WISE INVESTING: ANALYSIS OF THE RECESSION-PROOF SIN STOCKS

presented by

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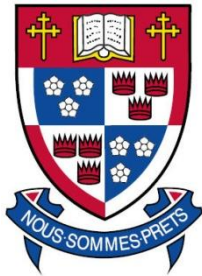BBA, Istanbul Bilgi University, 2008

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Thesis Project submitted in Partial Fulfilment of

the Requirements for the degree of

Master of Business Administration

In the Global Asset and Wealth Management Program

of the Faculty of

Business Administration

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SIMON FRASER UNIVERSITY

Fall 2009

Approval

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Degree: **Master of Business Administration**

Title of Project: **Wise Investing: Analysis of the Recession-Proof Sin Stocks**

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Abstract

This paper investigates whether the sin stocks under or over perform the SP500 for different investment periods, i.e. most of the time, and especially during the recession periods. A sin portfolio is constructed for the research purposes, VICEP. Using two conventional asset pricing model regressions, the characteristics of the VICEP are studied. Each model is estimated using the sample ranging from 1980 to 2008 as well as for the three recession periods (1991, 2001 and 2007 recessions). We analyzed the sin stocks on an industry basis to advice on the individual securities that have significant share in VICEP.

We found that our portfolio of sin stocks is able to provide recession-proof returns to the investors. The majority of time, industry sub portfolios under sin stocks also provides superior results than the market. We present evidence that the risk-return characteristics of sin stocks are superior compared to the market as well as socially responsible stocks.

Keywords: Sin Stocks, Vice Investing, Recession-Proof Returns.

Dedication

I dedicate this paper to my beloved mother Cigdem Ozkan and my dear father Atila Ozkan for their absolute love and support. You gave me the tools to survive, make good out of life, and follow my dreams.

I can't express enough of my gratefulness to my life partner Alara Ozturk for bringing me happiness and providing me with a dream to follow.

Cenk Ozkan

I dedicated this paper to my beloved parents for their endless understanding and support. Without their love, I would never have made this far.

Yelena Xiong

Acknowledgements

We would like to thank our senior supervisor Dr. Christina Atanasova for her commentary and
Insight in the writing of this thesis project, her support carried us on through the difficulties in the
process. We also would like to thank Dr. Evan Gatev for his support to our research.

Warm thanks to our colleagues for their encouragements and suggestions.

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I. Introduction

The goal of investing money is to make a profit. Reaching this goal is not always easy especially in turbulent economic times. During the past few years of poor stock market performance, certain asset classes and industries had performed comparatively well. At the same time, other investment areas had showed top performance over three, five, or ten years periods since they continued to perform respectably while the overall market dropped. During periods when the overall market has taken a huge fall, these industries, screened out by many investors, especially the socially responsible ones, have proven to be a safer bet.

Often, the definition of a sin stock is simply these stocks that are screened by the socially responsible funds. These include alcohol, gambling, tobacco, defence, and weapons as well as those industries that are involved in animal testing, unable to meet the regulations of being environmentally friendly, have a real or perceived problem with human rights, labor relations, employment equality, and community investment. In this paper, we consider the stocks in the alcohol, gambling, tobacco, weapons and adult entertainment industries.

Merrill Lynch recently examined the performance of alcohol, tobacco and casino stocks in all recessions since 1970 and found that while the S&P 500 fell by 1.5% on average, sin stocks raised on average 11%.[1] The recent downturn is not shaping up to be any different. For sure, people are cutting their spending far more than in the past recessions, but history shows that people do not drop their bad habits in hard times. Instead many people feel an intense need to escape through alcohol, tobacco, or a trip to their local casino. Habits are persistent especially for addictive substances and gambling, so demand does not respond much to the price changes, taxes or etc. When people are depress, for instance, losing their jobs or facing financial hardship in recessions, they increase their consumption of drugs and gambling. This means the demand for vice products is countercyclical, i.e. increases in recessions.

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[1] http://www.businessweek.com/investor/content/dec2008/pi20081231_314591.htm

Because human weakness is universal and predictable during period of severe market turbulence, predictable behaviour can prove to be a source of a successful investment strategy. Galvin (2001) says that during the past recessions, particularly during the years of 1982 and 1990-1991, sectors like alcohol, tobacco, and food consumption outperformed the market and industry pricing benchmarks in all these areas raised above the national average, except food industry. These sectors were classified as good, safe bet in all markets, their vice aspect aside, but they were at their best during the early parts of the recessions. He tries to prove that there are some sectors that tend to show better business performance during the economically weak periods, even though they are beneficiaries of mere flaws in human character. These stocks are in highly demand and remain pretty steady and actually increase during economically volatile conditions. Waxler (2004) found out investments related to human weaknesses had been a safe bet, no matter how the market is performing historically in her book.

Vice investors have done well in the Vice Fund (VICEX), which is based in Dallas, Texas. The investment company Mutuals.com launched this fund focused solely on vice: tobacco, defence, alcohol and gambling stocks in August 2002. In 2005, the fund had assets of $45 million. Its 3-year rate of return as of 2005 was 20.7%, compared to 12.3% for the S&P 500 in the same period. The fund's top five holdings included Altria Group (makers of Philip Morris cigarettes), Shuffle Master (produces automatic card shufflers used in casinos), Anheuser-Busch (brewing Budweiser and other beers), British American Tobacco (producer of cigarette brands such as Benson & Hedges and others), and L-3 Communications (defence contractor). They are pretty much sin central.[2]

This paper contributes to the literature in the following distinct ways. First, we construct a portfolio that consists of sin stocks, the "Vice Portfolio" (VICEP). Second, we use two different asset-pricing models to evaluate the risk adjusted excess returns of sin stocks over the market (S&P 500), specifically, the capital asset pricing model (CAPM) and the Fama-French three-factor model. Third, we run the regressions to observe the correspondence of VICEP and S&P 500 between the periods 1980 to 2008 and then we focus on three different crisis periods to test performance on VICEP and S&P 500.

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[2] Kelleher, E., "Markets are giving the devils his due," Financial Times, June 19, 2009

Fifth, we examine each of individual industry of VICEP which socially responsible investors avoid: alcohol, gambling, tobacco, defence, and adult entertainment with S&P 500. Under each industry, specific companies are analyzed in order to evaluate their performances. The intention of this paper is to investigate whether sin stocks under or over perform the S&P 500 for different investment periods, i.e. most of the time, and especially during recession periods.

The results demonstrate that after estimating the two asset-pricing models, sin stocks are considered to be defensive towards the market, which have a Beta less than one. They generally perform like the value stocks. Additionally, after testing their performance under each specific crisis periods, we confirm the defensiveness of the sin stocks. Finally, we conclude that sin stocks are outperforming the market during different recession periods and the same situation applied under each five specific industry. VICEP is the recession-proof portfolio of alcohol, gambling, tobacco, war and adult entertainment.

The rest of this paper is as follows. Section two reviews the literature. Section three describes the methodology of this paper. Section four presents the data and summarizes the statistics. Section five describes the estimation results and section six concludes.

II. Literature Review

The empirical evidence on vice investing is relatively small. Luck and Wood (1992) conducted a study to examine the return effects in the U.S. for the liquor, tobacco, and gambling industries from January 1980 to October 1991. They find a statistically significant (at 5% confidence level) positive alpha over the full time period (January 1980 – October 1991) associated with both the tobacco and liquor industries with the alpha averages 5.67% and 8.4% per year, also same as gambling industry. Goodall (1994) looks at the price movement patterns of gaming stocks compared with the broader market for six stock market cycles between 1973 and 1992. He shows that gambling stocks have average returns that far exceeded that of the general market throughout this twenty-year period and suggests they seem to be more volatile than the market as a whole. Also, gambling stocks do occasionally move against the general market in response to special events such as the establishment of gambling in New Jersey.

Chen and Bin (2001) investigates the impacts on the risk-adjusted return and the systematic risk of gambling stocks across the bull and bear market situations. They find that on average gaming stocks yield significantly lower returns and have significantly greater systematic risks against the U.S. stock market between July 1993 and December 1997. Their studies examine different kinds of federal and state legislation events regarding casino gaming regulation and deregulation and find that the announcement effects on stock portfolio returns vary across different types of gambling companies. Generally speaking, gaming equipment suppliers and small casino operators are found to react to legislation events more significantly than those large casino firms.

Kacperczyk and Hong (2006) analyzed stock markets and the impact they feel from society's framework of morals, traditions and laws. They say investors can gain 2.5% higher returns every year on a risk-adjusted basis by investing in sin stocks versus investing in stocks with comparable characteristics, such as beverage, food and entertainment companies. Their paper examines the performance of sin stocks from 1926 – 2006 and found that they significantly outperform the market. They conclude that there is a societal norm against funding operations that promote vice funds and sin stocks and these companies are neglected by norm-constrained investors and face greater litigation risk due to social norms.

Fabozzi et al. (2008) find that a sin portfolio produced an annual return of 19% unambiguously outperforming the common benchmarks on a risk adjusted basis. Kim and Venkatachalam (2008) find that sin company's financial reporting quality is superior to a control group along with three dimensions: earnings and accrual persistence, predictability of earning for future cash flows, and timely loss recognition. This implies that despite superior returns and higher financial reporting quality, investors are willing to sacrifice returns in order to comply with societal norms and reflect non financial criteria in their portfolio by neglecting sin stocks. Lobe and Roithmeier (2008) extend prior studies on sin investing and find out publicly traded companies involved in the alcohol, gambling, tobacco, sex, arms and nuclear power industry can generate abnormal returns. Furthermore, they construct their own worldwide index of more than 700 unethical firms and provide evidence that the risk-return characteristics of sin stocks are

superior in comparison to stocks with the same characteristics as well as socially responsible stocks and they are defensive.

III. Methodology

Through the course of this paper, two conventional asset pricing models are employed to investigate the returns of VICEP. In particular, the Capital Asset Pricing Model (CAPM) from Sharpe-Lintner-Treynor, and three-factor model from Fama-French are employed during the analysis. The model equations are as follows:

$$r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \varepsilon_{it} \tag{1}$$

$$r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \delta SMB_t + \gamma HML_t + \varepsilon_{it} \tag{2}$$

where r_{it} is the return on the portfolio for the period t, and r_{ft} is the risk-free return for the same period, r_{mt} represents the market return, by subtracting the r_{ft} from it, market excess return is gathered; $(r_{mt} - r_{ft})$. Additional variables in the equation (2) are as follows; SMB_t is the size factor, HML_t is the book-to-market factor.

Each model is estimated using the complete sample range, from 1980 to 2008 as well as for the three recession periods (1991, 2001 and 2007 recessions). We report and test the significance of CAPM and three factor model betas as well as Jensen's (1970) alphas also known as the abnormal return or the risk adjusted excess return[3]. We provide these estimates for the vice portfolio, for each vice industry and for individual sin stocks that represent a significant proportion of the portfolio return

Under the analysis of three economic downturns, Sharpe ratio has been used to study the risk-adjusted returns for different portfolios or indexes. The equation for Sharpe ratio is as follows:

$$S_i = \frac{r_i - r_f}{\sigma} \tag{3}$$

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[3] http://www.russell.com/US/glossary/analytics/jensen_alpha.htm

where r_i is the portfolios return, r_f is the risk-free return, subtracting one from other, excess return of the portfolio is acquired, and σ is the standard deviation of the asset excess return for the same period.

Compounded returns, which are widely used in practice, are employed for the performance analysis of the economic downturns and are calculated for a hypothetical investor, investing his/her 100% wealth in corresponding assets, and holding them for the period of the economic downturn. The beginning of the investment period is chosen to anticipate the beginning of the economic downturn, and the results are analyzed at the end of the trough.

IV. Data and Summary Statistics

The analysis throughout the paper is based on data from three sources; CRSP, Bloomberg, and Ken French's website. Data used for the paper is monthly, as used in the previous studies over the subject. Dataset is chosen for a long period of time to include more trough periods of market for comparison to the performance of VICEP. For these purposes data range is set to be from 1980 to 2008 for both the VICEP and SP500, this dataset is used for regression analysis. Throughout this period of time some companies in the VICEP are dropped as they discontinued their opperations under the brand name and some of them are added as they become publicly available. Under the "Estimation Results" section of the paper, three market crisis are analyzed to examine the relative performance of VICEP to the market, SP500. Under the same section, for the comparison purposes to other distinctive funds, Vice Fund (VICEX)[4]; a mutual fund that is constructed through the same screening process as VICEP, is used for the 2007 market turmoil. Also a mutual fund that has a relative opposite screening process, Domini Social Equity Fund (DSEFX) [5]; a fund that contains socially screened firms, is used for both 2001 crisis and 2007 crisis. The period restriction of comparison to these funds is due to data limitations.

Two models are used for the all-time-period regression; CAPM and FF-3 Factor Model. The variables that are used under the CAPM all-time-period regression, from 1980 to 2008, are the excess

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[4] http://www.usamutuals.com/vicefund/abt.aspx
[5] http://www.domini.com/

return on the VICEP, and the excess return on the market (SP500). Regression for the same period under FF-3 factor models also includes size factor (SMB), and book-to-market factor (HML). The variables under the CAPM regression are acquired via CRSP, and Bloomberg. Additional variables for FF-3 Factor Model are gathered from Ken French's website[6]. Each of these variables is in monthly percent returns. Excess returns are calculated by deduction of monthly risk-free rate form the monthly returns. The monthly risk-free rate (Rf) is collected from CRSP database.

VICEP is constructed by including stocks from alcohol, tobacco, gaming, war/defence, adult entertainment industries. 37 companies are included in the portfolio, approximately equally divided in five sectors mentioned above. Portfolio is mostly focused on the US market. Holdings are market - weighted, and return of the portfolio is constructed accordingly. Dividends are excluded in throughout the analysis in this paper. Table 1 presents the company names and tickers of the holdings of the VICEP.

Descriptive statistics for the whole time period of the sample is presented in Table 1. Note that for the time period Sp500 has a higher mean return than the sin stocks. However shifting the analysis towards more recent period, findings significantly change. Table 2 illustrates Descriptive statistics for the period starting 1990 to 2008. Notice that VICEP has the highest mean monthly excess return. This is explained by the neglect of norm-constrained investors in the market, by Hong and Kacperczyk (2007). Even so the standard deviation is higher than the SP500 for the period; it is not a comparison with the difference in the returns.

Figure S1 demonstrates the spread between monthly excess returns of VICEP and SP500 for the whole sample period. Note that the spread widens in a positive direction during economic downturns of 1990, 2000, and 2007. Observe that the highest spread on monthly excess returns is reached during the time of "dot.com bubble crush"; starting at 2000. Trend line on the Figure 1 is a 15-period moving average line, illustrating that the moving average picks up during the economic downturn; this is consistent with the findings of Dan Ahrens (2004) and Thomas M. Galvin (2001). They both stated the

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[6] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

sin stocks are outperforming the market during economic downturns, and therefore they provide investors with a tool for smoothing recession returns.

V. Estimation Results

a. VICEP Returns

Table 3 presents the regressions results for the two models, CAPM and Fama-French three-factor model, for whole time of the sample, from 1980 to 2008. Capital Asset Pricing Model (CAPM) regression results illustrates the sin stocks defensiveness. Beta coefficient for the time-series regression is 0.80 corresponding to a significantly high t-stat value of 17.47. Earlier studies have found similar results; Lobe and Roithmeier, 2008; Dan Ahrens, 2004; presented the defensiveness of the sin stocks.

Furthermore, Fama-French (1993) three-factor model is employed. By doing so, adjusted R-square is slightly increased from 0.46 at CAPM regression to 0.48 in FF-three-factor model. This finding suggests that using FF-three factor model, variance in the sin stocks is explained further. There is also a slight increase in Beta coefficient; suggesting that by employing new variables in to the model, market excess return gains power on explaining the variance in the sin stocks. However, the Beta of the sin stocks is still less than 1; stating the defensiveness of the stocks. Size factor is not capturing significant variation on the sin stocks since the coefficient is not significant; therefore a confident statement cannot be made for the size factor. This finding is in alliance with the findings of Lobe and Roithmeir (2008); they found no size effect on sin stocks. Conversely book-to-market factor is significant enough for consideration. Results of the estimation report a positive book-to-market factor, stating that the sin stocks perform similarly to "value" stocks rather than "growth" stocks. Significance of historical premium of the value stocks have been acknowledged by many studies; Lakonishok, Shleifer and Vishny (1994); Capaul, Rowley and Sharpe (1993); Fama and French (1998). Result of the Fama-French three-factor regression suggests the same direction, that the sin stocks have a superior performance over the market.

In both regressions, there is no significant alpha. Indicating that the Jensen's alpha doesn't exist for the sin stocks performance. In other words, there is no evidence of abnormal return on sin stocks over the market. The results are in aligning with the assumptions of the both regression models that for repeated periods of time there should not be any significant abnormal returns. This finding might be due to the fact that many vice firms are privately held subject to less scrutiny requirements, and these vice firms might generate positive abnormal returns. Thus, publicly traded firms only provide protection from recessions.

b. Crisis Analysis

This section compares the performance of sin stocks and the S&P 500 index during the three different crisis periods, Crisis I (July 1990 – March 1991), Crisis II (March 2001 – November 2001), and Crisis III (Dec 2007 – Dec 2008). We use the U.S. business cycle peak and trough dates provided by the National Bureau of Economic Research (NBER). Specifically, during the Crisis II and Crisis III, we also make comparisons of our VICEP with Domini Social Equity Fund and Vice Fund, which is based in Texas. Explicit statistical comparisons of risk-adjusted returns are performed at the end, Sharpe ratios and Beta analysis.

Crisis I (July 1990 – March 1991)

Figure C1 depicts the returns for the VICEP and S&P 500 over the period of April 1990 to May 1991. Notice that the huge drop starts from June 1990 and reaches its bottom after three-month in, September 1990. Compared to the S&P 500, VICEP has slightly higher return when they reaches the peak and goes smoothly down to the trough. On the other hand, the S&P 500 goes down sharply and it is around 6% lower than VICEP at the bottom. A month later, October 1990, they start recovering and VICEP is outperforming the S&P 500 most of the time through the end of Crisis I.

Figure C2 reports the compounded returns for the VICEP and S&P 500 over the same period. As we can see, VICEP is giving higher annualized return of 31% of the whole Crisis I period. For instance,

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an investor invests $ 1 at the beginning month of Crisis I; he/she will get $ 1.31, 31% of his initial wealth at the ending month of Crisis II. Conversely, S&P 500 only gives $ 1.16, 16% of the initial wealth. No matter how volatile the compounded returns are during the Crisis I, the higher returns of VICEP can satisfy investors' currently life style needs most of the time.

Table 4 reports an estimated Beta of 0.97, which shows that sin stocks are defensive. VICEP generally follows the market in an overall decline through the Crisis I, but does so by a factor of 0.97, which means the market has an overall decline of 1%, VICEP with a beta of 0.97 will only fall 0.97% that poses lower risks especially during this economic downturn. The findings are consistent with Dan Ahrens (2004) and Lobe and Roithmeier (2008) that all find sin stocks to be recession-proof. Table 5 displays Sharpe ratios and VICEP earns statistically higher risk-adjusted returns compared to the S&P 500 with additional higher 0.14, which gives more returns for the same risk.

Crisis II (March 2001 – November 2001)

Figure C3 describes the returns for the VICEP, the S&P 500 and the DSEFX over the period of early 2000s recession. The 1990s were the longest period of growth in U.S. history. The collapse of the speculative dot-com bubble, a fall in business outlays and investments, and the September 11th attacks brought the decade of growth to an end, which hugely affected the stocks of most of the sin companies, industries such as weapons. We can see from the graph that there is a sharp decline, much worse than S&P 500 and DSEFX, which perform closely related around the period. However, VICEP quickly recovers from the recession and performs much better most of the time in the rest of the downturn. Even though special event inflicts heavy losses on VICEP, it still generates superior abnormal returns most of the time in economic downturn.

Figure C4 shows the compounded returns for the VICEP, S&P 500 and DSEFX over the same period. The graph shows that although all three indices started from around 1%. VICEP went up directly since then; on the other hand, S&P 500 and DSEFX went in the opposite direction all together. Both S&P 500 and DSEFX have negative annualized compounded returns, but VICEP has significantly positive

20%. If you invest \$ 1 at the first month of Crisis II, you will get 20% more of your initial wealth with VICEP at the end of Crisis II.

Table 4 reports an estimated Beta of 0.35 during Crisis II, which provides a stronger case for having sin stocks in the portfolio during worse recession periods, since market goes down 1% that VICEP only goes down 0.35%. Looking at the Sharpe ratios from Table 5; VICEP is the only one with positive 0.337 within this crisis, which proves the higher performance of sin stocks over the economic downturns.

Crisis III (Dec 2007 – Dec 2008)

Figure C5 represents the returns for the VICEP, S&P 500, DSEFX and VICEX over the period of the late 2000s recession. The subprime mortgage crisis led to the collapse of the U.S. housing bubble. Falling housing-related assets contributed to a global financial crisis. This crisis led to the failure of many of the U.S.'s largest financial institutions as well as in the automobile industry. Mainly most of the industries were affected badly. Around the end of 2008, all the funds are going deep down, especially S&P 500 at about −16%, compared with VICEP of -14.5%. Two months later, at the end of 2008, all the funds recover from the recession and VICEP reaches the top with extra 7% over the S&P 500.

Figure C6 displays the compounded returns for the VICEP, S&P 500, DSEFX and VICEX over the same period. The overall trend of all funds is going down over the late 2000s recession, but VICEP still outperforms the rest with additional annualized 12.8%, 9.8%, and 14% higher than S&P 500, VICEX and DSEFX respectively. Table 4 reports an estimated Beta of 0.90 during recent crisis, which implies that the VICEP will only going down 0.90% as the market goes down 1%. Almost everyone does not do well on their returns compensates for the risks taken over recent crisis with all negative Sharpe ratios. However, VICEP is still the best performer among the others with ratio of -0.152. This result is consistent with our previous results.

c. Industry Analysis

In this section, we look at specific sin industries in greater detail. Similar figures are constructed for presenting the compounded return for a hypothetical investor, who is investing in the regarded industry by itself, the compounded return for the same period on the market, and the compounded return on VICEP as well. The investor in question is considered to have made 100% investment in to the related industry as of the end of 2000. The time period is chosen to be shorter than the whole sample period, to make a practical case of an investment horizon. Holding of the industries are consistent with the VICEP's holding under each industry, however weighting are given on individual industry basis. Under each industry, the top holding under the VICEP fund is taken in to further consideration for constructing investment advice for individual investors. The end result would make more sense for investors who are investing for a fixed horizon. On the other hand, investors who are seeking to invest in order to meet their current life style needs, or in other words, investors who take into consideration the short-term fluctuations that investments generate, the end results might not be appropriate. Explicit statistical comparisons of alpha and beta for the industry portfolios and individual stocks are described to understand if they generate positive alphas, and how risky they are.

Alcohol Industry

Figure I1 illustrates the compounded returns for the whole sin portfolio, VICEP; for the market portfolio, SP500; and for the sub-portfolio of alcohol industry, Alcohol Sub. Notice that the alcohol industry by itself is not providing a better performance than the VICEP; however its performance is higher than the market. Also note that the industries performance picks up high during the market downturn, and lowers a bit as the market is picking up. Table 6 shows the regression estimates for the investment horizon. The alpha coefficient is not significant, suggesting that there is no indication of abnormal return. Beta coefficient is 0.28 and statistically significant at a 5% confidence level, which indicates that the variation on the sub-portfolio's return has small dependence on the market returns. This

proves that the alcohol industry is highly defensive, and in aligning with the findings of Luck and Wood (1992)

Figure I2 presents the top holding of the sub-portfolio under this industry; Anhauser-Busch (BUD). Anhauser-Busch is a US based brewing company. Company owns 48.5% of U.S. beer sales. Produces more than 100 beers, flavored alcohol beverage and non-alcoholic brews at 12 breweries in the United States and 15 around the world and imports other beers for distribution in the United States. One of the aspects that make the BUD stay in a far better stance than its competitors is that the company reaches solid economies of scale through its global operations. Notice from the graph that the company performs better in than the SP500 in the end of the investment period, also the path that the investment takes is greater in most cases than the market. BUD also provides a better period ending return, but it doesn't provide the same performance as the alcohol sub-portfolio through the path of the investment, and this is due to diversification benefits gained through investing in a portfolio of stocks. Table 6 shows that the alpha is not significant for the BUD as well as the sub-portfolio, representing the absence of abnormal returns. Same as the alpha, beta is insignificant with a 5% confidence level, suggesting that the variation in BUD is not explained by the variation in the market. However, with its strong historical success BUD is a good investment for individual investors who are seeking exposure to the alcohol industry.

Gaming Industry

Figure I3 illustrates the compounded returns for the whole sin portfolio, VICEP; for the market portfolio, SP500; and for the sub-portfolio of gaming industry, Gaming Sub. Observe that gaming industry has a steady wealth growth profile until the recent market turmoil in 2007. Las Vegas based US gaming industry is one of many industries across the country which suffered from the economic downturn. Gaming industry is believed to be one of the recession proof industries, as the demand for the industry remains stable during the downturns, and this is in aligning with the finding until the recent market crush. Even so gaming sub-portfolio doesn't give the performance of VICEP; it has a higher performance throughout the holding period and in the end date than the market portfolio, SP500. Table 6

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presents the alpha coefficient is not significant, suggesting that there is no evidence of abnormal returns. Beta reveals interesting findings with a statistically significant coefficient of 1.19, which represent the aggressiveness of the gaming industry compared to the market. This industry carries notably higher risk than the other ones under the VICEP.

Figure I4 demonstrates one of the top holding for this industry under the gaming sub-portfolio; Penn National (PENN). Penn National Gaming owns and operates casino gaming, horse racing and off-track wagering facilities with a focus on slot machine entertainment. Penn presently operates twenty-four facilities in twelve jurisdictions in US and Canada. Company has been growing fast with successful and strategic acquisitions. Note that the company produces superior performance over the industry and also the market, also the path the investment takes is higher than the other two in all times. Table 6 illustrates that the alpha is not significant for the PENN, presenting the lack of abnormal returns. Contradictory to the alpha, beta is statistically significant at a 5% confidence level, and has a value of 1.46. PENN has much higher market risk than the gaming sub-portfolio, which makes the company look uninteresting to the investor. However, this dependency comes from the nature of the industry. Thus, concluding our advice to hold Penn National Gaming for individual investors that are willing to have the exposure to the gaming industry.

Tobacco Industry

Figure I5 illustrates the compounded returns for the whole sin portfolio, VICEP; for the market portfolio, SP500; and for the sub-portfolio of tobacco industry, Tobacco Sub. Note that the tobacco industry by itself is providing superior ending results than the VICEP and SP500. Realize that the tobacco industry also picked up during the economic downturn around the beginning of the investment period, 2001; and also maintained to be stable in the recent economic downturn, starting at late 2007. Furthermore, industries compounded return profile provides higher capital in most of times than the VICEP, and in all times than the SP500. Alpha coefficient is not significant, as can be observed from Table 6, suggesting that there is no evidence of abnormal returns on the tobacco Industry. Beta coefficient

is 0.39 and statistically significant. This proves the point that the tobacco industry is slightly dependent on the market.

Figure I6 provides the compounded returns for one of the top holding of the portfolio, under tobacco industry; British American Tobacco (BTI). BTI is an international tobacco producer. Company is the world's second largest quoted tobacco group by global market share, with brands sold in more than 180 markets, with over 300 brands under the company portfolio. Recognize that the period ending compounded return of the UST is significantly higher than the industry sub-portfolio and the market. Also the path the investment takes is significantly higher at all times. Through its globally diversified portfolio of brands, and continuous successful acquisitions; such as TEKEL, one of the biggest tobacco manufacturers in Eastern Europe, BTI promises to keep the track record of success looking forward. Interestingly, Table 6 illustrates the alpha for the BTI which is significant, presenting the evidence for the abnormal return in the stock for the holding period. Same as the alpha, beta is statistically significant at a 5% confidence level, and has a value of 0.40. Therefore not only this company replicates the low dependency of the tobacco industry to the market but also sets an example of a recession-proof instrument. Hence, BTI will be a strong advice for the investors looking in to this sector.

War/Defence Industry

Figure I7 illustrates the compounded returns for the whole sin portfolio, VICEP; for the market portfolio, SP500; and for the sub-portfolio of war and defence industry, War/Def Sub. Notice that the industry portfolio tracks the variance of the whole portfolio closely; however the performance is less for all time periods. Industry sub-portfolio outperforms the SP500 index in all time periods. In the economic downturn of 2001, sub-portfolio, as well as VICEP, brings superior returns than while the market falls. However, the recent market turmoil has affected the industry significantly. Table 6 shows the regression estimates for the investment horizon. The alpha coefficient is not significant, suggesting that there is no indication of abnormal return. Beta coefficient is 0.74 and statistically significant at a 5% confidence

level, which indicates that the performance of the sub-portfolio have low dependency on the market. This proves that the industry provides protection from the fluctuations in the market.

Figure I8 presents the compounded return profile for the top holding under war/defence industry; Lockheed Martin Corp (LMT). Lockheed Martin Corp. is a multinational aerospace manufacturer, global security and advanced technology company. The main business of the company is with the U.S. government. In fact, Lockheed Martin is the largest provider of IT services, systems integration, and training to the U.S. Government. The company also produces the aircrafts for various nations, including the most widely used models for stealth aircrafts. Realize that the company produces significantly higher returns than the industry and the market in all time periods. In the course of its history, the company has done well with winning contracts from U.S. government and promises to continue stepping on high-worth projects in the future. Table 6 demonstrates that the alpha is not significant for the LMT as well as the sub-portfolio, representing the absence of abnormal returns. Same as the alpha, beta is insignificant at a 5% confidence level, suggesting that the variation in LMT is not explained by the variation in the market. Lockheed Martin Corp., with its strong profile, represents our advice for the investors to have an exposure to the war/defence industry.

Adult Entertainment Industry

Figure I9 illustrates the compounded returns for the whole sin portfolio, VICEP; for the market portfolio, SP500; and for the sub-portfolio of adult entertainment industry, Adult Sub. Industry is considered to be recession-proof until the recent market turmoil in 2007. Notice from the figure that the findings back up the defensiveness of the industry with higher compounded returns throughout the period. However the industry is struggling with various different aspects threatening the industry, free online adult entertainment, content piracy and government regulations are some of them. As can be seen from the Table 6, the alpha coefficient is not significant, suggesting that there is no evidence of abnormal returns. The industry portfolio also has a significant beta for the holding period, which is 1.14, suggesting the aggressiveness of the industry over the market. This industry by itself might expose the investors to

high amounts of market risk however, holding it with the other suggestions made in the paper, industry can provide upside potential.

Figure I10 depicts the compounded returns for the holding period for one of the top holdings under this industry; New Frontier Media Inc. (NOOF). New Frontier Media produces and distributes adult themed content for distribution through broadcast satellite operators, cable television, and the internet. These services reach over 190 million network homes. Being one of the fastest growing companies inside adult entertainment industry, and also have less exposure to copy write infringement due to usage of other distribution channels, such as satellite operators and cable television, company has a significant advantage over its competitors. Realize that until recent market turmoil in 2007 company presents a finer return profile than the industry and the market. Table 6 illustrates that the alpha is not significant for the NOOF, presenting the lack of abnormal returns. Contradictory to the alpha, beta is statistically significant at a 5% confidence level, and notably high value of 2.11. NOOF has much higher market risk than most of the suggestions in the paper. However, this dependency of the stock is due to notable downside rally of the industry in the recent market recession. With its strong historical summary, New Frontier Media Inc. is expected to do well in its industry going forward, therefore constructs the base of our advice for investors seeking exposure to the adult entertainment industry.

VI. Conclusion

This study used two conventional asset-pricing models, CAPM, and Fama-French three-factor model, to study potential differences between the market portfolio and a portfolio with high exposure to the sinful industries. Different windows for regression throughout the sample are employed to see the changes in the nature of sin portfolio's dependence on the market in economical downturns. Also compounded returns are applied to different type of asset pools to examine the benefits to investors.

The results are in favor of sin stocks, given that the sin portfolio VICEP proves to be defensive, and behave like a "value" stock, which are both consistent with the previous research conducted on the subject. Different windows used for economic downturn periods back up the findings, that even under

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downside pressure, where most of the stocks gain more dependence towards the market, sin stocks remain to be defensive by maintaining a beta less than one.

Evidence indicated that sin portfolio VICEP outperforms the market (SP500), the socially responsible investment fund Domini (DSEFX) and another sin portfolio that has the similar screening process VICEX over the three different economic crises. Moreover, the results represent that all Betas are lower than one. Significantly positive Sharpe ratios during the whole three crisis periods are also consistent with most of the researches in the past. Thus, from these findings it is wise to state that investors can generate superior returns through investing to these recession-proof sin stocks.

. Such advice might not be suitable for the investors introducing norm constraints to their investment decisions, as the industries presented in this paper might create discomfort under these constraints. However, from a risk-return trade-off stance, sin stocks prove themselves worthy for investor's consideration. Investors with desire to have protection, and enjoy the superior returns through the economic downturns should consider the partial or full extent exposure to such industries that we have presented in this paper.

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Appendix

Table 1   Descriptive Statistics

Variables	Mean	Std. Dev.	Kurtosis	Skewness	Minimum	Maximum
VICEP	0.0020	0.0513	1.6656	-0.4703	-0.2078	0.1807
Excess SP500	0.0022	0.0439	2.4922	-0.6959	-0.2221	0.1270
Rf	0.0048	0.0027	1.0602	0.9249	0.0000	0.0134
SMB	0.0011	0.0320	8.5637	0.7423	-0.1685	0.2199
HML	0.0038	0.0310	2.4196	0.1064	-0.1237	0.1387

The sample period is from 29/02/1980 to 31/12/2008. The variables are the excess return on the constructed portfolio of sin stocks (VICEP), excess market return (Excess SP500), size factor (SMB), book-to-market (HML). First three variables come from CRSP database; the last two variables are from Ken French's website. Excess returns are calculated by subtracting the monthly risk-free rate from monthly returns. Dividends are excluded.

Table 2   Descriptive Statistics

	Mean	Std. Dev.	Kurtosis	Skewness	Minimum	Maximum
VICEP	0.0040	0.0477	1.2507	-0.1598	-0.1474	0.1807
Excess SP500	0.0017	0.0418	1.4785	-0.6817	-0.1698	0.1083
Rf	0.0034	0.0015	-0.5897	-0.2065	0.0000	0.0066
SMB	0.0017	0.0355	8.1317	0.8243	-0.1685	0.2199
HML	0.0033	0.0325	2.8706	0.1976	-0.1237	0.1387

The sample period is from 31/01/1990 to 31/12/2008. The variables are the excess return on the constructed portfolio of sin stocks (VICEP), excess market return (Excess SP500), size factor (SMB), book-to-market (HML). First three variables come from CRSP database; the last two variables are from Ken French's website. Excess returns are calculated by subtracting the monthly risk-free rate from monthly returns. Dividends are excluded.

Table 3   Monthly time-series regression coefficient estimates: 31/01/1980 - 31/12/2008

	CAPM	FF-3 Factor
α	0.000	-0.001
	0.098	*-0.530*
β	0.801	0.877
	17.478	*17.669*
δ		0.051
		0.759
γ		0.273
		3.610
Adjusted R-Square	**0.468**	**0.485**

t-statistics are in presented in bold and italic format.

r_{it} is the return on the VICEP. Equations employed are as follows

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{mt} - r_{ft}) + \varepsilon_{it}$$
$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{mt} - r_{ft}) + \delta SMB_t + \gamma HML_t + \varepsilon_{it}$$

Where $r_{it} - r_{ft}$ is the excess return of the VICEP over the risk-free rate. The term $(r_{mt} - r_{ft})$ stands for the excess return on the market portfolio over the risk-free rate. Market portfolio is SP500. SMB_t and HML_t are the size and the book-to-market factors of Fama, French 3 Factor Model. r_{ft} is the risk-free-rate for the corresponding period and ε_{it} is the error term.

Table 4	Monthly time-series regression coefficient estimates for three crises periods		
	1989-1994*	**1999-2003****	**2004-2008*****
α	0.003	0.007	0.006
	0.004	*0.007*	*0.003*
β	0.975	0.348	0.903
	0.095	*0.147*	*0.068*
Adjusted R Square	**0.640**	**0.072**	**0.747**

t-statistics are in presented in bold and italic format.

CAPM is used in all three time periods. See Table 3 for regression equations and details on the variables.

*Data used for the regression is from 31/01/1989 to 31/12/1993.

**Data used for the regression is from 29/01/1999 to 31/12/2003.

***Data used for the regression is from 30/01/2004 to 31/12/2008

Table 5	Sharpe Ratios for the Crisis Periods		
	Crisis I	**Crisis II**	**Crisis III**
Vicep	0.30	0.34	-0.15
SP500	0.16	-0.23	-0.44
Domini		-0.27	-0.43
Texas Vice			-0.30

Crisis I corresponds to the time period from 29/12/1989 to 31/05/1991. Crisis II corresponds to the time period from31/08/2000 to 28/02/2002. Crisis III corresponds to the time period from 31/05/2007 to 31/12/2008. Sharpe Ratios (Sharpe, 1966) are calculated by dividing asset's return mean for the time period to the asset's return standard deviation for the time period. See Methodology section for further details on the calculation.

Table 6   Time-Series Regression Coefficient Estimates : 29/12/2000 - 31/12/2008

	α	α(t)	β	β(t)
Alcohol Sub	0.003	*0.803*	0.283	*3.097*
BUD	0.003	*0.633*	0.168	*1.595*
Gambling Sub	0.010	*1.248*	1.192	*6.730*
PENN	0.025	*1.867*	1.461	*4.793*
Tobacco Sub	0.008	*1.295*	0.389	*2.716*
BTI	0.014	*2.560*	0.395	*3.108*
Weapons Sub	0.006	*1.470*	0.735	*7.311*
LMT	0.011	*1.631*	0.241	*1.607*
Adult Sub	0.021	*1.464*	1.140	*3.492*
NOOF	0.037	*1.409*	2.113	*3.525*

t-statistics are presented in italic format. CAPM is used in all three time periods. See Table 3 for regression equations and details on the variables. Company names are presented with their index tickers.

Figure S1: Spread between the VICEP and SP500 for the whole sample period.
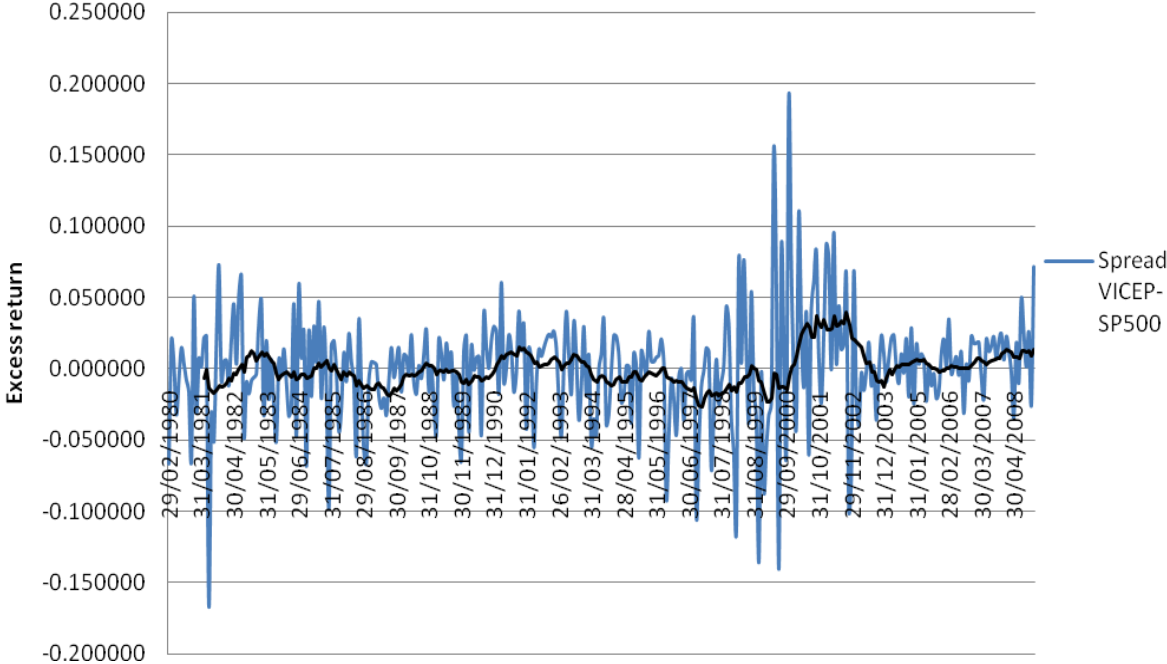
Figure C1: Returns for the VICEP and S&P 500 over the period of April 1990 to May 1991.
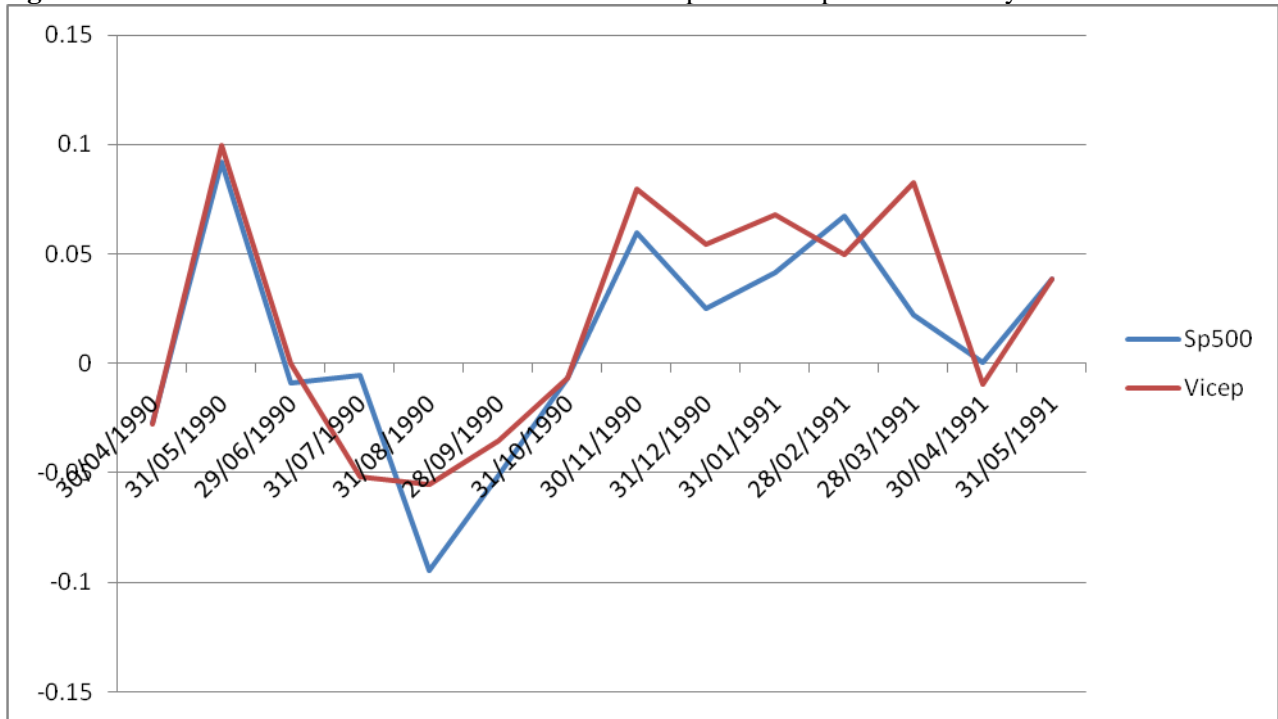
Figure C2: Compounded returns for the VICEP and S&P 500 over the period of April 1990 to May 1991.
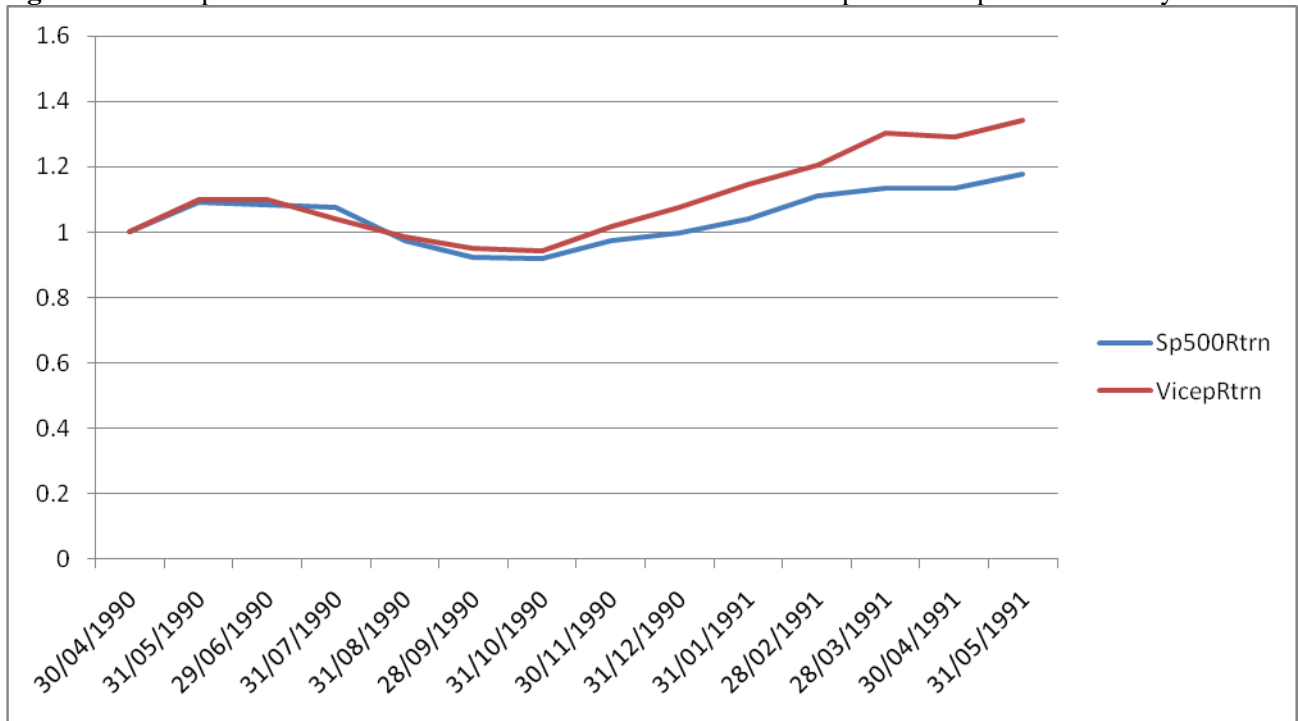
Figure C3: Returns for the VICEP, S&P 500 and DSEFX over the period of early 2000s recession.
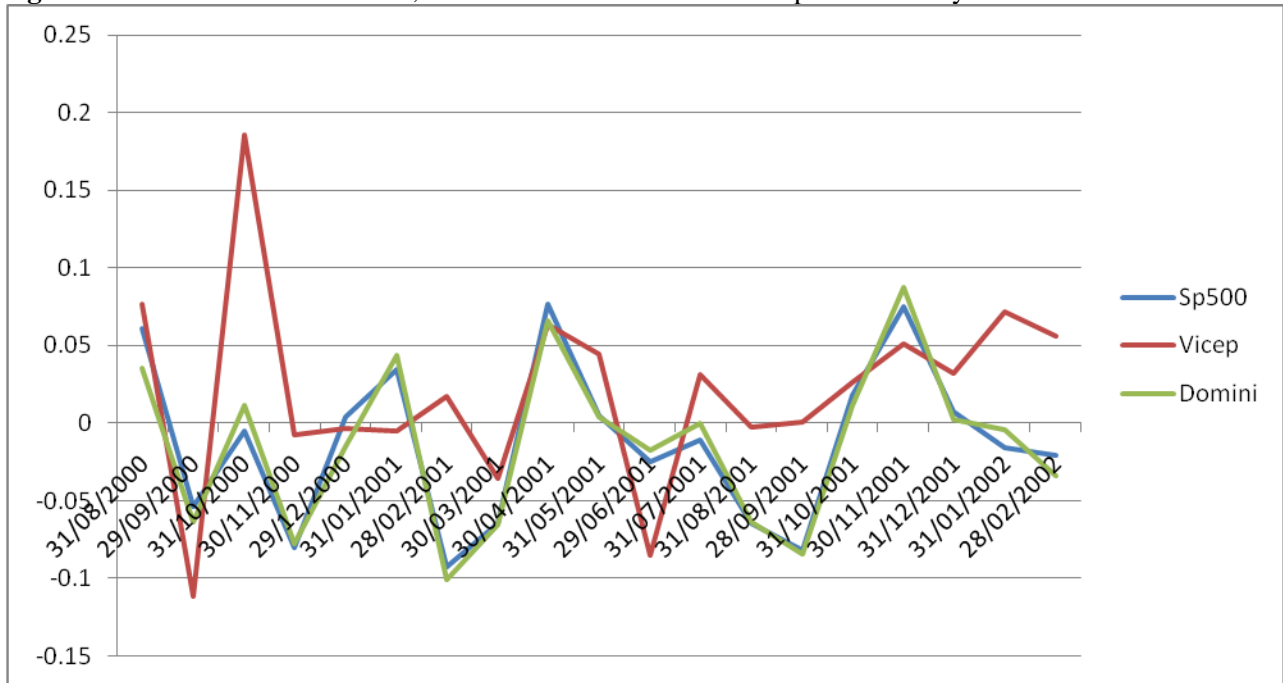
Figure C4: Compounded returns for the VICEP, S&P 500 and DSEFX over the period of early 2000s recession.
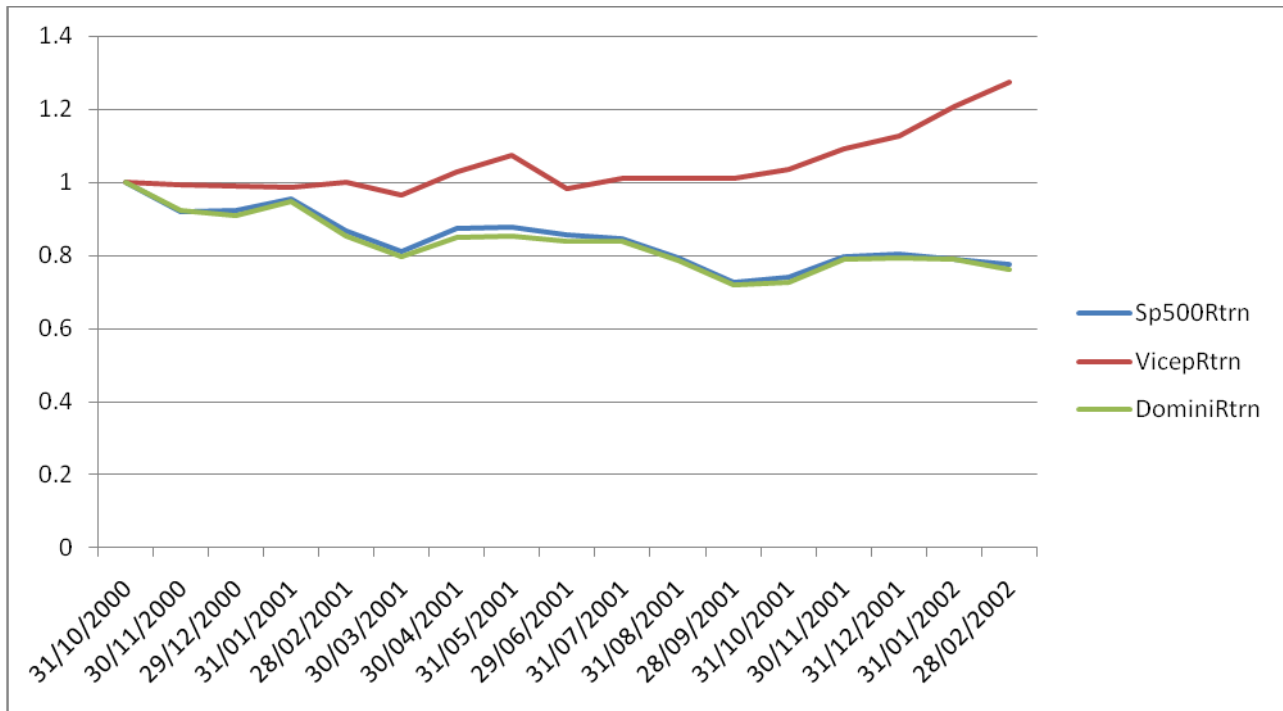
Figure C5: Returns for the VICEP, S&P 500, DSEFX and VICEX over the period of late 2000s recession.
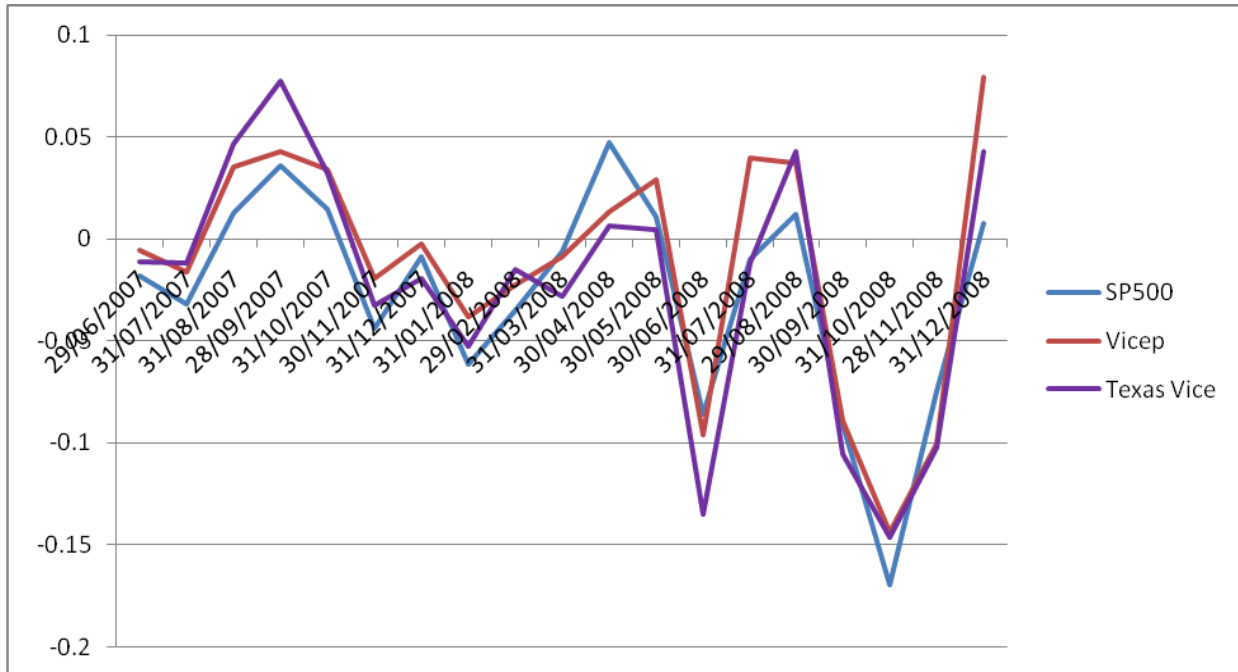
Figure C6: Compounded returns for the VICEP, S&P 500, DSEFX and VICEX over the period of late 2000s recession.
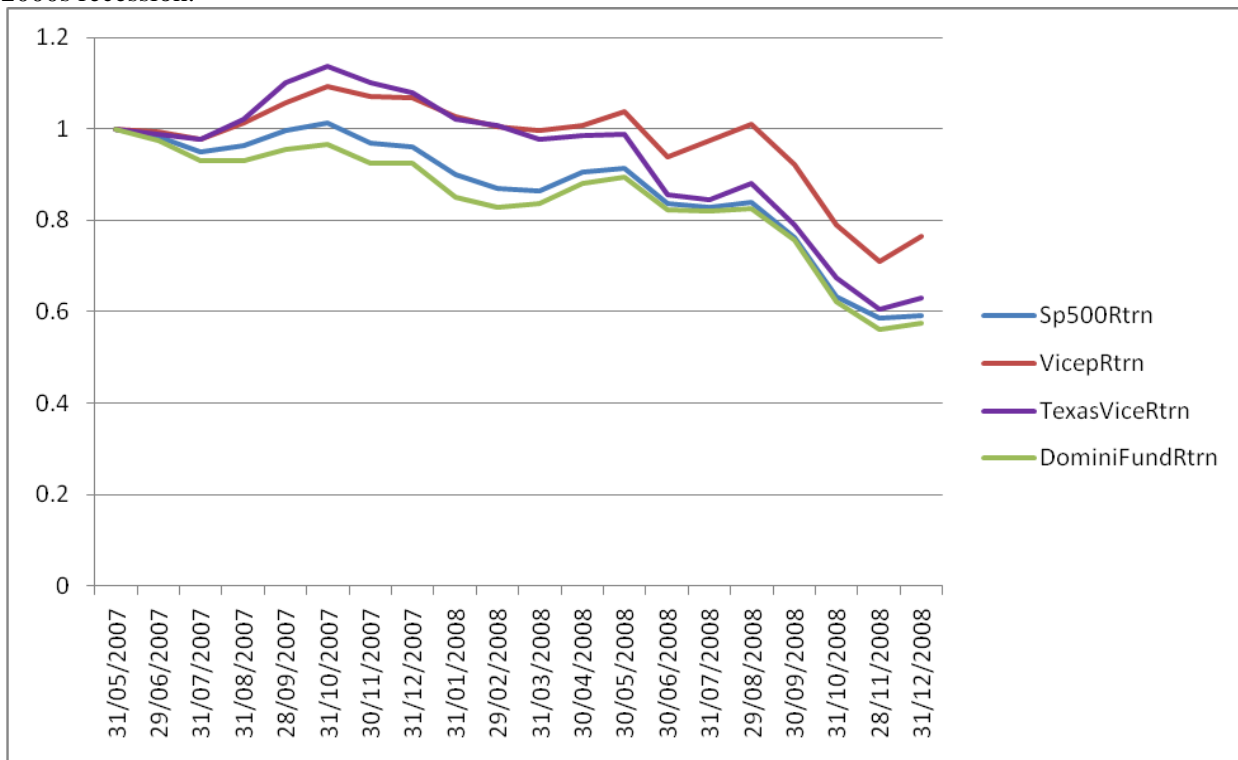
Figure I1: Compounded returns for VICEP; SP500; and for the sub-portfolio of alcohol industry, Alcohol Sub
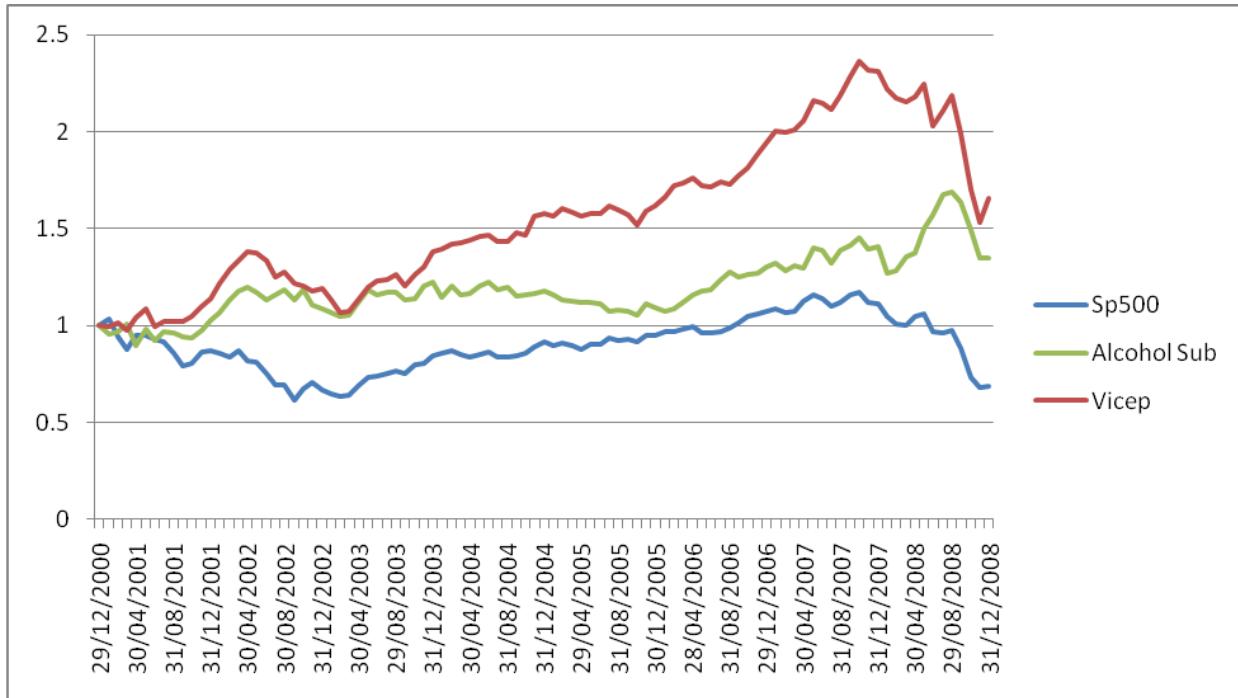
**Figure I2:** Compounded returns for Anhauser-Busch (BUD); Alcohol Sub; SP500
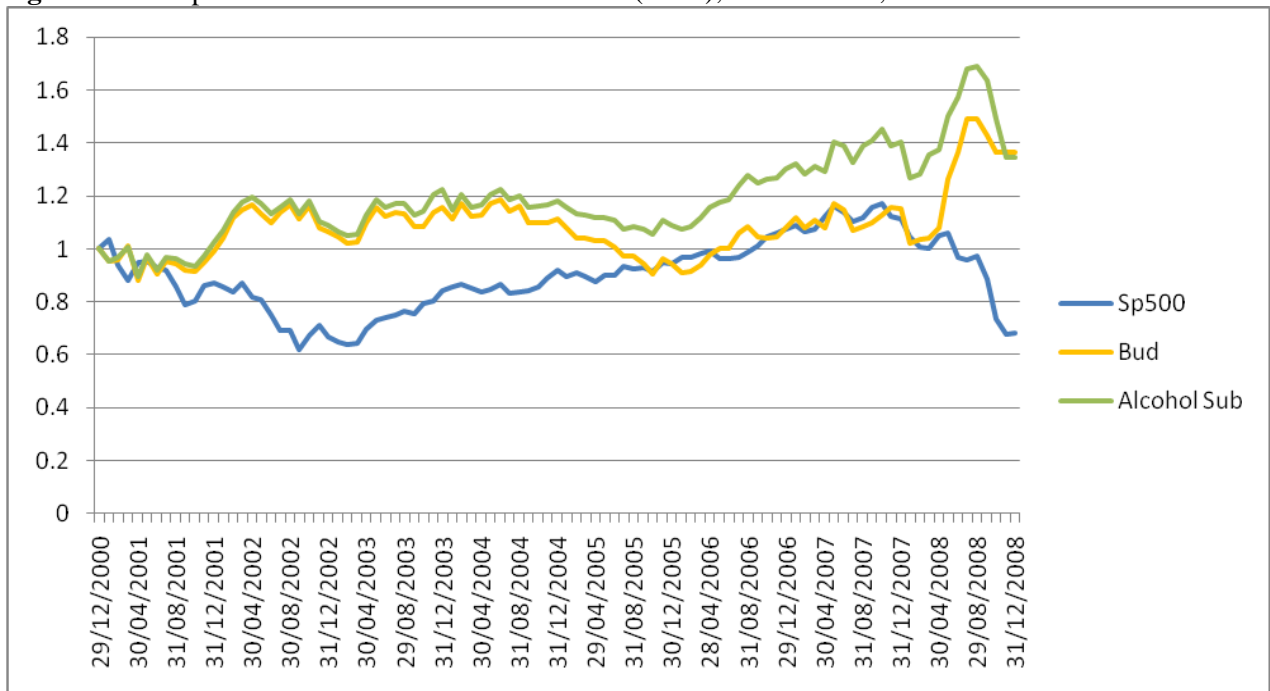
Figure I3: Compounded returns for VICEP; SP500; and for the sub-portfolio of gaming industry, Gaming Sub.
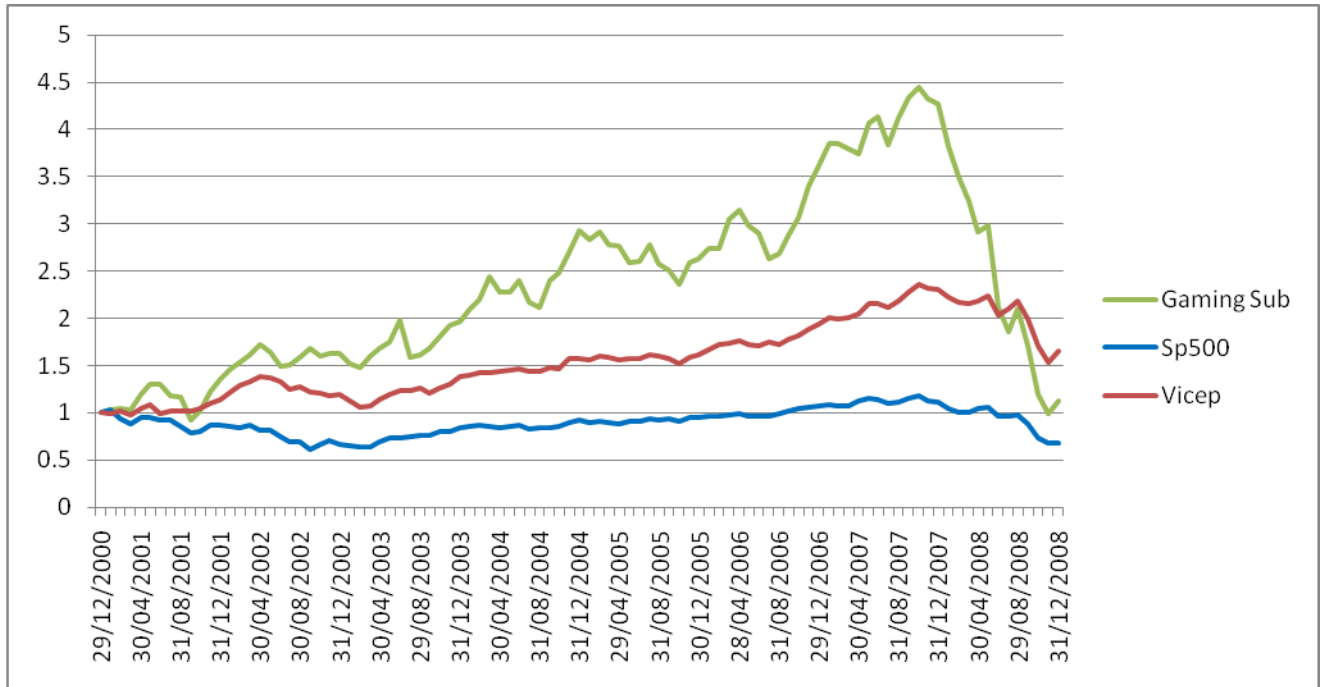
Figure I4: Compounded returns for Penn National (PENN); Gaming Sub; SP500
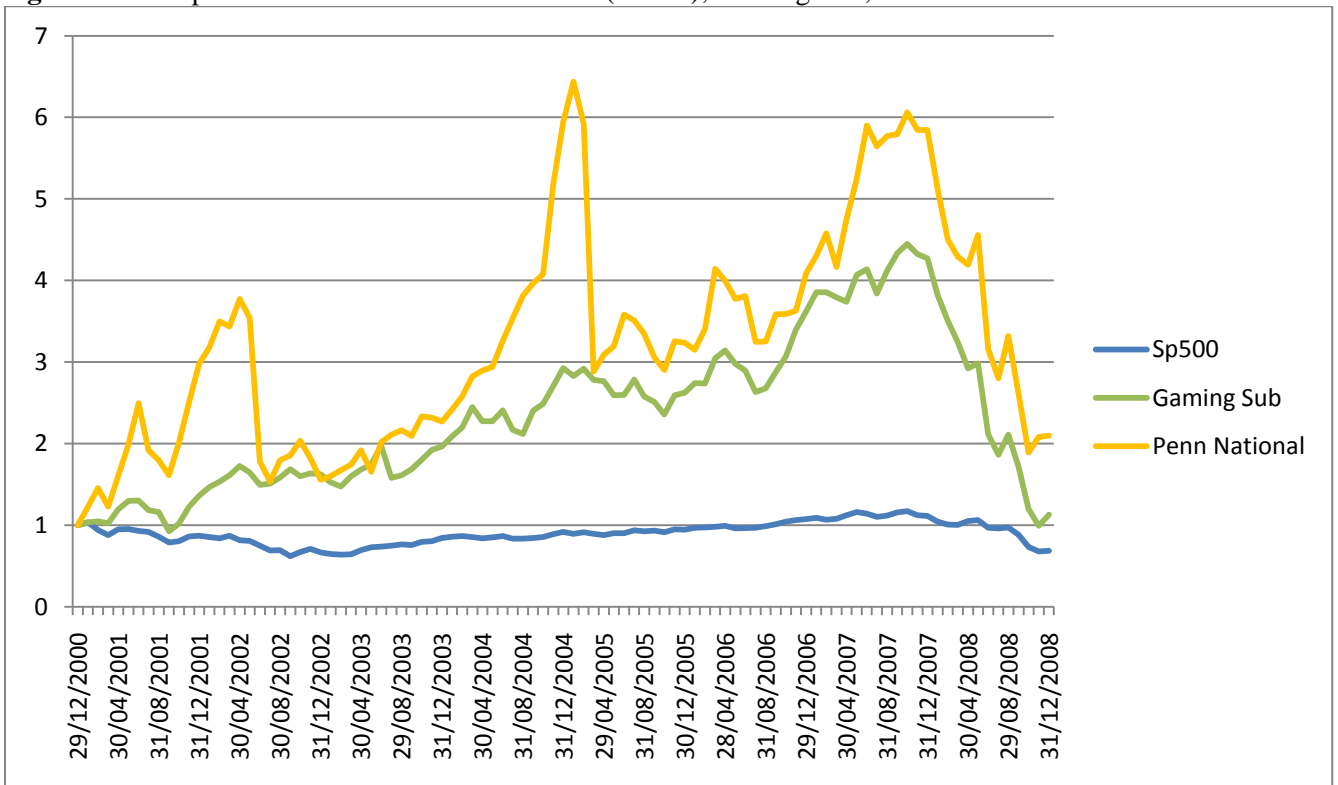
Figure I5: Compounded returns for VICEP; SP500; and for the sub-portfolio of tobacco industry, Tobacco Sub.
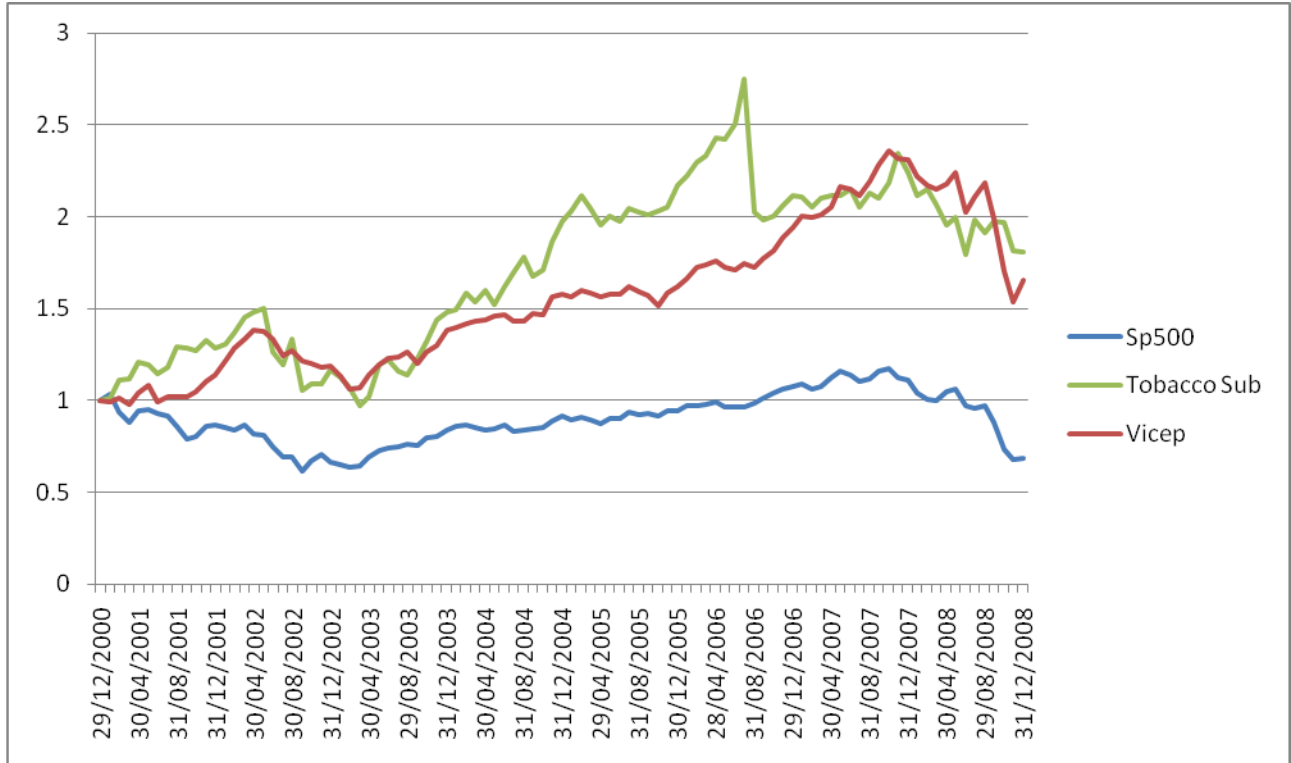
Figure I6: Compounded returns for British American Tobacco (BTI); Tobacco Sub; SP500
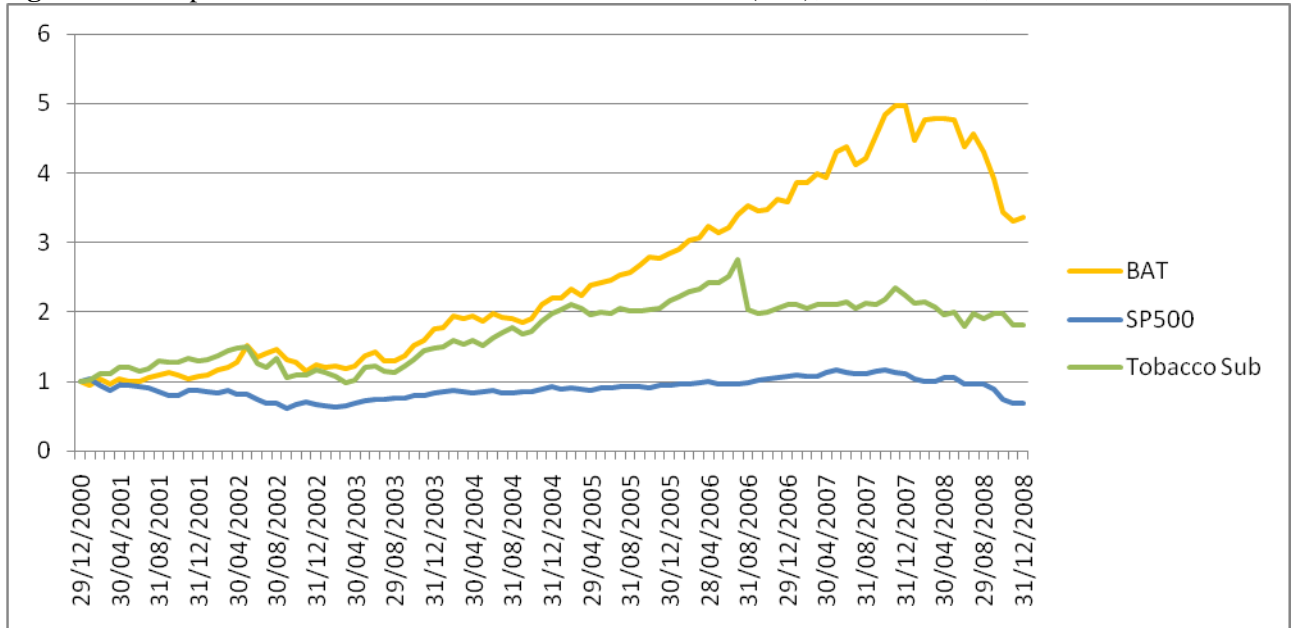
Figure I7: Compounded returns for VICEP; SP500; and for the sub-portfolio of war and defence industry, War/Def Sub
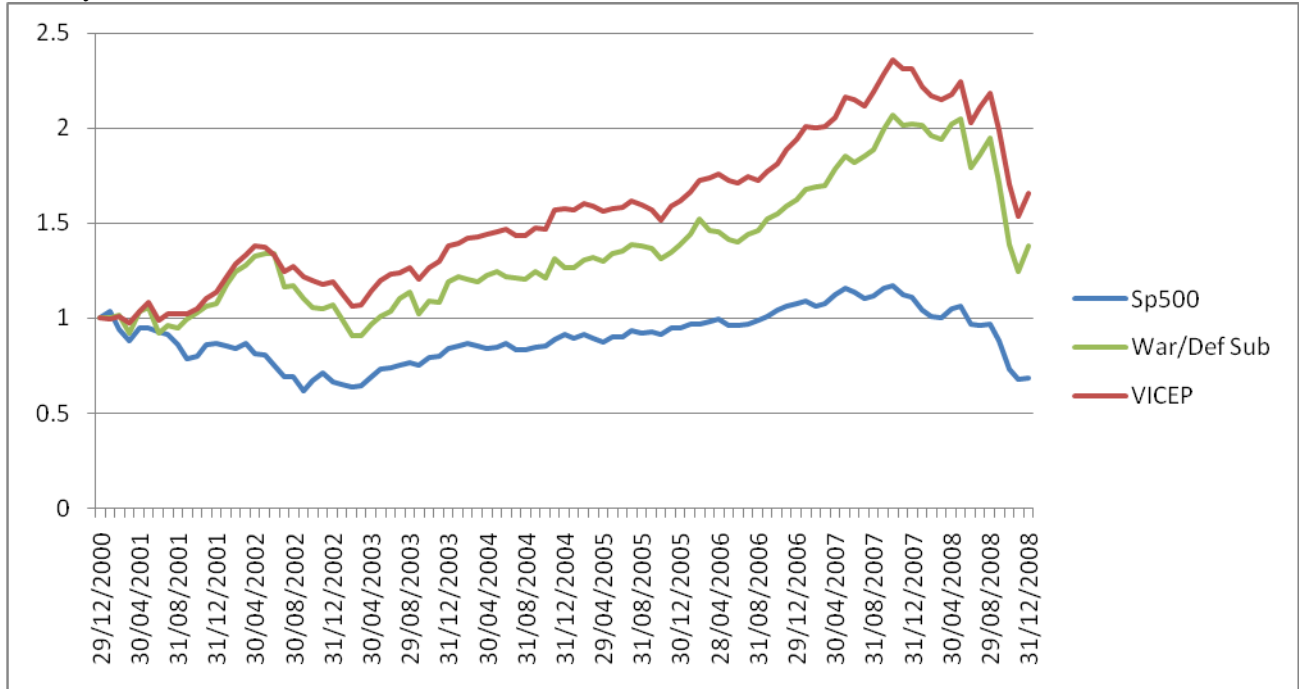

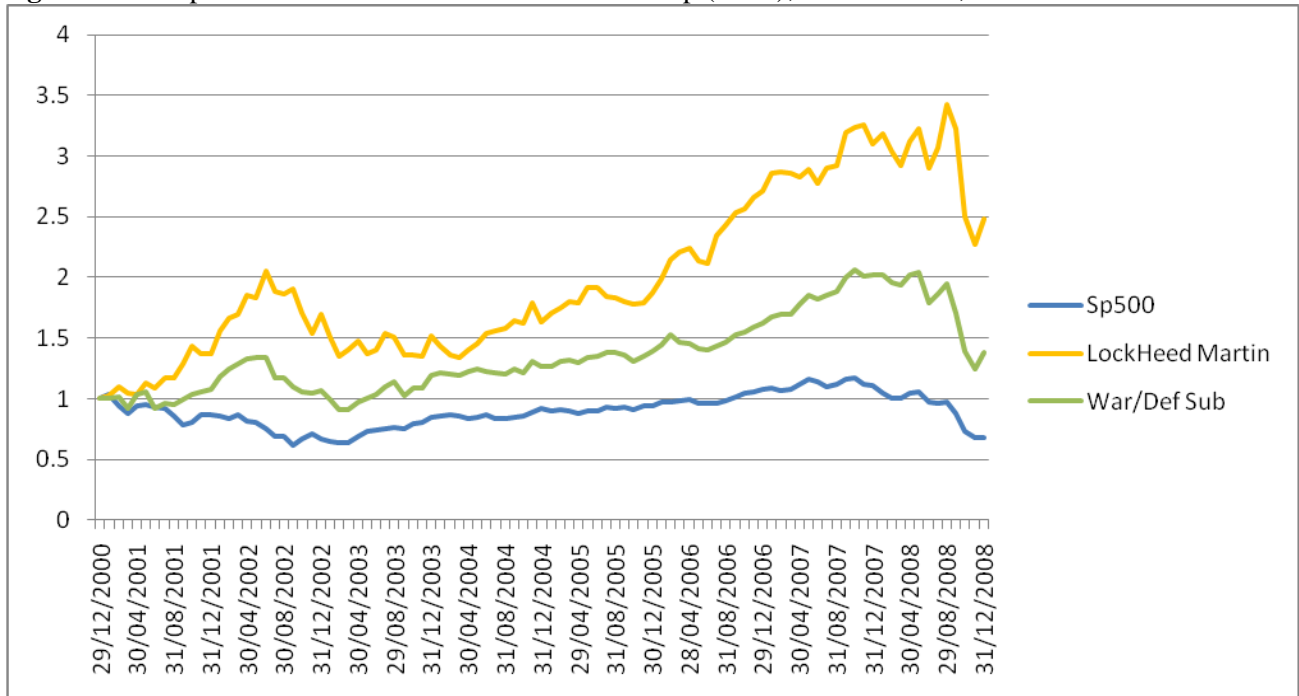**Figure I8**: Compounded returns for Lockheed Martin Corp (LMT); War/Def Sub; SP500

Figure I9: Compounded returns for the VICEP; SP500; and for the sub-portfolio of adult entertainment industry, Adult Sub.
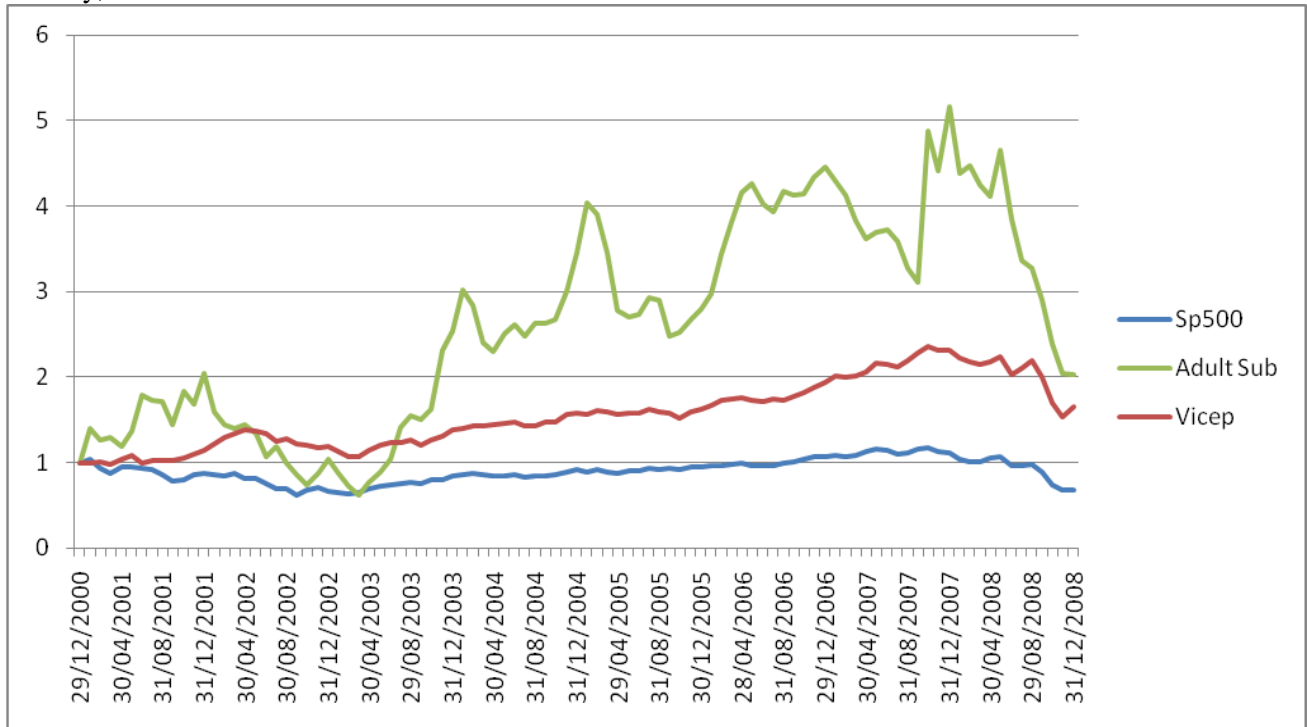

Figure I10: Compounded returns for New Frontier Media Inc. (NOOF); Adult Sub; SP500