 + \beta_1 * Sindum + \beta_3 * Beta + \varepsilon$

(4) $IOpercentage = a_0 + \beta_1 * Sindum + \beta_2 * BMratio + \beta_3 * Beta + \varepsilon$

IOpercentage: shows the percentage of shares that are held by institutional investors. *Sindum:* a dummy variable with value 1 if the stock is a sin stock and 0 otherwise. *BMratio:* the ratio between book value of equity and the market capitalization. *Beta:* a measure for the systematic risk per company/stock.

The value of a_0 is the intercept. The value of β_1 is the part of the institutional ownership percentage that depends on the stock classifying as a sin stock or not. *Sindum* is the variable of interest, the other variables are control variables. The value of ε is a random error term. In this regression *White standard errors* were used to control for heteroskedastic data.

The variable *market capitalization* is not used as a control variable, because it should not have a significant relation in this regression with this dataset. The control stocks are matched with the sin stocks with market capitalization as main matching criterion. For every market capitalization level there are at least three different institutional ownership percentages.

3.2.2 Paired T-test

In the regression section the mean of all sin stocks is compared with the mean of all control stocks. The *paired T-test* is used to compare the institutional ownership percentage of sin stocks and the two matched control stocks directly. More specifically, the institutional

ownership percentage of a sin stock and the mean of the two control stocks are compared in this test. The *T-test* is used, because the variance of the data of the population is unknown. The *paired T-test* is used, because the sin stocks are paired with two control stocks with market capitalization as main criterion. The test statistic looks like this:

$$(5) \qquad T = \frac{d}{SE(d)}$$

d: the mean difference between the institutional ownership percentage of sin companies and the mean institutional ownership percentage of the two paired control companies. *SE(d):* the standard error of the mean difference.

The disadvantage of this *T-test* is that it assumes a normal distribution in the data. The *Wilcoxon signed-rank test* deals with this problem.

3.2.3 Wilcoxon signed-rank test

The last test that is conducted is the *Wilcoxon signed-rank test*. The *paired T-test* assumes that the data we use follows a normal distribution. Because the distribution of the data is unknown, the *Wilcoxon signed-rank test* is used. This test is a non-parametric statistical hypothesis test. This specific sign test is used, because the sin and control stocks are paired. In this test all the sin and control stocks are compared directly. The difference between the institutional ownership percentage of a sin stock and the mean institutional ownership percentage of the control stocks is calculated. This leads to a sign and a rank per sin company. These signs and ranks are used to perform the test and result in a *Z-score*. The test consists of comparing the sum of the ranks of the positive values and the negative values. If these values differ significantly from each other we can conclude that the institutional ownership percentage between sin stocks and normal stocks differ.

3.2.4 Difference between types of institutional investors

I used the five categories as stated in section 3.1.2 to test if there is a difference between types of institutional investors. I made two subgroups from these five categories of institutional investors. The first one consists of banks, insurance companies and all others (type 1, 2 and 5) and represents companies that are expected to be more constrained by social norms. The second one consists of investment companies and independent investment advisors (type 3 and 4) and represents companies that are expected to be less constrained by social norms. I used a regression to test the effect of the independent variables on the two categories of investors. The same regressions as in section 3.2.1 are used, but the dependent

variable *IOpercentage* is replaced with group 1 consisting of the institutional ownership data of type 1, 2 and 5 and group 2 consisting of type 3 and 4. This is the same methodology that Hong and Kacperczyk (2009) used in their research.

Furthermore, a *T-test* on the difference between the coefficients of the institutional ownership percentage per group is conducted. The test that is used, is retrieved from the research of Paternoster, Brame, Mazerolle, and Piquero (1998). I used the fourth equation of their research, which is constructed for the comparison of two different coefficients and which looks as follows.

$$(6) \qquad T = \frac{\beta_{1\ group\ 1} - \beta_{1\ group\ 2}}{\sqrt{SE(\beta_{1\ group\ 1})^2 + SE(\beta_{1\ group\ 2})^2}}$$

4. Results

4.1 Regression

The results of the regressions are displayed in table 4. The dependent variable in all regressions is the institutional ownership percentage. In the first regression only the variable *Sindum* is used as an independent variable. This results in a value of -13% for the coefficient of *Sindum*. This means that sin stocks have on average a 13 percentage points lower institutional ownership percentage than control stocks. This value is significant at a 5% level.

Table 4

Effect of different variables on the institutional ownership percentage

Variable	1	2	3	4
Sindum	-0.130**	-0.116**	-0.114**	-0.107**
	(0.056)	(0.054)	(0.054)	(0.053)
BMratio		-0.091***		-0.069***
		(0.025)		(0.026)
Beta			0.185***	0.140**
			(0.052)	(0.057)

*Note: Sindum = a dummy variable with value 1 when a company is a sin stock and 0 otherwise, BMratio = book-to-market ratio, Beta = systematic risk per company, * = p<0.10, ** = p<0.05, *** = p<0.01*

The second regression also includes the independent variable *BMratio*. In this regression the coefficient of *Sindum* changed to -11.6%. The coefficient of *BMratio* is -9.1%. This means that if the *BMratio* of a company is 0.1 higher than another company, on average the institutional ownership percentage is 0.91 percentage points lower for the first company. Part of the effect from *Sindum* in regression 1 has moved to *BMratio* in regression 2. Both values are significant at a 5% level and *BMratio* even at 1%.

In the third regression *Sindum* and *Beta* are used. This results in a comparable value for the coefficient of *Sindum* as in regression 2, -11.4%. Which is significant at a 5% level. The coefficient of *Beta* has a value of 18.5%. This means that if the *Beta* of a company is 0.1 higher than another company, on average the institutional ownership percentage is 1.85 percentage point higher for the first company. This value is significant at a 1% significance level.

In the fourth regression all variables are used. In this regression the coefficient of *Sindum* has a value of -10.7% and is significant at a 5% level. The coefficient of *BMratio* has a value of -6.9% and is significant at a 1% level. The coefficient of *Beta* has a value of 14% and is significant at a 5% level. This last regression is the most complete of all the four

regressions, has significant results, and is therefore seen as the most precise result. With this test we can conclude that the effect of *Sindum* is negative and therefore that sin companies have a lower institutional ownership percentage than other companies in the US.

4.2 Paired T-test

A *paired T-test* was run on the institutional ownership percentage of 32 sin companies and the average percentage of two control companies per sin company. The test statistic was calculated as follows, using equation 5 from section 3.2.2:

$$(7) \qquad T = \frac{-0.13}{0.038} \approx -3.4$$

Sin companies had a lower institutional ownership percentage. The results are displayed in table 5. This test had a p-value of 0.0009 and thus was significant on a 5% and even a 1% significance level. From this test we can conclude that sin companies have a lower institutional ownership percentage than other companies in the US. This confirms the conclusion from section 4.1.

Table 5
Results of the paired T-test

T	df	p
-3.399	31	0.0009

Note: T = T-value of the T-test, df = degrees of freedom, p = p-value of T-test

4.3 Wilcoxon signed-rank test

The *Wilcoxon signed-rank test* was conducted on the institutional ownership percentage of the sin companies and the mean of the control companies. The results are displayed in table 6 and 7. All institutional ownership percentages of the sin stocks are compared with the mean of the two matched control stocks. If the sin stock had a higher percentage it got a positive sign. When the mean of the two control stocks was higher it got a negative sign. Furthermore, the differences between the sin stock and control stock were ranked from small to large. The sum of the ranks is calculated for the positive and negative values and these values are displayed in table 6. These values are compared and table 6 shows that they significantly differ. The test had a p-value of 0.003 and thus was significant on a 5% and even a 1% significance level. From this test we can conclude that sin companies have a lower institutional ownership percentage than other companies in the US.

Table 6

Results of the Wilcoxon signed-rank test part 1

Sign	Observations	Sum of ranks	Expected sum of ranks
Positive	11	107	264
Negative	21	421	264
Total	32	528	528

Table 7

Results of the Wilcoxon signed-rank test part 2

z	p
-2.936	0.003

Note: z = z-value of the test, p = p-value of the test

4.4 Difference between types of institutional investors

In this section the same regression is used as in section 4.1, but the dependent variable is replaced with group 1 consisting of type 1, 2 and 5 in table 8 and group 2 consisting of type 3 and 4 in table 9. For both groups and all regressions, except the fourth regression of group 1 which is not statistically significant, the coefficient of *Sindum* is still negative. This means that sin stocks have a lower institutional ownership percentage for both groups compared to the control stocks.

In all regressions the coefficient of *Sindum* is bigger in group 1 than in group 2, but this must not be interpreted incorrectly. The effects of group 1 have a lower T-value, and this means that in group 2 it is more likely to have a difference in ownership percentage between sin companies and control companies than group 1. The cause of this is probably the fact that there is a bigger standard deviation in group 1 compared with group 2. The first three coefficients of *Sindum* of group 1 are significant at a 10% level, the last one is not significant. For group 2 all coefficients of *Sindum* are significant at a 5% level.

Looking at the fourth, most complete regression, we can see that *Sindum* has no significant effect on the institutional ownership percentage of group 1. We can also see that for group 2, *Sindum* has a significant effect on the institutional ownership percentage. To compare two coefficients from different regressions the *T-test* from equation four of the research of Paternoster et al. (1998) is used. This is equation 6 from section 3.2.4. The *T-test* conducted on the regression coefficients of *Sindum* of group 1 and 2 leads to a T-value of -0.417. This means the coefficients do not differ significantly from each other.

$$(8) \qquad T = \frac{(-0.063--0.044)}{\sqrt{(0.041^2+0.02^2)}} \approx -0.417$$

Another thing that stands out is the fact that the variables *BMratio* and *Beta* are significant on a 1% level for the regression on group 1 and not significant for group 2.

Table 8
Effect of different variables on the institutional ownership percentage of group 1 (more constrained by social norms)

Variable	1	2	3	4
Sindum	-0.082*	-0.070*	-0.068*	-0.063
	(0.043)	(0.041)	(0.041)	(0.041)
Bmratio		-0.073***		-0.054***
		(0.022)		(0.022)
Beta			0.154***	0.119***
			(0.043)	(0.044)

*Note: Sindum = a dummy variable with value 1 when a company is a sin stock and 0 otherwise, BMratio = book-to-market ratio, Beta = systematic risk per company, * = p<0.10, ** = p<0.05, *** = p<0.01*

Table 9
Effect of different variables on the institutional ownership percentage of group 2 (less constrained by social norms)

Variable	1	2	3	4
Sindum	-0.048**	-0.046**	-0.046**	-0.044**
	(0.020)	(0.020)	(0.020)	(0.020)
Bmratio		-0.019		-0.015
		(0.014)		(0.015)
Beta			0.031	0.021
			(0.025)	(0.027)

*Note: Sindum = a dummy variable with value 1 when a company is a sin stock and 0 otherwise, BMratio = book-to-market ratio, Beta = systematic risk per company, * = p<0.10, ** = p<0.05, *** = p<0.01*

4.5 Hypotheses

The research question that was formulated in the introduction was: '*What is the difference in institutional ownership between normal stocks and sin stocks in the United States in 2015?'*. The first hypothesis was as follows: '*Sin stocks have less institutional ownership than normal stocks in 2015.'* The first three tests (section 4.1-4.3) that are conducted in this research all lead to a unified conclusion. All these tests led to a significant result that confirmed the hypothesis. The *paired T-test* and the *Wilcoxon signed-rank test* showed that sin stocks have a lower institutional ownership percentage. The regression led to

the same conclusion and also estimated the mean difference between institutional ownership of a sin stock and a normal stock on -10.68 percentage points. This means that sin stocks have an institutional ownership percentage which is on average 18.1% lower, compared to the control stocks.

The second hypothesis was as follows: '*Institutional investors that are more constrained by social norms have a lower ownership percentage for sin stocks than institutional investors that are less constrained by social norms in 2015.*' The fourth regression for group 1, consisting of the investors that are more constrained by social norms, did not lead to a significant result for the coefficient of *Sindum*. This means that we cannot conclude that institutions constrained by social norms have a different ownership percentage for sin companies compared with the control companies. For group 2 the last regression did have a significant negative value for the coefficient of *Sindum*. This means that investors we classified as less constrained by social norms actually have a lower ownership percentage for sin stocks. This is contrary to our hypothesis stated above. The *T-test* on the difference of the two regression coefficients of *Sindum* showed that they do not differ significantly from each other. This confirms that the hypothesis can be rejected.

5. Discussion

This thesis is mainly based on the research done by Hong and Kacperczyk (2009). They tried to answer a similar question as the main question in my research, using data ranging from 1962 till 2004 of US stocks. They used the same Thomson Reuters 13-F filings database and a comparable methodology. They found that sin stocks had a lower institutional ownership percentage than normal stocks, when controlling for different variables. In this thesis comparable results occur. I found that sin companies have a 10.7 percentage points lower institutional ownership percentage than control stocks. Hong and Kacperczyk (2009) found a smaller difference, around 3.3 percentage points over their entire sample period, but still a lower institutional ownership percentage for sin stocks than for their control stocks. This difference is likely to occur, because Hong and Kacperczyk (2009) used more and different control variables. These were not available for this thesis due to database access and time limitations. They also did not use the methodology of matching two control stocks to every sin stock. It is also fairly possible that, in the decade between this thesis and the end of the sample period of the research done by Hong and Kacperczyk (2009), the opinion of institutional investors has changed. Maybe they adhere better to their ESG criteria and have completer exclusion lists. These are all reasons for the bigger difference between institutional ownership percentages of sin stocks and other stocks.

Correspondingly, Durand et al. (2013) found a negative coefficient for their sin variable in a comparable regression for New Zealand, Japan, Australia, and South Korea. They found no significant difference for India, Malaysia, and Singapore. The reason for this could be that the countries that belong to the first group have a culture that is closer to that of the US than the second group of countries. They also used a proxy for the institutional ownership percentage, because the countries they examined did not have the 13-F filings Hong and Kacperczyk (2009) and I used.

Hong and Kacperczyk (2009) also split the institutional investors in two groups, in the same manner as in this thesis. They found a significant negative effect of their *Sindum* coefficient for group 1. They did not find a significant effect for group 2. This is opposite to the results I found in my research. A possible explanation for this difference is the fact that Hong and Kacperczyk (2009) used data from 1980-1997[2], and I used data from 2015. Also,

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[2] More information on why Hong and Kacperczyk (2009) only used data till 1997 can be found in section 6.2 Limitations.

they wrote that after 1997, many institutional investors in the dataset are incorrectly labeled as type 5 institutions. This is the reason they limit their dataset to the years before this change. It is possible that this change in the dataset has an effect on the results in this thesis. Furthermore, they used more and different control variables, which were not available for this thesis due to database access and time restrictions. For these reasons this comparison may not be perfect.

6. Conclusion

6.1 Research conclusions

In this thesis, I provide evidence for the significant differences between the institutional ownership percentages of sin stocks and normal stocks. Sin stocks are classified as companies that operate in the alcohol, tobacco, gambling, or controversial weapon industry. The research question I study is as follows. '*What is the difference in institutional ownership between normal stocks and sin stocks in the United States in 2015?'*. This research contributes to the current academic literature on sin stock investments.

The main hypothesis of this research is: *'Sin stocks have less institutional ownership than normal stocks in 2015'*. This hypothesis is in line with the results that Hong and Kacperczyk (2009) found. To research this hypothesis I used institutional ownership data from the Thomson Reuters 13-F filings database from 2015. With this data I compared the institutional ownership percentages of 32 sin stocks and 64 control stocks. A regression, *paired T-test* and the *Wilcoxon signed rank test* all led to the same conclusion. The outcome of the tests was that sin stocks have an on average 18.1% lower institutional ownership percentage than the control stocks in 2015. This means the first hypothesis was accepted.

The second hypothesis is: '*Institutional investors that are more constrained by social norms have a lower ownership percentage for sin stocks than institutional investors that are less constrained by social norms in 2015'*. To research this hypothesis the institutional ownership data was split in five categories. These five categories were divided over two groups. The first group was classified as more constrained by social norms, the second group as less constrained by social norms. The results that were found with different regressions and a *T-test* on the coefficients of the two groups were contrary to the second hypothesis. Because of these results this hypothesis is rejected. I found no significant difference between the institutional ownership percentage of sin stocks and control stocks for the more socially constrained companies. For the less socially constrained companies this was a significant negative effect.

6.2 Limitations

There are a couple shortcomings and limitations in this thesis. First of all, the quality of this research depends heavily on the correctness of the databases that were used, mainly the Thomson Reuters 13-F filings database. It is highly likely that the data in this database is

correct, because institutional investors must fill in the 13-F fillings correctly by law. However, errors are always possible. Another possible shortcoming is the fact that I used the classification of the SIC and NAICS codes as a tool to select sin stocks. If a stock was operating in an industry that was a sin industry, I classified that stock as a sin stock. Some of the companies I classified as sin stocks also operate in other industries and are therefore not 100% sin companies. Hong and Kacperczyk (2009) used this method of selecting sin stocks as well.

In this thesis I also made a comparison with a part of the research of Hong and Kacperczyk (2009) by splitting the institutional investors into two groups. They only used data till 1997, because after that the database Thomson Reuters made a change in their classification method of the different institutional investor types. They wrote that after 1997, many institutions in the dataset are erroneously labeled as type 5 institutions. For my research I used the same database but from the year 2015. Because of this change in the database and the gap of 18 years the comparison may not be perfect.

6.3 Future research

Future research could be directed at a better understanding of differences in institutional ownership percentage. For example, it may be possible to look at the differences in institutional ownership between different sin stock categories. Is there a difference in institutional ownership percentage between tobacco and alcohol stocks? For this kind of research, a bigger dataset is probably needed for significant results. Therefore, the use of data from more countries, next to the US, is an option to extend the research on this topic. It is also possible to extend the research to more categories of sin stocks. For example, the recently new category: marijuana stocks. This category is not used in this thesis, because for 2015 there was not enough data available in the Thomson Reuters 13-F fillings for this kind of stocks.

7. References

Blitz, D., & Fabozzi, F. J. (2017). Sin Stocks Revisited: Resolving the Sin Stock Anomaly. *The Journal of Portfolio Management, 44*(1), 105-111.

Blume, M. E., & Keim, D. B. (2014). The changing nature of institutional stock investing. *Critical Finance Review, 6*, 1-41.

Bowen, H. (1953). *Social Responsibility of The Buisnessmen*. New York: Harper & Row.

CRSP/Compustat Merged [Wharton Research Data Services]. (02/05/2018) Retrieved from wrds.wharton.upenn.edu

Durand, R. B., Koh, S., & Tan, P. L. (2013). The price of sin in the Pacific-Basin. *Pacific-Basin Finance Journal, 21*(1), 899-913.

Fabozzi, F. J., Ma, K. C., & Oliphant, B. J. (2008). Sin stock returns. *Journal of Portfolio Management, 35*(1), 82.

Friedman, B. M. (1995). *The Economic Implications of Changing Share Ownership*. NBER Working Paper (No. w5141). Retrieved from National Bureau of Economic Research website: http://www.nber.org.eur.idm.oclc.org/papers/w5141

Gompers, P. A., & Metrick, A. (2001). Institutional investors and equity prices. *The quarterly journal of Economics, 116*(1), 229-259.

Hartzell, J. C., & Starks, L. T. (2003). Institutional investors and executive compensation. *The journal of finance, 58*(6), 2351-2374.

Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics, 93*(1), 15-36.

Lobe, S., & Walkshäusl, C. (2011). *Vice vs. virtue investing around the world*. Working paper. Retrieved from University of Regensburg website: https://papers-ssrn-com.eur.idm.oclc.org/sol3/papers.cfm?abstract_id=1089827

Nagel, S. (2005). Short sales, institutional investors and the cross-section of stock returns. *Journal of financial economics, 78*(2), 277-309.

Paternoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology, 36*(4), 859-866.

Poterba, J. M., Samwick, A. A., Shleifer, A., & Shiller, R. J. (1995). Stock ownership patterns, stock market fluctuations, and consumption. *Brookings papers on economic activity, 1995*(2), 295-372.

Salaber, J. M. (2007). *The determinants of sin stock returns: Evidence on the European market.* Working Paper, University of Bath School of Management.

Thomson Reuters Institutional (13f) Holdings [Wharton Research Data Services]. (02/05/2018) Retrieved from wrds.wharton.upenn.edu

USA Mutuals. (2018). *Vice Fund*. Retrieved from   http://www.usamutuals.com/usa-mutuals-vice-fund on 05/05/2018

Visaltanachoti, N., Zou, L., & Zheng, Q. (2009). The performances of sin stocks in China. *Department of Commerce, Massey University, Albany Campus.*

Yahoo. (2018) *Yahoo finance holder data*. Retrieved from https://finance.yahoo.com/ on 08/06/2018