A case study on the risk-adjusted-financial performance of The Vice Fund

The risk-adjusted-financial performance of this fund will be evaluate through a comparison with an other mutual fund having a different investment strategy and with two benchmarks.

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SUMMARY

Nowadays, there is a debate about the possibility that sin stocks bring higher returns than other ones to the investors. This thesis is a case study on a mutual fund: The Vice Fund. This US fund has a specific investment strategy: it invests in sin stocks. We compared this mutual fund to The Timothy Fund because they have similar characteristics such as – date of inception, total assets, home country and investment universe, expect the investment strategy. Indeed, The Vice Fund invests in sin stocks and The Timothy Fund does not. Two benchmarks are also used in the study: the S&P 500 Index as a domestic benchmark and the MSCI World Index as an international benchmark. This thesis is a case study using a deductive approach on a quantitative ground. The study is done on ten years long from 2003 to 2012. We divided the entire period into three different sub-periods depending of the S&P 500 Index trend. The first and the last sub-periods are bullish and the second one is bearish. In order to analyse both the financial performances and the risks of The Vice Fund we use several tools. We calculated returns and risk-adjusted ratios: the Treynor’s ratio, the Sharpe’s ratio and the Jensen’s ratio. Because these ratios are less accurate in bearish markets, we calculated the normalized Sharpe ratio by doing linear regressions and we also calculated the modified Sharpe ratio. In order to perform these calculations, we used DataStream as a database to obtain prices and dividends for the two mutual funds and the prices for the two benchmarks. We got also the one-month T-bill to have a risk-free rate. We found that The Vice Fund had a better average returns performance whatever the market conditions over the period studied. However the difference between weekly results with The Timothy Plan Fund and the benchmarks is not statistically significant. The risk-adjusted ratios confirmed the superiority of the risk-adjusted financial performance of the sin fund.

Keywords: fund’s return, Sharpe’s ratio, normalized Sharpe’s ratio, modified Sharpe’s ratio, Treynor’s ratio, Jensen’s ratio, sin fund.
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1) Introduction

This part is the introduction. It aims to present the subject of the study: The Vice Fund performance and its comparison to another mutual fund and to benchmarks. Last but not least, the introduction presents the research question on The Vice Fund financial performance case.

Nowadays, mutual fund industry undergoes a hard competition and many kinds of funds appeared such as ethical funds, standard funds or non-ethical funds. Different active management investment styles are supposed to beat the market. However, a controversy exists in the financial research world. Markets are supposed to be efficient and all information is already included in prices, it should be worthless to manage actively mutual funds, this is the Efficient Market Hypothesis. A case study on a particular and original investment style could be interesting through a focus on a specific mutual fund: The Vice Fund. This mutual fund invests in very specific equities such as alcohol, tobacco, gaming and defence industry. Such investment strategy is a winning one according to Dan Ahrens, co-portfolio manager in The Vice Fund. He said: “we believe people are going to drink, smoke and gamble no matter what is going on with the economy” (Money Management Executive, 2003). A highlighted study would be to compare this fund to another one, having the same characteristics but implementing a different strategy, and to some benchmarks: a domestic one like the S&P 500 and an international one like the MSCI World Index.

So, the goal of the study is to see whether The Vice Fund entails higher financial performances regarding risk and returns. To assess the risk-adjusted financial performance of The Vice Fund we followed the methodology of the study led by Kreander et al (2005). This consists in the comparison between the selected fund and a fund having similar characteristics and benchmark.

Applied to our case study on The Vice Fund, the elements chosen for the comparison are:

- The Timothy Fund
- The S&P 500 Index
- The MSCI World Index

A clear definition of the central element of the study: The Vice Fund and definitions of the elements used for the comparison like the Timothy Fund, the S&P 500 Index and the MSCI World Index will be given in the introduction. Later on, the reasons for the choice of these elements will be exposed in the practical methodology.
1.1) Background

1.1.1) Definitions

Some definitions are detailed here in order to make the notions clear for the reader.

**Sin Funds:** in this thesis, we used this expression to talk about mutual funds investing in specific stocks as gaming, tobacco, alcohol and military industries. So, here, The Vice Fund is a sin fund because it invests in these stocks (USA Mutuals Statutory Prospectus, 2012, p. 10).

**Conventional Funds or non-ethical fund:** in this thesis, we use this expression to talk about mutual funds having no specific moral investment strategy. Conventional funds are not ethical funds or sin funds. Here, The Timothy Fund is a considered as a conventional fund because it is not limited to ethical stocks (Timothy Plan Statutory Prospectus, 2013, p. 20).

**SRI or ethical funds:** these funds have a specific strategy and the following definition describes it accurately. “Sustainable and responsible investing (SRI) is an investment discipline that considers environmental, social and corporate governance criteria (ESG) to generate long-term competitive financial returns and positive societal impact.” (USSIF, 2013).

**Actively managed funds:** JP Morgan defines it as the “seek to return a risk-adjusted premium that outperforms their benchmark or tracking index” by active managers (JP Morgan, 2013). Both The Vice Fund and The Timothy Fund are actively managed. (Timothy Plan Statutory Prospectus, 2013, p. 20; USA Mutuals Statutory Prospectus, 2012, p. 10).

**Passively managed funds:** JP Morgan also provides an accurate definition: “passive management on the other hand is a manager’s approach to mimic a set of securities, such as an index.” (JP Morgan, 2013).

1.1.2) Audience

Even if some definitions are given above, it is important to remember that this thesis is for an audience with a financial background.

The audience of this thesis are investors who would like to have more knowledge on The Vice Fund. This study aims to bring new elements to have a good overview of the risk-adjusted financial performance of this fund. Moreover, the audience is supposed to have some basic financial skills to make a good understanding of the vocabulary, of the financial calculations like the risk-adjusted ratios and of the statistical tests like the Wilcoxon test.
1.1.3) Ethical and non-ethical funds performance controversy

The first trade-off that appeared was between investing in SRI (Socially Responsible Investment) or in conventional funds. Previous studies, especially lead by Hamilton et al (1993) and Statman (2000), suggested that SRI funds performance have insignificantly different results from conventional funds (Hamilton et al., 1993; Statman, 2000). Indeed, it is difficult to outperform the market for a standard mutual fund. Adding some investment constraints would increase the difficulty to obtain higher returns. Investors would think that to exclude specific stocks could bring lower returns. However, a growing number of academic studies have demonstrated that SRI funds perform at least as well as benchmark funds. This is the case in the study of Kreander et al (2005) and Mallin et al (1995). Those discoveries lead to the emergence of the phenomenon of thematic investments funds. They have been launched to create an alternative to the supply of traditional asset classes. The investors had to face a new trade-off, in particular between SRI funds and mutual funds investing controversial areas. Thus, in a world where ethical funds are increasing, funds dedicated to vice add a subversive touch. The sin funds are specialized in activities considered as immoral through the eyes of society. They invest, for example, in the four main areas that are gaming, tobacco, alcohol and military industries. This concept is that those areas are recognized as addictive and, as a result, they should be resistant to the economic fluctuations and bring higher returns on the long run. While the notion of SRI implies that the maximization of the financial returns should not be the only goal, the vice investments deal with the removal of emotion from the investing question. The rational investor will have to distinguish which strategy generates the best performance.

So after the debate between the financial performances of the SRI funds and those of the standard mutual funds, a new debate is rising about the financial performance between the sin stocks and the conventional ones. Some researchers found that sin stocks generate significant higher returns than convectional stocks. Two studies argue that for US publicly traded stocks (Hong & Kacperczyk, 2009; Kim & Venkatachalam, 2011). The first one deals with social norms, it demonstrates that less sin stocks are owned by norm-constrained institutions and are less analyzed by experts but they have higher expected returns (Hong & Kacperczyk, 2009, p. 15). The second study starts with the same hypothesis as the first one: social norms that make investors reluctant to invest in sin stocks. The study tries to understand why lower financial analysis on these stocks can lead to higher expected returns. The conclusion of this second research is quite important. The sin stocks have better financial reporting that entails better forecast for earnings and timely loss recognition. So investors have an additional cost to invest in socially acceptable stocks (Kim & Venkatachalam, 2011, p. 415). Last but not least, a larger study done among 21 countries on 267 sin companies argues that they get higher returns than conventional equivalent stocks. (Fabozzi et al., 2008, p. 92). However, a recent study achieved on the Australian market about sin stocks found another conclusion: sin stocks do not provide higher returns (Philipps, 2011, p. 49).

This active debate shows the interest for the investors to learn more about sin stocks and their returns. So, we decided to do a case study on a specific mutual fund investing in sin stocks: The Vice Fund.
1.1.4) Mutual Fund presentation

A fundamental point is to understand the mutual fund nature. First, this type of fund is a part of the family of investment companies. The goal of investment companies is to collect funds from investors and then invest the money into financial markets (Bodie et al., 2010, p. 120). So, investors obtain shares of the investment companies and these shares increase or decrease in value depending of the financial performance of the portfolio of the fund. The value of these shares is the Net Asset Value (NAV). Simply, NAV is the market value of assets minus liabilities divided by the number of shares outstanding (Bodie et al., 2010, p. 121). For investors, investment companies offer many advantages such as record keeping and administration, diversification, professional investment manager and lower transaction cost because of the economy of scale (Bodie et al., 2010, p. 121). Many kinds of investment companies exist like unit investment trust, managed investment companies, commingled funds, real estate investment trusts and hedge fund but the study focus only on mutual funds. Even in this category, several families operate. Indeed, there are money market funds, equity funds, sector funds, bond funds, international funds, balanced funds, asset allocation and flexible funds and index funds. The study tries to understand a mutual fund: The Vice Fund. This specific fund is an equity fund. This means that it “…invest primarily in stock, although they may, at the portfolio manager’s discretion, also hold fixed-income or other types of securities. Equity funds commonly will hold between 4% and 5% of total assets in money market securities to provide liquidity necessary to meet potential redemption of shares.” (Bodie et al., 2010, p.125). Last but not least about the nature of equity funds, they can be into two categories: income funds and growth funds. The first one emphasises on dividends and incomes from the holding stocks. The second one spots on capital gains from the holding stocks.

A second point is to understand mutual fund costs for investors. There is front-end load, the cost to buy a share. There is also the back-end load, the cost to redeem a share. Moreover, investor should pay attention to the management fees and operating expenses. These expenses are available in the prospectus of the fund. For example, the redemption fee for The Vice Fund is 1% (USA Mutuals Statutory Prospectus, 2012, p. 5). Moreover, the SEC frames mutual funds. There are granted “pass-through”, that means that this is the investor who pays taxes, not the fund. So, investors should be careful to all the expenses that minimize gains from investing into a mutual fund.

A last point is to understand the structure of a mutual fund. With this knowledge, the reader will be able to grasp the environment of a US mutual fund and more precisely the environment of The Vice Fund. Basically, a mutual fund is a structure made by several actors: the Board of Directors, the shareholders, the management company, the investment advisor, the distributor, the transfer agent, the custodian bank and the accounting firm. The board objective is to avoid conflict of interest between the management company and the shareholders. Indeed board tackles problem such as excessive risk taking, churning by trading without information or herding behaviour by following other traders. These phenomena rise with the principal-Agent problem jobs (Brealey et al., 2011, p. 319). The management company is used for administrative functions and the investment advisor takes care about the investment strategy, complying with investment objectives written in the prospectus. The distributor promotes and sells shares of the fund to investors through banks.
for example. The custodian has in accounts the assets held by the fund. The transfer agent
records investor’s movements and manages dividend distributions.

1.1.5) The Vice Fund overview

This paper will focus on a deep analysis of The Vice Fund.

Before giving any details about this particular fund, it is important to define what is meant
by unethical fund. According to the conventional wisdom, funds investing in firms
involved in tobacco, alcoholic beverages, gambling and defence industry are named sin
funds. The existing literature does not give a precise definition of what should be
considered as sin investing. However, sin funds are comparable to “the seven categories of
damnable vice” such as pride, greed, anger, lust, gluttony and sloth. (Neusner & Noam,
2002, p. 28). Concerning the anger for example, “It’s hard to find a company that
deliberately caters to people intent on harm. Certainly, none admit it. But Pacifists
generally regard any defence firm as a sin stock” (Neusner & Noam, 2002, p. 28).

The Vice Fund (VICEX: Investor Class) became operational on August 30, 2002 (USA
Mutual Semi-Annual Report, 2012, p. 25). The Vice Fund is a distinct portfolio within the
trust USA Mutuals. The later is registered under the Investment Company Act of 1940 as
an open-end management investment company. The fund is managed by Mutuals Advisors,
Inc. The portfolio is managed by Gerald Sullivan since June 2011 (USA Mutuals Semi-
Annual Report, 2012, p. 25). The Vice Fund’s investment objective is the core, long-term
growth of capital (Vice Fund Summary Prospectus, p. 1, 2012).

For the purpose of its objective, the non-diversified fund developed a specific strategy
relying on four points. First, it invests mainly in equity securities of small, medium and
large capitalization companies, including U.S. and foreign issuers (USA Mutuals Statutory
Prospectus, 2012, p. 10). Second, the companies required to be part of the investment
portfolio are selected from their involvement in one of those four areas: tobacco, alcohol,
gaming and defence industries. In fact The Vice Fund requires that each portfolio
company’s revenues result at least in 25% from alcoholic beverages, tobacco, gaming or
defence industries (USA Mutuals Statutory Prospectus, 2012, p. 10). After those specific
companies have been spotted, a top-down analysis and a detailed investigation of
companies’ fundamentals is done. “such as valuation, sales and earnings growth,
profitability, indebtedness and competitive position” (USA Mutuals Statutory Prospectus,
2012, p. 10). Last but not least, under normal market conditions, The Vice Fund invests a
minimum of 80% of its net assets in the companies presenting the above-characteristics.
Concerning cash consideration, the fund may hold up to 20% of its net assets in cash or
short-term securities that stay available to quickly respond to investment opportunities
(USA Mutuals Statutory Prospectus, 2012, p. 10).

The Vice Fund main arguments to defend its position about holding sin stocks are, firstly,
that he has the characteristic to present a steady demand no matter what is the economic
context. Secondly, its international investment strategy allows it to invest outside the U.S.
Thirdly it presents natural barriers to the entrance of new competitors. Fourthly, it is
dowered with a double ability to generate excess cash flow and pay high, growing
dividends (The Vice Fund fact sheet, 2012, p. 1).

Invest in this specific fund brings risks. The common risk to mutual funds is the stock market risk or loss of the principal. Moreover, as highlighted earlier, The Vice Fund is non-diversified. This involves that it is “more exposed to individual stock volatility than a diversified fund” (The Vice Fund fact sheet, 2012, p. 2). The currency and exchange rate risks are very important as well. As a result of investing in foreign countries, the fund has to deal with different accounting methods and greater volatility and economic risks. The last point is that the strategic view of the fund implies investments in smaller companies, leading to liquidity and volatility risks (The Vice Fund fact sheet, 2012, p. 2).

1.1.6) The Timothy Plan Fund

Timothy Plan Large/Mid-Cap Value Fund Class A (TLVAX) was created in 1999 and is focused on growth (Timothy Plan Statutory Prospectus, 2013, p. 19). This mutual fund will be used for a comparison with The Vice Fund. There are four points in the investment strategy. The fund invests most of time in US common stocks and 80% of its assets are in market capitalizations that are more than $2 billion. It invests according to a “bottom-up” approach and uses information about invested companies to analyse them. The fund can also take a defensive position if needed in case of higher market volatility. Last but not least, the strategy of the fund is the opposite of The Vice Fund because it does not invest in alcohol, tobacco or gambling (Timothy Plan Statutory Prospectus, 2013, p. 20). So, it would be interesting to compare the two funds.

Invest in Timothy Plan Large/Mid-Cap Value Fund includes some risks that should be explained. Because the share price of the fund is not constant, there is a “general risk” for the investor of losing money. Moreover, because it is a mutual fund and more specifically an equity fund, there is a “stock market risk”. Then, a larger company investing risk exists because important companies are slow to adapt themselves to a new competition. A mid-sized company investing risk also exists because these companies are less able than big companies to gather resources and have less experience (Timothy Plan Statutory Prospectus, 2013, p. 21).

1.1.7) The S&P 500 Index

The S&P 500 Index is managed by Standard & Poor’s and has been created in 1920. It represents 500 major companies in the leading industry in the US. This Index will be the national benchmark for a comparison with The Vice Fund. The S&P 500 Index Committee maintains the accuracy of the benchmark. Moreover, companies have to fulfil several criteria to be included in the Index (Standard & Poor’s, 2012). For example, it must be a US company, the Market Capitalization should be at least $4 billions, the public float should be at least at 50% and the company should have four consecutive quarters of positive earnings (Standard & Poor’s, 2012).

The Index is very useful for our study because it represent very well the US market. Then,
we will be able to compare The Vice Fund with this benchmark as a domestic benchmark.

1.1.8) The MSCI World Index

In order to compare and assess the financial performance of The Vice Fund, the MSCI World Index has been chosen as an international benchmark. The MSCI World Index is an index, calculated by Morgan Stanley Capital International, measuring the stock market performance of developed countries. It was established on December 31, 1969. It comprises over 1,600 values spread across 24 countries. Its total market capitalization stood at several trillion dollars of which 50% are U.S. companies, 25% are UK companies and 10% are European companies. The MSCI World is in the range of indices from Morgan Stanley, which is the most regularly monitored by the markets (MSCI World Index, 2013).

The Vice Fund invests in the US but also worldwide so the MSCI seems to be the best suitable benchmark for our purpose as in international benchmark.

1.1.9) T-bill presentation

The risk-free rate is very useful to compute risk-adjusted measures like the Sharpe, the Jensen or the Treynor’s ratio. The Vice Fund is a US mutual fund. So, in this study, we will use a US risk-free rate. According to the conventional wisdom, the US Treasury-Bill represents it. Moreover researchers used commonly the US T-bill one month. For example, T-Bill is used (Carhart, 1997, p. 62) in the study of Carhart (1997).

1.1.10) Tools for financial performance comparisons

The study will use the financial performance to compare The Vice Fund with The Timothy Plan Large/Mid-Cap Value Fund Class A in order to analyse the efficiency of the strategy of The Vice Fund. It will use also the financial performance to compare The Vice Fund with an international benchmark and a domestic benchmark: the MSCI Index and the S&P 500.

Financial performance has two sides in this study. First, there is the performance evaluation on the basis of the rate of return. Second, there is the performance based on the risk-adjusted performance expressed by financial ratios: the Sharpe’s ratio, the Treynor’s Ratio and the Jensen’s Ratio. During non-conventional market period, we will also calculate the normalized Sharpe ratio and the modified Sharpe’s ratio.

1.2) Contribution to knowledge: the research gap

Mutual funds have become a widely popular subject for researchers since the 60’s with the studies of Sharpe (1966) and Jensen (1968) among others. These studies have focused on the ability of mutual funds to outperform the market. The original conclusions were that fund managers were not able to compete with a “passive strategy of investing in a broadly
based index” (Kreander et al., 2005, p. 1468). Thereafter, other researchers showed that some funds could outperform the market, especially studies achieved by Gjerde & Saettem (1991) or more recently by Bollen & Busse (2001).

Recently the point of interest attracting researchers concerns the Socially Responsible Investment (SRI) funds. In the mid-nineties, Mallin et al (1995) used the first matched sample approach to compare returns of a sample of ethical funds and returns of sample of standard funds in UK. They concluded, with other studies, that there is no significant difference between the two groups (Luther et al., 1992; Luther & Matatko 1994; Gregory et al., 1997). More recently, the same type of debate came between the performances generate by sin stocks and performances generate by “standard stocks”. We have seen in the funds controversy part of the introduction of our study that some articles demonstrate higher returns for sin stocks (Fabozzi et al., 2008) and others argue the reverse (Pillips, 2011). This rising controversy leads us to have a reflection about the sin investment strategy. We aim to provide to investors more confidence in investing in these type of investment. More precisely, we do a case study on The Vice Fund, a specific mutual fund investing in sin stocks.

Our research on a case study, the financial performance of The Vice Fund, aims to bring knowledge in two areas.
- We aim to bring knowledge on the performance of the Vice Fund regarding two aspects: the return and the risk.
- We aim to bring knowledge about the new controversial debate about sin stock returns with a different approach. We do not analyse sin stocks directly but a unique specific fund: The Vice Fund investing in sin stocks.

1.3) Research question

A case study on the Vice fund: does the Vice Fund have a better risk-adjusted financial performance than The Timothy Plan Large/Mid-Cap Value Fund Class A, than the MSCI World Index and than the S&P 500 from 2003 to 2012?

1.4) Research purpose

The Vice Fund claims to have a very specific strategy that helps it to resist to market fluctuations (Money Management Executive, 2003). The aim of this study is to lead an explanatory research analysis on The Vice Fund investment strategy by comparing its financial performance to a very similar fund, which has a different strategy: The Timothy Plan Fund. The study analyses the financial performance of The Vice Fund by comparing it to the market with the MSCI Index and to the S&P 500 Index.

The study is based from 2003 to 2012 because it would be interesting to analyse the financial performance of The Vice Fund on a long run and before and during the financial crisis. Both return comparisons and risk-adjusted performance comparisons will be used on the entire 2003-2012 but also on the three sub-periods defined according to the fluctuations
of the S&P 500 Index. The return comparison is performed by the rate of return and the risk adjusted performance comparison is performed by the Sharpe’s ratio, the Treynor’s ratio and the Jensen’s ratio. During non-conventional market period, we will also calculate the normalized Sharpe ratio and the modified Sharpe’s ratio.

1.5) Research limitation

The study focuses only on one single fund performance because of its very original policy: The Vice Fund. The research uses only standard financial performance indicators and only pays attention on return and risk with the returns, the Sharpe’s ratio, the Treynor’s ratio and the Jensen’s ratio. The performance evaluation covers from January 2003 to December 2012.

After this introduction, it is easier to understand to goal of the study and the research gap. Indeed, this study aims to answer to the research question. This introduction presents some elements of comparison of The Vice Fund such as the Timothy Fund and some benchmarks. If we explained in this part why The Vice Fund is studied through the research gap, the reasons for the choice of The Timothy Fund and the choice of the benchmarks will be detailed in the empirical discussion part.
2) Theoretical Methodology

The methodology part allows the reader to grasp the research structure used for the study. It gives some details about the research approach and philosophy. It explains also the research strategy, design and method. At the end, this part assesses the quality criteria and ethical principles of the study.

2.1) Research Approach

In research methodology, a theory is “an explanation of observed regularities” (Bryman & Bell, 2011, p.7). The researcher has two main options to conduct his theory. There are the deductive theory and the inductive theory (Bryman & Bell, 2011, p. 11).

On the one hand, the deduction process starts from a theory and goes to the observations and findings (Bryman & Bell, 2011, p. 13). So, the process of the deductive theory remains simple. The researcher uses known theory and elaborates hypothesis. Then, he collects data and deduces findings. At the end, he confirms or rejects hypothesis and revises the main theory (Bryman & Bell, 2011, p. 11). On the other hand, the inductive research approach starts from observations and creates and new theory. So, the researcher begins with a general research question. Then he selects relevant sites and subjects and collects the data. After he interpreted the data, he sets up new theories and writes conclusions (Bryman & Bell, 2011, p. 390).

In this study, we apply the deductive research approach. Indeed, we do not try to elaborate new theory. We start with a well-known economic theory: the Efficient Market Hypothesis. Then we create hypotheses from the theory and our topic: The Vice Fund. The purpose of the study is to compare The Vice Fund to another fund and to benchmarks. We aim to bring more knowledge for individual investors investing in this specific mutual fund.

2.2) Research Philosophy

In this section, the discussion focuses on the methodological assumptions, or philosophy. They consist in two different reflexions: epistemology and ontology.

2.2.1) Epistemology

The first one is about epistemological considerations: “what is regarded as acceptable knowledge in a discipline” (Bryman & Bell, 2011, p. 15). Researcher has here to deal with the question whether or not social sciences can be studied in the same way that natural sciences are. The epistemological consideration splits into two schools: the positivism and the interpretivism. The positivism is “the application of the natural sciences to the study of a social reality” (Bryman & Bell, 2011, p. 15). That means that researchers, acting under
this statement, analysed facts with the same processes as natural sciences. At the opposite, with an interpretivism approach, researchers “grasp the subjective meaning of social action” (Bryman & Bell, 2011, p. 17). Because the purpose of our work is to study concrete reality using financial sciences, the epistemology orientation is clear. In this study, we collect objective data to answer the research question and apply established scientific formula. Those data are not biased by interactions of social actors. So, it is appropriated to use the positivism as an epistemological consideration.

2.2.2) Ontology

The second reflexion concerns ontological assumptions or the question whether or not the reality of a social phenomenon is influenced by social actors, “Questions of social ontology are concerned with the nature of social entities.” (Bryman & Bell, 2011, p. 20). Again, two schools exist: the objectivism and the constructivism. The first one means that the “…social phenomena and their meanings have an existence that is independent of social actors” (Bryman & Bell, 2011, p. 21). The second one is the reverse: “social phenomena and their meanings are continually being accomplished by social actors.” (Bryman & Bell, 2011, p. 22). In this study, we separate social actors and social phenomena. Our subject leads us to deal with financial performance of mutual funds, historical returns and other data. It is consistent to adopt an objectivist orientation. However, we are aware that some elements of the study can be seen as constructionism. Indeed, The Vice Fund is called a sin fund and the sin is a very subjective point of view. The goal of the study is to provide information about the risk and return performance of this strategy, not to judge the morality of this strategy. So, we do not take into account this aspect and the study still has an objectivism approach. Finally the choices of positivism as the epistemological considerations and the choice of objectivism as the ontological consideration seem to be logic for the research philosophy regarding the subject of this study.

2.3) Research Strategy

The research strategy has two main approaches: a qualitative approach or a quantitative approach. A qualitative strategy is mostly used with an inductive theory. In this study, we will use a quantitative strategy. Indeed, we have a deductive theory and adopt positivism and objectivism methods. A quantitative study consists in the “quantification in the collection and analysis of data” (Bryman & Bell, 2011, p. 717). In order to be as clear as possible we make the links between the process of the quantitative research and the process of our study.

Table 1: A presentation of the quantitative research process

| Step 1 | Elaborate theory | As a major financial theory, we used the Efficient Market Theory. We wondered if The Vice Fund delivered higher financial performance regarding risk and return. |
Step 2 | Devise hypothesis | Hypotheses are design to answer to the research question by comparing The Vice Fund to the Timothy Fund and to the benchmarks.
---|---|---
Step 3 | Select research design | A case study on the Vice Fund is adopted. We used also a longitudinal study because The Vice Fund is studied within ten years.
Step 4 | Devise measure of concepts | We select returns and risk-adjusted measures to evaluate the concept of financial performance.
Step 5 | Select research site | Our research site could be the mutual fund sector in the US.
Step 6 | Select research subjects | Our research subjects are the mutual funds and the benchmarks.
Step 7 | Collect data | The collection of data is done via DataStream.
Step 8 | Process data | The calculation of the returns and risk-adjusted measures are done via Excel.
Step 9 | Analyse data | The analysis of the data is achieved through the results provided by the calculations.
Step 10 | Develop findings | Then we develop findings about the financial performance of The Vice Fund and accept or reject hypotheses.
Step 11 | Write up conclusions | To end up, we develop conclusion about The Vice Fund performance and the validity of the Efficient Market Theory for this case study.

Source for the steps: (Bryman & Bell, 2011, p.151).

In this study, as researchers, we aim to pay attention to particular points: measurement, causality, replication and generalization (Bryman & Bell, 2011, p. 22). However, about the generalization point, we highlight that the results of the researches are only applicable for the case study about The Vice Fund and not for all sin stocks for example.

2.4) Research Design

The first preoccupation is to define the research design. "A research design provides a framework for the collection and analysis of data" (Bryman & Bell, 2011, p. 717). So depending on the topic and the research question you select the more adapted research design. Moreover, it is possible to mix them in order to fulfil all the requirements of the research. There are the experimental design, the cross-sectional design, the longitudinal design, the case study design and the comparative design (Bryman & Bell, 2011, p. 68).

This study focuses on a specific mutual fund and evaluates its performance during ten years long. We use a case study design because we analyse The Vice Fund deeply. Our research question is focus on it. Moreover, the hypotheses involved this mutual fund. Because we compute the financial performance on the entire period but also on three distinct sub-periods, we are also applying a longitudinal design.
2.5) Research Methods

2.5.1) The literature review construction

The construction of the literature review is far from simple but it is an essential stage in the study. This elaboration allows the researcher to find the right research question, to find a research gap and to operate accurate researches in databases (Bryman & Bell, 2011, p. 91). We aimed to develop a systematic review following a process for the construction of the literature review. First, it is mandatory to have a clear and answerable research question. The question should also have very strict limitations (Bryman & Bell, 2011, p. 97). Then, using keywords, we search for academic articles published in well-known financial journals. After taking some notes about them, we select them depending of their usefulness for the study. So, to sum up, we applied this following process. First, we read articles and books related to the research question. Then, we collect some notes and keywords. After that, we create our own suitable keywords and use them to look for new articles in databases. We select them with the title and the abstract before reading them. Last but not least, once this is done, it is important to check regularly for new publications (Bryman & Bell, 2011, p. 110). This literature review should not stop at the middle of the thesis. It can continue until the end of the writing (Bryman & Bell, 2011, p. 94).

The step of the selection of the databases is important because it should enforce the respect of the quality criteria. The quality criteria are described in the next section. We select reliable databases. Indeed, we use:

- DataStream provided by Thomson Reuters for the data collection concerning prices and dividend of the funds, the benchmarks and the risk-free rate.
- Morningstar.com as a fund screener to find a suitable comparable mutual fund for The Vice Fund.
- Umea University Library database EBSCO Host for academic articles.
- SPSS software to conduct OLS regressions and Wilcoxon signed rank test.

We consider that the sources above are reliable. Indeed, some sources are provided by Umea University like SPSS, Umea University Library database EBSCO and DataStream. About Morningstar, is a commonly tool used in finance.

2.5.1) The literature review evaluation

In order to increase the reliability of the study, the choice of relevant academic articles is important. So the theories and the literature review exposed in this study come from articles in official financial journals. Moreover, we selected recent articles. Many articles are dated after the 90’s. Some articles come from the 50’s or the 60’s. However, these old academic articles are still very used and cite in recent studies. They exposed some fundamental economic theories. After the date of publication and the importance of the academic journal, the quality of the literature review is assessed by the number of academic articles used in the study even if researchers cannot read all of the literature about a topic. In this
study numerous of academic research articles are used. So, to conclude, we try to achieve an accurate literature review.

2.6) Quality criteria

Since the nature of this study is quantitative, it should comply with the quality criteria of such type of study. Indeed, two concepts are very important: reliability and validity. The reliability is about the “consistency of measure of a concept” (Bryman & Bell, 2011, p. 158). The validity is more about “the issue of whether or not an indicator (or a set of indicators) that is devised to gauge a concept really measures that concept” (Bryman & Bell, 2011, p. 158). In order to make sure that this study respects the different reliabilities and validities of the quantitative study, we will do a parallel with the quality criteria and the study itself.

First, reliability is divided in three types: stability, internal reliability and inter-observer consistency (Bryman & Bell, 2011, p. 158). About the stability, our measures done on The Vice Fund are stable over time. Indeed, prices are registered in database and once it is done, it cannot change. About the internal validity, all of the indicators are coherent and are used is academic articles like the study of Kreander et al (2005). Last but not least, to avoid the inter-observer consistency risk, we follow methodology of academic articles for the collection of the data like the study of Kreander et al (2005).

Second, validity is divided in five types: face validity, concurrent validity, predictive validity, construct validity and convergent validity (Bryman & Bell, 2011, p. 160). The face validity refers weather a measure represents well a concept (Bryman & Bell, 2011, p. 160). In this study, the concept of financial performance is well represented by measures such as returns and risk-adjusted measures. The concurrent validity refers to the use of actual measures (Bryman & Bell, 2011, p. 160). The Vice Fund performance is evaluated through measures, which are used by many researchers like Statman (2000) or Sturm (2010). The predictive validity refers to the use of future criterion measures (Bryman & Bell, 2011, p. 160). We are not using new concepts in that study, so this validity is not applying here. The construct validity is quite important because it reflects the ability of the researcher to create hypotheses from a theory (Bryman & Bell, 2011, p.160). The hypotheses are related to the concept of financial performance of The Vice Fund. Last but not least, the convergent validity refers to evaluate the same concept with different methods (Bryman & Bell, 2011, p.160). The Vice Fund performance is evaluated by several risk-adjusted methods: the Sharpe’s ratio, the Jensen’s ratio and the Treynor’s ratio.

Third, an important quality criterion in a study is also the generalization of the results. This research is a case study on The Vice Fund. According to Bryman & Bell (2011), the externality or generalizability of a case study research is not possible (Bryman & Bell, 2011, p.160). Results are only applicable to this particular situation and cannot be representative of any other sin funds. We made the choice of the case study design knowing this limitation. However, the research gap still exists because of the limited previous researches.
2.7) Ethical approach

All studies are concerned with ethical approach even if some studies are more concerned than others due to their research question or population. There are four major ethical areas according Diener & Crandall (1978): harm to participants, lack of informed consent, invasion of privacy and deception. Due to the nature of our study, we are not so much involved in such ethical principles. However, we still pay a particular attention to the first principle because we study The Vice Fund and we call it also sin fund for example. In order to avoid hurting the reputation of any actors involved in this study we would like to be very clear. Some expressions are used such as “sin investments” or “sin stocks” for the needs of the study because they represent investments in controversial industries such as defence, alcohol, gaming and tobacco. Such activities could be bad socially considered. However, these expressions do not mean that these industries, funds or whatever related with these words are bad or act badly. This study focuses only on financial performance evaluation aspects of specific investment strategy.

After this methodology part, it would be good to sum up a little bit. The research approach is deductive. The research philosophy is positivism for the epistemology consideration and objectivism for the ontology consideration. The research strategy is quantitative. The research design is a mix of both a case study and a longitudinal study. The research method is detailed in order to have a clear process to collect and analyse the literature review. The quality criteria and the ethical principles are respected.
3) Theoretical framework

This part is about the theoretical framework. First, there are the theories. These theories help the researchers and the readers to rely on the calculations and to grasp the meaning of broad economic theories like the Efficient Market Hypothesis. Second, there is the literature review. It summarizes some research articles that have been done around this research area. Moreover, it helps the researchers to find and follow a specific methodology for the study.

3.1) Theories

3.1.1) Efficient Market Hypothesis

Efficient Market Hypothesis theory implies that all information that is available is already taken into account in the price of the stock. The father of this reflexion is Kendall when he demonstrated the random walks of the stock prices (Kendall, 1953). This means that prices cannot be predictable by investors. This phenomenon does not prove any irrationality but implies market efficiency. Indeed, investors will search new information about stock if it allows getting higher returns (Grossman & Stiglitz, 1980). So, stock prices are fair and are not undervalued or overvalued during a long time. So, it would be complicated to beat an index of a market. It means that an active portfolio strategy would be not a winning strategy. The Vice Fund does not represent a market because it is not enough diversified since it invests only into specific industries. Checking the financial performance of The Vice Fund compared to an index or to a similar fund would be interesting. The study will not validate or invalidate the EMH theory because The Vice Fund is not a representative sample of mutual funds. However, this theory is a good support to understand through a case study this unique and original strategy of The Vice Fund. So, the first innovation was the statement that prices are random (Kendall, 1953, p. 11). It is impossible to find a pattern in a stock price. This “random walk” (Kendall, 1953, p. 11) seems logical because as soon investors find a cycle in a stock price, they adjust their strategy to this cycle. So, at the end, there are no more patterns.

Usually, three forms of Efficient Market Hypothesis are available: the weak form, the semi-strong form and the strong form (Bodie et al., 2010, p. 376). First, the weak form hypothesis explains that stock prices reflect all past or historical information. New information is quickly included in the price that means price is quickly adjusted (Bodie et al., 2010, p. 375). Second, the semi-strong hypothesis implies that more than historical prices are known. For example, investors know “fundamental data on the firm’s product line, quality of management, balance sheet composition, patents held, earning forecasts, and accounting practices” (Bodie et al., 2010, p. 376). All these data are included in the price because there are public. Third, the strong-form hypothesis states that all information both public and private is reflected in the stock price (Bodie et al., 2010, p. 376). However, this form is questionable because all information is supposed to be public. Indeed, the Securities
and Exchange Commission (SEC) monitor insider trading. It means that the commission checks in the US if people inside a company who are able to obtain significant information about the stock fluctuation use this information for its own interest.

So, supporters of the EMH claim that an active management of assets is not worthwhile. In order to have a better understanding of this point of view, an article published in the Journal of Finance called “On the persistence in Mutual Fund Performance” by Carhart (1997) can help. Indeed, Carhart studied a sample of mutual fund free of survivor bias. He explained that funds managed actively do not bring higher returns than passive ones. So, the management skills in mutual fund industry do not really exist (Carhart, 1997, p. 81).

3.1.2) Modern Portfolio Theory

For the construction of a portfolio, there are basically two steps. First, there is the observation to predict the future performance of the securities. Then, relevant beliefs about future performance are available to select a portfolio. The Modern Portfolio Theory is focused on the second step (Markowitz, 1952, p. 77). The theory aims to increase the expected returns for the same risk and use the diversification. A central element of the demonstration of the portfolio construction is the expected return-Variance of portfolio, or E-V rule (Markowitz, 1952, p. 79).

The goal is to find the best portfolio depending of a level of risk chosen by the investors. So, the best portfolios will be on the efficient frontier line. In order to illustrate this theory the Efficient Frontier and the best portfolio are showed in the Figure 1.

**Figure 1: The Efficient Frontier**

Source: Bodie et al., 2010, p. 239
With:

\( E(r) \): Expected return of a portfolio \\
\( \sigma \): Variance \\

**3.1.3) CAPM**

William Sharpe, John Lintner, and Jack Treynor created in the 60’s the Capital Asset Pricing Model. The aim of this model is to define the expected risk premium depending of the Beta. (Brealey et al., 2011, p. 220). This premium changes in a proportional way to the beta. So, the expected risk premium equals the Beta times the expected premium on the market (Brealey et al., 2011, p. 221). In order to understand this model, there are some assumptions to take into account (Bodie et al., 2010, p. 309).

- There are a lot of investors and their individual wealth is low, compared to the aggregate wealth. Moreover, they are price-taker.
- Investors have one single time horizon.
- Investments are done only in a universe of publicly traded financial asset and investors are able to borrow or lend at the risk-free rate.
- There is no transaction cost.
- Investors use the Markowitz model explained above.
- Investors have “homogeneous expectations”.

*Formula of the Expected Return:*

\[
E(r) = r_f + \beta (\bar{r}_m-r_f)
\]

Source: Brealey et al., 2011, p. 221

With:

\( E(r) \): Expected return of the stock \\
\( r_f \): Risk free-rate \\
\( \bar{r}_m \): Expected return of the market \\
\( \beta \): Beta of the stock

CAPM is important for our study for one main reason. It is going on the same way of the Efficient market Hypothesis. Indeed, the CAPM uses the Capital Market Line, which is the graphical representation of the model. Investors can follow a passive strategy in investing in a market index.
The market portfolio, $M$, is the best portfolio for the investors in terms of return and risk. It is at the intersection of the CML and the risk-free rate in the Figure 2 (Bodie et al., 2010, p. 311).

3.1.4) Beta

Beta has to be defined because it is used in both Treynor’s ratio and Jensen’s ratio. So, understand what it means and how it is calculated is important to make the study clear and understandable. Beta is designed to see the sensitivity of a stock to the market risk. In other word, it measures the sensitivity of the stock due to a market fluctuation (Brealey et al., 2011, p. 202).

Beta is quite simple to analyse. Indeed, on the one hand, a beta above 1 means that the stock will undergo higher fluctuations than market ones. It amplifies market fluctuations. On the other hand, a beta between 0 and 1 will also follow market trends but not as much as the market itself (Brealey et al., 2011, p. 202).
We compute the Beta in the same way for The Vice Fund, The Timothy Plan Large/Mid-Cap Value Fund and the MSCI World Index using the S&P 500. Indeed, the S&P 500 is the benchmark used for the study, it represents the market. So, with this calculation, we compare the fluctuation of the funds with the fluctuation of the market.

The formula used is the covariance of the index and the fund divided by the variance of the index. This calculation is done for the entire period from 2003 to 2012 and for the three sub-periods.

**Formula of the Beta used for the study:**

\[
\beta = \frac{cov(r_m; r_i)}{\sigma_m^2}
\]

Source: Brealey et al., 2011, p. 204

With:
- \(\beta\): Beta
- \(cov(r_m; r_i)\): Covariance between the returns of the market and the returns of the fund
- \(\sigma_m^2\): Variance of the market

### 3.1.5) Standard Deviation

The Standard Deviation evaluates the risk. It is obtained with the square root of the variance. This measure is used in the Sharpe’s ratio in this study. Standard Deviation is useful to understand the volatility of the returns. (Bodie et al., 2010, p. 156).

The Standard Deviation is computed for The Vice Fund, The Timothy Fund, The MSCI World Index and the S&P 500 Index. Then, this measure will be used for the risk-adjusted ratios.

### 3.1.6) Treynor’s ratio

In 1965, the US fund industry was growing. However, few methods existed to evaluate the financial performance of these funds. Treynor (1965) suggested that the value of an actively managed portfolio depends of the market trend. If the market is bullish, the portfolio’s value increases and if the market is bearish, the portfolio’s value decreases (Treynor, 1965, p. 64). Then, the Beta can be added, for analysing the portfolio fluctuation due to the market fluctuation. Last but not least, the risk premium of the portfolio is introduced when the following formula is done: the portfolio return minus the risk-free return.

A clear definition of the Treynor’s ratio is “Treynor’s measure gives excess return per unit of risk” (Bodie et al., 2010, p. 850). Moreover, it is important to notice that the Beta represents the systematic risk and not the global risk. That means that only the risk of a
well-diversified portfolio is taking into account.

The interpretation of the Treynor’s measure is very simple. Indeed, the higher the ratio is, the better the fund performed. However, there are some special cases. The ratio can be negative for two reasons. First, the risk free return is above the return of the portfolio. This means a very poor performance of the portfolio. Second, the Beta is negative. This situation means that the portfolio has an exceptional performance. There is a last special case, the ratio is positive because the Beta is negative and the risk free return is above the portfolio return. This means that the ratio is positive but both the numerator and the denominator are negative. In this situation, a comparison should be done between the Security Market Line of the CAPM model and the portfolio.

**Formula of the Treynor’s ratio used for the study:**

\[ T_i = \frac{(\bar{r}_p - r_f)}{\beta_p} \]

Source: Bodie et al., 2010, p. 850

With:
- \( T_i \): Treynor’s measure
- \( \bar{r}_p \): Return of the fund
- \( r_f \): Risk-free rate
- \( \beta_p \): Beta of the fund

**Figure 3: The Security Market Line**

Source: Bodie et al., 2010, p. 317
With:

\[ E(r) \]: Expected return of a portfolio
\[ \sigma \]: Variance
\[ \eta_f \]: Risk-free rate
\[ E(r_{M}) \]: Expected return of the Market Portfolio
\[ SML \]: Security Market Line
\[ \beta_M \]: Variance of the market portfolio

The Figure 3 is easy to interpret. When the Beta is equal to one, the SML represents the market portfolio premium (Bodie et al., 2010, p. 317).

### 3.1.7) Sharpe’s ratio

In 1966, Sharpe studied 34 open-end mutual fund performances between 1954 and 1963 (Sharpe, 1966, p. 122). In order to do that, he computed the average annual rate of return and the standard deviation of these rates of return for each fund (Sharpe, 1966, p. 123). He confirmed the CAPM theory, explaining that funds with higher average returns obtained also higher volatility. This relationship seems to be linear. Moreover, he uses the same formula of Treynor’s one but replaces the Beta by the Standard Deviation.

So, the Sharpe’s ratio is quite similar to the Treynor’s ratio but the meaning is different. Indeed, the Treynor’s measure takes into account the systematic risk. The Sharpe’s ratio uses the global risk. A good definition of this measure is that the ratio “measures the reward to (total) volatility trade-off.”(Bodie et al., 2010, p. 850).

The interpretation of the Sharpe’s measure is not complicated. Indeed, the higher the ratio is, the better the fund performed well. The measure can be negative if the risk-free return is above the annual average return. That means that the fund has a poor performance. The Treynor’s ratio is compared to the Security Market Line - CAPM model - but the Sharpe’s ratio is commonly compared to the Capital Market Line. The explanation is evident, the Security Market Line uses the Beta to measure the risk and the Capital Market Line uses the standard deviation to measure the risk. To conclude, a ratio of 0.5 for example entails a portfolio average excess return of 0.5 on the risk-free rate for every 1% of standard deviation (Bodie et al., 2010, p. 207).

**Formula of the Sharpe’s ratio used for the study:**

\[
S_i = \frac{(\bar{r}_p - \bar{r}_f)}{\sigma_p}
\]

Source: Bodie et al., 2010, p. 850
With:

$S_i$: Sharpe’s measure

$r_p$: Return of the fund

$r_f$: Risk-free rate

$s_p$: Standard deviation of the fund

### 3.1.8) Modified Sharpe Ratio

The Sharpe ratio can be misleading in downward trend market periods (Scholz, 2007, p. 356). Indeed, in bear market periods, the risk free rate is better than the return of the fund. Then the Sharpe ratio becomes negative and it misleads for the ranking of the funds based on their performances. So, in order to obtain a valid ratio, we compute a modified Sharpe Ratio (Israelsen, 2005, p. 425). It allows obtaining the real fund performance (Scholz, 2007, p. 348) in non-normal market conditions.

**Formula of the Modified Sharpe Ratio used for the study:**

$$mSR_i = \frac{\bar{e}r_i}{S_i(\bar{e}r_i/abs(\bar{e}r_i))}$$


$mSR_i$: Modified Sharpe ratio of the fund $i$

$\bar{e}r_i$: Average excess return of the fund $i$

$abs(\bar{e}r_i)$: Absolute value of the Average excess returns of the fund $i$

$S_i$: Standard Deviation of the fund $i$

### 3.1.9) Normalized Sharpe Ratio

As we said before, the Sharpe ratio can be misleading in downward trend market periods (Scholz, 2007, p. 356). So, in order to obtain another valid ratio, we compute a normalized Sharpe Ratio. It allows obtaining the real fund performance (Scholz, 2007, p. 349) in non-normal market conditions.

**Formula of the Normalized Sharpe Ratio used for the study:**

$$nSR_i = \frac{IA_i + \beta_i \bar{e}r_{iM}}{\sqrt{\beta_i^2 s_{iM}^2 + s_{ei}^2}}$$

Source: Scholz, 2007, p. 349
With:

\( nSR_i \): Normalized Sharpe Ratio of the fund  
\( JA_i \): Jensen’s Alpha of the fund based on Excess returns  
\( \beta_i \): Beta of the fund based on Excess returns  
\( \bar{\varepsilon}_{IM} \): Average Excess Returns of the market on the long term  
\( s_{IM}^2 \): Variance of the Excess Reruns of the market on the long term  
\( s_{\varepsilon_i}^2 \): Variance of the residuals of the Excess Returns of the fund

According to the single factor model, the excess returns of the funds are linked to the excess returns of the markets (Scholz, 2007, p. 349).

**Formula of the linear relationships between excess returns of the fund and excess returns of the market:**

\[
er_{it} = JA_i + \beta_i er_{Mt} + \varepsilon_{it}
\]

Source: Scholz, 2007, p. 349

With:

\( JA_i \): Jensen’s Alpha of the fund based on Excess returns  
\( \varepsilon_{it} \): Residuals of the Excess Returns of the fund  
\( \beta_i \): Beta of the fund based on Excess returns  
\( er_{it} \): Excess return of the fund  
\( er_{Mt} \): Excess return of the market

The conventional way to find the alpha, the beta and the residuals in the normalized Sharpe Ratio method is to perform an OLS regression analysis on the particular period of non-conventional market trend (Scholz, 2007, p. 349). This linear regression is achieved with the excess return of the fund as a dependent variable and the excess return of the market as an independent variable. The other elements of the ratio – the average excess return of the market and the variance of these market’s excess returns – are calculated on a longer period to decrease the weight of the bearish market trend (Scholz, 2007, p. 349).

### 3.1.10) Jensen’s Ratio

In 1968, Jensen published an important study called “The performance of mutual funds in the period 1945-1964”. He analysed US mutual funds and compared them to a benchmark: the S&P 500. He used also the US treasury one year as a risk-free rate. At the beginning of the article, Jensen gave a definition of the portfolio performance. First, it is “the ability of the portfolio manager or security analyst to increase returns on the portfolio through successful prediction of future security prices” (Jensen, 1968, p. 389) and second it is “the ability of the portfolio manager to minimize (through "efficient" diversification) the amount of "insurable risk" born by the holders of the portfolio.” (Jensen, 1968, p. 389).

Moreover, before he explained his model for mutual fund performance analysis, Jensen
exposed his five assumptions (Jensen, 1968, p. 390).

- “all investors are averse to risk, and are single period expected utility of terminal wealth maximizers”
- “all investors have identical decision horizons and homogeneous expectations regarding investment opportunities”
- “all investors are able to choose among portfolios solely on the basis of expected returns and variance of returns”
- “all transactions costs and taxes are zero”
- “all assets are infinitely divisible”

As the Jensen’s measure uses the Beta, it assumes also that there is only a systematic risk, so the portfolio if well diversified.

A clear definition of the Jensen’s ratio can be that it is the difference between the return of the fund minus the expected return of the benchmark provided by the formula of the CAPM. This result is called the alpha.

The interpretation of the ratio comes from the Jensen’s definition of the portfolio performance. If the ratio is positive, it means that the investment manager outperformed the index and if the ratio is negative, it means that the investment manager underperformed the index. In our study, we will use the ratio to compare The Vice Fund to the MSCI World Index.

**Formula of the Jensen’s ratio used for the study:**

\[ \alpha_p = \bar{r}_p - \left[ \bar{r}_f + \beta_p (\bar{r}_M - \bar{r}_f) \right] \]

Source: Bodie et al., 2010, p. 850

With:

\( \alpha_p \): Jensen’s measure Alpha
\( \bar{r}_p \): Return of the fund
\( \bar{r}_f \): Risk-free rate
\( \bar{r}_M \): Return of the market
\( \beta_p \): Beta of the fund

**3.1.11) Returns Measurement**

The calculation of the returns is done for The Vice Fund and its elements of comparisons: The Timothy Fund, the MSCI World Index and the S&P 500 Index. The returns are computed weekly because prices are collected weekly on the Wednesday as recommended (Kreander et al., 2005, p. 1470). Then, the average return calculation is done for the global period and each sub-period. For the funds, dividends are included in the calculation even if their impact is marginal for these two funds.
Formula for the returns:

\[ R = \frac{P_1 - P_0}{P_0} \]

With:
- \( R \): Return
- \( P_1 \): Price at time 1
- \( P_0 \): Price at time 0

3.2) Literature review

An interesting research article to introduce the subject of The Vice Fund has been written by Fabozzi et al. (2008): “Sin Stock Returns”. He explained at the beginning “A firm making a "bad" product is often presumed to be a "bad" firm” (Fabozzi et al., 2008, p. 82). He aimed to show the reverse of this sentence. First he selected a sample in order to have 267 companies in 21 countries from 1970 to 2007 with Datastream. Then he compared returns, excess market returns and risk adjusted excess market return of the sin stocks with national index. The conclusion of the author is clear; sin stocks outperformed their benchmarks. He explained that situation because investors undervalue these industries. However, these industries have to comply with very strict legislation (Fabozzi et al., 2008, p. 92). In our study, we do not study stocks but directly a mutual fund investing in these specific stocks. We will try to identify the performance trend of such mutual fund. We will use the methodology of the following articles.

One of the most important article used for the study comes from the Journal of Business Finance & Accounting: “Evaluating the Performance of Ethical and Non-ethical funds: A Matched Pair Analysis” (Kreander et al., 2005). This research compares the financial performance between Ethical and Non-ethical funds in Europe. The results show that there is no difference between the two groups regarded the performance (Kreander et al., 2005, p. 1491). In the study, Kreander et al. (2005) compared the 60 funds from three different points of view: the risk adjusted performance measures, the timing and the cross sectional analysis. The risk adjusted performance use well-known indicators: the Sharpe’s ratio, the Treynor’s ratio and the Jensen’s ratio (Kreander et al., 2005, p. 1480). In our study, we will use these ratios to compare The Vice Fund with The Timothy Plan Fund, the MSCI world Index and the S&P 500 Index. The second point of view adopted by Kreander et al (2005) is the timing ability of the fund to sell and buy assets at the right time in order to make profit (Kreander et al., 2005, p. 1486). Last but not least, Kreander et al (2005) performed a cross sectional analysis. The aim of the approach is to observe whether the fund size, age, load fees and management fees have a significant impact on the performance of the funds (Kreander et al., 2005, p. 1489). The study concludes that there is no evidence that the performance is different between Ethical funds and Non-ethical funds (Kreander et al., 2005, p. 1491). Since results from research are not always similar about performance between groups of funds, it would be interesting to focus our study on a particular mutual fund like The Vice Fund.
Another very important research article which is very helpful for our study is provided in The Journal of Wealth Management by Sturm (2010) called “Select Sector SPDRs and the S&P 500: Is the Sum of the Parts Greater than the Whole?”. The author wrote a case study on a very specific benchmark, the SPDR S&P 500 (SPY). He compared it to the nine Select Sector SPDRs. There are supposed to represent the SPY. The study is from 1999 to 2007 (Sturm, 2010, p. 65). Indeed the nine ETF have been created in 1998. Moreover, the Efficient Market Hypothesis is as well important in the article. Indeed, according to this theory, the SPY should have better results than the nine portfolios (Sturm, 2010, p. 65), especially because the Select Sector funds represent the total of the SPY. As it is a case study, the result cannot be generalized. However, it brings some knowledge about the SPY and the nine ETF. It is a similar case for The Vice Fund. These ETF represent the sectors of the S&P 500: consumer discretionary, consumer staples, energy, financials, health care, industrial, materials, technology and utilities (Sturm, 2010, p. 64). Then the author achieved some comparison between the SPY and the nine ETF. First, he compared average monthly returns (Sturm, 2010, p. 65). Second, he computed the average monthly risk premium, the annualized risk premium, the standard deviation and the beta. With these results, Sturm computed the Sharpe’s ratio and the Treynor’s ratio for the nine ETF and the SPY (Sturm, 2010, p. 66). At the end of the study, the author gave some conclusion about the value for investors to invest in these ETF compared to the SPY as a benchmark. He found that “an equally weighted portfolio of the sector funds reliably outperforms the SPY over all measures of performance during the sample period” (Sturm, 2010, p. 73). This conclusion is not only valid for the entire period but also for each year. So, that means that the nine ETF are greater than the SPY. This article is interesting for our study for some reasons. First, it analysed a single benchmark as a case study and compared it. The results are not able to be generalized and are valid only for these specific comparisons. In our study, it is the same situation, we analysed a single mutual fund: The Vice fund and we compare it. Second, like Sturm (2010), we use the same methodology for the comparison. On the one hand, we study both sub-periods and an entire period and on the other hand, we use similar ratio: the Sharpe’s measure and the Treynor’s measure. So, Sturm (2010) helps us for the case study methodology and for the computation of the calculations.

In his article, “Socially Responsible Mutual Funds”, Statman (2000) used very helpful method for our study. There are two steps in Statman (2000) research. First, he compared two indexes: the Domini Social Index, representing the SRI (Socially Responsible Investment) funds and the S&P 500 Index. Second, he compared SRI funds performances with the two indexes and with conventional mutual funds. The two indexes comparison has been done through several tools: annualized arithmetic mean return, annualized geometric mean return, annualized standard deviation of returns and calculation of Jensen’s alpha (Statman, 2000, p. 31). Moreover, additional calculations have been done like a modified Sharpe’s ratio called the “excess standard-deviation-adjusted return” (eSDAR). The SRI mutual funds came from Morningstar. An important conclusion is that the Domini Social Index, a SRI version of the S&P 500, had a similar performance than the S&P 500 (Statman, 2000, p. 38). Indeed, returns of the Domini Social Index outperformed returns of the S&P 500. Risk-adjusted measure of the SRI index underperformed the S&P 500 but not significantly. Moreover, SRI mutual funds had a better financial performance than conventional fund. However, this performance is not significant (Statman, 2000, p. 38). Last but not least, conventional funds and SRI funds have beaten the S&P 500 (Statman,
So, to sum up, Statman (2000) article is important for our study for some reasons. First, it used the S&P 500 as a benchmark. Moreover, he explained that he compared the returns of this benchmark to mutual funds returns. We will use this method, comparing returns of the S&P 500 Index with returns of The Vice Fund. Second, Statman (2000) computed the Jensen’s alpha. He used the S&P 500 as a benchmark to compute the Beta included in the alpha formula. We will follow the same methodology, computing the Beta of The Vice Fund, the Beta of the Timothy fund and the Beta of the MSCI with the S&P 500 index.

Moreover, there is another article that can be useful for our study because it goes into the Efficient Market Theory. Wermers (2000) published in the Journal of Finance “Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses”. The controversy is still important between the worth to manage actively or not mutual funds even if it seems that passive management is the best alternative. The research tried to analyse the value of an active management. The result of the study found that the sample of mutual funds studied from 1975 to 1994 had a better performance that the index (CRSP value-weighted index). This result is partly explained by the ability of stock picking of the fund management. However, the study demonstrated that this performance is not profitable for the investors. Indeed, higher returns allow fund manager to cover their expenses and transaction costs (Wermers, 2000, p. 1689).

*After this part, the reader is able to understand the origin and the formula of the tools used to compare the performance of The Vice Fund such as the returns or the risk-adjusted ratios. Moreover, the previous literature review gives knowledge about the context of the study.*
4) Empirical Discussion and practical methodology

This part gives more details on the data collection process. Moreover, it explains the main steps for the calculations starting from the raw data. Then, it exposes the reasons for the choices of the element of comparison to The Vice Fund like the choice of the Timothy fund and the choice of the benchmarks. It argues also for the selection of the periods. Last but not least, it details the hypotheses concerning the mean returns and presents the results obtained.

Abbreviation:
VICEX: The Vice Fund
TLVAX: The Timothy Plan Large/Mid Cap Value A

4.1) Data collection process

The study compares The Vice Fund to The Timothy Plan Fund, to the MSCI World Index and to the S&P 500 Index. We collect data from only one source:

- DataStream provided by Thomson Reuters available at the library of Umea University.

From DataStream, we collect weekly prices from January 2003 to December 2012 for the VICEX, the TLVAX, the MSCI and the S&P 500 and the US Treasury bill. In the case of the VICEX and the TLVAX the dividends are also retrieved. Their amounts are negligible because there are growth funds (Morningstar, 2013) so that their impact is not significant.

We follow the methodology of Kreander et al (2005). The first point is that Kreander et al (2005) used weekly returns in order to decrease the skewness effect in the return distribution. So, for the data collection for The Vice Fund and for The Timothy Plan Fund, prices will be collected weekly to compute weekly returns. Second, prices are collected on Wednesday to avoid the weekend effect. So, for the funds and the benchmarks in our study, we will collect data on Wednesday (Kreander et al., 2005, p. 1470). Then, three important ratios are used: the Sharpe’s ratio, the Treynor’s Ratio and the Jensen’s Ratio (Kreander et al., 2005, p. 1476). It is important to highlight that one month T-Bill has been used for a risk free rate and that funds has been compared to three benchmarks: a national and an international benchmark and a two index model (Kreander et al., 2005, p. 1473). Moreover, the matched pair analysis connects funds with similar characteristics. The criteria used for this type of analysis are the age, the size, the country and the investment universe (Kreander et al., 2005, p. 1473). These criteria will be used in our research in order to select a similar fund than The Vice Fund. So, The Timothy Plan Fund has been found in that way to have a good match with The Vice Fund.

Another article very useful for the methodology of this study has been used: “Investigating
a New Methodology for Ranking International Mutual Funds” (Srivastava & Essayyad, 1994). Indeed they compare mutual funds by calculating the returns and also the Treynor’s ratio, the Sharpe’s ratio and the Jensen’s ratio and ranking the funds according these ratios (Srivastava & Essayyad, 1994, p. 247). Moreover, they provide good example of the Wilcoxon test (Srivastava & Essayyad, 1994, p. 247). They also calculate the standard deviation of each fund (Srivastava & Essayyad, 1994, p. 247). Finally they used the S&P 500 Index to obtain the beta of the mutual fund and also as a benchmark (Srivastava & Essayyad, 1994, p. 247). So, we follow this methodology because, like them, we compare and rank US mutual funds.

4.2) Data calculation process

Once we collect these data, we compute them step-by-step through Excel. Concerning the returns, a statistical approach will be used to test their significance through the SPSS software.

4.2.1) Returns and statistical tests, beta and standard deviation calculations

The following method of calculation is applied to the VICEX, the TLVAX, the MSCI World Index and the S&P 500 Index.

- Step 1: Computing weekly returns.
- Step 2: Computing the average of weekly return for the entire period and sub-periods.
- Step 3: Checking if the returns are normally distributed using SPSS.
- Step 4: If the results follow a normal distribution, use of a paired sample t-test and if not, use of a Wilcoxon signed rank test.
- Step 5: Computing standard deviation for the entire period and sub-periods.
- Step 6: Computing Beta using the S&P 500 index as the market reference for the entire period and sub-periods.

The indicators above are then annualized in order to facilitate the reading and the interpretation of figures.

- Step 7: Computing the annualized returns for the entire period and sub-periods.
- Step 8: Computing the annualized Standard Deviation for the entire period and sub-periods. The Beta does not need to be annualized.
4.2.2) Risk-adjusted ratios calculations

The risk-adjusted ratios taking into account both returns and risks are calculated following the next principals. They applied also here for the two funds and their benchmarks.

- Step 1: Computing the Sharpe’s measure for the entire period and sub-periods.
- Step 2: Computing the Jensen’s measure for the entire period and sub-periods.
- Step 3: Computing the Treynor’s measure for the entire period and sub-periods.
- Step 4: Computing annualized Sharpe, Jensen and Treynor’s measure for the entire period and sub-periods.
- Step 5: For the second sub-period corresponding to the bearish market, the normalized Sharpe’s ratio and the modified Sharpe’s ratio are also calculated.

4.2) The choice of the entire period and sub-periods

In this study, The Vice Fund is compared to the Timothy Fund and to benchmarks on four periods. As we mentioned above, the data are collected weekly on the Wednesday. So, we have:

- The entire period is from the 01/01/2003 to the 26/12/2012.
- The first sub-period is from the 01/01/2003 to the 10/10/2007.
- The second sub-period is from the 17/10/2007 to the 04/03/2009.
- The third sub-period is from the 11/03/2009 to the 26/12/2012.

The entire period is ten years long. This period seems interesting because some fluctuation should appear for a US mutual fund. Indeed, the US financial markets have been impacted by a both a bubble and a crisis. Moreover, the date of inception of The Vice Fund is 2002 and it is 1999 for the Timothy Plan (Morningstar, 2013), so, it would be difficult to study The Vice Fund on a longer period. However, this period represent the majority of its life. So, this case study on The Vice Fund tries to be very representative. The exact date of inception of The Vice Fund is August 2002 (Morningstar, 2013). It takes time to implement the distribution of a fund and it would not be relevant to compare the four last months of 2002 of The Vice Fund with an already established Timothy Fund at the same period.

About the sub-periods, the choice is simple. As The Vice Fund invests more than 66% of its portfolio in US stocks (Morningstar, 2013), it seems reasonable to use the domestic benchmark; the S&P 500 Index; as a reference to determine the sub-periods. In order to do that, some trends are identified during the global periods. A Min-Max analysis is used to separate the sub-periods. This analysis is done through Excel using the raw data of the Index collected weekly on DataStream. We identified clearly the first and third sub-periods as upward trends. The second sub-period represents a downward trend.
Despite the periods are not equal in terms of time and number of observations, there is enough observations in each period to keep the meaning of the analysis:

- The first sub-period contains 250 observations.
- The second sub-period contains 73 observations.
- The third sub-period is contains 199 observations.

4.3) The choice of the Mutual Fund Timothy Plan

The study selected The Timothy Plan Large/Mid-Cap Value Fund Class A to be compared to The Vice Fund for two major reasons. First, Timothy Plan Large/Mid-Cap Value Fund invests in many equities except particular ones such as alcohol, tobacco and gambling (Timothy Plan Statutory Prospectus, 2013, p. 20). This is very different from The Vice Fund strategy, so it will help to evaluate the efficiency of The Vice Fund investment strategy. Second Timothy Plan Large/Mid-Cap Value Fund and The Vice Fund have very similar characteristics: age, total assets, country and investment universe. These criteria are usually used by researchers in a matched pair analysis (Kreander et al., 2005, p. 1473).
Moreover, The Timothy Fund and The Vice Fund are quite comparable because they have the similar fees. Indeed, comparing the fund performances should also focus on fees paid by the investors. The TER (total expense ratio) for The Vice Fund is 1,76% and it is 1,57% for The Timothy Fund (Morningstar, 2013).

### 4.4) The choice of the benchmarks

**The S&P 500 Index**

We choose the S&P 500 Index because The Vice Fund invests 66% of its portfolio in US stocks (Morningstar, 2013). So, we need a domestic benchmark. Moreover, Morningstar uses this Index for The Vice Fund as a benchmark (Morningstar, 2013). Because Morningstar is an independent provider of financial information, we rely on them. Moreover, some authors of research articles use this Index as a reference index like Sturm (2010) or Statman (2000).

**The MSCI World Index**

We choose the MSCI World Index because the Vice Fund has some investment abroad. Indeed, it invests 33% of its portfolio in non-US stocks. So, an international benchmark is needed. In his study called “Discussion of Risk Exposures and International Diversification: Evidence from iShares” published in 2005 in the Journal of Business Finance & Accounting, Taylor used the MSCI World Index as a benchmark for mutual funds comparison (Taylor, 2005, p. 774).

### 4.5) The choice of the risk-free rate

The risk free rate is “the rate you can earn by leaving money in risk-free assets such as T-bills, money market funds, or the bank.” (Bodie et al., 2010, p. 157). Nowadays, large government debts are giving a new definition of the risk-free rate because we cannot shelter from a government collapse. However, the US T-bills still seems a reliable indicator for the risk-free rate. As we mentioned in the introduction for the presentation of the US Treasury-bill, we use one month T-bill as Carhart (1997) and Statman (2000). However, here is a crucial problematic and it is important to take some time in order to have a reflection about the validity of this risk-free rate. Indeed, we collect prices weekly for the mutual funds and
the benchmarks. Then returns and risk-adjusted ratio are first computed weekly using average of these weekly calculations. It means that the right risk-free rate would be a weekly one. It would be also a US one since the funds are US. However, in DataStream, only the 4-weeks, 3 months and 6 months T-Bill were available. So, replicating the study “Socially Responsible Mutual Funds” (Statman, 2000), we use the one-month T-bill but we collected it weekly (Statman, 2000, p. 31). Then we take the average of it and divided the result by 52 to be in the same scale of the other weekly data. The point is, it is far from simple to get the comparable data and rates and it is important to think about such problems.

4.6) The choice of the modified Sharpe ratio

We have seen that the tools for the comparison of The Vice fund are the returns and the Sharpe’s ratio, the Jensen’s ratio and the Treynor’s ratio. However, the second sub-period studied is bearish. It would create a negative Sharpe Ratio. “Use the Sharpe Ratio to rank all managers with positive Sharpe ratio and to rank the remaining managers using a return measure” (Schwager, 1996, p. 33). It means that a negative Sharpe ratio is not efficient.

In order to increase the reliability of our ranking in the second sub-period, we decided to calculate the modified Sharpe’s ratio. The modified Sharpe’s ratio should give more reliability to the original Sharpe ratio calculation because it minimizes bearish fluctuation (Israelsen, 2005, p. 423).

The modified Sharpe’s ratio is reliable in such bearish market period (Israelsen, 2005, p. 424). The calculation of it should give us more confidence with the calculation of the original Sharpe’s ratio. For the calculation, the following steps will be followed like the methodology of Israelsen (2005).

- Step 1: Computing weekly excess returns for the sub-period for the benchmarks and the funds.
- Step 2: Computing Standard Deviation of excess returns for the sub-period for the benchmarks and the funds.
- Step 3: Computing Standard the modified Sharpe’s ratio for the sub-period for the benchmarks and the funds to obtain the correct ranking.

4.7) The choice of the normalized Sharpe ratio

In order to increase the reliability of our ranking in the second sub-period, we decided to calculate the normalized Sharpe ratio. This specific ratio is reliable in such bearish market period (Scholz, 2007, p. 356). For the calculation, the following steps will be followed like the methodology of Scholz (2007). We assume that excess returns are normally distributed (Scholz, 2007, p. 349).

- Step 1: Computing weekly excess returns for the 10 years period for the benchmark S&P 500 Index. Then the average and the variance of these excess returns will be
calculated. This benchmark will be used as an independent variable.
- Step 2: Computing weekly excess returns of the sub-period 2 - bearish market – for the VICEX, the TLVAX and the MSCI World Index. There will be used as dependent variables.
- Step 3: Processing three linear regressions using SPSS to obtain the alpha, the beta and the variance of the residuals of the dependent variables.
- Step 4: Computing the normalized Sharpe ratio of the VICEX, the TLVAX and the MSCI World Index. It is not done for the S&P 500 because it is used as a benchmark for the calculation (Scholz, 2007, p. 353).

4.8) Statistical test and Hypotheses

First, here is the research question.

_A case study on the Vice fund: does the Vice Fund have a better risk-adjusted financial performance than The Timothy Plan Large/Mid-Cap Value Fund Class A, than the MSCI World Index and than the S&P 500 from 2003 to 2012?_

This research question is focus around three main pillars:

1. _Does The Vice Fund have a better risk-adjusted financial performance than the Timothy Plan Large/Mid-Cap Value Fund Class A?
2. _Does The Vice Fund have a better risk-adjusted financial performance than the S&P 500 Index?
3. _Does The Vice Fund have a better risk-adjusted financial performance than the MSCI World Index?

So, to answer to these three main pillars, we will use two comparison approaches.
- A comparison between the returns using the following statistical hypotheses.
- A comparison between the risk-adjusted financial ratios.

In this part, we designed the hypotheses that suit to the statistical test for the returns in SPSS. As mentioned above, statistical test will be only used on returns. The risk-adjusted ratios will come in a second time to support and complete the analysis.

First of all, the normality of the data – the returns – has been checked. It appears that for all periods the returns are not normally distributed (see Appendix 2). As a consequence the Wilcoxon test has been implemented. We define $H_0$ as the null hypothesis. If it is not valid, the alternative hypothesis named $H_A$ will be accepted and the null hypothesis will be rejected. Indeed, the alternative hypothesis is the opposite of the null hypothesis.
**Hypothesis 1:**

\[ H_0: \text{The difference of The Vice Fund mean return and The Timothy Plan Large/Mid-Cap Value Fund Class A mean return is equal to zero.} \]

\[ H_A: \text{The difference of The Vice Fund mean return and The Timothy Plan Large/Mid-Cap Value Fund Class A mean return is different from zero.} \]

**Hypothesis 2:**

\[ H_0: \text{The difference of The Vice Fund mean return and the S&P 500 Index mean return is equal to zero.} \]

\[ H_A: \text{The difference of The Vice Fund mean return and the S&P 500 Index mean return is different from zero.} \]

Because the Vice Fund is a US mutual fund and invests partly in the US, we compare it to a US Index. Moreover, many researchers commonly use the S&P 500 Index as a reference index like Sturm (2010) or Statman (2000).

**Hypothesis 3:**

\[ H_0: \text{The difference of The Vice Fund mean return and the MSCI World Index mean return is equal to zero.} \]

\[ H_A: \text{The difference of The Vice Fund mean return and the MSCI World Index mean return is different from zero.} \]

Because the Vice Fund is a US mutual fund and invests also partly in the all over the world, we compare it to an international Index. Moreover, some researchers commonly use the MSCI World Index as a reference index like Taylor (2005).

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*After this part, the reader is able to grasp the methodology for the calculations and to understand why such methodology has been used. Moreover, the hypotheses give a structure for the future analysis of the results.*
5) Empirical results and analysis

The analysis part gives some details about the results found for the three sub-periods and the entire periods. The returns, the volatility and the risk-adjusted performance ratios are exposed for The Vice Fund, The Timothy Fund and the two benchmarks. Then, the part of statistical test for returns and the risk-adjusted ratios part will be gathered and summarized to have an overview of the performance.

5.1) Analysis of the first sub-period from January 2003 to October 2007

5.1.1) Analysis of the returns

The Table 3 presents the results for the first sub-period. We can see that the returns are very high for the VICEX: 23.01%. It is a very good profitability compared to the TLVAX and to the two benchmarks. The Vice Fund performed 29.69% better than the TLVAX, 21.48% better than the MSCI Index and 38.80% better than the S&P 500 Index. These figures help to understand the large gap between returns from The Vice Funds and returns from the others. During this first sub period, The Vice Fund had the best average return.

The Wilcoxon signed rank test allows us to fulfill the second line of Table 3. It shows that the difference in mean returns between the VICEX and the TLVAX and the VICEX and the MSCI Index is not significant at the level of 5% confidence. However, the difference in mean return between The Vice Fund and the S&P 500 Index is significant at the 5% level. The matched pairs analysis used in the paper of Kreander et al. (2005) for the standard deviation and the Beta is similar to the methodology applied to our returns.

The third line of the Table 3 presents the volatility with the Standard Deviation. Even if we can observe that the Standard Deviation is very low for the MSCI Index and the S&P 500 Index, the volatility of the VICEX is under the volatility of the TLVAX. Moreover, the Beta of the VICEX is the lowest on this first sub-period. A beta of 1 for the S&P 500 Index is normal because we used this index as a benchmark for the Beta calculations.

Table 3: Returns and volatility of the first sub-period from January 2003 to October 2007

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns</td>
<td>23.01%</td>
<td>15.68%</td>
<td>17.66%</td>
<td>13.52%</td>
<td>2.83%</td>
</tr>
<tr>
<td>P-Value Wilcoxon</td>
<td>0.606</td>
<td>0.186</td>
<td></td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.126</td>
<td>0.141</td>
<td>0.118</td>
<td>0.118</td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0.887</td>
<td>0.913</td>
<td>0.916</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data
Note: The cells containing no information - blank cells - are empty because the calculations were not relevant to perform. Indeed, the US T-Bill 1 month only concerns the returns. The cell of the P-Value Wilcoxon for the VICEX is always blank because it is the element of comparison. This applies for all Tables in the analysis part.

5.1.2) Analysis of the risk-adjusted ratios

Only the MSCI World Index and the VICEX have a Sharpe’s ratio above 1. Moreover, the Sharpe’s ratio of the VICEX is the highest. We can see that it is less risky for an investor to invest in the VICEX rather than in the TLVAX and to obtain higher return. The Treynor’s ratio confirms the ranking of the Sharpe’s ratio. Last but not least, the Jensen’s ratio demonstrates the better skills of the portfolio manager of The Vice Fund. Indeed, 0,107 is the highest ratio compared to the others. A Jensen’s ratio of 0 for the S&P 500 Index is a normal result because we used this Index as a benchmark for Jensen’s ratios calculations. So, it appears that for this first sub-period there is an important gap between the VICEX and the others element studied.

Table 4: Risk-adjusted ratios of the first sub-period from January 2003 to October 2007

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpe’s ratio</td>
<td>1,597</td>
<td>0,911</td>
<td>1,259</td>
<td>0,906</td>
<td></td>
</tr>
<tr>
<td>Treynor’s ratio</td>
<td>0,227</td>
<td>0,141</td>
<td>0,162</td>
<td>0,107</td>
<td></td>
</tr>
<tr>
<td>Jensen’s ratio</td>
<td>0,107</td>
<td>0,031</td>
<td>0,050</td>
<td>0,000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data

5.2) Analysis of the second sub-period from October 2007 to March 2009

The second period is a downward trend starting at the end of 2007 just after the housing bubble in this US. Comparing funds in a bearish market is far from simple.

5.2.1) Analysis of the returns

About the returns, it appears clearly that both funds and benchmarks undergo a harsh crisis. No matter the strategy of the fund, it seems that the burst of the bubble hits all the sectors. However, a ranking on the returns basis is still possible. It seems that the VICEX got a low lost like the S&P 500 Index. Then the TLVAX underwent hard losses. The worst performance is achieved by the MSCI. Even if the VICEX seems to have fewer damages, the performance is very negative.

The Wilcoxon signed rank test allows us to fulfill the second line of Table 5. It shows that the difference in mean returns between the VICEX and the other three elements is not
significant at the level of 5% confidence.

About the volatility, the VICEX seems the more stable over this period according the standard deviation. At the opposite, the TLVAX is quite volatile. This situation would be explained by the strategy of selection of stock by The Vice Fund. Indeed, it argues that whatever the growth, sin stocks will still be strong. Compared to the market with the Beta, again, it seems that the VICEX is less volatile.

**Table 5 Returns and volatility of the second sub-period from October 2007 to March 2009**

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns</td>
<td>-41.09%</td>
<td>-42.20%</td>
<td>-42.74%</td>
<td>-40.73%</td>
<td>1.50%</td>
</tr>
<tr>
<td>P-Value Wilcoxon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.247</td>
<td>0.293</td>
<td>0.277</td>
<td>0.264</td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0.836</td>
<td>1.032</td>
<td>0.965</td>
<td>0.965</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.

**5.2.2) Analysis of the risk-adjusted ratios**

About the risk-adjusted performance ratios it is far from simple to obtain an accurate ranking of the funds and the benchmarks. Indeed, in normal market conditions the return of the fund is higher than the risk-free rate. So, the higher the risk-adjusted performance ratios are, the better is the fund. However, under downward trend market conditions, the risk-adjusted performance ratios are misleading and are against the intuitive logic. For example, with equal negative returns, a fund with higher standard deviation will obtain higher (less negative) risk-adjusted performance ratios. So, it is misleading because funds with higher volatility all else equal would have better ratios. This phenomenon explained the Sharpe, Jensen and Treynor’s ratios results in this second sub-period presented in the table 6 in the grey area.

**Table 6: Risk-adjusted ratios of the second sub-period from October 2007 to March 2009**

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpe’s ratio</td>
<td>-1.721</td>
<td>-1.494</td>
<td>-1.596</td>
<td>-1.598</td>
<td></td>
</tr>
<tr>
<td>Treynor’s ratio</td>
<td>-0.510</td>
<td>-0.424</td>
<td>-0.458</td>
<td>-0.422</td>
<td></td>
</tr>
<tr>
<td>Jensen’s ratio</td>
<td>-0.073</td>
<td>-0.001</td>
<td>-0.035</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.
Even if the Sharpe ratio is a reference as a tool of performance evaluation for funds, the ratio is challenged because of its weaknesses in bearish markets (Scholz, 2007, p. 356). So, the modified Sharpe ratio could be an accurate alternative (Israelsen, 2005, p. 424). The normalized Sharpe ratio could be also an accurate alternative (Scholz, 2007, p. 347).

The Jensen’s ratio and the Treynor’s ratio have a similar misleading ranking behaviour than the Sharpe Ratio. The only meaning when these two ratios are negative is that the fund underperformed the market but an accurate ranking is not possible.

**Table 7: Modified and normalized Sharpe ratios of the second sub-period from October 2007 to March 2009**

<table>
<thead>
<tr>
<th>Results</th>
<th>Original Sharpe Ratio</th>
<th>Normalized Sharpe Ratio</th>
<th>Modified Sharpe Ratio</th>
<th>Rank from Modified Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>VICEX</td>
<td>-1,721</td>
<td>-0,049</td>
<td>-0,105</td>
<td>1</td>
</tr>
<tr>
<td>S&amp;P 500 Index</td>
<td>-1,598</td>
<td>NA</td>
<td>-0,112</td>
<td>2</td>
</tr>
<tr>
<td>MSCI World Index</td>
<td>-1,596</td>
<td>-0,04</td>
<td>-0,118</td>
<td>3</td>
</tr>
<tr>
<td>TLVAX</td>
<td>-1,494</td>
<td>0,033</td>
<td>-0,125</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.

The table 7 shows the three different Sharpe ratios computed for the second sub-period. The Original Sharpe ratio is only here to see the difference but we remind that this ratio is useless when it is negative. The normalized Sharpe ratio seems to follow the trend of the original’s one. This ratio is NA (not applicable) for the S&P 500 Index because this Index has been used as an independent variable for the linear regression (Scholz, 2007, p. 353). However, we can see that the modified Sharpe ratio provides a very logical ranking. Indeed, if follows the trend of both the returns and the Standard Deviations. The Modified Sharpe Ratio has more weight here for two reasons. It gives more meaning to the returns and the volatility and in bearish markets, the modified Sharpe Ratio emphasises mainly on the volatility. This is an important criterion in such market conditions. So, because of these reasons, we will retain the ranking provided by the Modified Sharpe Ratio rather than the Normalized Sharpe Ratio for the risk-adjusted financial performance part of the analysis in this second sub-period. The elements are ranked from 1 to 4, 1 being the element having the higher Modified Sharpe Ratio. We notice that this ranking is coherent with the results provided by the returns approach.

**5.3) Analysis of the third sub-period from March 2009 to December 2012**

These tables 8 and 9 detail the results for the last sub-period. The scheme is quite similar to the first sub-period. This is explained by a good trend on the markets. However, the VICEX does not outperformed with a so large gap than previously in the first sub-period.
### 5.3.1) Analysis of the returns

About the returns, the VICEX had a quite good performance compared to the TLVAX and the benchmarks. In the same time, the risk free rate continued to going down since the beginning of 2003. Moreover, even after the crisis, the VICEX obtained better returns during the last sub-period compared to the first sub-period. So it seems that sin stocks are stronger than before. However, the VICEX’s returns are not so important compared to the TLVAX and to other benchmarks.

The Wilcoxon signed rank test allows us to fulfill the second line of Table 8. It shows that the difference in mean returns between the VICEX and the other three elements is not significant at the level of 5% confidence.

Both Standard Deviation and Beta are unanimous: the VICEX is less risky than the others. Here, the difference is quite important. This should be a motivating factor for the investors.

#### Table 8: Returns and volatility of the third sub-period from March 2009 to December 2012

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns</td>
<td>24.35%</td>
<td>22.49%</td>
<td>19.56%</td>
<td>21.72%</td>
<td>0.08%</td>
</tr>
<tr>
<td>P-Value Wilcoxon</td>
<td>0.730</td>
<td>0.288</td>
<td>0.624</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.159</td>
<td>0.182</td>
<td>0.190</td>
<td>0.182</td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0.764</td>
<td>0.974</td>
<td>0.997</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.

### 5.3.2) Analysis of the risk-adjusted ratios

The Sharpe’s ratio was back to its first period level for the VICEX. Broadly, all Sharpe’s ratio increased for the funds and the benchmarks. One of the explanations is a diminution of the risk-free rate. The ratio of the VICEX is above the others. The Treynor’s ratios and the Jensen’s ratios argue in the same way of the Sharpe’s ratio, they demonstrate the domination of the VICEX. Under these results, there is little free space for discussion: the VICEX had clearly a higher financial performance than the TLVAX and the benchmarks from the point of view of both returns and risk.
Table 9: Risk-adjusted ratios of the third sub-period from March 2009 to December 2012

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpe’s ratio</td>
<td>1,528</td>
<td>1,228</td>
<td>1,025</td>
<td>1,187</td>
<td></td>
</tr>
<tr>
<td>Treynor’s ratio</td>
<td>0,318</td>
<td>0,230</td>
<td>0,195</td>
<td>0,216</td>
<td></td>
</tr>
<tr>
<td>Jensen’s ratio</td>
<td>0,077</td>
<td>0,013</td>
<td>-0,021</td>
<td>0,000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.

5.4) Analysis of the global entire from 2003 to 2012

The tables 10 and 11 present the results for the entire period: 10 years long. It is interesting to have an overview on the long run even if the fluctuations are less visible. However, sub-periods has been previously analysed and they have been designed to have an accurate view of the fluctuations.

5.4.1) Analysis of the returns

About the returns, there is no doubt that the VICEX has a really strong performance comparing to the TLVAX and the benchmarks. To understand well the spread between the returns, we detailed it. The VICEX has a 36% higher return than the TLVAX, a 38% higher return than the MSCI World Index and a 43% higher return than the S&P 500 Index. These figures are relative, so they can be misleading. However, they show quite well the gap between the VICEX performance and the others.

The Wilcoxon signed rank test allows us to fulfill the second line of Table 10. It shows that the difference in mean returns between the VICEX and the other three elements is not significant at the level of 5% confidence.

The interesting fact about the volatility is that both funds and the international benchmark have a lower beta than the S&P 500 Index. However, the Standard Deviation is low only for the VICEX compared to the TLVAX and the MSCI World Index.

Table 10: Returns and volatility of the entire period

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns</td>
<td>11,48%</td>
<td>7,35%</td>
<td>7,09%</td>
<td>6,50%</td>
<td>1,59%</td>
</tr>
<tr>
<td>P-Value Wilcoxon</td>
<td>0,833</td>
<td>0,117</td>
<td>0,055</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0,164</td>
<td>0,188</td>
<td>0,180</td>
<td>0,173</td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0,830</td>
<td>0,987</td>
<td>0,976</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.
5.4.2) Analysis of the risk-adjusted ratios

The Sharpe’s ratio of the VICEX is almost twice the ratio of the others. These results demonstrate high returns for a low level of risk for investors. This statement is very strong on the US market because the S&P 500 has the lowest Sharpe’s ratio. The Treynor’s ratios demonstrate a similar conclusion. Moreover, the very high Jensen’s ratio for the VICEX proves the ability of the fund manager to select the better stocks. To end up, it is clear that for the global period the VICEX had the better financial performance.

<table>
<thead>
<tr>
<th>Annualized Results</th>
<th>VICEX</th>
<th>TLVAX</th>
<th>MSCI World Index</th>
<th>S&amp;P 500 Index</th>
<th>US T-Bill 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpe’s ratio</td>
<td>0,602</td>
<td>0,307</td>
<td>0,306</td>
<td>0,283</td>
<td></td>
</tr>
<tr>
<td>Treynor’s ratio</td>
<td>0,119</td>
<td>0,058</td>
<td>0,056</td>
<td>0,049</td>
<td></td>
</tr>
<tr>
<td>Jensen’s ratio</td>
<td>0,058</td>
<td>0,009</td>
<td>0,007</td>
<td>0,000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author design from DataSteam raw data.

Comparing on a graph basis performance of funds and indexes is not easy because it means compared prices for funds with points for Indexes. This is not the same scale. So, in order to make a simple graphic comparison, we start from a basis of 100 to obtain a coherent graph.

**Figure 5: Prices comparison on the entire period 2003-2012 on base 100**

Source: Authors adaptation from DataStream data
A graph analysis is not really accurate and precise. However, the reader is more able to have a concrete view of the performance of the funds compared to the benchmarks. Concerning the first sub-period from January 2003 to October 2007, the hierarchy appears without doubt. The VICEX rules over the others. The more the time spends, the more the spread increases between the VICEX and the others. Concerning the TLVAX, the fund performed as well as the international Index at the beginning of the first period but underwent a decrease at the end and became closer to the national benchmark. The second period is the most interesting from October 2007 to March 2009. The burst of the bubble had a general negative impact on the funds and benchmarks. While the trends of the TLVAX and the S&P 500 seems really similar, the international Index getting closer and closer of them during this period even if, it maintained a superior position. The VICEX decreased sharply, especially in the middle of the period. However, it maintained proportionally higher prices at the end of the sub-period. The last sub-period from October 2009 to December 2012 could be similar to the first one but it is not exactly the case. Both the TLVAX and the S&P 500 were still stuck together. Meanwhile, the international benchmark is getting closer of them during the period despite the fluctuations. The VICEX has a unique behaviour; it increased during the period like the others but faster to create a large gap at the end of the period.

5.5) Summary and theorization beyond data

This part aims to summarize the acceptance or rejection of the statistical hypotheses about the significance of returns. It gives also a global interpretation of all the results.

Table 12: Summary of the hypothesis

| Sub-period 1: from January 2003 to October 2007 | Hypothesis 1: \( H_0 \): Not rejected |
| Hypothesis 2: \( H_0 \): Not rejected |
| Hypothesis 3: \( H_0 \): Rejected |
| Sub-period 2: from October 2007 to March 2009 | Hypothesis 1: \( H_0 \): Not rejected |
| Hypothesis 2: \( H_0 \): Not rejected |
| Hypothesis 3: \( H_0 \): Not rejected |
| Sub-period 3: from March 2009 to December 2012 | Hypothesis 1: \( H_0 \): Not rejected |
| Hypothesis 2: \( H_0 \): Not rejected |
| Hypothesis 3: \( H_0 \): Not rejected |
| Global Period: from January 2003 to December 2012 | Hypothesis 1: \( H_0 \): Not rejected |
| Hypothesis 2: \( H_0 \): Not rejected |
| Hypothesis 3: \( H_0 \): Not rejected |

Source: Author design.
We remind the three pillars stated in the methodological part and answer to them to summarize the analysis part:

1- *Does The Vice Fund have a better risk-adjusted financial performance than the Timothy Plan The Timothy Plan Large/Mid-Cap Value Fund Class A?*

Even if the weekly return comparison is not significant; the average return during the entire period and the sub-periods demonstrates a higher performance of The Vice Fund. Moreover, the risk-adjusted ratios bring a similar conclusion about the superiority of The Vice Fund. So, it seems that the investment strategy of The Vice Fund is relevant.

2- *Does The Vice Fund have a better risk-adjusted financial performance than the S&P 500 Index?*

Even if the weekly return comparison is not always significant; here again the average return during all the periods is better for The Vice Fund except the second one because the S&P 500 Index seems to resist a little bit better than The Vice Fund to the crisis. The risk-adjusted ratios are higher for The Vice Fund compared to the S&P 500 Index. The fact that The Vice Fund has a better global performance than the national benchmark could confirms what we found in the first pillar: the investment strategy of the Vice fund is good.

3- *Does The Vice Fund have a better risk-adjusted financial performance than the MSCI World Index?*

The comparison between The Vice Fund and the international benchmark is similar to the second pillar and confirms that this fund has a highlighted strategy. Even if the weekly return comparison is not significant; the average return during the entire period and the sub-periods and the higher risk-adjusted ratios demonstrates a better performance of The Vice Fund.

To sum up the analysis, during the entire period and all sub-periods, The Vice Fund obtained better results. This performance is achieved in very different market conditions. So, this situation increases the weight of the results. However, this analysis is contrasted by the non-significance of the difference in the returns between The Vice Fund and the others. In fact, the average returns are globally higher, in every market situations, but from one week to another the difference between too returns is very low. The situation can be explained by the fact that the returns are most of time quite similar but in few cases the difference is very large in favour of the VICEX. Several reasons could explain the higher performance of The Vice Fund.

The most intuitive one is that the stocks in which The Vice invests have two characteristics: they bring higher returns and are more resistant to market fluctuations. This assumption makes stronger the conclusion of Fabozzi et al (2008) arguing that sin stocks obtained better returns.

The second reason that could explain the performance of The Vice Fund is linked with the first one. This is the ability of The Vice Fund’s portfolio manager to select better stocks
comparing to other fund managers. The Jensen’s ratio is a good indicator for this phenomenon.

This analysis showed very interesting results. The Vice Fund obtained a better average return even if the weekly returns are not significant at a 5% level. The risk-adjusted ratios support this conclusion in favour of The Vice Fund. So, whatever, the market conditions, it seems that The Vice Fund provide high returns for a reasonable risk.
6) Conclusion

This conclusion part is designed to answer the research question. Then, the contribution done by this study will be detailed. Last but not least, some further researches to complete this study will be suggested.

Before answering to the research question, it is important to sum up this study. The Vice Fund financial performance has been studied on two main aspects: returns and risks. The Vice Fund is compared to another mutual fund: The Timothy Fund. This mutual fund has very similar characteristics to The Vice Fund – date in inception, total assets, home country and investment universe - with The Vice Fund expect the strategy. Indeed, The Vice Fund invests in sin stocks and The Timothy Fund does not. The Vice Fund is also compared to a national benchmark: the S&P 500 and to an international benchmark: the MSCI World Index. In order to do such analysis, returns and risk-adjusted ratios like the Sharpe’s ratio, the Treynor’s Ratio and the Jensen’s ratios have been calculated. Moreover, the study is on ten years long from 2003 to 2012 in order to have an overview of the all life of The Vice Fund. This period has been also divided into three sub-period depending of the S&P 500 market trend. The first and the last sub-periods are bullish. The second one is bearish. Because standard risk-adjusted ratios are less reliable in bearish markets, the modified Sharpe Ratio and the Normalized Sharpe Ratio have been calculated. For the Normalized Sharpe Ratio, some Linear Regressions have been done with SPSS software. The results of the study demonstrated that The Vice Fund provided higher returns than The Timothy Fund and than the benchmarks whatever the market conditions for a relative low level of risk. The Vice Fund has a better average returns performance whatever the market conditions. However the difference between weekly results with The Timothy Plan Fund and the benchmarks is not statistically significant. The risk-adjusted ratios confirm the superiority of the risk-adjusted financial performance of the sin fund.

6.1) Answer to the research question

The research question are answered in this part:

A case study on The Vice fund: does the Vice Fund have a better risk-adjusted financial performance than The Timothy Plan Large/Mid-Cap Value Fund Class A, than the MSCI World Index and than the S&P 500 from 2003 to 2012?

The first part asked about the performance of similar mutual funds with radical different investment strategies. The statistical test done on the weekly returns do not allow to conclude to a significant higher performance from The Vice Fund. However the average returns for each period are higher for the sin fund. Also, the Sharpe’s, Treynor’s and Jensen’s ratios show a better risk-adjusted financial performance. The most complicated period to answer to the research question was the second sub-period between October 2007 and March 2009. However, through efficient tools such as the Modified Sharpe ratio, it was
still possible to answer without ambiguity to the question: the VICEX is the best.

The second part is about the comparison between The Vice Fund and a domestic benchmark and an international benchmark. Once again, The Vice Fund evaluation is clear. It outperformed both national and international markets from the point of view of average returns and risk-adjusted performance ratios. Adding to this conclusion is the fact that The Vice Fund offered high returns for low risk to the investors. However here too, it is a matter of fact to underline that The Vice Fund weekly returns have not outperformed the benchmarks in a significant way, according to the Wilcoxon test.

6.2) Contribution

First, this thesis brings some direct knowledge about The Vice Fund. Indeed, the study shows quite accurately how well The Vice Fund obtained higher returns for low risk. This specific mutual fund seems to have a better investment strategy than a mutual fund without sin stocks. Moreover, the sin fund had a better risk-adjusted performance than both domestic and international markets.

Moreover, this study brings another element to the debate about the performance of the sin stocks. Indeed, it confirms the profitability of such investment. Adding to that fact, this case study cannot be generalized but it argues against the EMH (Efficient market Hypotheses) because The Vice Fund outperformed its benchmarks.

Finally, this thesis tries to improve the knowledge of investors if they wish to invest in The Vice Fund. We recommend investing in this mutual fund. This recommendation is based both on returns and risks. However, we would like to point out the fact that even if The Vice Fund obtained better returns than the others during all the period study, it does not mean that it is a safe investment. Indeed, during the crisis from October 2007 to March 2009, we remind that the average return on this period was -41%. So, this figure is not so bad compared to The Timothy Fund or the overall market but it is still a big loss. The belief that the sin fund resists well to the market turmoil during the crisis is wrong.

6.3) Further research

This study is only a part of The Vice Fund analysis. Much more can be done about it. Here, we give some ideas to complete this thesis and bring more knowledge to investors willing to invest in The Vice Fund.

After this analysis of risk and return of The Vice Fund, it would be interesting to investigate the reasons of this good performance. We recommend following the methodology of Carhart (1997). In order to know the factor of the fund performance, he used the CAPM model and the 4-factor model (Carhart, 1997, p. 60).

Another very important study should be done to give more weight to this one. Indeed,
following the same methodology as we have done from Kreander et al (2005), Statman (2000) and Sturm (2010), more mutual funds investing in important proportion into sin stocks should be selected. In the same time, a group of mutual fund with no sin stock investments should also be selected. Then, the two groups of mutual funds should be compared with the same tools we used: returns and risk-adjusted performance ratios. The two groups should be also compared to domestic and international benchmarks. The results of this study will be able to be generalized if there are statically significant. This is an important improvement because our results are only valid for a case study but they cannot be generalized. We point out the fact that the funds of the two groups should be selected through a match-pair analysis to have the same age, size, country and investment universe. Moreover, another very important element is the fees charged by the fund. We recommend that the fees should be similar or they should be included in the final return calculation in order to have a better view of the final return for the investors. This check is strongly recommended because the TER of The Vice Fund is 1.76 % (Morningstar, 2013) which is high.

This conclusion sum up the results and answered to the research question arguing that The Vice Fund has a better risk-adjusted financial performance during the period studied. The contribution is mainly addressed to the investors who want to invest in the sin fund. Two further researches can be added to this one is order to complete it.
References:


USA Mutuals (2012). *Statutory Prospectus*. [electronic]. Available via:
[Retrieved: April 18, 2013]

Appendix 1: SPSS output for the Linear Regression

<table>
<thead>
<tr>
<th>Model</th>
<th>TLYAX_1</th>
<th>TLYAX_2</th>
<th>TLYAX_3</th>
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<th>TLYAX_5</th>
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<tbody>
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<td>TLVAX</td>
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<td>TLVAX</td>
<td>MSCI</td>
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<td>0.167</td>
<td>-0.032</td>
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<td>0.005</td>
<td>0.009</td>
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<td>1.068</td>
<td>1.068</td>
<td>1.068</td>
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</tbody>
</table>

Tests of Normality

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro-Wilk</th>
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<td>Statistic</td>
<td>df</td>
<td>Sig.</td>
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<tr>
<td>TLVAX_1</td>
<td>0.098</td>
<td>249</td>
</tr>
<tr>
<td>MSCI_1</td>
<td>0.068</td>
<td>249</td>
</tr>
<tr>
<td>SP500_1</td>
<td>0.070</td>
<td>249</td>
</tr>
</tbody>
</table>

*a.* This is a lower bound of the true significance.
### Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
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</thead>
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<td>df</td>
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<td>521</td>
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<tr>
<td>TLVAXALL</td>
<td>,097</td>
<td>521</td>
</tr>
<tr>
<td>MSCIALL</td>
<td>,082</td>
<td>521</td>
</tr>
<tr>
<td>SP500ALL</td>
<td>,079</td>
<td>521</td>
</tr>
</tbody>
</table>

### Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>VICEX&lt;sub&gt;2&lt;/sub&gt;</td>
<td>,110</td>
<td>73</td>
</tr>
<tr>
<td>TLVAX&lt;sub&gt;2&lt;/sub&gt;</td>
<td>,082</td>
<td>73</td>
</tr>
<tr>
<td>MSCI&lt;sub&gt;2&lt;/sub&gt;</td>
<td>,061</td>
<td>73</td>
</tr>
<tr>
<td>SP500&lt;sub&gt;2&lt;/sub&gt;</td>
<td>,091</td>
<td>73</td>
</tr>
</tbody>
</table>

* This is a lower bound of the true significance.

### Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>VICEX&lt;sub&gt;3&lt;/sub&gt;</td>
<td>,075</td>
<td>199</td>
</tr>
<tr>
<td>TLVAX&lt;sub&gt;3&lt;/sub&gt;</td>
<td>,064</td>
<td>199</td>
</tr>
<tr>
<td>MSCI&lt;sub&gt;3&lt;/sub&gt;</td>
<td>,070</td>
<td>199</td>
</tr>
<tr>
<td>SP500&lt;sub&gt;3&lt;/sub&gt;</td>
<td>,088</td>
<td>199</td>
</tr>
</tbody>
</table>
## Appendix 3: SPSS output for the Wilcoxon Tests

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>The median of differences between VICEX_1 and TLVAX_1 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.005</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>The median of differences between VICEX_1 and MSCI_1 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.186</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>The median of differences between VICEX_1 and SP500_1 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.007</td>
<td>Reject the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>The median of differences between VICEXALL and TLVAXALL equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.833</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.
### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The median of differences between VICEXALL and MSCIALL equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.117</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The median of differences between VICEXALL and SP500ALL equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.055</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The median of differences between VICEX_2 and TLVAX_2 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.088</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The median of differences between VICEX_2 and MSCI_2 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.830</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.
### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The median of differences between VICEX_5 and SP500_5 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>0.882</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is 0.05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The median of differences between VICEX_3 and TLVAX_3 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>0.730</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is 0.05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The median of differences between VICEX_3 and MSCI_3 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>0.208</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is 0.05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The median of differences between VICEX_3 and SP500_3 equals 0</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>0.624</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is 0.05.