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Barely Legal; Highly Profitable

A master's thesis about the return on sin stocks

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Barely Legal; Highly Profitable

"It costs a penny to make. Sell it for a dollar. It's addictive. And there's a fantastic brand loyalty."

- Warren Buffett on why he likes the cigarette industry.

Abstract

In the world of finance, companies are assessed, in theory, by expected risk and return based on fundamental valuation techniques. In this study we show that fundamentals are being suppressed around the world by social norms and moral standards. We support our theory by creating portfolios consisting of publicly traded stocks within sectors that are considered unethical and then compare their historical performance to their normal counterparts and to an ethically screened portfolio. We find the much sought after Alpha in three out of four sin stock portfolios as well as the total sin portfolio with a statistical significance level of at least 5 percent. We also test for arbitrage opportunities between the portfolios and find it in one of the industries with at least 10 percent significance level.

Keywords:

Sin stocks, portfolio performance, unethical investments, alpha

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Erik Flood Bolneset   Daniel Storm

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1. Introduction and Background

1.1 Introduction

Investing in listed stocks is one of the fundamentals in asset management. In business schools all over the world, valuation techniques are developed and taught to students. These same techniques are also used by professionals in the world of finance to make rational investment decisions in regard to risk and return. However, there are additional criteria by which these investments are assessed. One of these is the current social norm of the society. The difficulty however, is that there are quite different social norms in different parts of the world. This thesis will approach the matter in a way that we consider the social norm of Sweden.

With overall social responsibility receiving more publicity in both the political and financial press concerning environmental issues, companies are being increasingly assessed by their ethical and social standpoint. Societies all around the world are becoming more concerned about the overall state of public health. This has led to governments starting to intervene against health hazardous consumer products. An example of this is that in 2012, thirty of the fifty largest cities in USA had laws that prohibit smoking indoors in public areas. This can be compared to only one out of fifty in the year of 2000 (Centers for Disease Control and Prevention, 2012).

Institutional investors, such as large governmental pension funds, are pressuring companies to adapt to stricter code of conducts to be eligible as an investable company by these asset managers. This was the case when the Swedish AP-funds started blacklisting companies that operate within, the industry of producing cluster munitions, banned by the Geneva Convention (Ethical Council Swedish AP-funds, 2011). However, the Norwegian government has taken it one step further by also excluding companies that manufacture tobacco from the Government Pension Funds (The Norwegian Ministry of Finance, 2013).

In this study we will try to make a geographically wider data selection of sin stocks compared to the earlier research mentioned below in the literature review. We intend to create portfolios consisting of sin stocks from all around the world. The stocks will be divided into four different categories that we believe are consistent with Swedish or at least our definition of "sin"; Alcohol, Gambling, Tobacco and Weapons. We will then compare these with suitable counterparts from industry sectors that are considered normal in an ethical sense.

Earlier research by Hong & Kacperczyk (2009) defines sin stocks as companies involved in the production of alcohol, tobacco and gaming. Studies by Fabozzi, et al. (2008) also include the adult industry, biotech and weapons industry. Biotechnology is included by Fabozzi, et al. because "Investors' religious or moral views regarding pro-life versus pro-choice impact whether they view a company that makes products relating to abortion, birth control, bioethical concerns, and genetic alterations as sinful"(Fabozzi, et al., 2008, p. 85).

The industry portfolios that we create are value weighted and we do not manage them in any optimizing fashion. By using this approach, we believe that we can show the development of the whole industry and not just the shooting stars or the failures. This method was also chosen by Hong & Kacperczyk (2009). The Saint, Neutral and Sin portfolios are equally weighted due to the fact that they represent several industries.

1.2 Literature Review

1.2.3 Sin stocks

The question of who is buying sin stocks is analyzed in the article by Hong & Kacperczyk (2009). They show that social norms affect the investment procedure regarding financial investments in sin companies. They further state that

institutional investors have these companies to a smaller extent in their portfolios than hedge funds.

They also hypothesize that companies under possible public scrutiny, such as banks, pension funds, universities, insurance companies and religious organizations, are likely to hold these stocks in a smaller proportion. The average comparable company has approximately 28 percent of equity held by institutional investors, sin companies have on average 23 percent of their stocks held by institutions. They assume that individual investors do not get their portfolio assessed in the same manner as institutions and therefore are more willing to position themselves in these kinds of investments. Hedge funds and mutual funds are "natural arbitrageurs in the marketplace" (Hong & Kacperczyk, 2009, p. 16) and are assumed to be willing to invest in sin stocks. The article also shows that sin stocks are monitored by fewer analysts than their more ethical counterparts. This might be a reason for sin stocks being traded at a discount and thereby outperforming comparable stocks.

The authors presented a theory that says that unethical stocks are undervalued due to the social pressure on different financial institutions to make social responsible investments (SRI). Many of today's financial institutions, especially the non-profit ones, have some kind of ethics program that they have to take into consideration before making an investment. According to The Forum for Sustainable and Responsible Investment, 11.2 percent of all investments in the US marketplace are made with consideration to SRI (US-SIF, 2013).

A closely related topic is if sin stocks are traded with a discount or not. According to Hong and Kacperczyk (2009), the average discount of unethical stocks is 15-20 percent. In their study, they have not included weapons manufacturing, which we think is an essential part of this stock class.

The sin companies have a higher leverage as a result of debt markets being less transparent than equity markets. The reason is, according to Hong &

Kacperczyk (2009), that being an underpriced stock makes it better from a corporate view to finance through debt instead of equity.

Fabozzi, Ma & Oliphant (2008) argue that a firm that makes a socially unacceptable product, but still a profitable one, may receive a lower valuation due to the fact that people investing in these kinds of businesses are frowned upon. They also points out that this contradicts the commonly known theory that a stock should be priced by "its unique properties of risk and return" (Fabozzi, et al., 2008, p. 82).

The authors also consider the society's view of sin. The example of the Jerry springer show is mentioned, which shows that very many people watch the program but few admits doing so. They also present information from a survey that showed that the main reason for investors not investing in sin stocks is that "it won't look good". The theory seems to suggest that people are willing to do one thing, but they do not want to admit to it or get caught doing it since they think it is shameful.

Sinful investments are not the same all over the world. The definition that Fabozzi, et al. (2008, p. 84) use is "a deliberate violation of some religious or moral principle". These violations can differ between religions and cultures. An example of this is that "incurring debt is considered a sound business practice" (Fabozzi, et al., 2008, p. 84) in the Western part of the world while it is considered dishonoring in the Arabic nations since people may believe that an individual that acquires debt as unable to take care of their own finances.

According to Fabozzi, et al. (2008), there are both upsides and downsides to being a sin company. The upside is that it is often a monopoly/oligopoly business since the barriers to enter is high. Due to the nature of the products, there is often a need for licenses and permissions. On the other hand, there is the so called "head-line risk" which means that a major news story will affect the company. This could be, for example, new research showing that cigarettes are extremely deadly printed on the front page of a major newspaper.

1.2.2 Saint stocks

The opposite of a sinful investment is defined as a Socially Responsible Investment or in short SRI, as it will be referred to in the remainder of this paper. SRI is an approach to investing that is applied to over 10 percent of the professionally managed investments in the US today (US-SIF, 2013). Investors use negative-, positive- and best-in-class-screening when choosing which stocks to include in their funds and portfolios. Negative screening is when a stock is excluded on the basis that it is involved in an industry that is considered sinful e.g. tobacco, gambling, alcohol and the adult industry. Positive screening is when a stock is ranked and chosen based on its ability to fulfill different social responsibility criteria such as "community, diversity, employee relations, environment, human rights and product" (Kempf & Osthoff, 2007, p. 909). A best-in-class screen combines the positive screening with a well-diversified portfolio including a wide spectrum of industries as well as geographical diversification.

The general consensus is that SRI arose in the US in the sixties as a result of the civil rights movement making socially concerned investors screen out companies negatively involved with the opposite side of the matter. According to Cooper, Lott & Lowry (2001), the Vietnam War in the seventies led to many investors boycotting weapons manufacturers and other businesses related to the armed conflict. The approach of investments has evolved and is now, as mentioned before, a force to be reckoned with.

Studies have been made to see if these investments are creating excess returns to the investors due to them adapting some sort of non-financial screen in their stock picking procedure. Kemp & Osthoff (2007) show that both the positive and the best-in-class screen provide excess return for the investors. However that is not the case with the negative screening, which still is the most used.

Although portfolios with different screening procedures are able to create excess returns one could argue that without the SRI restraints, the portfolio would

be able to perform even better. Renneboog, et al. (2008) claim that positive screening of companies on non-financial criteria could make SRI driven investors in to negative net present value investments, because of the good ranking on the SRI criteria. An argument for the screening procedure is that it generates value-adding information about the company and also that a good SRI ranking can be interpreted as a good managerial capacity in the company. So even if the screens may not prove to generate the best return, they are a tool that gives information that may not have been accessed otherwise.

1.3 Aim

The aim of this study is to find out if sin stock portfolios outperform their social acceptable counterparts and SRI investments.

1.4 Problem Discussion

It is no secret that illegal and un-ethical "businesses" e.g drugs, brothels and weapons on the black market, are very profitable. In this thesis, we would like to find out if the legal counterparts, i.e. unethical stocks, can be considered to yield a higher return than neutral companies. We will also compare these stocks with an ethically screened portfolio to get a clearer picture of how social responsibility affects return.

- Have investments in unethical stocks historically been more profitable in regards to risk than their neutral counterparts and SRI?
- Is the return of these portfolios explained by the standard regression analysis tools?
- Are all sin industries equally profitable?

Our study adds to the earlier research with the introduction of comparing the Sin portfolios with corresponding industry portfolios that are ethically neutral. This is done to get more of an industry evidence of the performance.

1.5 Limitations

In this thesis we evaluate sin stocks and compare them to neutral stocks. We have chosen to start with the Hong and Kacperczyk (2009) definition of sin stocks and then add the weapons industry into our portfolio. In addition to these sectors Fabozzi, et al. (2008) added the adult industry and biotech. Our decision, however, is to not include the biotech and the adult industry. The reasons for this is that we are not convinced that biotech is considered a sin industry in regard to the definition chosen for this thesis i.e. considered a sin industry in Sweden. The reason for excluding the adult industry lies more within the problem of finding a sufficient number of companies. The traditional market of the adult industry is on the verge of extinction due to internet copy right infringement and the business inability to react to this (Yagielowicz, 2012). However, the new players in the industry have found new ways to make money. Today, much less capital is required since all you really need is a camera and an internet connection instead of a fully developed distribution network, camera team and a studio. This has led to the fact that small players are able to fight their way into the market and compete on equal terms with listed giants like Playboy. As a result, very few of the companies involved in the adult industry are listed since the need to be a public sized-company is not really existent anymore, thanks to the technological revolution.

2. Method

2.1 Data

2.1.1 Data-selection

We constructed our own unethical portfolio consisting of sin stocks from the all over the world. This portfolio was formed by four different sub-portfolios. Of a total of 248 sin stocks, 123 were related to alcohol, 64 to gambling, 28 to tobacco and 33 to weapons. In the counterpart selection, the total number of companies was 547. This sample consisted of 68 firms from Beverage, 121 from Hotels and Gaming, 122 from Agricultural and 272 from Industrial Engineering.

We utilized the Bloomberg Industry Classification System (BICS) to find relevant companies for our selection. The selection was made upon the percentage of revenue generated from the chosen sector. A minimum of 50 percent had to be derived from the sector for a company to be included in our study. Where the BICS classification did not provide a good match, as in the case of for the weapons industry's counterpart, we used DataStream's Industrial engineering classification instead.

We also wanted to compare our portfolios with a completely ethical portfolio. This selection was based on Ethisphere´s ranking of the most ethical companies in the world for 2011 and 2012 (Ethisphere, 2013). A total number of 118 constituents were selected to be included in a Saint portfolio.

The data from the previously mentioned lists was taken from DataStream. We retrieved information about adjusted price and number of shares from this system. The only stocks that were excluded were those with incomplete data and extremities that were biasing the results.

The fact that we have such a geographically well-diversified portfolio reduces the risks tied to a specific country. In this way, our study differs from previous research where only the European and/or the US market are taken into consideration.

2.1.2 Risk free rate

The risk free rate of return that was used in this study is based on historical data for US one-month Treasury bills from Kenneth French's homepage (French, 2012). This US rate was chosen due to the convenience that it was the used rate in all regression series by Fama & French, Carhart and Stambaugh. Also our belief is that it matches our portfolios in a satisfying way even though taking more rates into account would perhaps reflect reality slightly better.

2.2 Evaluating the portfolios

2.2.1 Comparing the returns with an index

Since our portfolio consists of global stocks, we argue that it is reasonable to compare it with the MSCI World-Index. The index is based on 24 different countries from the developed parts of the world (MSCI Inc., 2011). We then compare the over-all return between the portfolio and the World MSCI World-index during the years of 1980-2012. Both our portfolios and the chosen index take re-investment of dividends into account.

We are aware of that the MSCI World ACWI-index would be a better match since it involves developing countries but there are no available data dating back to 1980. This is one of the reasons for us wanting to compare with a corresponding industry and not just an index.

2.2.2 Regression analysis with CAPM

In the famous papers by Sharpe (1964), Lintner (1965) and Mossin (1966), the Capital Asset Pricing Model was presented with the purpose of filling the void of pricing an asset dependent of its risk. Before CAPM was invented, there was no way to sufficiently provide information of how much of the asset's price was related to risk and what was related to other factors such as "basic influences of investor preferences, and the physical attributes of capital assets" (Sharpe, 1964, p. 426).

$$r = R_f + \beta_m(R_m - R_f)$$
$$R_f = Riskfree\ rate\ of\ return$$
$$R_m = Rate\ of\ return\ for\ the\ market$$
$$\beta_m = Market\ Beta$$

This model shows that as long as the asset is not affected by changes in the economy, it will only yield the risk free rate. However, a security that is affected by a change should yield "appropriately higher expected rates of return" (Sharpe, 1964, p. 442).

The CAPM formula has been greatly used since its invention and is still considered a very important tool when valuating financial assets. As a result of this, William Sharpe was rewarded the Nobel Prize in 1990 (The Nobel Foundation, 1990). Nowadays, many analysts choose to use more refined versions of the formula to get a greater understanding of an asset's true value.

2.2.3 Regression analysis with Fama French

To establish if the higher return from the sin stock portfolio was related to the theory that sin stocks perform better than ordinary stock or due to other factors, we used the Fama French three-factor model (Fama & French, 1993). The aim with this regression analysis was to find an Alpha with at least 5 % significance level. The residual that cannot be explained by the three factors is considered the abnormal return for the specific asset (Fama & French, 1993).

$$r = R_f + \beta_m(R_m - R_f) + \beta_s * SMB + \beta_v * HML + \alpha$$
$$R_f = Riskfree\ rate\ of\ return$$
$$R_m = Rate\ of\ return\ for\ the\ market$$
$$\beta_m = Market\ Beta$$
$$\beta_s = SMB\ Beta$$
$$\beta_v = HML\ Beta$$
$$SMB = (Avg.return\ of\ three\ small\ cap\ portfolios)$$
$$- (Avg.return\ of\ three\ large\ cap\ portfolios$$
$$HML = (Avg.return\ of\ two\ value\ firms\ portfolios)$$
$$- (Avg.return\ of\ two\ growth\ firms\ portfolios)$$
$$\alpha = Jensen's\ alpha, the\ abnormal\ excess\ return$$

2.2.4 Regression analysis with Fama French and Momentum

To further explore what is the abnormal return and what is derived from other elements, we chose to add another factor. Carhart's momentum is based on the assumption that a stock that has performed well will continue to do so and the opposite for a stock that has performed badly during the recent past (Carhart, 1997).

$$Fama\ French\ with\ momentum$$
$$= R_f + \beta_m(R_m - R_f) + \beta_s * SMB + \beta_v * HML + \beta_{MOM} * MOM + \alpha$$

2.2.5 Regression analysis with Fama French and Momentum and Liquidity

Lubos Pastor and Robert F. Stambaugh published in June 2003 their paper about how liquidity risk affects the return. The liquidity factor is constructed by comparing the order flow and excess return on a day-to-day basis. They argue that stocks that are harder to liquidate carry a greater risk. Due to this fact, the investors demand a higher return as a compensation for the additional risk. During a time-span of thirty years "the average return on stocks with high sensitivities to liquidity exceeds that for stocks with low sensitivities by 7.5 percent annually" (Pastor & Stambaugh, 2003, p. 642).

$$
\begin{aligned}
Fama\ French\ &with\ momentum\ and\ liquidity \\
&= R_f + \beta_m(R_m - R_f) + \beta_s * SMB + \beta_v * HML + \beta_{MOM} * MOM + \beta_L * L \\
&\quad + \alpha
\end{aligned}
$$

2.2.6 Sharpe Ratio

The Sharpe ratio measures how much excess return over the risk-free rate that is received in relation to the standard deviation of the asset (Sharpe, 1994). We will use the following formula to evaluate the risk-adjusted return on our portfolios:

$$
Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}
$$

$R_p = Return\ of\ the\ portfolio$

$R_f = \text{Riskfree rate of return}$

$\sigma_p = Standard\ devation\ of\ the\ portfolio$

3. Data Analysis

3.1 Portfolio Analysis

A complete breakdown of all the different portfolio regression results can be found in the appendix.

3.1.1 Alcohol Portfolio vs. Beverage Portfolio

The Alcohol portfolio has generated an average yearly return of 18 percent which can be compared to the Beverage portfolio's 17.4 percent. Both of these are considerably higher than the 10.5 percent return of the MSCI world index. Investments in alcohol seem to marginally beat its normal counterpart however not in the extreme fashion that we initially thought it would. We believe that much of this can be explained by the performances of power players like Coca-Cola and PepsiCo in the Beverage portfolio. In the graph below we can see that the beverage industry outperformed the alcohol industry during the 1990´s and the early 2000's all the way up till the financial crisis in 2008. In the aftermath of the financial crisis the two portfolios showed similar characteristics and were both experiencing a tremendous   growth.
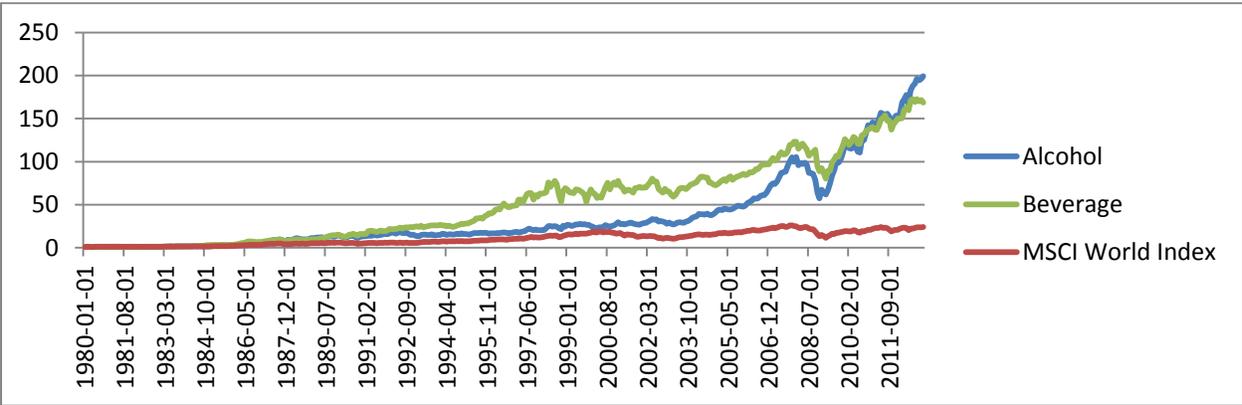
Figure 1 Alcohol vs Beverage

The table below shows a regression analysis with Fama French's three-factor-model as well as the momentum and liquidity factors. It shows that Jensen's Alpha along with the betas for Mkt-Rf and HML are all significant at a significance level of at least 5 percent. The coefficients demonstrate how much of the excess return, compared to the risk-free rate, can be related to each factor. In this case Alpha, which is the abnormal return, stands for largest part followed by market beta and the fact that the companies in the portfolio have more similar characteristics with value companies than with growth companies.

Table 1 Alcohol and Beverage regression results

	1980-2011			2000-2011		
	Alcohol	Beverage	Alcohol-Beverage	Alcohol	Beverage	Alcohol-Beverage
Alpha	0.626*	0.758**	-0.131	1.017**	0.511	0.506
	(2.44)	(2.90)	(-0.46)	(2.93)	(1.48)	(1.48)
Mkt-rf	0.616***	0.545***	0.071	0.605***	0.437***	0.168*
	(10.60)	(9.22)	(1.08)	(8.44)	(6.13)	(2.38)
SMB	-0.008	-0.181*	0.174+	0.115	0.044	0.071
	(-0.09)	(-2.17)	(1.89)	(1.22)	(0.47)	(0.77)
HML	0.278**	0.072	0.206*	0.311**	0.208*	0.103
	(3.25)	(0.83)	(2.15)	(3.11)	(2.09)	(1.05)
MOM	-0.036	-0.058	0.022	-0.057	-0.123*	0.066
	(-0.68)	(-1.08)	(0.37)	(-1.04)	(-2.25)	(1.22)
Non-traded liquidity factor	-0.034	0.029	-0.063	-0.071	-0.082	0.011
	(-0.80)	(0.66)	(-1.32)	(-1.38)	(-1.60)	(0.22)
Adjusted R^2	0.228	0.199	0.008	0.365	0.229	0.036

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Beverage portfolio has an even higher Alpha than the Alcohol portfolio. The excess return of this portfolio can also be explained by the Mkt-rf and the SMB factor. The latter indicates that the portfolio has negative correlation to a small market cap portfolio. This was expected as the sample includes large corporations like Coca-Cola and PepsiCo. These two firms contributed with 40 and 26 percent of the portfolio performance in 2012 respectively.

3.1.2 Gambling Portfolio vs. Hotels and Gaming Portfolio

The Gambling portfolio has generated an average yearly return of 20.8 percent compared to the Hotels and Gaming portfolio, which return has been 15.2 percent in average. It consists of casinos & gambling shops (98.6 percent), online gambling (1.3 percent) and mobile gaming (0.1 percent). The Gambling portfolio is the best performing sin stock portfolio with a return of 400 times since 1980. We have visualized the performance of the portfolios in the graph below. It shows that even though the Gambling portfolio crashed hard prior to the financial crisis, the recovery period has been truly outstanding from an investor's perspective.

Figure 2 Gambling vs Hotels and Gaming
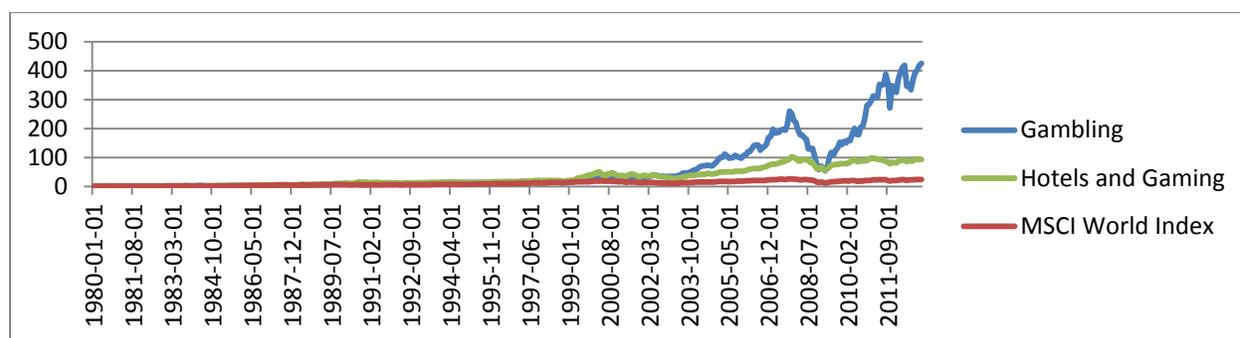
Running the regression of the Gambling portfolio, we found that the model could explain the relation well and we did not find Alpha with at least 5 percent significance level. All other factors except the liquidity factor do explain the performance of the portfolio.

Table 2 Gambling and Hotels & Gaming regression results

	1980-2011			2000-2011		
	Gambling	Hotels & Gaming	Gambling - Hotels & Gaming	Gambling	Hotels & Gaming	Gambling - Hotels & Gaming
Alpha	0.407	0.456	-0.048	1.369*	0.168	1.201+
	(1.10)	(1.56)	(-0.11)	(2.28)	(0.44)	(1.76)
Mkt-rf	1.105***	0.484***	0.621***	1.521***	0.739***	0.782***
	(13.15)	(7.34)	(6.26)	(12.26)	(9.34)	(5.55)
SMB	0.408***	0.184*	0.224	0.391*	0.209*	0.182
	(3.42)	(1.97)	(1.59)	(2.39)	(2.01)	(0.98)
HML	0.564***	0.057	0.507***	0.446*	-0.048	0.494*
	(4.56)	(0.59)	(3.47)	(2.57)	(-0.44)	(2.51)
MOM	0.163*	0.122*	0.041	0.189*	0.167**	0.022
	(2.12)	(2.02)	(0.45)	(1.99)	(2.75)	(0.20)
Non-traded liquidity factor	-0.008	0. 034	-0.043	-0.064	-0.005	-0.059
	(-0.13)	(0.71)	(-0.58)	(-0.72)	(-0.08)	(-0.58)
Adjusted R^2	0.360	0.171	0.100	0.562	0.445	0.200

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

When studying the shorter and more recent time period, where SRI was more important than before, the results are dramatically different (The conference on Sustainable, Responsible, Impact Investing, 2012). Now we can see an Alpha of 1,369 as well as significance for all other factors except the non-traded liquidity. This can be explained by looking at the graph of the return. It is clear that the industry started outperforming around the millennium shift. The underlying reasons for this this might be an interesting topic for further research. The initial though was that it must be related to the internet boom and the online gambling, but that seems not be the case. This result surprised us, but it can probably be explained by the extremely tough competition between the online gambling

companies. Another thought is that the modern society's information flows, where stories about winners of large sums travel fast, has contributed to peoples increased lust for gambling.

It seems rather logical that casinos have a harder time performing well during economic downturns due to possible shifts in the attitude towards risk taking. It is interesting however that after the financial crisis, the industry does not just recover but also clearly exceeds previous values. This could perhaps be explained by a larger interest in gambling coming from the customers of the less profitable online gambling industry who now want to gamble "live".

The Hotels and Gaming portfolio's regression shows similar results as its unethical counterpart with no Alpha at the chosen significance level. The return is explained by a correlation with the market factors as well as with SMB and the momentum factor.

3.1.3 Tobacco Portfolio vs. Agricultural Portfolio

The Tobacco portfolio has generated an average yearly return of 18.7 percent compared to the Agriculture Portfolio's 15.7 percent. The different curves in figure 3 show that the industries have similar characteristics with regard to the shape of the curves even though the tobacco industry seems to beat its counterpart with a large margin. This indicates that from an investor's point of view, the tobacco is preferable when compared to agriculture since the risk seem to be similar but the return is in favor for the unethical alternative.

Figure 3 Tobacco vs Agriculture
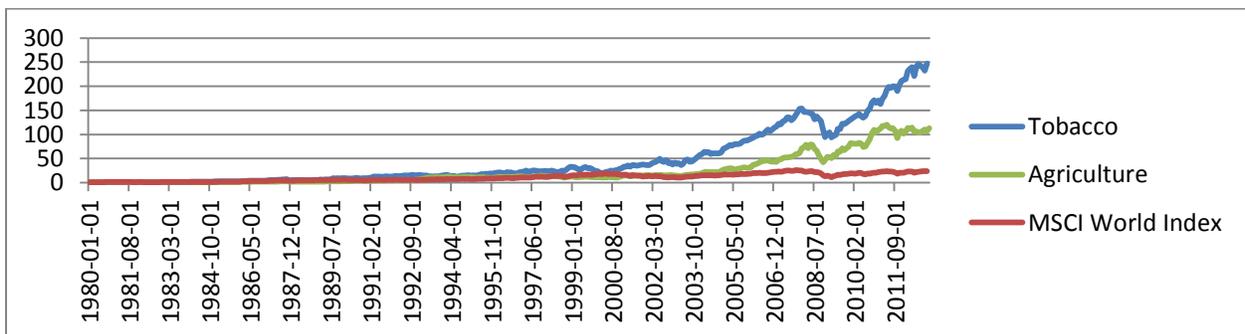
The regression of the Tobacco portfolio resulted in significance for Alpha and the betas for Mkt-rf and HML. This shows that the industry consists of value companies and that there is an excess return in this unethical sector that the regression model cannot explain.

Table 3 Alcohol and Beverage regression results

	1980-2011			2000-2011		
	Tobacco	Agriculture	Tobacco - Agriculture	Tobacco	Agriculture	Tobacco - Agriculture
Alpha	0.800**	0.567+	0.232	1.360**	1.739***	-0.379
	(2.76)	(1.78)	(0.59)	(3.19)	(3.49)	(-0.68)
Mkt-rf	0.654***	0.620***	0.034	0.551***	0.439***	0.112
	(9.98)	(8.57)	(0.38)	(6.27)	(4.27)	(0.98)
SMB	-0.106	0.140	-0.246+	-0.127	0.090	-0.217
	(-1.14)	(1.37)	(-1.93)	(-1.10)	(0.66)	(-1.43)
HML	0.220*	0.156	0.065	0.297*	0.090	0.207
	(2.28)	(1.46)	(0.49)	(2.42)	(0.63)	(1.30)
MOM	-0.079	-0.000	-0.079	-0.077	-0.131+	0.055
	(-1.32)	(-0.01)	(-0.96)	(-1.14)	(-1.67)	(0.62)
Non-traded liquidity factor	-0.007	0.14**	-0.147*	-0.047	0.153*	-0.200*
	(-0.14)	(2.63)	(-2.22)	(-0.75)	(2.08)	(-2.43)
Adjusted R^2	0.212	0.219	0.018	0.234	0.182	0.061

t statistics in parentheses
$+ p < 0.10$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

The Agriculture portfolio does not produce any Alpha with a significance level of at least 5 percent and the regression is mostly explained by the Mkt-rf beta. It is also

the first portfolio that is partially explained by the liquidity factor at the chosen significance level. This is a sign that it is not frequently traded on the stock market.

3.1.4 Weapon vs. Industrial Engineering

The weapons industry has not beaten its normal counterpart during the time period. The yearly average return of the weapons industry is 12.5 percent compared to industrial engineering, which is able to produce 16.8 percent in annual return. When studying the Weapons portfolio, we can see that it is rather insensitive to economic downturns. This may be due to the fact that countries seldom change their funding of defense unless they are in a serious economic downturn. It is safe to say that the industry is driven more by geopolitical factors than economical ones (Plumer, 2013). During the time between the World Trade Center attacks in 2001 and the financial crisis of 2008, the portfolio more than doubled its value. There is a dip during the crisis due to natural reasons since even though the defense budget is often a "holy cow" for prime consumers like the U.S. it comes to a point where it must be cut down.

Figure 4 Weapon vs Industrial Engineering
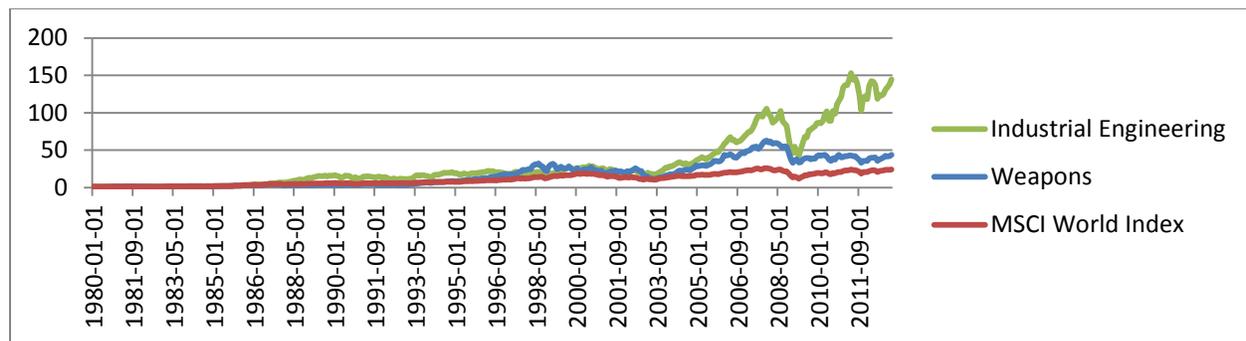
The weapons industry's return is almost fully explained by the model and it does not provide the investor with an Alpha.

Table 4 Weapon and Industrial Engineering regression results

	1980-2011			2000-2011		
	Weapon	Industrial engineering	Weapons - Industrial engineering	Weapon	Industrial engineering	Weapons - Industrial engineering
Alpha	0.218	0.492	-0.274	0.117	0.841*	-0.724
	(0.58)	(1.49)	(-0.59)	(0.22)	(2.34)	(-1.30)
Mkt-rf	0.747***	0.834***	-0.087	0.732***	1.251***	-0.519***
	(8.76)	(11.19)	(-0.83)	(6.69)	(16.92)	(-4.51)
SMB	0.257*	0.230*	0.027	0.088	0.249*	-0.161
	(2.13)	(2.18)	(0.18)	(0.61)	(2.56)	(-1.06)
HML	0.348**	0.328**	0.020	0.436**	0.176+	0.261
	(2.77)	(2.99)	(0.13)	(2.86)	(1.70)	(1.62)
MOM	0.007	-0.012	0.019	-0.126	0.086	-0.212*
	(0.09)	(-0.18)	(0.20)	(-1.50)	(1.51)	(-2.40)
Non-traded liquidity factor	0.161*	0.035	0.126	-0.033	0.006	-0.040
	(2.55)	(0.63)	(1.63)	(-0.43)	(0.12)	(-0.48)
Adjusted R2	0.226	0.282	-0.005	0.273	0.707	0.188

t statistics in parentheses
+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Industrial Engineering seems to have similar characteristics as the Weapons portfolio with no significant Alpha. This is not very surprising since the portfolio includes many large and stable companies that are included in "ordinary" indexes.

3.1.5 Sin vs. Neutral vs. Saint

To get a more in depth comparison between unethical selections and the more ethical ones, we compare the different total portfolios. By looking at the graph of the return below, we can see that all of them follow the same trends. The average yearly return for the portfolios are; 18.7 percent for the Sin, 16.4 percent for the Neutral and 16.6 percent for the Saint. The first thing that we noticed is that they follow the theories of previous research. The Sin portfolio clearly outperforms the other two while the Saint portfolio beats the Neutral portfolio marginally. It is reasonable to think that the Saint portfolio has a better return since it consists of handpicked companies that have had the time and money to spend on CSR.

Figure 5 Sin vs. Neutral vs. Saint
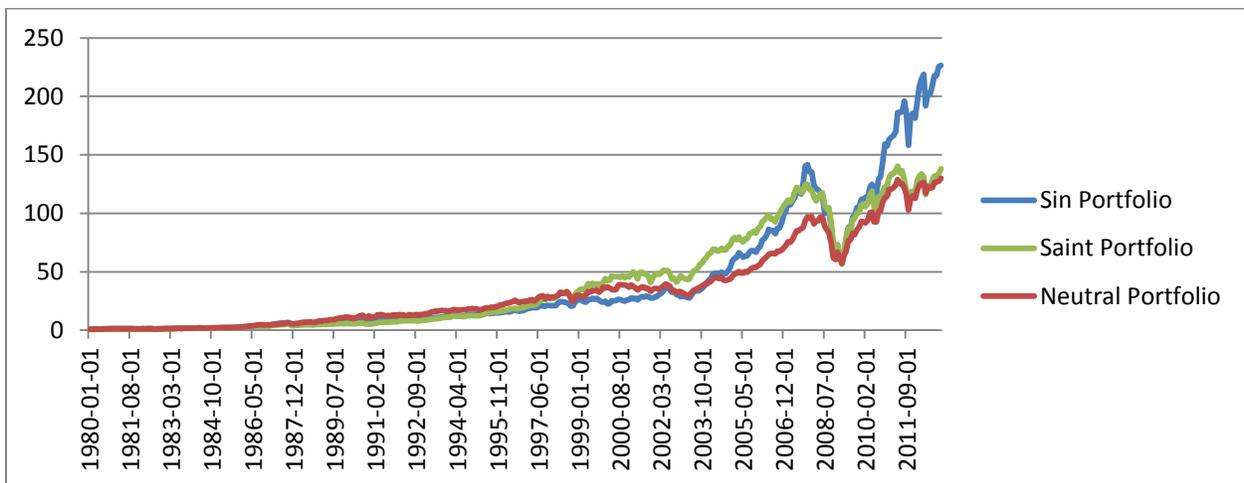
The total portfolio for sin stocks shows an Alpha which can be explained by the fact that three out of four sin portfolios show an Alpha and that the total portfolio is able remove some of the risk due to diversification. We can also see that much of the return is explained by the other factors in the regression.

Table 5 Sin, Neutral and Saint regression results

	1980-2011			2000-2011		
	Sin Portfolio	Neutral Portfolio	Saint Portfolio	Sin Portfolio	Neutral Portfolio	Saint Portfolio
Alpha	0.513*	0.145	0.418+	0.966**	0.633*	0.275
	(2.52)	(0.76)	(1.94)	(2.99)	(2.44)	(1.19)
Mkt-rf	0.780***	0.622***	0.829***	0.852***	0.719***	1.106***
	(16.92)	(14.48)	(16.96)	(12.80)	(13.44)	(23.12)
SMB	0.138*	0.010	0.048	0.117	0.155*	-0.011
	(2.11)	(1.64)	(0.69)	(1.33)	(2.20)	(-0.17)
HML	0.353***	0.150*	0.053	0.373***	0.094	-0.024
	(5.19)	(2.38)	(0.74)	(4.01)	(1.26)	(-0.37)
MOM	0.014	0.016	-0.037	-0.018	0.000	-0.005
	(0.32)	(0.42)	(-0.82)	(-0.35)	(0.01)	(-0.13)
Non-traded liquidity factor	0.028	0.059+	0.004	-0.054	0.018	-0.075*
	(0.82)	(1.86)	(0.10)	(-1.13)	(0.47)	(-2.19)
Adjusted R^2	0.466	0.411	0.474	0.571	0.607	0.799

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As shown above, the Neutral portfolio offers no Alpha in the long term, which comes as no surprise since it contains only ordinary stocks that resemble the overall market. The return is explained by the Mkt-rf beta as well as the HML factor.

The Saint portfolio is extremely well diversified due to the positive screening process which selects the "best in class" in several industries. This results in the portfolio only correlating with the Mkt-rf beta with at a significance level of at least 5 percent.

Table 6 Arbitrage regression results

	1980-2011			2000-2011		
	Sin - Neutral	Sin - Saint	Saint - Neutral	Sin - Neutral	Sin - Saint	Saint - Neutral
Alpha	0.368+	0.095	0.273	0.333	0.691*	-0.358
	(1.74)	(0.39)	(1.31)	(1.17)	(2.06)	(-1.28)
Mkt-rf	0.159**	-0.049	0.207***	0.134*	-0.253***	0.387***
	(3.31)	(-0.88)	(4.40)	(2.28)	(-3.65)	(6.68)
SMB	0.038	0.010	-0.052	-0.038	0.127	-0.165*
	(0.56)	(1.15)	(-0.78)	(-0.49)	(1.39)	(-2.17)
HML	0.202**	0.299***	-0.097	0.278***	0.397***	-0.119
	(2.87)	(3.68)	(-1.40)	(3.41)	(4.10)	(-1.47)
MOM	-0.003	0.051	-0.053	-0.018	-0.013	-0.005
	(-0.06)	(0.99)	(-1.23)	(-0.40)	(-0.24)	(-0.11)
Non-traded liquidity factor	-0.031	0.024	-0.055	-0.071+	0.021	-0.093*
	(-0.88)	(0.59)	(-1.59)	(-1.71)	(0.43)	(-2.24)
Adjusted R^2	0.026	0.033	0.056	0.105	0.151	0.227

t statistics in parentheses
$+ p < 0.10$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

We wanted to find out if there is an arbitrage opportunity between the portfolios. We found that going long in the Sin portfolio and short in the Neutral portfolio resulted in an Alpha with at least 10 percent significance level is created in the long run. This indicates that our theory of sin stocks outperforming neutral stocks might be correct.

Table 7 Portfolios excluding weapons and industrial engineering regression results

	1980-2011		2000-2011	
	Sin (-W)	Neutral (-IE)	Sin (-W)	Neutral (-IE)
Alpha	0.611**	0.593**	1.249***	0.806**
	(2.83)	(3.21)	(3.69)	(2.98)
Mkt-rf	0.792***	0.550***	0.892***	0.538***
	(16.22)	(13.14)	(12.80)	(9.64)
SMB	0.0981	0.0475	0.126	0.114
	(1.42)	(0.80)	(1.38)	(1.55)
HML	0.354***	0.0951	0.351***	0.0831
	(4.93)	(1.54)	(3.61)	(1.07)
MOM	0.0159	0.0211	0.0184	-0.0292
	(0.36)	(0.55)	(0.34)	(-0.68)
Non-traded liquidity factor	-1.643	6.807*	-6.052	2.210
	(-0.45)	(2.20)	(-1.21)	(0.55)
Adjusted R^2	0.430	0.370	0.568	0.442

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Since the Weapons Portfolio does not seem to be considered a sin industry in the aspect of return, we chose to also run the regressions without it to not bias the Sin portfolio. Furthermore, the industrial engineering sector was excluded to not bias the result. By the exclusion we got higher and more significant Alphas for the portfolio but no arbitrage opportunity can be found between the Sin and Neutral portfolios in the regression. There is however some arbitrage opportunities between other portfolios in the sample, which can be seen in the regression table below.

Table 8 Arbitrage regression results

	1980-2011			2000-2011		
	Sin(-W) - Neutral (-IE)	Sin(-W) - Saint	Saint - Neutral (-IE)	Sin (-W) - Neutral (-IE)	Sin (-W) - Saint	Saint - Neutral (-IE)
Alpha	0.018	0.466*	-0.175	0.443	0.616*	-0.531+
	(0.08)	(2.19)	(-0.72)	(1.41)	(2.09)	(-1.70)
Mkt-rf	0.242***	0.170***	0.279***	0.354***	0.174**	0.567***
	(4.71)	(3.52)	(5.06)	(5.49)	(2.86)	(8.83)
SMB	0.051	-0.002	0.000	0.012	-0.028	-0.125
	(0.69)	(-0.03)	(0.00)	(0.14)	(-0.35)	(-1.47)
HML	0.259***	0.204**	-0.042	0.268**	0.257**	-0.108
	(3.43)	(2.87)	(-0.52)	(2.98)	(3.03)	(-1.20)
MOM	-0.005	-0.000	-0.058	0.048	0.018	0.024
	(-0.11)	(-0.01)	(-1.14)	(0.96)	(0.39)	(0.49)
Non-traded liquidity factor	-0.084*	-0.076*	-0.064	-0.083+	-0.078+	-0.097*
	(-2.22)	(-2.12)	(-1.57)	(-1.79)	(-1.80)	(-2.11)
Adjusted R^2	0.058	0.034	0.064	0.208	0.105	0.341

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Since the Agriculture portfolio produced such a large and significant Alpha in the time period of 2000-2011, it was necessary to do the regression without it and its counterpart as well as the weapons and industrial engineering portfolios. The regression presented below shows a significant and strong arbitrage opportunity between the Sin and the Neutral portfolios in the time period of 2000-2011.

Table 9 Arbitrage and portfolios excluding weapons, industrial engineering, tobacco and agriculture regression results

	1980-2011			2000-2011		
	Sin - (W) - (T)	Neutral - (IE) - (A)	Sin - Neutral	Sin - (T) - (W)	Neutral - (IE) - (A)	Sin - Neutral
Alpha	0.517*	0.607**	-0.090	1.192**	0.340	0.854*
	(2.02)	(2.89)	(-0.33)	(2.97)	(1.27)	(2.10)
Mkt-rf	0.861***	0.515***	0.346***	1.063***	0.588***	0.475***
	(14.85)	(10.84)	(5.59)	(12.83)	(10.68)	(5.68)
SMB	0.200*	0.001	0.199*	0.253*	0.127+	0.127
	(2.44)	(0.02)	(2.27)	(2.32)	(1.75)	(1.15)
HML	0.421***	0.065	0.356***	0.379**	0.080	0.299*
	(4.94)	(0.93)	(3.92)	(3.27)	(1.04)	(2.56)
Mom	0.063	0.032	0.032	0.066	0.022	0.044
	(1.20)	(0.73)	(0.56)	(1.04)	(0.52)	(0.69)
Non-traded liquidity factor	-0.021	0.032	-0.053	-0.067	-0.043	-0.024
	(-0.50)	(0.90)	(-1.16)	(-1.14)	(-1.10)	(-0.40)
Adjusted R^2	0.396	0.269	0.090	0.578	0.473	0.214

t statistics in parentheses
$+ p < 0.10$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

3.2 Sharpe Ratio of the Portfolios

From the numbers in the previous section, we learned which portfolio performed the best in terms of return on invested money. This section puts the industry performance in relation to how much risk is taken on.

Table 10 Sharpe Ratios

	Average	Standard Deviation	Sharpe Ratio
Alcohol	1.079	5.384	0.200
Beverage	1.055	5.352	0.195
Gambling	1.486	8.567	0.173
Gambling (2000-2013)	2.128	10.129	0.210
Hotels & Gaming	0.913	5.874	0.156
Tobacco	1.176	6.005	0.196
Agriculture	0.999	6.630	0.151
Weapons	0.850	7.865	0.108
Industrial Engineering	1.102	7.173	0.154
Sin Portfolio	1.148	5.152	0.223
Sin Portfolio (without Weapons)	1.247	5.272	0.237
Neutral Portfolio	0.607	4.550	0.133
Neutral Portfolio (without Industrial Engineering)	0.578	4.294	0.135
Saint Portfolio	0.875	5.492	0.159

According to this ratio, Alcohol is the portfolio with the most value for money when comparing risk and return. If we once again look at gambling industry between the years of 2000 and 2011, the portfolio has a Sharpe-ratio of 0.21 during this time period. These two are only beaten by the Total Sin portfolio which is quite reasonable, since a lot of risk can be diversified away while still keeping a good return. It is also worth noticing that both the Neutral portfolio and the Saint portfolio give significantly less risk-adjusted return than the Sin portfolio.

4. Conclusion

In this study we provide results that suggest that it is more profitable to invest in certain sin industries compared to ethically neutral investments. Three out of our four sin portfolios showed an Alpha with a significance level of at least 5 percent. The Weapons portfolio did not show any Alpha which may indicate that the stocks included are not generally considered too unethical to invest in, from a global perspective.

The Sharpe ratios imply that sin stocks would be favorable for an investor. All our unethical portfolios except the Weapons portfolio have higher ratio compared to their corresponding portfolios. Overall the Sin portfolio has a dramatically higher ratio than the Neutral portfolio. The reason for this larger difference is probably that sin stocks have a higher industry-specific risk to diversify away than the neutral stocks.

We are quite confident that sin stocks will continue to deliver Alphas and better Sharpe ratios, compared to neutral stocks, until the moral aspect is no longer a valid factor when managing a portfolio. This however will probably not happen in the near future. This leads us to the conclusion that investing in sinful businesses will continue to be a sound decision from a financial point of view.

5 The future of sin

There is no doubt that the exploitation of the human's sinful mind has been very profitable in the past. The question that arises is whether these sectors will continue to thrive in the future.

5.1 Alcohol industry

We are confident that the alcohol industry will continue to be successful in the future as it has been in the past. When taking a closer look at the development during the last ten years, we cannot find anything too worrying. The fact that alcohol is a rather socially accepted drug is what makes us sure that this industry will continue to outperform the average stock. It is not likely that any new bans on alcohol will be adopted. We think that it is more likely that the market will increase when or if the Arabic countries remove their legislations against these kinds of beverages. This would open up a new customer segment which would lead to increased income for the industry.

5.2 Gambling industry

This sector has been around since the chariot racing in ancient Rome and will most likely be there in the future too. During the last decade, the gambling industry had a tuff start and performed similar to the index but sky-rocketed after the financial crisis. We think that the industry will continue to grow along with the technology revolution that has made it possible for people to gamble on their smart phones, anywhere and anytime they like.

5. 3 Tobacco industry

As with the previous two sin industries, tobacco has also beaten the index during the last decade and has shown an upward trend. The main threat against tobacco is that new health studies will be published or the launching of major anti-smoking

campaigns. In addition to this, we are seeing a trend with increased legislations which mainly consist of bans of smoking in public environments. It is likely that the bans will continue and be even broader in the future due to the health aspects brought forward by the non-smoking part of the society.

5. 4 Weapons industry

In our study we could see that the manufacturing of weapons has not nearly been as profitable as the other sectors, even though it still beats the MSCI World Index. The sector correlates well with the overall market. We cannot find any reason for the weapons industry to not continue to perform well in the future since as long as there are wars, governments are going to need weapons.

6. Further research

Our research indicates that there is money to be made from investing without regard for ethical and moral standards. It would be interesting to apply this theory to portfolio management by looking at, for example how many unethical stocks can be included in a portfolio before the end customer reacts. Another fascinating research question is how much the savers in a pension fund lose due to the moral standards.

To make the Saint portfolio side of the research less subjective, further research could be made in an attempt to replicate our portfolio recipe from the sin industries. This could give more insight into the whole field of ethical investing and not just the positive screen that we have included as our Saint portfolio.

As the number of funds that have an ethical profile grows, it would be interesting to interview the asset managers that work within this field. The questions could be about the way stocks are chosen and the criteria that they have to pass to be a candidate. How do they make decisions in the grey area? For example: can a company involved in oil refining be deemed an ethical company, as in the case of Statoil being on the 2012 list of the most ethical companies in the world issued by Ethisphere (2013)?

A study made from an Islamic socio-cultural point of view would be interesting in the sense that they have definitions of sin that do not coincide perfectly with the western view that has been the foundation for most of the research carried out to date.

It would be interesting to investigate if a company´s spending on its ethical profile is good from an economical viewpoint or if it is more of a charitable action. What is the payback on making a company "look good"?

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Appendix

	Alcohol				
Mkt-Rf	0.548***	0.572***	0.630***	0.629***	0.635***
	(10.41)	(10.61)	(11.31)	(11.23)	(10.75)
SMB		-0.116	-0.0595	-0.0537	-0.0411
		(-1.35)	(-0.68)	(-0.61)	(-0.46)
HML			0.296***	0.298***	0.298***
			(3.42)	(3.42)	(3.39)
MOM				-0.0108	-0.0115
				(-0.20)	(-0.21)
Non-traded liquidity factor					-4.084
					(-0.94)
Alpha	0.773**	0.804**	0.623*	0.624*	0.608*
	(3.18)	(3.29)	(2.53)	(2.44)	(2.32)
Observations	392	388	386	383	372
Adjusted R^2	0.216	0.224	0.246	0.244	0.238

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Beverage				
Mkt-Rf	0.514***	0.564***	0.583***	0.588***	0.579***
	(9.67)	(10.56)	(10.41)	(10.45)	(9.73)
SMB		-0.272**	-0.249**	-0.255**	-0.262**
		(-3.18)	(-2.84)	(-2.90)	(-2.92)
HML			0.104	0.103	0.103
			(1.20)	(1.18)	(1.17)
MOM				-0.00249	-0.00535
				(-0.05)	(-0.10)
Non-traded liquidity factor					3.095
					(0.70)
Alpha	0.744**	0.757**	0.705**	0.721**	0.728**
	(3.02)	(3.13)	(2.85)	(2.81)	(2.76)
Observations	392	388	386	383	372
Adjusted R2	0.191	0.222	0.222	0.224	0.223

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Gambling				
Mkt-Rf	1.055***	0.998***	1.100***	1.097***	1.084***
	(13.56)	(12.64)	(13.57)	(13.49)	(12.66)
SMB		0.394**	0.499***	0.492***	0.487***
		(3.12)	(3.94)	(3.87)	(3.78)
HML			0.528***	0.533***	0.528***
			(4.19)	(4.23)	(4.14)
MOM				0.104	0.125
				(1.33)	(1.57)
Non-traded liquidity factor					-1.088
					(-0.17)
Alpha	0.866*	0.889*	0.582	0.449	0.420
	(2.40)	(2.49)	(1.62)	(1.21)	(1.11)
Observations	392	388	386	383	372
Adjusted R^2	0.319	0.332	0.361	0.362	0.356

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Hotels & Gaming				
Mkt-Rf	0.525***	0.502***	0.522***	0.523***	0.504***
	(8.87)	(8.26)	(8.33)	(8.33)	(7.58)
SMB		0.221*	0.218*	0.207*	0.198*
		(2.27)	(2.23)	(2.11)	(1.98)
HML			0.0622	0.0680	0.0624
			(0.64)	(0.70)	(0.63)
MOM				0.115	0.129*
				(1.91)	(2.09)
Non-traded liquidity factor					2.665
					(0.54)
Alpha	0.605*	0.642*	0.532	0.409	0.392
	(2.21)	(2.33)	(1.92)	(1.43)	(1.33)
Observations	392	388	386	383	372
Adjusted R^2	0.166	0.177	0.183	0.189	0.184

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Tobacco				
Mkt-Rf	0.593***	0.633***	0.680***	0.682***	0.682***
	(10.03)	(10.49)	(10.84)	(10.82)	(10.24)
SMB		-0.198*	-0.150	-0.151	-0.144
		(-2.05)	(-1.53)	(-1.53)	(-1.43)
HML			0.244*	0.241*	0.247*
			(2.50)	(2.46)	(2.49)
MOM				-0.0389	-0.0417
				(-0.64)	(-0.67)
Non-traded liquidity factor					-0.944
					(-0.19)
Alpha	0.839**	0.858**	0.709*	0.741*	0.754*
	(3.07)	(3.14)	(2.55)	(2.57)	(2.55)
Observations	392	388	386	383	372
Adjusted R^2	0.203	0.218	0.230	0.230	0.225

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Agriculture				
Mkt-Rf	0.659***	0.648***	0.681***	0.677***	0.627***
	(10.11)	(9.70)	(9.73)	(9.63)	(8.49)
SMB		0.0966	0.130	0.137	0.112
		(0.90)	(1.19)	(1.24)	(1.01)
HML			0.169	0.172	0.164
			(1.55)	(1.57)	(1.49)
MOM				-0.00273	0.0125
				(-0.04)	(0.18)
Non-traded liquidity factor					13.02*
					(2.39)
Alpha	0.636*	0.700*	0.600	0.570	0.570
	(2.11)	(2.31)	(1.94)	(1.78)	(1.74)
Observations	392	388	386	383	372
Adjusted R^2	0.206	0.207	0.210	0.207	0.215

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Weapons				
Mkt-Rf	0.776***	0.749***	0.823***	0.823***	0.751***
	(10.04)	(9.41)	(9.98)	(9.92)	(8.63)
SMB		0.165	0.251	0.250	0.213
		(1.30)	(1.95)	(1.93)	(1.62)
HML			0.401**	0.399**	0.397**
			(3.13)	(3.10)	(3.06)
MOM				-0.0183	0.0118
				(-0.23)	(0.15)
Non-traded liquidity factor					17.10**
					(2.66)
Alpha	0.427	0.448	0.239	0.256	0.202
	(1.19)	(1.24)	(0.66)	(0.68)	(0.52)
Observations	392	388	386	383	372
Adjusted R^2	0.203	0.202	0.220	0.217	0.225

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Industrial Engineering				
Mkt-Rf	0.813***	0.792***	0.858***	0.862***	0.838***
	(12.06)	(11.40)	(11.93)	(11.94)	(11.01)
SMB		0.153	0.216	0.210	0.196
		(1.38)	(1.93)	(1.86)	(1.71)
HML			0.336**	0.332**	0.330**
			(3.01)	(2.96)	(2.91)
MOM				-0.0333	-0.00919
				(-0.48)	(-0.13)
Non-traded liquidity factor					3.280
					(0.58)
Alpha	0.646*	0.668*	0.459	0.496	0.473
	(2.07)	(2.12)	(1.44)	(1.50)	(1.40)
Observations	392	388	386	383	372
Adjusted R^2	0.270	0.270	0.287	0.287	0.279

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$