# CAN NAUGHTY BE NICE FOR INVESTORS:
## A MULTI-FACTOR EXAMINATION OF VICE STOCKS

GREG M RICHEY

This article examines the return characteristics of a portfolio of US 'vice stocks', firms that manufacture and sell socially irresponsible products such as alcohol, tobacco, gaming services and national defense. First of all, I construct a portfolio using the daily returns of 41 vice stocks over the period October 2007 to October 2013 and find the Jensen's alpha (CAPM), Fama-French Three Factor and Carhart Four-Factor results for the entire portfolio, the entire portfolio during bear and bull markets, and each vice industry individually. Full-period results show a positive, yet insignificant alpha for the entire portfolio and each vice industry. Bear market results show a positive and significant alpha for the entire portfolio as well as for all industry portfolios except the tobacco industry. Bull market results for the portfolio are less conclusive with a significant alpha only in the three and four-factor models.

## 1 INTRODUCTION

Searching for strategies to outperform the market portfolio have been occurring since Markowitz (1952), in some ground-breaking research on corporate finance theory, found that investors could construct an optimal portfolio by exclusively considering assets based on a combination of risk and return, while disregarding the origination of the elements of risk and return in the portfolio of risky assets. Essentially, Markowitz's research assumed a portfolio based on the variance of the assets' returns and did not identify the underlying causes of volatility. Subsequently, since Markowitz, corporate finance theory, and investment theory in particular, has continued to evolve by considering different factors of risk. As a result, from Markowitz to Sharpe (1964) to Fama & French (1992, 1993) to Carhart (1997) finance theory continues to broaden and breakdown the elements of risk in order to project the expected (required) return on a portfolio of assets.

Along the way, investment professionals and academics alike have broken away from the traditional investment models in order to consider other possible elements or strategies in portfolio construction, evaluation, and performance. One strategy that has arisen in investment models is the adherence social norms, psychological biases, and other factors to measure risk and return in order to earn abnormal returns and 'beat' the market. In the social sciences, the idea of making choices in the corporate world according to social norms has existed for quite some time and has even taken precedence over the focus on profits. According to Becker (1957), employers ('agents' in Becker's model) who discriminate against particular types of people suffer financial costs from their decisions not to hire or conduct business with certain groups.

Subsequently, Romer (1984), while critiquing Akerlof's (1980) theory of social customs, contends that unprofitable social conditions may exist and sanctions against the violators depend on the size of the violation. Essentially, these theories argue that agents bear an opportunity cost by adhering to a social norm or focusing on profit, which may be mutually exclusive at times. The aforementioned theories also provide a new arena into the investing effects of social norms, whereby investment managers attempt to outperform the stock market by creating a portfolio based on the notions of social customs or values.

One of the most popular methods of non-traditional investing has been the emergence of Socially Responsible Investing (SRI), whereby investment professionals construct portfolios of firms that do not engage in the production of tobacco, alcohol, or gaming activities. These 'ethical funds' employ 'sin' screens which include screening firms on an exclusionary (or negative) basis and on a qualitative (or positive) basis Kinder and Domini (1997). According to the Forum for Sustainable and Responsible Investment (2011), which represents SRI in the U.S., SRI can be defined as 'an investment process that considers the social and environmental consequences of investments, both positive and negative'. The trend to invest in socially responsible firms has caught on, and from 2007 to 2011, Socially Responsible Investing assets increased more than 13% while all investments managed increased by only 1% in terms of total assets managed in the investment universe. In fact, the report states that 12.2% of all assets under management ($3.7 trillion out of $25.2 trillion) constitute Socially Responsible Investments. Previous empirical studies on SRI dates back to Moskowitz (1972) and haven't provided positive results. According to Schroder (2007), SRI investments do not exhibit a superior risk-adjusted return or outperform the market. Hamilton et al. (1993) and Statman (2000) concluded that the performance of socially responsible mutual funds do not statistically differ from the performance of conventional or traditional mutual funds. However, Moskowitz (1972) suggested that strong social performance may improve the relationship of a firm and its stakeholders, thereby reducing costs. This conclusion hints at possible research into utility from non-monetary (or financial) gains, which may be a driving force in Socially Responsible Investing.

On the contrary, an even newer investing niche has emerged, one that focuses on the violation of social norms — 'vice investing' or 'sin investing'. This investment strategy entails a direct contrast to Socially Responsible Investing by investing heavily in firms that are screened by SRI funds and investment managers. Vice investors focus primarily on the 'Sin Triumvirate': tobacco, alcohol, and gambling (gaming) stocks. Investors in 'vice' bet that the cash flows and defensive nature of these industries provide risk-adjusted abnormal returns when compared to a benchmark. One possible drawback of vice investing is the lack of mutual funds and hedge funds that employ investing in vice-related industries as a dominant strategy of investor focus. In fact, only one such mutual fund, the Vice Fund (VICEX), can be categorised as a true investment dedicated to vice industries. This niche may have evolved from Merton's (1987) 'neglected stock' theory, which states that firms with a smaller investor base will be followed by fewer analysts and thus provide a higher return for investors. Merton does not state neglected stocks lack the quality of information, only the quantity of information from the missing coverage. My research focuses on a category of neglected or screened stocks, and examines the traditional performance measure of a portfolio constructed of firms from 'sin' or 'vice' related industries. I employ Jensen's alpha, the Fama-French Three-Factor model and the Carhart Four-Factor Model in an attempt to determine if a portfolio of vice stocks outperforms (on a risk-adjusted basis) the S&P 500, an index of the 500 largest U.S. based firms and a benchmark to measure the market portfolio of risky stocks. In addition, I attempt to determine how the individual vice industries have performed against the market portfolio as well as if the industries' performance holds during bear and bull markets. My findings should provide academics and practitioners with further research ideas and investment strategies alike.

The remainder of this paper is organised as follows: Section 2 provides a literature review of vice investing. Section 3 describes the data. Section 4 presents the methodology. The empirical results are presented in Section 5. Finally, Section 6 provides concluding remarks.

## 2 LITERATURE REVIEW

Although an abundance of literature exists on specialty mutual funds such as Socially Responsible Investments, the amount of research dedicated to 'Sin Investing' remains limited in both quantity and theoretical relevance. In fact, all of the articles dedicated to the market performance of sin stocks reflect an empirical approach or borrow a theory and apply it to the realm of vice investing. In many regards considered a seminal paper, authored by Chong, Her and Phillips (2006), the scholars use the traditional performance measures to evaluate the Vice Fund and then apply a generalised autoregressive conditional heteroskedacticity (GARCH (1, 1)) model. The authors find the Vice Fund outperformed the Domini Social Equity Fund (the benchmark for socially responsible investing) over a three-year period from 2002-2005.

Other researchers have built on Chong, Her and Phillips (2006) with various results. In the most theoretical work on vice stocks to date, Hong and Kacperczyk (2008) use data from 1965¬–¬2004 and find sin stocks outperform their benchmarks by up to 30 basis points per month. They find no systematic relationship between vice stock returns and the association of litigation risk, which states vice stocks generate a higher return to compensate investors for the risk of the firms being sued. Hong and Kacperczyk (2008) also conclude that vice stocks are underpriced due to neglect by institutional investors who lean on the side of Socially Responsible Investing. Moreover, they find the defensive nature rests in the addictive nature of the products produced by vice industries. In a paper that focused on one 'sin', Goodall (1994) researched gaming stocks and finds these firms to be more sensitive to market downturns than to upswings in the stock market. Intuitively, casino patrons gamble less during economic downturns and bear markets, yet do not increase gambling consumption during times of prosperity. Goodall's finding seems plausible and follows Kahneman and Tversky's (1979) Prospect Theory, which states that investors are more sensitive to losses than they are to gains.

In another study, Salaber (2009) finds that sin stocks earn an excess return relative to the overall market, but that the excess return disappears when sin stocks are compared to a portfolio of stocks with similar defensive characteristics. Furthermore, Salaber concludes that sin stocks outperform during market downturns but underperform during market upswings. Hoepner and Zeume (2009) use a time series approach and find the Vice Fund's abnormal return does not statistically differ from zero. Hoepner and Zeume also state that the Vice Fund's management team possesses value-destroying trading and crisis management skills. They show that the Vice Fund's management's trading instability to be statistically significant at the 1% level over a six-year sample period. However, Fabozzi, Ma, and Oliphant (2008) concluded that sin stocks outperform the market in terms of both magnitude and frequency. They identify the main reason for the outperformance of sin stocks lies in not abiding to or upholding implicit or explicit costly social standards.

Areal, Cortez and Silva (2010) use data from 1993¬–2009 and find the 'irresponsible fund' outperforms the market when volatility is low, but underperforms the benchmark during high-volatility regimes. They attribute the results to changing risk throughout the period. They conclude the 'irresponsible fund' exhibits a higher level of systematic risk (beta) in low volatility regimes, a lower level of systematic risk in high volatility regimes, and deserves further research. Visaltanachoti et al. (2009) compute Jensen's alpha and Tobin's Q with a portfolio of Chinese and Hong Kong sin stocks and show that the sin stocks outperformed their indexes in both China and Hong Kong over the period 1995–2007.

Finally, Durand et al. (2013) focus on social norms (individualism and collectivism) and examine sin stocks in seven Pacific-Basin markets. They find that 'substantial shareholders' are less likely to hold sin stocks in nations that have cultural norms which are different from those in the U.S. They also find that sin stocks generate negative risk-adjusted returns in the markets covered.

## 3 DATA

Using daily stock return data from CRSP (Center for Research in Securities Prices) over the period October 2007 to October2013, I examine the performance of a vice portfolio constructed of 41 corporations. For my vice portfolio selection, I understand that the definition of 'sin' may be ambiguous or subjective at best, depending on one's social norms, upbringing, or cultural values; therefore, I start with the 'Triumvirate of Sin' used in Hong and Kacperczyk (2009). These firms are chosen from alcohol, tobacco and gambling industries which are listed on the New York Stock Exchange, NASDAQ, or NASDAQ OTC. I also add defense firms to complete my portfolio of vice stocks. I base this decision on the notion that defense stocks become profitable during times of conflict, which aptly fits the definition of sin. Following Fama & French (1997), I select the firms based on Standard Industry Classification (SIC) code. I exclude privately-owned firms and foreign firms unless they can be purchased on an American exchange through and American Depository Receipt (ADR). Furthermore, I have decided not to include firms in the (adult) entertainment industry due to the small number of publicly-traded firms that provide such products or services. For clarity, Appendix I presents the firms held in the ViceFund alphabetically, along with ticker symbol and industry. Table 1 presents the total number of firms in the portfolio by industry.

**Table I. Vice Fund Portfolio By Industry**

| No of Firms | Alcohol | Tobacco | Casinos/ Gambling | Defense | Total |
|---|---|---|---|---|---|
| | 14 | 9 | 9 | 9 | 41 |
| Total | 14 | 9 | 9 | 9 | 41 |

Table 2 below presents the summary statistics of my 'ViceFund' and each of the vice industries over the sample period. The daily return data over the sample period yield a sample size of 1511 observations. The table shows the daily mean return of the portfolio at 0.000156% (or 5.7% per annum) is higher than that of the S&P 500 (0.0001379% mean daily return), and its standard deviation of returns is also tighter (0.0118% vs. 0.0155%) over the sample size. These summary statistics give the first glimpse that indicates the performance regressions may show a higher risk-adjusted return for the ViceFund over its benchmark. For clarity, I create the following abbreviations for each vice industry: AlcFund (alcohol index), TobFund (cigarettes and tobacco index), GamFund (casino and gaming services index), and DefFund (defense industry index). Furthermore, I hereafter refer to the complete portfolio of vice stocks as ViceFund.

**Table 2. Descriptive Data of Each Vice Industry Portfolio**

| | ViceFund | AlcFund | TobFund | GamFund | DefFund |
|---|---|---|---|---|---|
| No. of Obs. | 1511 | 1511 | 1511 | 1511 | 1511 |
| Mean Return | 0.000156 | 0.0003165 | 0.0002415 | -0.000393 | 0.0001911 |
| Standard Deviation | 0.011753 | 0.0106736 | 0.0136428 | 0.025781 | 0.0152007 |
| Skewness | -0.531513 | -0.525147 | -0.322229 | 0.059936 | -0.1948602 |
| Kurtosis | 8.01672 | 9.671351 | 10.75789 | 9.522324 | 8.076477 |

**Figure 1**

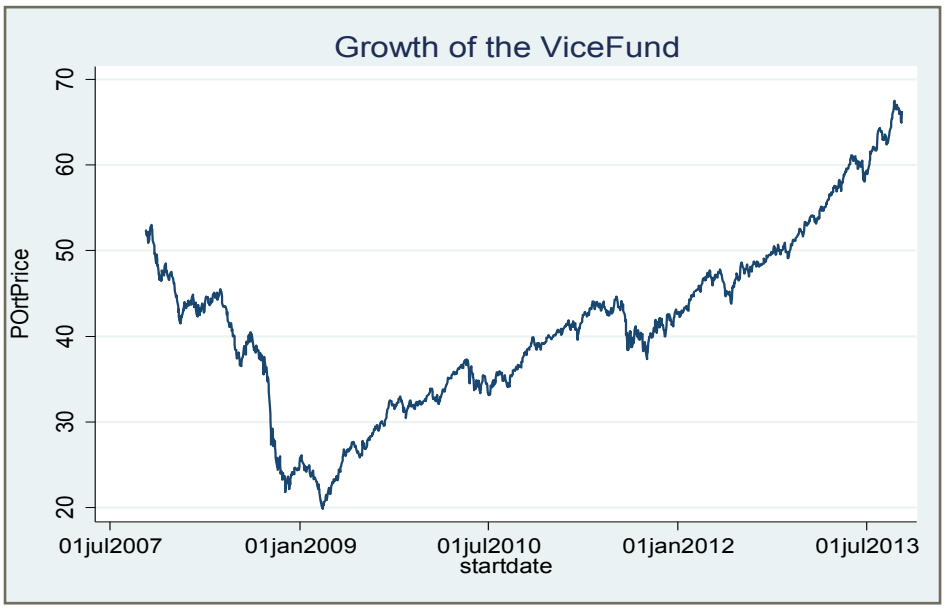
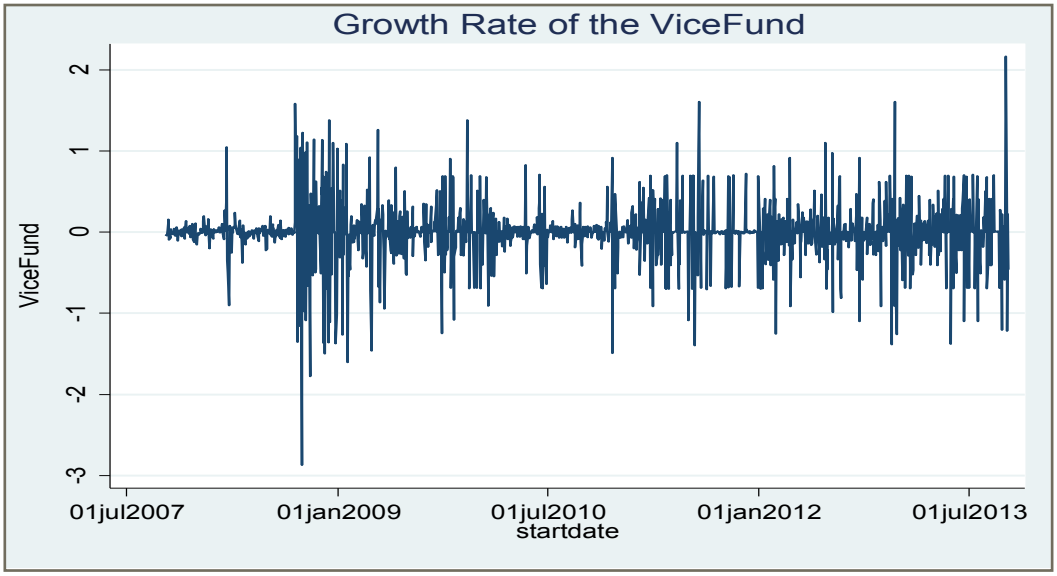



Figure 1 shows the performance of the equally-weighted ViceFund from October 2007 to October 2013. The series obviously lacks stationarity and has a unit root, so I construct the rate of growth of the log daily returns by ln(Pt / Pt-1) where Pt represents the closing price at time t and Pt-1 represents the closing price from the previous day. The results of the daily Vice Fund returns, which appear stationary, are shown in Figure 2 below. I confirm the stationarity by conducting an augmented Dickey-Fuller test and the resulting Z-statistic yields -10.457, so I can reject the null hypothesis of the presence of a unit root and accept the alternative hypothesis that the series is stationary. Now, I proceed to the methodology to determine if an abnormal return exists for 'Vice' investors.

**Figure 2**




## 4 METHODOLOGY

### 4. 1 Jensen's Alpha

I begin with Jensen's alpha method to measure the financial performance of the portfolio of sin, or vice stocks. Pioneered by Michael Jensen (1968) to assess the performance of mutual fund managers, Jensen's alpha is a performance measure based on the Sharpe-Lintner (Sharpe, 1964; Lintner, 1965) Capital Asset Pricing Model (CAPM), which uses beta, or an asset's volatility relative to the market portfolio, as a measure of risk, and assumes asset returns are driven by their degree of systematic risk (Sharpe, 1964). Jensen suggests that a portfolio's financial performance can be approximated by its systematic return component unexplained by the overall market portfolio return. With the S&P 500 as a proxy for the market portfolio and a benchmark for the vice stock portfolio, Jensen's alpha can be described as follows:

$$r_{p,t} = \alpha_p + [r_{ft} + \beta (r_{mt} - r_{ft})] + \varepsilon_{i,t} \quad (1)$$

Where $r_{i,t}$ is the rate of return on asset $i$ at time $t$, $rf_t$ denotes the risk-free rate of return, based on the continuously compounded daily return of 90-day U.S. Treasury Bills, and $r_{mt}$ denotes the continuously compounded daily returns of the S&P 500 Composite Index. Subtracting $r_{ft}$ from $r_{mt}$ gives the *Market Risk Premium*, or the expected return above the risk-free rate that an investor would receive by investing in the market portfolio. The coefficient $\boldsymbol{\beta}$ represents the asset's systematic risk of being exposed to the return of the market portfolio during the sample period and $\boldsymbol{\varepsilon_{p,t}}$ represents a well-behaved random disturbance term with mean zero. Finally, alpha ($\alpha_i$) represents the abnormal market performance of the asset on a risk-adjusted basis. Alpha measures the performance of a portfolio or stock $i$ earned above (if alpha is positive) or below (if alpha is negative) a diversified market portfolio of risky assets formed with some combination of stocks and the risk-free asset. As a result, we can rewrite the measure to solve for alpha in equations (2) & (3), where, intuitively, alpha equals the abnormal return of the portfolio, or the actual return of the portfolio minus its expected or required return:

$$\alpha_p = Actual\ Return - Expected\ return \quad (2)$$

$$\alpha_p = r_{pt} - [r_{ft} + \beta (r_{mt} - r_{ft})] + \varepsilon_{p,t} \quad (3)$$

Next, if I rearrange the terms slightly, I can generate the time-series regression equation:

$$r_{pt} - r_{ft} = \alpha_p + \beta (r_{mt} - r_{ft}) + \varepsilon_{p,t} \quad (4)$$

### 4.2 Fama French Three-Factor Model

Since the discovery of CAPM, it has been widely used in empirical finance; however, the model's development in the theoretical literature has also continued to evolve and provide academics with other factors which may explain stock returns beyond systematic risk. One such development is the Fama-French Three Factor Model, which extends CAPM by including two additional factors beyond systematic risk, *SMB* (Small minus Big) and *HML* (High minus Low). Fama and French designed the SMB factor to incorporate the risk factors related to firm size and designed the HML factor to include the risk inherent in firm value. Fama and French state that using these two additional factors provides greater explanatory power over the original CAPM in evaluating stock performance. The specification of the three-factor model regression is as follows:

$$r_{p\,t} - r_{ft} = \alpha_p + \beta (r_{mt} - r_{ft}) + \gamma_p SMB + \delta_p HML + \varepsilon_{p,t} \quad (5)$$

Where $r_{p,t} - r_{ft}$ represents the return of the portfolio less the risk-free rate for the period $t$, $r_{mt}$ is the return on the market portfolio (the S&P Index), SMB is the size factor and HML gives the growth factor, and $\varepsilon_{p,t}$ represents a random disturbance term. The symbols $\beta$, $\gamma$ *and* $\delta$ represent the coefficients for their respective variables. Finally, $\alpha$

Obtained from Kenneth French's Data Library, the SMB & HML factors provide the evidence that the traditional CAPM fails to incorporate. The SMB factor, used to incorporate risk associated with firm size and shown in equation 5-a, is constructed by subtracting the average return of three constructed 'big' portfolios from the average returns of three constructed 'small' portfolios. In order to determine what constitutes 'big' or 'small', Fama & French (1993) rank firms on the NYSE according to size and the median size of these NYSE firms is used to separate all NYSE, NASDAQ and AMEX firms into the categories 'big' and 'small'. Next, all of the firms are grouped according to their book-to-market equity (BE/ME) ratios. The first group (Growth) is comprised of stocks in the lowest 30%. According to Fama & French (1993), these 'Growth' stocks are associated with persistently high earnings (EPS) and possess low book-to-market equity ratios, indicating a high stock price relative to book value. The middle group (Neutral) represents firms in the middle 40% and the remaining 30% are grouped into the highest (Value) category. Fama & French (1993) then use the two size portfolios and three value portfolios to create the *SMB* factor shown below:

*SMB = 1/3 (Small Value + Small Neutral + Small Growth) - 1/3(Big Value + Big Neutral + Big Growth)* (5-a)

Fama & French continue with the previously mentioned portfolio designations to construct the HML factor, shown in equation 5-b, which measures the return risk undertaken by an investment based on 'Value' or 'Growth' strategies.

*HML = 1/2(Small Value + Big Value) - 1/2(Small Growth + Big Growth)* (5-b)

### 4.3 Carhart Model

Carhart (1997) expands the Fama-French Three-Factor Model to include a momentum, or 'hot hand' factor. Based on Jegadeesh and Titman (1993), the momentum factor argues that investors can achieve superior performance by buying stocks that have performed well in the past 3–12 months (winners) and selling stocks that have performed poorly in the last 3–12 months (losers). Momentum data collected from Kenneth French's website are based on six value-weighted portfolios formed on size and prior (2–12) returns. The portfolios, formed daily from NYSE, AMEX, and NASDAQ stocks with prior return data are the intersections of 3 portfolios formed on size (market equity) and 3 portfolios formed on the prior 2–12 month returns. French indicates the daily size breakpoint is the median NYSE market equity and the daily prior 2-12 month return breakpoints are the 30th and 70th NYSE percentiles; therefore, the momentum factor is computed as follows:

*MOM* = 1/2 (Small High + Big High) - 1/2(Small Low + Big Low). (5-c)

The final model to indicate the performance of vice investing will be tested as follows using the Carhart Four-Factor Model:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_p (r_{mt} - r_{ft}) + \gamma_p SMB + \delta_p HML + \mu_p MOM + \varepsilon_{p,t} \quad (6)$$

Where:

$r_{pt}$ = the return on the equal-weighted vice portfolio on day *t*

$r_{ft}$ = the return on a thirty-day t-bill on day *t*

$r_{mt}$ = the return on the S&P 500 index on day *t*

*SMB* = the difference between the return on a small-cap portfolio on day *t* and the return on a large-cap portfolio on day *t*

*HML* = the difference between the return on a high book-to-market portfolio on day *t* and the return on a low book-to-market portfolio on day *t*

*MOM* = the return on the two high prior return portfolios minus the average return on the two low prior return portfolios

$\alpha_p$ = the risk-adjusted excess return on the equal weighted portfolio

$\beta_p$ = the sensitivity of the excess return on the equal-weighted vice portfolio to the excess return of the market portfolio

$\gamma_p$ = the sensitivity of the excess return on the equal-weighted vice portfolio to the size factor

$\delta_p$ = the sensitivity of the excess return on the equal-weighted vice portfolio to the value factor

$\mu_p$ = the sensitivity of the excess return on the equal-weighted vice portfolio to the momentum factor

$\varepsilon_{p,t}$ = random error term

## 5 EMPIRICAL RESULTS

### 5.1 Vice Stock Portfolio Results

I regress each of the vice industries as well as the total vice portfolio using ordinary least squares (OLS) with heteroskedasticity-robust standard errors. I begin by arranging the 41 individual vice stocks into an equally-weighted portfolio. Ignoring transaction, or brokerage costs, I perform a regression for the sin-focused ViceFund portfolio. The null hypothesis, $H_0$: $\alpha = 0$, states that the portfolio does not provide a risk-adjusted abnormal return for investors (market efficiency). The results of the portfolio regression, as well as the Vice industry regressions, are presented in Table 3.

**Table 3. Regression Results of the ViceFund and Industry Portfolios**

| Excess Return of Vice Fund | Alpha | $R_m - R_f$ | SMB | HML | MOM |
|---|---|---|---|---|---|
| ViceFund: Jensen | 0.00002 | 0.99956*** | | | |
| | (0.00020) | (0.00099) | | | |
| ViceFund: Fama-French | 0.00002 | 0.99977*** | 0.00093 | -0.00377*** | |
| | (0.00018) | (0.00083) | (0.00074) | (0.00045) | |
| ViceFund: Carhart | 0.00002 | 0.99987 | 0.00091 | -0.00228*** | 0.00139*** |
| | (0.00018) | (0.00080) | (0.00072) | (0.00052) | (0.00027) |
| AlcFund: Jensen | 0.00031 | 0.99852*** | | | |
| | (0.00274) | (0.00076) | | | |
| AlcFund: Fama-French | 0.00027 | 0.99848*** | 0.00221*** | 0.00448*** | |
| | (0.00026) | (0.00072) | (0.00042) | (0.00037) | |
| AlcFund: Carhart | 0.00026 | 0.99859*** | 0.00223*** | 0.00273*** | 0.00165*** |
| | (0.00026) | (0.00099) | (0.00071) | (0.00071) | (0.00038) |
| TobFund: Jensen | 0.00010 | 1.0008*** | | | |
| | (0.00025) | (0.00088) | | | |
| TobFund: Fama-French | 0.00009 | 1.0011*** | 0.00142*** | -0.00365*** | |
| | (0.00024) | (0.00084) | (0.00054) | (0.00061) | |
| TobFund: Carhart | 0.00010 | 1.00125*** | 0.00140*** | -0.00143*** | 0.00209*** |
| | (0.00024) | (0.00080) | (0.00080) | (0.00060) | (0.00031) |
| GamFund: Jensen | -0.00039 | 1.00002*** | | | |
| | (0.00066) | (0.00251) | | | |
| GamFund: Carhart | -0.00061 | 1.0001*** | 0.00971*** | 0.00680*** | -0.00689*** |
| | (0.00056) | (0.00206) | (0.00160) | (0.00147) | (0.00085) |
| DefFund: Jensen | 0.00019 | 0.99919*** | | | |
| | (0.00039) | (0.00165) | | | |
| DefFund: Fama-French | 0.00126 | 0.99923*** | 0.00258** | 0.00781*** | |
| | (0.00037) | (0.00151) | (0.00130) | (0.00074) | |
| DefFund: Carhart | 0.00011 | 0.99945*** | 0.00262*** | 0.00444*** | -0.00316*** |
| | (0.00036) | (0.00144) | (0.00124) | (0.00099) | (0.00036) |

*Note: The symbols ** and *** represent significance at the 5% and 1% levels, respectively.*

Empirical results in Table 3 show the portfolio of vice stocks outperforms the market index (S&P 500); however, unlike results in Hong & Kacperczyk (2009) and Salaber (2007) the alpha is not statistically significant at any level. The alpha remains positive yet insignificant for the Fama-French and Carhart regressions for the entire ViceFund as well as the various industry funds, except the GamFund (Gaming stocks) which yields a negative alpha, indicating underperformance of the gaming industry against the market portfolio on a risk-adjusted basis for the sample period. Furthermore, the beta coefficient on the portfolio of vice stocks, statistically significant with a coefficient of 0.99956, indicates the portfolio exhibits slightly less volatility or risk than the S&P 500 Index, which by definition has a beta equal to one. In addition, SMB, HML and MOM variables return statistically significant results for the total portfolio and the specific vice industry portfolios, all at the 1% level, implying a these factors explain the performance of the vice portfolios. Finally, I cannot reject the null hypothesis that the portfolio of vice stocks outperforms the market portfolio on a risk-adjusted basis. These results contrast those of most vice/sin stock research.

### 5.2 Vice Stock Performance in a Bear Market

The results from the bear market test in Table 4 show that the ViceFund underperformed the market index on a risk-adjusted basis by returning an alpha equal to -0.00048%. This equates to an annual underperformance of vice stocks versus the market portfolio by approximately -1.75%, yet the results for the portfolio are not significant. This result may provide some evidence to refute the inelastic stereotype of vices; that is, consumers do not reduce consumption of sin products during economic downturns. Vice industry results during the bear market yield more robust results. The AlcFund underperformed the market with a daily alpha of -0.00223%, which was significant at the 1% level in all three regressed models. Interestingly enough, the only industry to outperform the market during the downturn was the TobFund. This performance could be attributed to the rapid growth of cigarette smoking in developing nations, whereby tobacco is viewed as a growth industry. Finally, in all regressed industries, I find the alpha decreases in the three and four-factor models. This occurs from the explanatory power of the SMB, HML, and Momentum factors, all of which are significant except the HML coefficient in the four-factor regression of the GamFund industry. Finally, these results may provide a foundation to refute the notion of vice stocks possessing a defensive nature in the event of an economic contraction. Obviously, it's one's wish to overweight a portfolio with vice stocks during 'good' times and alternatively underweight sin in portfolios during 'bad' times. This strategy, however, obviously raises the concern or risk of market timing.

### 5.3 Vice Stock Performance in a Bull Market

The regression results of the ViceFund and each industry portfolio over the bull market from March 2009 to the present (October 2013) are presented in Table 5 below. Unsurprisingly, the alphas for each of the vice industries, excluding the TobFund as well as the entire ViceFund, came back with positive alphas, indicating a return to spending on vice while 'times are good'. The Fama-French regressions returned a significant alpha for the ViceFund throughout the bull-market period. The Small minus Big and High minus Low variables from the three-factor model returned statistically significant coefficients for all portfolios except the TobFund, which had an insignificant SMB variable, implying that investors in tobacco are not rewarded for undertaking the risk inherent in small firms. Finally, variables from the four-factor model yielded significant Fama-French factors; however, the momentum variable came back insignificant in the AlcFund and DefFund regressions. Furthermore, in the AlcFund regression, the alpha coefficient turns insignificant with the addition of the fourth factor, indicating a lack of momentum in the purchase of alcohol-related stocks. Interestingly, the alcohol and gaming industries had the largest effect on the vice portfolio with daily abnormal returns of 0.00109% and 0.00122% respectively, and each significant at at least the 10% level.

Obviously, the wealth effect from the market upswing played a role in consumption of alcoholic beverages and gambling, yet is hardly noticeable in the tobacco industry, which returned an insignificant alpha coefficient. Surprisingly, in two of the industry regressions (AlcFund and DefFund), the momentum factor of the Carhart Model came back insignificant and had little change on the alpha. The Fama-French factors, SML and HML, returned mixed signs throughout the regression, thus leaving opportunity for further research that focuses primarily on the return characteristics of specific sin, or vice industries.

## 6 CONCLUSION

This paper employs three traditional, multi-factor performance regressions: Jensen's alpha, the Fama-French Three-Factor Model and the Carhart Four-Factor Model to analyze the performance of a portfolio of "vice" stocks from several industries. My results are similar to those of Visaltanachoti et al. (2009) and Hoepner & Zeume (2009) in terms of vice funds containing a positive Jensen's alpha, indicating an abnormal return for the given level of systematic risk. However, more research needs to be undertaken to examine the impact that the Fama-French and Carhart variables have on the performance of vice stocks. Hoepner & Zeume's (2009) as well as Hong and Kacperczyk's (2008) work appear to be solid candidates for the foundation of a theoretical perspective on Vice Investing in order to catch up with that of Socially Responsible Investing. This research on vice stocks is worth undertaking as it has been shown in numerous articles to provide investors with lucrative or abnormal returns.

**Table 4. Bear Market Results from Vice Portfolios (Oct 2007 – Mar 2009)**

| Excess Return of Vice Fund | Alpha | $R_m - R_f$ | SMB | HML | MOM |
|---|---|---|---|---|---|
| ViceFund: Jensen | -0.00048 | 0.99949*** | | | |
| | (0.00065) | (0.00280) | | | |
| ViceFund: Fama-French | 0.00065 | 1.00032*** | 0.00344*** | -0.00331*** | |
| | (0.00060) | (0.00216) | (0.00158) | (0.00082) | |
| ViceFund: Carhart | -0.00077 | 1.0002*** | 0.00363*** | 0.00004 | 0.00254*** |
| | (0.00058) | (0.00209) | (0.001520 | (0.00125) | (0.00059) |
| AlcFund: Jensen | -0.00223*** | -0.99564*** | | | |
| | (0.00076) | (0.00256) | | | |
| AlcFund: Fama-French | -0.00203*** | -0.99609*** | -0.00202* | 0.00385*** | |
| | (0.00072) | (0.00244) | (0.00123) | (0.00097) | |
| AlcFund: Carhart | -0.00184*** | 0.99604*** | -0.00233*** | -0.00158 | -0.00412*** |
| | (0.00067) | (0.00228) | (0.00105) | (0.00119) | (0.00059) |
| TobFund: Jensen | 0.00087 | 1.0016*** | | | |
| | (0.00074) | (0.00210) | | | |
| TobFund: Fama-French | 0.00074 | 1.00275*** | 0.00452*** | -0.00248*** | |
| | (0.00070) | (0.00197) | (0.00102) | (0.00100) | |
| TobFund: Carhart | 0.00059 | 1.00269*** | 0.00476*** | 0.00189* | 0.00331*** |
| | (0.00066) | (0.00176) | (0.000920) | (0.00113) | (0.00052) |
| GamFund: Jensen | -0.00566*** | -1.00393*** | | | |
| | (0.00120) | (0.00668) | | | |
| GamFund: Fama-French | 0.00479*** | -1.00179*** | 0.00745** | 0.017718*** | |
| | (0.00169) | (0.00515) | (0.00371) | (0.00197) | |
| GamFund: Carhart | -0.00428*** | -1.00162*** | 0.00662** | 0.00292 | -0.01123*** |
| | (0.00151) | (0.00453) | (0.00331) | (0.00294) | (0.00153) |
| DefFund: Jensen | -0.00232** | -0.99704*** | | | |
| | (0.00114) | (0.00437) | | | |
| DefFund: Fama-French | -0.00198* | -0.99817*** | -0.00484** | 0.00660*** | |
| | (0.00105) | (0.00357) | (0.00229) | (0.00125) | |
| DefFund: Carhart | -0.00164* | -0.99805*** | -0.00541*** | -0.00336* | -0.00756*** |
| | (0.00092) | (0.00316) | (0.00193) | (0.00176) | (0.00084) |

**Table 5. Bull Market Results from Vice Portfolios (Mar 2009 – June 2013)**

| Excess Return of Vice Fund | Alpha | $R_m - R_f$ | SMB | HML | MOM |
|---|---|---|---|---|---|
| ViceFund: Jensen | 0.00017 | 0.99961*** | | | |
| | (0.00016) | (0.00536) | | | |
| ViceFund: Fama-French | 0.00027* | 0.99983*** | -0.00088** | -0.00397*** | |
| | (0.000150) | (0.00042) | (0.00041) | (0.00037) | |
| ViceFund: Carhart | 0.00029* | 0.99995*** | -0.00091** | -0.00326*** | 0.00087*** |
| | (0.00015) | (0.00041) | (0.00040) | (0.00032) | (0.00023) |
| AlcFund: Jensen | 0.00109*** | -0.99989*** | | | |
| | (0.00027) | (0.00083) | | | |
| AlcFund: Fama-French | 0.00090*** | -1.0001*** | 0.00538*** | 0.00449*** | |
| | (0.00023) | (0.00075) | (0.00056) | (0.00055) | |
| AlcFund: Carhart | 0.00089*** | -1.0001*** | 0.00538*** | 0.00431*** | -0.00020 |
| | (0.000240) | (0.00075) | (0.00056) | (0.00062) | (0.00038) |
| TobFund: Jensen | -0.00013 | 1.00047*** | | | |
| | (0.00024) | (0.00082) | | | |
| TobFund: Fama-French | 0.00004 | 1.00072*** | -0.00064 | -0.00440*** | |
| | (0.00023) | (0.00072) | (0.00049) | (0.00062) | |
| TobFund: Carhart | 0.00001 | 1.0009*** | -0.00061* | -0.00305*** | 0.00165*** |
| | (0.00022) | (0.00007) | (0.00047) | (0.00054) | (0.00035) |
| GamFund: Jensen | 0.00122* | -0.99802*** | | | |
| | (0.00062) | (0.00191) | | | |
| GamFund: Fama-French | 0.00081* | -0.99852*** | 0.11606*** | 0.010066*** | |
| | (0.00053) | (0.00178) | (0.00126) | (0.00132) | |
| GamFund: Carhart | 0.00071 | -0.99898 | 0.01176*** | 0.00729*** | -0.00339*** |
| | (0.00055) | (0.00179) | (0.00126) | (0.00137) | (0.00089) |
| DefFund: Jensen | 0.00095*** | -1.0002*** | | | |
| | (0.00037) | (0.00111) | | | |
| DefFund: Fama-French | 0.00064** | 1.0006*** | 0.00799*** | 0.00802*** | |
| | (0.00032) | (0.00088) | (0.00073) | (0.00074) | |
| DefFund: Carhart | 0.00062** | -1.00071*** | 0.00802*** | 0.00747*** | -0.00067 |
| | (0.00062) | (0.00087) | (0.00073) | (0.00079) | (0.00052) |

*Note: The symbols *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.*

In addition, as values change and the social, economic, and political climates become more averse to sin, we may see more industries added to expand the 'Sin Triumvirate'. For example, in the future, when more funds emerge to focus on vice investing, the portfolio managers may consider firearm or sugary soda-pop manufacturers in their portfolio selection. On the other hand, some industries may be deleted from the definition of sin, as these 'vices' become more accepted. An increase in the industries that constitute sin would also serve to reduce the main disadvantage of vice investing—that it possesses a greater amount of risk than a typical mutual fund because of the lack of diversification. On the contrary, as social norms change, society may come to view previously sinful products and industries as acceptable, thus again redefining the definition of what constitutes vice investing. Just like any other type of investment niche or strategy, sin investing (and Socially Responsible Investing) will have to evolve over time in order to remain relevant.

In sum, modern portfolio theory generally considers diversification to occur with about 40 randomly-selected securities across all industries. Although the portfolio of vice stocks may not be diversified enough to provide investors with a complete portfolio strategy, it deserves to be part of an investor's portfolio considerations, at least for the idiosyncratic, abnormal risk-adjusted historical returns generated. For further research, I suggest the role of survivorship bias be the primary query in the vice investing realm. I decided to omit 'dead' firms; however, the market portfolio, the S&P 500, doesn't include 'dead' firms either, thereby giving it a sense of survivorship bias as well.

**APPENDIX 1: Sample Selected Vice Fund Portfolio**

| CORPORATION | TICKER SYMBOL | INDUSTRY |
|---|---|---|
| 1. Alliance One Int, Inc. | AOI | Tobacco Products |
| 2. Altria | MO | Tobacco Products |
| 3. Anheuser Busch InBev | BUD | Beverages-Brewers |
| 4. Asia Entertainment Resources | AERL | Gaming Activities |
| 5. BAE Systems | BAESY | Defense Products and Services |
| 6. Beam, Inc. | BEAM | Beverages-Wineries and Distillers |
| 7. Big Rock Brewery | BRBMF | Beverages-Brewers |
| 8. Boeing Company | BA | Aerospace/Defense Products and Services |
| 9. Boston Beer Co, Inc. | SAM | Beverages-Brewers |
| 10. British American Tobacco | BTI | Tobacco Products |
| 11. Brown-Forman Corp. | BF-B | Beverages-Wineries and Distillers |
| 12. Century Casinos, Inc. | CNTY | Resorts and Casinos |
| 13. Constellation Brands Inc. | STZ | Beverages-Wineries and Distillers |
| 14. Craft Brew Alliance, Inc. | BREW | Beverages-Brewers |
| 15. Diageo | DEO | Beverages-Wineries and Distillers |
| 16.General Dynamics | GD | Aerospace/Defense Products and Services |
| 17. Global Casinos, Inc. | GBCS | Resorts and Casinos |
| 18.Grupo Modelo SAB | GPMCY | Beverages-Brewers |
| 19. Heineken NV | HINKF | Beverages-Brewers |
| 20. Honeywell | HON | Diversified |
| 21. Imperial Tobacco Group | ITYBY | Tobacco Products |
| 22. Ladbrokes PLC | LAD.L | Gaming Activities |
| 23. Las Vegas Sands | LVS | Resorts and Casinos |
| 24. Littlefield Corp | LTFD | Gaming Activities |
| 25. Lockheed Martin | LMT | Aerospace/Defense Products and Services |
| 26. Lorillard | LO | Cigarettes |
| 27. MGM Resorts International | MGM | Resorts and Casinos |
| 28. Molson Coors Brewing Co | TAP | Beverages-Brewers |
| 29. Northrop Grumman Corp | NOC | Aerospace/Defense Products and Services |
| 30. Philip Morris Int | PM | Tobacco Products |
| 31. Pinnacle Entertainment, Inc | PNK | Resorts and Casinos |
| 32. Raytheon Co | RTN | Aerospace/Defense Products and Services |
| 33. Reynolds American | RAI | Cigarettes |
| 34. Rockwell Collins | COL | Aerospace/Defense Products and Services |
| 35. SAB Miller | SBMRY | Beverages-Brewers |
| 36. United Technologies | UTX | Diversified Machinery |

## REFERENCES


Areal, Nelson, Maria Ceu Cortez and Florinda Silva, 'Investing in Mutual Funds: Does it Pay to be a Sinner or a Saint in Times of Crisis?' (Working Paper, University of Minho, 2010).

R T Baillie & R P DeGenarro, 'Stock Returns and Volatility' (1990) 25(2) *Journal of Financial and Quantitative Analysis* 203, 203–214.

Gary S Becker, *The Economics of Discrimination* (The University of Chicago Press, Chicago, 1957).

M Carhart, 'On Persistence in Mutual Fund Performance' (1997) 52(1) *Journal of Finance* 57, 57–82.

James Chong, Monica Her and G Michael Phillips, 'To Sin or Not to Sin? Now That's the Question' (2006) 6(6) *Journal of Asset Management* 406, 406-417.

Robert B Durand, Sze Kee Koh and Paul Lijian Tan, 'The Price of Sin in the Pacific Basin' (2013) 21 *Pacific-Basin Finance Journal* 899, 899–913.

Frank J Fabozzi, K C Ma and Becky Oliphant, 'Sin Stock Returns' (2008) 35(1) *The Journal of Portfolio Management* 82, 82–94.

E Fama and K French, 'The Cross Section of Expected Stock Returns' (2002) 47 *Journal of Finance* 427, 427–465.

E Fama and K French, 'Common Risk Factors in the Returns on Stocks and Bonds', (2003) 33 *Journal of Financial Economics* 153, 153–193.

E Fama and K French, 'Industry Costs of Equity' (1997) 43(2) *Journal of Financial Economics* 153, 153–193.

Forum for Sustainable and Responsible Investment, *Sustainable and Responsible Investing Survey* (2011) <http://www.ussif.org>.

Leonard Goodall, 'Market Behavior of Gaming Stocks: An Analysis of the First Twenty Years' (1994) 10(4) *Journal of Gambling Studies* 323, 323–337.

H Hong and Kacperczyk, 'The Price of Sin: The Effect of Social Norms on Markets' (2009) 93(1) *Journal of Financial Economics* 15, 15–36.

Andreas G F Hoepner and Stefan Zeume, 'The Dark Enemy of Responsible Mutual Funds: Does the Vice Fund Offer More Financial Virtue?' <http://ssrn.com/abstract=1485846>.

N Jegadeesh and S Titman, 'Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency' (1993) 48(1) *Journal of Finance* 65, 65–91.

Michael C Jensen, 'The Performance of Mutual Funds in the Period 1945–1964' (1968) 23(2) *Journal of Finance* 389, 389–416.

Daniel Kahneman and Amos Tversky, 'Prospect Theory: An Analysis of Decision Under Risk' (1979) 47(2) *Econometrica* 263, 263–292.

Peter D Kinder and Amy L Domini, 'Social Screening Paradigms Old and New' (1997) 6(4) *The Journal of Investing* 1, 1–12.

J Lintner, 'The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets' (1965) 47 *Review of Economics and Statistics* 13, 13–37.

H Markowitz, 'Portfolio Selection' (1952) 7(1) *Journal of Finance* 77, 77–91.

Robert C Merton, 'A Simple Model of Capital Market Equilibrium with Incomplete Information' (1987) 42 *Journal of Finance* 483, 483–510.

M Moskowitz, 'Choosing Socially Responsible Stocks' (1972) 10 *Business and Society Review* 71, 71–75.

M Peterson, 'Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches' (2009) 22(1) *Review of Financial Studies* 435, 435–480.

D Romer, 'The Theory of Social Custom: A Modification and Some Extensions' (1984) 99 *Quarterly Journal of Economics* 717, 717–727.

Julie Salaber, 'Sin Stock Returns over the Business Cycle', Working Paper, Université Paris-Dauphine, 2008.

William Sharpe, 'Capital Asset Prices: A Theory of Capital Market Equilibrium Under Conditions of Risk' (1964) 19 *Journal of Finance* 425, 425–442.

A Shleifer and R W Vishny, 'Corruption' (1993) 108(3) *The Quarterly Journal of Economics* 599, 599–617.

M Statman, 'Socially Responsible Mutual Funds' (2000) 56(3) *Financial Analysts Journal* 30, 30–39.

Nuttawat Visaltanachoti, Qing Zheng and Liping Zou, 'The Performance of "Sin" Stocks in China' (Working Paper, Massey University, 2009).


## AUTHOR PROFILE


***Greg Richey*** *is a Lecturer of Finance at California State University, San Bernardino, and a doctoral candidate in financial economics at Claremont Graduate University. His teaching interests include corporate finance, investments, financial markets and institutions, and personal finance. His research interests include banking crises, credit expansion, financial liberalisation and niche investing. Richey's research has appeared in the International Research Journal of Applied Finance, the Journal of International Finance and Economics and the International Journal of Business Research.*