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**PERFORMANCE OF ISLAMIC ETHICAL INVESTMENT**

Comparative study of Dow Jones Islamic Market Index and Dow Jones World  
Index in times of financial crisis

Master's Thesis in  
Accounting and Finance  
Line of Finance

Thesis mentor: Prof. E.K. Laitinen

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**ABSTRACT**

The purpose of this study is to investigate the performance of Islamic Ethical Investment during the financial crisis times. The study compares Dow Jones Islamic Market Index and Dow Jones World Index during financial crisis of Asia 1997, Russia 1998 and The Subprime 2007-2009. The meaning of the study is to find out does the DJ Islamic Market index performs better than the DJ World index. DJ Islamic Market index measures worldwide the performance of companies that are screened through Islamic *Shari'ah* law.

The data of the indexes was from Vaasa University data library. During the periods of financial crisis the performance of the indexes were measured with Fama-French multifactor model. The factors for the model were from Kenneth French data library. The crisis times were highlighted with the Volatility index VIX.

The results show that Dow Jones Islamic Market Index gives abnormal returns of 0,43% during all the crisis periods. During Asian financial crisis 0,46%, during The Subprime crisis 0,35%. Results from Russian financial crisis were not significant. The results cannot be generalized as for all crisis periods because Russian financial crisis gave different results. The Information considering Asian and Subprime crisis were interesting. The better results might come from the leverage prohibition of Islamic Market Index

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**KEYWORDS:** Islamic investing vs. conventional investing, index (Islamic & World index from Dow Jones), financial crisis, Fama-French multifactor model.





## 1. INTRODUCTION

Several years the world of investment has paid more attention to ethical investing, and ethical funds are currently one of the most rapidly growing investment sectors. In this thesis the returns of the ethical investing are in the highlight. Ethical investment can mean investing money in environmentally friendly projects or investing in companies that are screened using moral criteria. Companies that are engaged in tobacco production or distribution or are involved in armaments are usually excluded.

The rising wealth of Muslim countries has driven investment banks to offer ethical investments products also for Muslims. Dow Jones Islamic Market Index (DJIMI) measures the growth of the companies all over the world that have been screened through Islamic ethical rules. In this study we use DJIMI to measure the performance of Islamic Ethical investing.

The purpose of this study is to examine profitability of Dow Jones Islamic Market Index (DJIMI) comparing it to Dow Jones World Index (DJWI) in the times of financial crises. The central point of this thesis is to study if DJIMI gives better results.

First is studied the Asian crises from July 1997 to February 1998, second is the Russian crises from August 1998 and the third is the Subprime crises 2007-2009. These prices of Dow Jones index data were received from the data library of University of Vaasa.

These financial crises are examined as they occurred after DJIMI was founded and these crises had also downward global effects as we can see later from a volatility index (VIX) in the empirical part of the study. The returns from the crises times will give us some information also of how the ethical Islamic rules work in unusual stage of global markets.

Although there are not so many research papers from the field of Islamic Ethical investing, luckily there are some research papers which are comparing Islamic investment performance to non-Islamic investments like Hussein (2005) and Girard (2005).

Hussein and Omran (2005) used in their studies many different index counterparts and used parametric t-statistic and the non-parametric signed-rank test to examine whether the Islamic indexes achieve abnormal returns for investors. In this thesis DJIMI and DJWI are taken as whole Indexes and they are not divided to smaller indexes. The reason is to have more clear and simple results.

Now the main goal is to measure if the performance of DJIMI index is better than DJWI in the times of crises calculated with the three-factor model created by Fama and French three (1992; 1993). This model is used to remove the impacts of book-to-market ratio and firm size on stock return. DJIMI includes both small and big companies.

The Fama-French multifactor model should give more precise results than more famous Capital Asset Pricing Model. Fama-French multifactor model is a model that neutralizes the effects of the size and the book-to-market anomalies from the returns of the indexes. The Fama-French model is widely known and recognized. The multifactor model that occupies centre stage these days is the three-factor model introduced by Fama and French (Bodie, Kane & Marcus 2005:429).

First in this thesis is presented the theoretical part that supports the empirical part. In chapter 2 is presented former research papers with their results to give strong basis for this thesis. In chapter 3 the basis of the whole market system Market efficiency is introduced. In chapter 4 the rules and the structure of ethical and Islamic investments are presented. After this the factor model explains the factor based analyse tools and how the models are built before moving to empirical part of the thesis.

To compare the ethical index that has many limitations to world index that has no limitations is not the most equal. The comparison of these two indexes is crucial for the research of Islamic investing. Next step would be a comparison of Islamic ethical index and western ethical index or comparing the same data as here with some other method than the Fama-French, maybe with CAPM.

## 1.1 Background and Motivation

Religious groups have been founding ethical funds for some time. Some religious institutions have tried to avoid so called sin industries like tobacco, alcohol and gambling. In the 1970s, socially responsible investors excluded firms from their portfolios that had connections to the Vietnam War. In the 1980s environmental friendly rules were included to the ethical investing and the main thing to avoid investing was South Africa. The ethical screening is expanding all the time. Today ethical screening appears in corporate responsiveness like environment, community and human rights.

The ethical investing is a long debated issue. Some argue that ethical screening makes great social and economic contribution but other disagree. Many investors who want to invest by using ethical screening are investing by using their personal values. The awareness of firms that are not responsible to ethical concerns, are having pressure to follow social and particular ethical concerns. Others say that the screening process results in firms that enjoy stronger financial position and have more profits than firms which were eliminated through screening process. This is because environmental firms are less likely to get environmental fines, lawsuits and costly settlements. Good corporate citizenship may lead to loyal customers and increase sales.

On the field of financial business the desire to meet the customer's needs is the target and investment banks all over the world are more than eager to get customers' money to be invested. This means that ethical or socially responsible investing is getting more attention. That is why the ethical investing products are growing rapidly all over the world. Ethical investing means that investor uses ethical and social criteria to select and manage investment portfolios. Ethical funds are defined as a group of firms that are selected for non-financial reasons. This is the same with Islamic ethical investing. Dow Jones Islamic Market Index contains 70 indexes and an independent Shari`ah Supervisory Board counsels Dow Jones Indexes on the matters related to the compliance of index-eligible companies. Dow Jones Islamic Market Index, a subset of Dow Jones Global Indexes (DJGI), was launched in December 1995. The DJIMI excludes from the index universe any industry group that represents a business incompatible with Islamic principles.

Many large western financial institutions like Citibank, Barclays Capital, Morgan Stanley, Merrill Lynch and HSBC have established Islamic financial products. One of the most important indexes is Dow Jones Islamic Index that was published to public in 1999, but the index has been calculated since 1996. The index was launched to track the performance of firms in 34 countries whose activities are consistent with Islamic market index. Today DJIMI contains more than 50 Islamic indexes. (Hussein et al. 2005).

Standard & Poors (S&P) estimates the potential of Islamic market to be over US\$4trillion. In the US, Islamic mutual funds are outperforming their conventional counterparts in the wounded US market. Investors are paying attention to Islamic finance for good reason. (Salam, Merz 2008).

The Dow Jones Islamic Market Index was among the first mutual funds created for investors who were trying to find investments opportunities that were compliance with Muslims *Shari'ah* law. DJIMI has an independent supervisory board of Islamic scholars that advice Dow Jones company to screen Islamic Market index compliant to Islamic law. The composition of DJIMI is screened quarterly with changes implemented on the third Friday of March, June, September and December. The selections of DJIMI screening exclude companies that are incompatible with the Islamic principles. Those companies are from the field of alcohol, pork-related products, conventional financial services, gambling, pornography, hotel and leisure industry, tobacco, and weapons and defence.

The second level removes companies that have dept/capital ratio more than 33%. Companies are also excluded if the sum of cash and interest bearing securities exceed 33% of market capitalization. Companies also cannot be included to DJIMI if accounts receivables are more than 33% of total asset. Companies that pass these criteria are included to the DJIMI investable universe.

The hypothesis of this thesis is that Islamic investing is not giving better returns in the times of crises compared to conventional investing. As the so called Subprime crisis has been emphasized as credit crisis and Islamic investing has the rule of small leverage, Islamic investing might have done better than conventional investing.

The most important difference between Islamic and other ethical funds is that besides excluding particular sectors Islamic funds do not deal in fixed income market, but can Islamic investing perform better than non-Islamic investing? The follow-up research topic could be Islamic ethical indexes compared to western ethical indexes in times of crisis.

Al-Fil (2008) writes about the present Subprime crisis as follows. As at the close of trading on the 27<sup>th</sup> October, most of the components of Dow Jones Islamic Market indexes had posted a negative month-to-date performance. We have to notice that Islamic investing is not immune to stock market crashes. As the Islamic investing rules don't allow investing in tobacco and alcohol industry, which normally rises in the bear market, this can give surprising result.

## 2. PREVIOUS STUDIES

Bodie, Kane and Marcus (2005) wrote in general about stock market indexes. The daily performance of the Dow Jones Industrial Average is a well-known measure of the stock market performance. Dow Jones has many other indexes that measures performance and is published daily. The increasing role of international trade and investments has made indexes part of the general news and the names of the indexes are fast becoming household names. Next are presented former researches about Islamic Investing, Investing performance during times of crisis and researches of different multifactor models as the empirical method of this thesis is the Fama-French multifactor model.

The following subchapters are explaining the background of this thesis give the picture of what has already been studied on the fields of Islamic investing, crisis investing and multifactor models. From former researches about Islamic investing we can see that Dow Jones Islamic Market Index has been on the stage of research papers with other ethical measurements. Also many other methods have been used in measuring the returns. After this comes the crisis performance subchapter that mainly tells how much down has the stock market come during the crisis times. In the end is multifactor chapter that presents former research papers of performance measuring with factor models.

### 2.1 Islamic investing

Hussein et al. (2005) made a research about Dow Jones Islamic Market Index and how the ethical screening impacts the performance of index. This is the research paper where this thesis is based. Their goal was to detect whether returns earned by investors who purchase shares in Islamic indexes are significantly different from their index counterparts. They also test whether there are any significant differences among Islamic indexes depending on size and industry. They found that Islamic indexes give positive abnormal returns over the entire period and in the bull market period, but the index underperformed compared to their index counterparts in the bear market period. The index counterparts were Dow Jones World Index and its sub indexes. To take into account the risk factor in their study, they calculated the abnormal returns of each Islamic index based on the Jensen measure. In this

thesis the calculations is made with Fama-French multifactor model and the hypothesis expects Islamic Market Index to underperform during the crisis times compared with the counterpart DJ world Index because crisis times are bear market periods.

Girard and Hassan (2005) did a research paper about Faith-Based Ethical Investing: The Case of Dow Jones Islamic Indexes. Their purpose was to examine the comparative performance of Dow Jones Islamic Indexes and compare their non-Islamic counterparts using a variety of measures such as Sharpe, Treynor, Jensen and Fama's selectivity, net selectivity and diversification. They also examined the persistence of performance using Garhart four factor pricing models and how the Islamic indexes are related with their non-Islamic counterparts. They had two sample periods from 1996 to 2000 and from 2000 to 2005. They find that there was no difference between Islamic and non-Islamic indices. DJ Islamic indices outperform from 1996 to 2000 and underperformed 2001 to 2005. They say that there is similar reward to risk and diversification benefits for both Islamic and conventional indexes.

Renneboog, Ter Horst and Zhang made a research in 2008 about the price of ethics and stakeholder governance. They investigated if investors pay a price for investing in socially responsible investments (SRI) funds, or if they obtain superior returns across the world. They found that SRI funds in the US, the UK and in many continental European and Asia-Pacific countries underperform their domestic counterparts by -2.2% to -6.5%. But in France, Japan and Sweden the returns of SRI funds were not different from the performance of conventional funds.

Bauer, Koedijk and Otten (2004) investigated the performance of ethical mutual funds in Germany, the UK and the USA. They used Carhart multi-factor model to overcome benchmark problem most prior ethical studies have suffered from. After controlling investment style, they found that there was no significant evidence of differences in risk-adjusted returns between ethical and conventional mutual funds in the period of 1990 to 2001. Their estimates are robust to the inclusion of ethical indexes which are not incrementally capable of explaining ethical mutual fund return variation.

Abdullah, Hassan and Mohamad (2007) investigated the performance of Malaysian Islamic unit trust funds. Their main aim was to observe the



differences in terms of performance between Islamic and conventional mutual funds in the context of Malaysian capital market. They found that Islamic funds performed better than the conventional funds during bearish economic trends while conventional funds showed better performance than Islamic funds during bullish economic conditions. They also found that fund managers are unable to correctly find good bargain and to forecast the price movements of the general market.

Wilson (1997) wrote a paper about Islamic finance and ethical investment. The paper highlights that Islamic investors may be concerned a very different set of ethical criteria from Western “green” or ethical investors, but the issue of stock selection and screening technique are of mutual interest.

Luther, Matatko and Corner (1992) wrote an article about the performance of ethical unit trust in the UK. They showed that while it is easy to define the boundaries of the UK unit trusts that claim to invest ethically, within those boundaries there is significant diversity. Some trusts are principally environmental, others political, some medical, and others more widely social. They found that there is a weak evidence of some over performance, on a risk-adjusted basis, of “ethical” unit trusts. There is clear evidence that the ethical trusts have UK investment portfolios more skewed towards small market capitalization than the market as whole. The article summarizes that the investments of ethical trusts are too varied, too closely correlated with low yield and, particularly, small company classifications to allow a simple evaluation on an “ethical effect” on unit trust returns.

El-Havary, Grais and Iqbal (2005) studied the diversity in the regulations of Islamic Finance Institutions (IFI). The paper contributes to the discussion on the nature of the prudential standards to be developed. The regulatory regime governing IFIs varies across countries. The paper contrasts the risks and regulation that would be needed in the case of Islamic financial intermediation operating according to core principles and current practices. The paper finally suggests an organization of the industry that would allow it to develop in compliance with its principles and prudent risk management and to facilitate its regulation. However, the emerging and evolving nature of the industry and the competitive pressure it faces call for flexibility and alertness on the part of regulators.

Ashton (2008) wrote an article of the challenges of the Islamic market. The core problem for the sector still is product development – such as money market fund and insurance. The paper highlights that these fields do not comply with the definitions of products suitable for the Islamic market. The Islamic Shariah law has strict rules regarding the earning of interest. That prevents direct investment in money market type instruments. Compliance with Islamic legal principles is not black and white, as different cultures have different levels of flexibility with regard to financial concepts. That is why many companies have developed their own Islamic law scholars to assist in developing and marketing such products. The insurance industry is another area of challenges. The article says that many Islamic scholars agree that from social perspective the concept of insurance makes a lot of sense but at the same time more conservative community members feel that taking out insurance is a “challenge to the divine will”.

Dar and Presley (1999) wrote a paper about Islamic Finance: a Western Perspective. Their article begins to rectify the latter deficiency by exploring the key issues –support for the prohibition of interest in Western literature, the blame attached to interest based systems in the creation of business cycles in capitalist economies and empirical evidence of attitudes towards Islamic finance. The prohibition of the interest rates is also connected to the investment sector. They found out that there is much to be gained from utilizing the empirical approach of Western economic literature. The paper says that there has been reluctance amongst Islamic scholars to undertake empirical testing. The writers also encourage Islamic scholars not to develop isolation from Western literature.

Olson and Zoubi (2008) were studying whether it is possible to distinguish conventional and Islamic banks on the basis of financial characteristics alone, even if they have different principles and rules. Their target area was the Gulf Cooperation Council (GCC) region. They found that although the means of several ratios are similar between the two categories of banks, non-linear classification techniques are able to correctly distinguish Islamic from conventional banks in out-of-sample tests at about a 92% success rate.

## 2.2 Investing performance during times of crisis

Bartram and Bodnar gauged 2009 how did the investment performance developed worldwide in the subprime crises 2008-2009. The name subprime crisis comes from unsuccessful US Subprime mortgage loans. Their research paper *No Place to Hide: The Global Crisis in Equity Markets* was published in 2008/09. The paper says world equity markets were up in 2007 about 15% and then gave back. Starting in September 2008 index Data Stream world market portfolio lost 36.8% over 32 trading days. In the end of February 2009 the index was down 45.4% since the end of 2006, 52.6% down since 2007 and 16.5% since the end of 2008. Here we can see that the Subprime crisis was truly a strong bear market period that caused the world wide depression.

Chakrabarti and Roll (2001) made a research about East Asia and Europe during the 1997 Asian collapse: a clinical study of a financial crisis. The paper tells that 6 months after the crisis started on July 2<sup>nd</sup> 1997 Thailand lost 65% of its stock market value in dollar terms, Hong Kong 33%, Indonesia 71%, Malaysia 57%, Philippines 58%, Singapore 24% and South Korea 72%. Here is seen what the effects to the Asian markets was. Further in chapter 7 is presented the figure of Volatility Index (VIX) that shows how at this time the Asian crisis affected the world market.

Karolyi (2002) investigated if the Asian financial crises scared foreign investors out of Japan? Foreigners became net sellers of Japanese equities during the Asian financial crisis in 1997. The paper studies whether this change in the whole foreign portfolio investment activity in Japan made the effect of the crisis worse. He only found positive feedback-trading behaviour before, during and after the Asian crisis among the foreign investors. There was no evidence that this trading activity by foreigners made crisis worse.

Lucey and Voronko (2008) wrote an article about the Russian equity market before and after the 1998 crisis. They also calculated the decline of the stock market during the crisis. In the beginning of the year 1998 Russian stock market had fallen 50%. In March-May 1998 the stock market plummeted 20% more and during the period of August-September 1998 the Russian stock market fell by almost 70%. From this research we can see the period of the crisis and also that the crisis was strongly descending market period.

### 2.3 Multifactor model

Multifactor models seek to improve the explanatory power of single-factor models. Single-factor model uses only one factor which is usually market  $\beta$  but multifactor model uses indicators that capture a wide range of macroeconomic risk factors. The Fama and French three-factor model uses three factors, market  $\beta$ , small minus big stock (SMB) and high minus low stock (HML) factors, to calculate the valid return of the portfolio. This will give more specific results of the performance of measurement as the factors neutralize the effects  $\beta$ , SMB and HML. (Bodie et al. 2005, pp. 360-362).

Fama and French (1992) researched The Cross-Section of Expected Stock Returns. They found out that the size and the book-to-market equity combine to capture the cross-sectional variation in average stock returns associated with market  $\beta$ , size, leverage, book-to-market equity and earnings-prize ratios. They also found that when the tests allow for variation in  $\beta$  that is unrelated to size, the relation between market  $\beta$  and average return is flat, even when  $\beta$  is the only explanatory variable.

Fama and French (1993) made a research of Common risk factors in the returns on stocks and bonds. The paper identifies five common risk factors in the returns on stocks and bonds. There are three stock-market factors: an overall market factor and factors related to firm size and book-to-market equity. There are also two bond-market factors, related to maturity and default risk. Stock returns have shared variation due to the bond-market factors and they are linked to bond returns shared variation in the bond-market factors. They found out that the five factors explain the average returns on stocks and bonds.

Fama and French (1996) wrote a paper about Multifactor Explanations of asset Pricing Anomalies. This study was continuance to the previous studies. The previous studies show that average returns on common stocks are related to firm characteristics and that the factors are empirically motivated. They now found that except for the continuation of short-term returns, the anomalies largely disappear in the three-factor model.

Fama and French (1997) made a research about Industry cost of equity. They found that the estimates of the cost of equity for industries are imprecise and the standard errors for more than 3% per year are typical for both CAPM and

the three-factor model of Fama-French. The errors are the result of uncertainty about true factor risk premiums and imprecise estimates of the loading of industries on the risk factors. They highlight that they do not take stand that which is the right asset pricing model. Here we can see the Fama-French model and CAPM are close to each other even FF model uses more factors.

Wang (2003) did a research of Asset Pricing with Conditioning Information: A New Test. He presented a new test of conditional versions of Fama-French three-factor model. The test was based on a general nonparametric methodology that avoids functional form misspecifications of betas, risk premium, and the stochastic discount factor. He found that a nonparametric version of Fama and French model performs well even when challenged by momentum portfolios. The FF model is evolved and tested all the time.

These former research papers of multifactor model give the scientific basis for the multifactor models factors and for the empirical test of this thesis. The factors concerning book-to-market and market value factors are empirically motivated by observations that historical average returns on stocks of small companies as well as on the stocks with high ratios of book to equity market equity are higher than predicted by the security market line of the CAPM. Fama and French managed to create a model, which should explain the stock returns much better than the original CAPM. In Chapter 5 is presented more precise theoretical basis of the factor models.

## 2.4 Summary

Research papers about Islamic investing have been done in the past 20 years. There are only few scientific papers made of this subject but it is getting more and more attention all the time. It is not known how DJIMI will perform during financial crisis times when measuring the return of the index with Fama-French multifactor model. The stock market goes down really impressively during the crisis times as seen from the former research papers. Unfortunately the crisis time's stock market investing has not been investigated much and the investigation has been made only to see how much the stock market came down. The Fama-French multifactor model is competitive to give strong information of the real performance of the indexes during the crisis times. The

multifactor model takes account different indicators to capture a wide range of macroeconomic risk factors that will neutralize anomalies. This neutralized return of indexes tells us what is the real return of the index when other variables are neutralized. This is the marginal return that has been gained by the index manager's stock market screening.

### 3. MARKET EFFICIENCY

The concept of efficient market was developed in 1965 by Eugene Fama. This is the core assumption of the whole stock market and also to this thesis. His research paper of Behaviour of stock market Prices states that

*“An efficient market is defined as a market where there are large numbers of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value.”*

This chapter gives an overview to market efficiency and explains the assumptions of the stock market. Both indexes used in this thesis are measuring stock market worldwide. This is why the assumptions of the efficient markets are now presented.

In 1970 Fama introduced three forms of efficient market in his article Efficient Capital Markets. According to his research of the sufficient conditions for efficient stock market is based on three things.

1. Markets are frictionless. There are no transaction costs in trading securities.
2. All available information is free and available to all market participants.
3. All agree on the implications of current information for the current price and distribution of future prices of each security.

The primary role of the capital market is allocation of ownership of the economy's capital stock. The ideal is a market in which prices provide accurate signals for resource allocation: that is, a market in which firms can make production investment decisions, and investors can choose among the securities that represent ownership of firm's activities under the assumption that security prices at any time fully reflect all available information. A market in which prices always fully reflect available information is called efficient. (Fama 1970)

Given all available information to the market, it should increase or decrease stock price only if the information is new. New information must be unpredictable; if it could be predicted, then the prediction would be part of today's information. Thus stock prices that change in response to new information also must move unpredictably. This is the essence of argument that stock prices should follow a *random walk*, that is, that prices changes should be random and unpredictable. Far from a proof of market irrationality, randomly evolving stock prices are the necessary consequence of intelligent investors competing to discover relevant information on when to buy or sell stocks before the rest of the market becomes aware of that information. If prices are determined rationally, then only new information will cause them to change. Therefore, a random walk would be the natural result of prices that always reflect all current knowledge. Indeed, if stock prices movements were predictable, that would be damning evidence of stock market inefficiency, because the ability to predict prices would indicate that all available information was not already reflected in stock prices. Therefore, the notion that stocks already reflect all available information is referred to as the efficient market hypothesis. (Bodie, Kane & Marcus 2005 pp. 370-371)

*The Efficient Market Hypothesis* (EMH) has become a widely acknowledged concept since interest in it was reborn in the 1950s and 1960s under the name of the 'theory of random walks' in the finance literature and 'rational expectations theory' in the mainstream economics literature (Jensen, 1978). There are three forms of the hypothesis. The definitions according to Fama (1970) are the weak form of the EMH, the semi-strong form of EMH, and the strong form of EMH.

### 3.1 Weak form market efficiency

The weak-form hypothesis asserts that stock prices reflect all information that can be derived by examining market trading data such as the history of past prices, trading volume and short interest. This version of the hypothesis implies that trend analysis is fruitless. Past stock price data are publicly available and virtually costless to obtain. The weak-form hypothesis holds that if such data ever conveyed reliable signals about future performance, all investors already would have learned to exploit the signals. Ultimately, the signals lose their



value, as they become widely known because a buy signal, for instance, would result in an immediate price increase. (Fama 1979; Bodie et al. 2005: 373.)

### 3.2 Semi-strong form market efficiency

The semi strong-form hypothesis states that all publicly available information regarding the prospect of a firm must be reflected already in the stock price. Such information includes, in addition to past prices fundamental data on the firm's product line, quality of management, balance sheet composition, and patents held, earnings forecasts, and accounting practices. If the investors have access to such information from publicly available sources, one would expect it to be reflected in stock prices. (Fama 1970; Bodie et al. 2002: 343.)

The stronger assertion that all publicly available information has already been impounded into current market prices has proved far more controversial among investment professionals, who practice fundamental analysis of publicly available information as a widely accepted model of security analysis. The empirical evidence suggest that public information is so rapidly impounded into current prices that fundamental analysis is not likely to be fruitful. (Malkiel 1989)

Various tests have been conducted to ascertain the speed of adjustment of market prices to new information. Fama, Fisher, Jensen, and Roll (1969) examined the effect of stock splits on equity prices. While not providing any economic benefit themselves, splits are usually followed by dividend increases that do convey to the market information about management's confidence about future progress. While splits usually do result in higher share prices, the market appears to adjust to the announcement fully and immediately. Substantial returns can be earned prior to the split announcement, but there is not evidence of abnormal returns after the public announcement. In cases where dividends were not raised following the split, firms suffered a loss in price, presumably because of the unexpected failure of the firm to increase its dividend. Dodd (1981) found no evidence of abnormal price changes following the public release of merger information. Although merger announcements can

raise market price substantially, it appears that the market adjusts fully to the public announcements.

### 3.3 Strong form market efficiency

The strong-form version of the efficient market hypothesis states that stock prices reflect all information relevant to the firm, even including information available for only company insiders. This version of the hypothesis is quite extreme. Few would argue with the proposition that corporate officers have access to pertinent information long enough before public release to enable them profit from trading based on that information. The Securities and Exchange Commission's job is to prevent insiders profiting from their privileged position. (Bodie et al. 2005: 373.)

**Table 1.** The forms of efficiency (Alexander & Sharpe 1989)

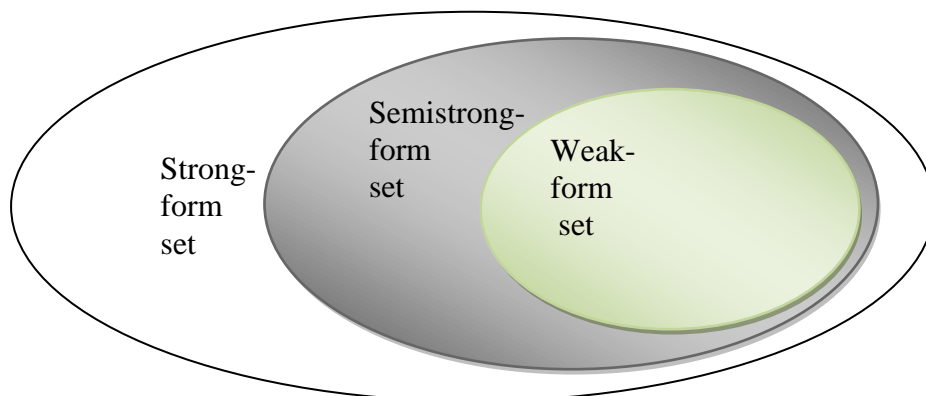
<b>Form of efficiency</b>	<b>Information reflected in price</b>
Weak	Previous prices of security
Semi-strong	Publicly available information
Strong	All information, both public and private

Investors cannot get abnormal returns if their investment strategy is based on these three strategies. The stock market should fulfil the weak form market efficiency conditions to make semi strong conditions possible. Also semi-strong conditions have to be fulfilled in the stock market in order to strong market efficiency conditions to be fulfilled. Even though there have been evidence of delay in the market efficiency this theory has kept its status as the basis of the empirical research. (Malkamäki & Yli-Olli 1988:11)

Fama (1991) updated the former research about the market efficiency. In the new research he highlighted that the fast reaction for the new information is not the only character of the efficient market. The new definition is that in the efficient market the prices contain all the information available. The new

method uses also interest rates, dividend yields and profits added to the historical information. When researching semi-strong market efficiency Fama suggests using event studies. Event studies can give a good picture of the speed of adjustment of prices to information. To test strong forms market efficiency Fama suggested researching the use of private information.

In general, the empirical evidence in favour of EMH is strong. However, along with the general support for EMH there has been anomalous evidence inconsistent with the hypothesis in its strongest forms, as reviewed by Jensen (1978) and Ball (1978). For example, Shiller (1981) argued that variations in aggregate stock prices are much too large to be justified by the variation in subsequent dividend payments, which is an apparent rejection of the EMH. However, Marsh and Merton (1983) concluded that Shiller's findings are a result of misspecifications rather than a result of market inefficiency, which is supported by Kleidon (1986).



**Figure 1.** Three forms of market efficiency. (Bodie et al 2005:413).

### 3.4 Random Walk -Model

*Random walk* is a theory closely related to the idea of market efficiency. The theory states that the past movements or trends of a stock price cannot be used to predict its future movements. Kendall (1953) examined weekly changes in British industrial share prices and spot prices for cotton and wheat. He wrote

that “*the series looks like a wandering one*”. The randomness of asset prices means that there is no autocorrelation between the contemporaneous asset prices and their lagged prices (Dougherty 2002: 367). This unpredictability of asset prices is one of the main important things of the idea of market efficiency.

There are other closely related theories of randomness. *Fair game* –model states that the expected return on an asset equals its actual return on average. *Martingale* theory is that tomorrow’s price is expected to be the same as today’s price. *Submartingale* is a fair game where tomorrow’s price is expected to be higher than today’s price, which means that the expected returns will be positive. The random walk –theory suggests that successive price changes are independent. (Copeland, Weston & Shastri 2005).

#### 4. ETHICAL AND ISLAMIC INVESTING

For many investors worldwide it is no longer enough to know if a company makes money. They want to know how it makes money. *Socially responsible investing* (SRI) or *ethical investing* has grown into an important component of global capital markets. From the 1970s to 2000s social investing had matured into a comprehensive investing approach, complete with social and environmental screens, shareholder activism and community investment. By 2007, 2.3 trillion is invested according to some ethical criteria in the United States. There are almost 200 mutual funds using ethical screens to select investments. (Mitchell 2003:70; Carrol & Buchholtz 2009:72).

In the crisis times ethical investing has some advantages but also strong disadvantages. Advantage of Islamic ethical investing during leverage crisis is the exclusion of high leverage firms. Hussein et al (2005) wrote about the disadvantages of Islamic ethical investing and they highlighted that normally in bear market alcohol and tobacco industries make good profit but that investing to this field is forbidden for Islamic investments.

##### 4.1 Ethical Investing

The origins of ethical investing can be found 1000 years ago. Early Jewish, Christian and Islamic laws laid down some rules on how to invest ethically that time. More specifically Socially Responsible Investing grew out of opposition to US involvement in the Vietnam War in the 1960s. Political campaigns targeted many chemical and weapon companies because of the weapons they manufactured were used by US forces. In the late 1970s the concept of ethical investing got media's attention when focused on ending apartheid in South Africa. Soon a major multinational company had to leave South Africa. Partly because of this economic pressure, apartheid ended and democracy was brought to South Africa. (Mitchell 2003:72)

There are three major ethical funds. The Domini 400 Social Index monitors the performance of 400 US corporations that pass multiple broad-based social screens. Second is Dow Jones Sustainability Index. It was launched to the public in 1999 as a group of indices that tracks the performance of the top 10% of the

leading sustainability driven companies. In the Dow Jones Global Index there are 2000 these kinds of firms that have particularly strong social characteristics. Third is ASPI Eurozone, which tracks the financial performance of companies in the Eurozone that are leaders in sustainability. (Mitchell 2003:72)

Socially responsible funds have continued to grow. Social investing has matured into a comprehensive investing approach, complete with social and environmental screens, shareholder activism, and community investment. The managers of the socially responsible funds do not use only ethical or social responsibility criteria to decide in which companies to invest. They consider a company's financial health before everything else. Moreover, a growing group of brokers, financial planners and portfolio managers are available to help people evaluate investments for their social impact. (Carrol et al. 2009:72)

The *social screening* is the cornerstone of socially responsible investing movements. Investors who want to invest into socially responsible firms' *screens out* those firms they consider to be socially irresponsible and *screens in* those firms that they think are socially responsible. There are also *negative social screens* that have been used in recent years to avoid investing in tobacco product manufacturers, gambling casino operators and defence or weapons contractors. *Positive screening* is used to find out what firms are socially responsible. Criteria that may be used as either positive or negative screens, depending on the firm's performance, might include the firm's record on issues of equal employment opportunity and affirmative action, environmental sustainability, treatment of employees, corporate citizenship and treatment of animals. (Carrol et al 2009: 73).

There can be collected three main reasons why there has been an upsurge in ethical investing.

1. There is more reliable and sophisticated research than in the past.
2. Investment firms using social criteria have established a solid track record and investors do not have to sacrifice gains for principles.
3. The socially conscious 1960s generations is now making investment decisions.

Whether it is be called social investing, ethical investing or social responsible investing it is clear that social investing has raised to be part of investing mainstream. Ethical investing is growing but it will be also debated in the investment community. The fact that they exist, have grown and have prospered provides evidence that the practice is serious one and that there truly is investors in the real world who take the social performance issue quite seriously. (Carrol et al 2009: 74).

#### 4.2 Islamic Ethical Investing

Islamic investing is a complicated business based on Islamic ethics and the body of law called *Shari'ah*. *Shari'ah* is the code of law derived from the Koran and from the teachings and examples of Mohammed. Those ethics prohibit money going into companies involved in alcohol or gambling, for example. The main prohibition is collecting the interest. Excluded are companies that make profits from interest payments, such as banks and insurance groups. That means 16 of the 30 stocks on Wall Street's Dow Jones Industrial Average fall outside *Shari'ah*. Many of the limitations on investment that Muslim businesspeople embrace are similar to approaches that are becoming common in many Western markets and in some developing economies (Cornell 2007:202). Still Islamic investing is probably the fastest-growing area of faith-based investing in the world. In June 2001 there were more than 100 Islamic mutual funds worldwide and almost half of them were launched since 1999. Dow Jones launched to the public its own Islamic Market Index to track *Shari'ah* compatible companies. In 2000 Germany Commerzbank launched its AlSukoor European Equity Fund targeting Muslims in the Middle East first and those living in Europe. AlSukoor got 25 million € in its first three weeks alone. (Mitchell 2003:74).

Considering the trend of all ethical investment and the increasing number of Muslims also in Europe, Islamic investment funds have spread across Europe. Kleinwort Benson became in 1986 the first investment to introduce an Islamic unit trust fund. The EU is a very attractive territory for promoters of Islamic investment funds since they have access to a growing and wealthy Muslim community here. (Siddiqi & Hrubu 2008).

Islamic investing products are also suitable alternative for investors of other faiths especially conservative Christians. Islamic funds avoid the same so called sin stocks: alcohol, tobacco, gambling and pornography. Added to this are also pork industry, armaments, the hotel and leisure industry. They avoid most conventional financial companies because Islamic law prohibits collecting interest in debt and the ban also means the fund cannot invest to companies that act as a lender or borrower. Islamic funds avoid companies with debt-to-asset ratios higher than 33 percent and accounts-receivable-to-asset ratios above 45 percent. In addition a company's combined interest income and revenue from sinful activities must not be more than 5 percent of total revenues. That limitation excludes many popular companies. Like of Apple Computers and IBM Corporation for instance carry too much debt. Still about 650 global companies, worth nearly USD 10 trillion, can be included in the portfolio. (Mitchell 2003:74; Hussein et al 2005).

**Table 2.** The Rules for excluding the stock in Islamic Ethical Investing. (Mitchell 2003:74; Hussein et al 2005).

1. Alcohol industry
2. Tobacco Industry
3. Gambling industry
4. Pornography industry
5. Pork related Industry
6. Armaments Industry
7. Hotel and Leisure Industry
8. Conventional Financial Companies
9. Companies that lend or borrow and the revenue is more than 5% of total income
10. Debt to asset ratio more than 33%
11. Accounts receivable to asset more than 45%

Because of the prohibition on interest associated with debt Islamic markets are inventing alternatives to traditional bond investments. In US one firm is working with leasing companies to develop securities backed by operating



leases which do not pay interest but rather a share of the leading revenue. These could be bought by Muslim customers also. Some firms are also developing mutual-aid society that serves as an alternative to conventional insurance for Muslims. Year after year the investment products served to Muslims are developed more and more. (Mitchell 2003).

Islamic investment funds have the same problem as all Islamic financial products: They are not very well developed brands. Due to events of recent years and unfavourable media coverage the word Islam associated with bad incidents that have affect to the reputation. The word Islamic Investment Fund may prevent some people from investing their money.

#### 4.3 Summary

As said before Ethical investing is getting more and more attention worldwide. The brands of ethical investing products are getting stronger. Ethical investing is also one important part of the environmental issues. Acknowledge of human rights has been growing for decades. Also the religious screening is trying to take its place in the field of investing. Since the 1990s Islamic screening took its place in the investment world and Dow Jones started to measure the profits. Because of the many prohibitions, Islamic ethical investing cannot invest the equity freely. Hussein et al wrote in 2005 that Islamic investing is not doing well in bear market because of the prohibition of alcohol and tobacco industries. In this thesis we notice that the absence of leveraged firms, that is one of the rules of DJIMI, might have effect to the performance of the Islamic Market index positively during financial crisis. Especially in the Subprime crisis leverage was highly emphasized.

## 5. FACTOR MODELS

The investors or people who want to invest in stock market should carefully think how to maximize their wealth. The investors have to estimate all important factors that **have** effect to return from investment in the future. Investor needs a lot of information when making the estimation, stipulation and offering suitable price in stock market. Using a multifactor model is a very important tool in assessing stock prices and helping the investors to plan and decide in investment correctly and effectively. According to financial theory presented in chapter 3, the market price of a stock is the best estimate of its correct value, fully reflecting all relevant information concerning the value. Initial public offerings do not, however, have any market price that complicates the valuation of the issue. In the following subchapters there are presented models to determinate return of investment. In the empirical part of this thesis there is used the three factor model called Fama-French.

Multifactor models seek to improve the explanatory power of single factor models by explicitly accounting for the various systematic components of security risk. These models use indicators intended to capture a wide range of macroeconomic risk factors. (Bodie et al. 2005:362).

### 5.1 Capital asset pricing model

The standard Capital Asset Pricing Model (CAPM) is based on Markowitz's portfolio theory and was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). The model was a big success because it is simple, straightforward and intuitively appealing. The standard CAPM states that the higher the risk the higher the return. Today CAPM is one of the most important and popular asset pricing models. (Bodie et al. 2005: 282).

The main idea of CAPM is that the expected risk premium for an asset is directly proportional to its unsystematic risk, that is beta, and that the expected return is the sum of risk free return and risk premium. The risk premium for an asset is calculated as the product of expected market return over the risk-free return and the beta coefficient ( $\beta$ ) between the asset return and market return. The CAPM states that the expected return of every asset must lay on *Security*

*Market Line* (SML), and that any deviations from it would result in abnormal returns.

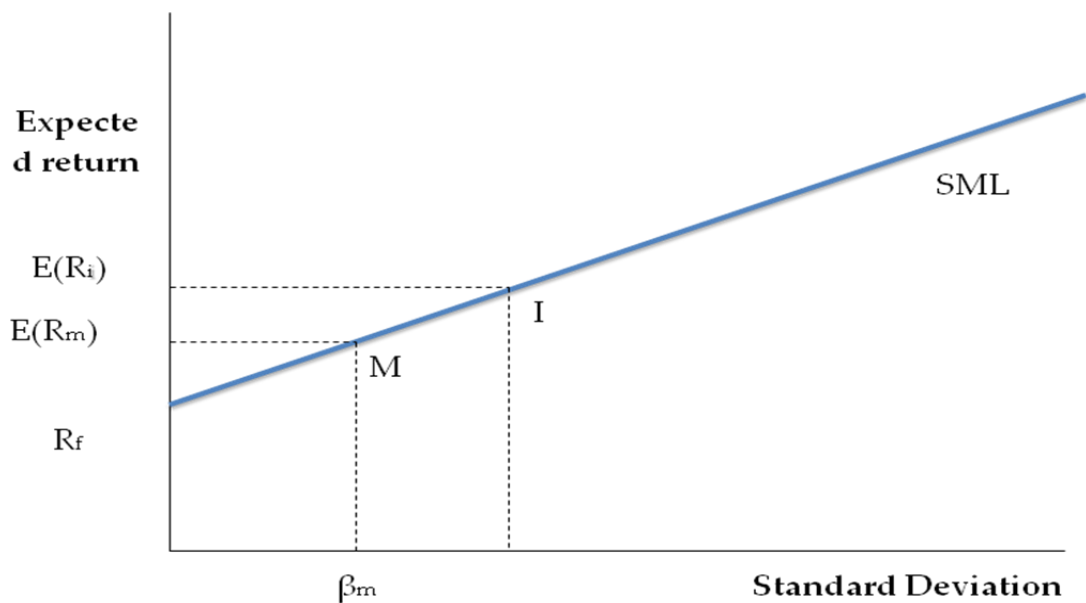
The standard CAPM is based on the assumption that the expected return of a portfolio or single stock can be defined as a sum of price of time and the product of price of risk and amount of risk. This can be also presented as:

$$(1) \quad E(r) = r_f + \beta(r_m - r_f),$$

where:

$E(r)$	=	expected return
$r_f$	=	risk free rate of return
$\beta$	=	risk factor
$r_m$	=	market return

This equation constructs a line, when illustrating in the coordinates. This line is called *security market line* (SML)



**Figure 2.** Security Market Line

The CAPM presupposes that the only relevant source of risk arises from variation in security returns, and therefore a representative portfolio can capture this entire risk the risk premium on an individual stock is solely determined by its beta on the market portfolio. CAPM also is only a single period model but behaviour of an intertemporal maximize will be significantly different when changing investment opportunity happens instead of a constant one. Merton (1973) made a multifactor version of the CAPM that recognizes the multidimensional nature of risk. Merton's multifactor CAPM is called the *Intertemporal CAPM* (ICAPM). (Merton 1973; Bodie et al. 2005: 361)

The model has (i) the simplicity and empirical tractability of the CAPM, (ii) is consistent with expected utility maximization and the limited liability of assets, (iii) and provides a specification of the relationship among yields that is more consistent with empirical evidence.

While the single factor CAPM predicts that only market risk will be priced, the ICAPM predicts that other sources of risk also may be priced. Merton suggested a list of factors that included uncertainties in labour income prices of important consumptions goods or changes in future investment opportunities. The ICAPM is a model of the risk-return trade-off that predicts the same multidimensional security market line as the arbitrage pricing theory. (Merton 1973)

## 5.2 The Arbitrage Pricing Model

Arbitrage means the exploitation of a security mispricing in such a way that risk-free profits can be earned. These mispricing errors are exploited by simultaneously purchasing and selling of equivalent securities in order to make a profit. A basic principle of capital market theory is that equilibrium market prices are rational in that they rule the arbitrage opportunities. Arbitrage opportunities might appear only split second at a time because the pressure to restore the equilibrium is really strong. That is because two same items can't be sold at different prices. *The Arbitrage Pricing Theory* (APT) is based on this assumption and on homogenous expectations. APT highlights the crucial distinction between non-diversifiable risk (risk factor) that requires a reward in

the form of a risk premium and diversifiable risk that does not. (Bodie et al 2005: 343-356).

In 1976, Stephen Ross developed the APT linking returns to risk in a different way than the CAPM. The model is based on far less stricter assumptions about the functioning of the market and behaviour of investors than CAPM. The APT arrives to its results by assuming that equilibrium is restored through trading so that no arbitrage opportunities are available. The expected beta-return relationship in APT is obtained by using a well-diversified portfolio that practically can be constructed while the market portfolio used in CAPM is unobservable due to the assumptions made in the underlying theoretical framework. (Bodie et al. 2005:348-356)

Linkages between macroeconomic variables and financial markets have been long time problematic. Understanding this has been a goal for many economists and academics. One reason for the interest in these linkages is that expected excess returns on common stocks appear to vary with business cycles. The APT does not answer the question which portfolios are efficient. Instead, it assumes that each stock's return depends partly in pervasive macroeconomic influences, which are factors, and partly on events that are unique to the company. According to the APT, the return of an asset,  $R_i$ , is assumed to follow the relationship (Ross 1976):

$$(2) \quad R_i = E(R_i) + \beta_1 R_{factor1} + \beta_2 R_{factor2} + \beta_3 R_{factor3} + \dots + \varepsilon_i$$

where:

$\beta_i$	= beta coefficient i.e. factor loading
$R_{factor n}$	= Return on factor $n$
$\varepsilon_i$	= unsystematic risk of asset $i$

When testing the APT, investors' do not have to define the market portfolio which makes testing of the APT fairly simple. It is not the same with CAPM. But there is uncertainty of what the appropriate factors are in APT model and how many factors should be used. This is one of the reasons why CAPM is much more popular to APT model. Chen, Roll and Ross suggested in their paper in 1986 using factors like change in industrial production, change in expected inflation, and change in unanticipated inflation, excess return of long-term corporate bonds over long term government bonds and excess return of long-term government bonds over T-bills.

In the end CAPM provides a clear statement on the expected return whereas the APT implies that beta relation for securities holds for perhaps a small number of securities. Because APT focuses on no-arbitrage condition, the APT cannot rule out a violation of the expected return-beta relationship for any particular asset. (Bodie et al. 2005:356).

### 5.3 Fama-French model

Many multifactor models have been proposed based on the Arbitrage Pricing Theory. Fama and French developed their three-factor model in *Journal of Finance* in 1992. They concluded, "In short, our tests do not support the most basic predictions of SMB (Sharpe-Lintner-Black) Capital Asset Pricing Model that average stock returns are positively related to market betas" (Fama & French 1992). In these days The *Fama-French three-factor model* (FF model) is the one that occupies centre stage of multifactor models. The systematic factors in the FF model are market index, firm size and book-to-market ratio. The latter two factors are empirically motivated by the observations that historical average returns on stock of small firms and on stocks with high ratios of book equity to market equity are higher than predicted by Security market Line (SML) of the CAPM. These observations suggest that size of the book-to-market ratio may be proxies for exposures to sources of systematic risk not captured by the CAPM beta and thus result in the return premiums we see associated with these factors. Fama and French succeeded to create a model, which should explain the stock returns much better than the original CAPM. (Bodie et al 2005: 429; Fama & French 1996).

Banz made a research in 1978 named Limited diversification and Market Equilibrium. He found that there was a negative relation between the market value of equity and the expected return. He was the first person to discover this. Smaller firms had larger expected return than bigger ones. Although this phenomenon was generally known, there was no proper answer for this negative effect of firm size on risk adjusted stock returns. The size effect has been reported to exist also in Finland, for example, by Berglund (1986) and Yli-Olli & Virtanen (1992).

Stattman (1980) found first that the ratio of a firm's book value of equity (BE) to its market value (ME) has some impact on the average stock returns. The higher the BE/ME is, the higher are the average returns of a common stock of the company. Same findings were made by Fama and French in 1992.

Fama and French three-factor model includes three stock market factors. They are the market return premium ( $R_m - R_f$ ), the small size premium (SMB, that is Small Minus Big) and the high book-to-market premium (HML, that is High Minus Low). SMB is calculated small companies minus big companies. Small companies are companies that are under the median in market value and the big companies are above the median in market value. HML means the difference of high book-to-market portfolios and low book-to-market portfolios. Companies are annually sorted into three groups based on book-to-market ratio: a low ratio group with the 33% lowest value, a medium-ratio and the high-ratio group. (Bodie et al 2005:429).

$$(3) \quad E(R_i) - R_f = \beta_i [E(R_m) - R_f] + \delta_i E(SMB) + \eta_i (HML)$$

where:

- $E(R_i) - R_f$  = expected return on portfolio i
- $E(R_m) - R_f$  = expected excess return on market portfolio m
- SMB = return difference between small-stock and big-stock portfolio
- HML = return difference between distressed and strong stock portfolios
- $\beta_i, \delta_i, \eta_i$  = coefficients of market risk, size and distress premium factors

In the above Fama-French three-factor asset pricing equation, coefficients  $\beta_i$ ,  $\delta_i$  and  $\eta_i$  are the factor loadings on the three risk factors. The factor loading  $\beta_i$  is analogous to the CAPM beta, but it is not the same since two additional factors are added to explain the variation in returns. The coefficients  $\beta_i$ ,  $\delta_i$  and  $\eta_i$  are estimated by utilizing a time-series regression for the portfolios created based on the size and the book-to-market values. (Fama et al. 1992.)

Fama and French (1993) also researched how the multifactor model explains the returns on portfolios that are formed on the basis of other informative variables including the Price/Earnings (P/E) ratio. The model suggests that the abnormal

returns of the low P/E portfolio are due to their loadings on the book-to-market factor HML. Low P/E portfolio has an HML sensitivity factor of 0.67, while the high P/E portfolio has a negative sensitivity factor of -0.50. The paper says that this is because low P/E stocks are considered as growth stock as they have a low book-to-market ratio having persistently high earnings on book to equity that result in low stock prices. The high P/E ratios logic is opposite and can be thought of being distressed stocks. According to Fama and French, this can be seen that Fama-French three-factor model captures the cross-section of average stock returns, and it absorbs most of the anomalies that have plagued the CAPM.

Still Fama-French model suffers from the same implementation issues as the CAPM. For instance, how much data should you use to determine the each factor's risk factor premium? Since 1926, small companies have outperformed large companies, but since 1982, they have not. Should returns be regressed using monthly data? Should regressions use five years of data? Given the model's recent development, many of these questions are still under investigation. (Koller, Goedhart & Wessels 2005: 321-323)

#### 5.4 Summary

As stated in chapter 3, the market price of a stock should be the best estimate of its correct value fully reflecting all information about the company. This is the case if market is efficient. In the 1920s people believed blindly that the correct value of a stock have to be the current market value. Today investors know the stock are under and overvalued from time to time. The crash of 1929 increased the interest towards methods for determining the theoretically correct stock price theoretically correct. In this chapter was presented the most famous Capital Asset Pricing Model, then Arbitrage Pricing Theory and in the end the Fama-French multifactor model. CAPM is based on Markowitz's portfolio theory and the model has been successful because of the simplicity of it. APT assumes that each stocks return depends partly on pervasive macroeconomic influences and partly on "noise" events that are unique to the company. Fama-French model is also multifactor model like APT but FF model tells us what the factors are. Market beta, the size anomaly and the value anomaly affect to the stock return and these are take account at FF model.



In this thesis Fama-French model is used to measure the return of the indexes. Because it has not been used in former research, this study will give new information of the index returns. All the models presented before have faced criticism, and they are not said to be perfect but as accurate as science has to offer. Presumably the FF model should be most accurate.

**Table 3.** Factor models

Year	Model	Structure of the model
1964, 65, 65	CAPM	$E(r)=r_f + \beta(r_m - r_f)$
1976	APT	$R_i = E(R_i) + \beta_1 R_{\text{factor1}} + \beta_2 R_{\text{factor2}} + \beta_3 R_{\text{factor3}} + \dots + \varepsilon_i$
1992	Fama-French	$E(R_i) - R_f = \beta_i [E(R_m) - R_f] + s_i E(\text{SMB}) + h_i (\text{HML})$

## 6. DATA AND METHODOLOGY

In the previous chapters, the introduction and the theoretical basics were presented as well as how to measure capital return and ethical investing. This chapter 6 compares the return of the Dow Jones Islamic Market Index and the Dow Jones World Index with the results given by Fama-French multifactor model in the times of financial crisis. Firstly, this chapter provides hypothesis and methodology of this study and after this, descriptive statistics of DJIMI, DJWI. Then the Volatility Index (VIX), that measures the volatility of options in Chicago Board Options Exchange, shows how volatile the 3 crisis times are. And then an overview of the DJIMI and the DJWI will be presented.

### 6.1 Hypothesis

The general purpose of this study is to examine abnormal returns of Dow Jones Islamic Market Index in the times of financial crises using Fama-French three-factor model. DJIMI is compared to Dow Jones World Index. The financial crises are Asian crises 1997, Russian crises 1998 and in the Subprime crises 2007-2009. There have been some researches made that are comparing Islamic finance performance to non-Islamic finance like Hussein (2005) and Girard (2005). Now the main goal is to test the null hypotheses that Islamic investing produces less in the times of crises.

The Islamic investments have many ethical rules that differ from the conventional finance. To DJIMI are excluded companies that represent the following lines of business: alcohol, tobacco, pork-related products, financial services, defence/weapons and entertainment. Also high meaning is in the debt-ratio of the companies. These rules set the limits to DJIMI and so it is expected to react differently to negative shocks of financial markets. To find out how these rules effect, this thesis examines the data from both DJIMI and DJWI in the times of financial crises.

Hussein et al. 2005 had results in their research paper that Islamic investments underperform in bear market, over perform in bull market, but totally Islamic finance does better than conventional investments. This is why in this thesis the  $H_0$  hypothesis is set in the following form:

H<sub>0</sub>: The Dow Jones Islamic Market Index underperforms in the times of crises compared to Dow Jones World Index.

H<sub>1</sub>: The Dow Jones Islamic Market Index performs equally or overperforms compared to Dow Jones World Index in the times of crises.

H<sub>0</sub> is explained with reasons that tobacco and alcohol industry is doing better in the times of crises and DJIMI excludes it. On the other hand DJIMI also screens companies quarterly and excludes companies that have debt/equity ratio more than 33%. This ratio is more likely to rise during the financial crises times.

In the beginning of Subprime crisis Islamic world was relatively unscathed and therefore it became suddenly the subject of many conventional investors' curiosity. In nearly every market worldwide, Islamic investing was attracting the attention of investors who only some years ago would have not given any attention. (Salam, Merz 2008).

Interest, derivatives and short selling are forbidden under the *Shari'ah*, which means that Islamic financial institutions did not bear any subprime loans, hedge funds or credit default swaps. But this does not mean that Islamic investing rules are not a shield against the global financial or even economic crisis. The global financial crisis is now so strong that it affects everyone. (Al-Fil 2008).

In the empirical test the hypotheses are tested. If the T-tests P-value is smaller than 0.05, the intercept of the regression will be rejected. Then the focus is on the H<sub>1</sub>. The multiple regression analysing tools give the intercept of the regression and that is the regressions alpha. The alpha tells how far the return is from the regression mean.

## 6.2 Methodology

Abnormal returns are usually thought as returns in excess of some benchmark. There are several empirical models to measure abnormal return. Most basic one is the market adjusted model. Abnormal return in the simplest way is measured as follows:

$$(4) \quad AR_{it} = R_{it} - R_{mt}$$

The study measures abnormal returns with factor-based analysis (FBA). There are many different kinds of FBA, but this thesis uses three factor analyses of Fama and French. The FF model takes into account different anomalies that affect to the monthly return. Unlike the simple relation between  $\beta$  and average return, the unvaried relation between average return and size, leverage, E/P, and book-to-market equity are strong (Fama, French 1992).

The systematic factors in this Fama-French model, firm size and book-to-market ratio as well as the market index, are empirically motivated by the observations that historical-average returns on stocks of small firms and on stocks with high ratios of book equity to market equity (B/M) are higher than predicted by the security market line of CAPM. These observations suggest that size or the book-to-market ratio may be proxies for exposures to sources of systematic risk not captured by CAPM and thus result in the return premiums we see associated with these factors. (Bodie, Kane & Marcus 2005).

The model of Fama-French was published in 1992 and also in 1993. The model says that the expected return on a portfolio in excess of the risk free rate [ $E(R_i) - R_f$ ] is explained by the sensitivity of its return to three factors: (i) the excess return on a broad market portfolio ( $R_m - R_f$ ); (ii) the difference between the return on a portfolio of small stock and the return on a portfolio of large stock (SMB, small minus big); and (iii) the difference between the return on a portfolio of high-book-to-market stock (HML, high minus low). (Fama, French 1993).

$$(5) \quad AR_{it} = b_i[E(RM) - R_f] + \delta_i E(SMB) + \eta_i(HML)$$

This study uses the monthly data from DJIMI and DJWI and compares these two indexes. The Indexes are from Dow Jones Corporation and the factors of the Fama-French model are taken from Kenneth French's data library. We also add for the interpreters the premium of DJWI – T-bill. This is how we can get the premium of DJWI to the test. By reorganizing the equation, abnormal returns of DJIMI can be expressed in the following way by using the same notation as before:

$$(6) \quad DJIMI - R_f = + b_i[DJWI - R_f] + \delta_i E(SMB) + \eta_i(HML)$$

The thesis documents the empirical study of the profitability of Islamic finance compared to conventional finance in crises times through the Dow Jones Indexes.

### 6.3 Data Description

The data used here is provided by Dow Jones Company and received from University of Vaasa database. Dow Jones is an index provider that develops, maintains and licenses indexes for use as benchmarks and as the basis of investment products. Dow Jones is also a provider of global business news and information services. One of the DJ indexes is Dow Jones Islamic Market Index. Dow Jones Islamic Market index was launched to the public in year 1999 but DJ started to calculate the index in 1996. The DJIMI measures the performance of a global universe of investable equities that have been screened for *Shari'ah* compliance consistent with Dow Jones Indexes' methodology. The selection universe is as wide as for the Dow Jones World Index. These two indexes cover approximately 95% of the market in 44 countries. (Dow Jones).

The data is from June 1997 - June 1998 (Asian financial crisis), July 1998 – December 1998 (Russian financial crisis) and January 2008 – May 2009 (The Subprime crisis). For the empirical study, the main body of data consists of monthly returns of the two indexes. The Fama-French multifactor models factors ( $R_m - R_f$ , SMB and HML) were downloaded from Kenneth R. French Data library<sup>1</sup> in the World Wide Web. The VIX (Chicago Board Options Exchange Volatility Index), which measures the implied volatility of the market, was received from University of Vaasa Data Library. VIX shows the times of crisis and is also presented in this study. VIX measures the risk perception in the broad market. When VIX rises, it means that expectations for market volatility are rising, and on the other way round when it falls.

<sup>1</sup> [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

The research period of this study provides a very interesting environment for the research because investments during crisis periods have not been investigated so systematically. The subprime crisis is shocking the world's economy at the time and that is what motivates for more specific research. Investigating the profits using indexes will cover wide range of investment environment all over the world.

When analysing indices the information can be simplified with few statistics. When using statistics, some of the information disappears but the benefits are that the information of large material can be packed into more simple form. The statistics can be divided in two groups, place descriptive and the change descriptive that describes the change of the variables. The deviations descriptive are standard deviation, skewness and kurtosis. (Heikkilä 2004: 82-83).

### 6.3.1 Descriptive statistics with long run index values

The descriptive statistic is presented in below in Table 3. All statistics are calculated with Excel program from the daily data during the whole period from 1996 to May 2009 to get more overall picture of the data. This data consists 3487 days.

**Table 4.** Descriptive statistics of DJIMI, DJWI and VIX.

STATISTICS	DJIMI	DJWI	VIX
Number of observations	3487	3487	3487
Mean	1647,63	200,28	21,94
Median	1570,92	155,39	20,58
Standard deviation	423,110	47,185	9,005
Skewness	0,2482	0,583	1,944
Kurtosis	- 0,797	- 0,550	6,309
Minimum value	839,52	124,90	9,89
Maximum value	2636,08	320,33	80,86

The arithmetic mean is calculated of the sum of the index divided by the number of observations. Standard deviation is the most important measurement of deviation. It describes the deviation of the index around the mean. That means practically the risk level. The symmetry of the deviation is described by skewness. Positive skewness means that the peak of the observation deviation is on the right side and negative skewness on the left side. Symmetric deviation has skewness zero. Kurtosis describes how high the peak is compared to the standard deviation. If the kurtosis is negative, like in the table 4, that means the peak is under the standard deviation peak but deviation is wider or it has many peaks and if kurtosis is positive the peak is above the standard deviations but the deviation is thinner than standard deviation. When kurtosis is zero that means the peak is on the same level than symmetric standard deviation. In table 4 we can see that the three indices are all turned to the right side because the skewness are positive and that the peaks of the DJIM index and DJW index are under the standard deviations peak but the peak of VIX is above. As the skewness and kurtosis for the DJIMI and DJWI are really close to 0 we can already notice that the indexes must be close to the normal distribution. (Heikkilä 2004: 82-89.)

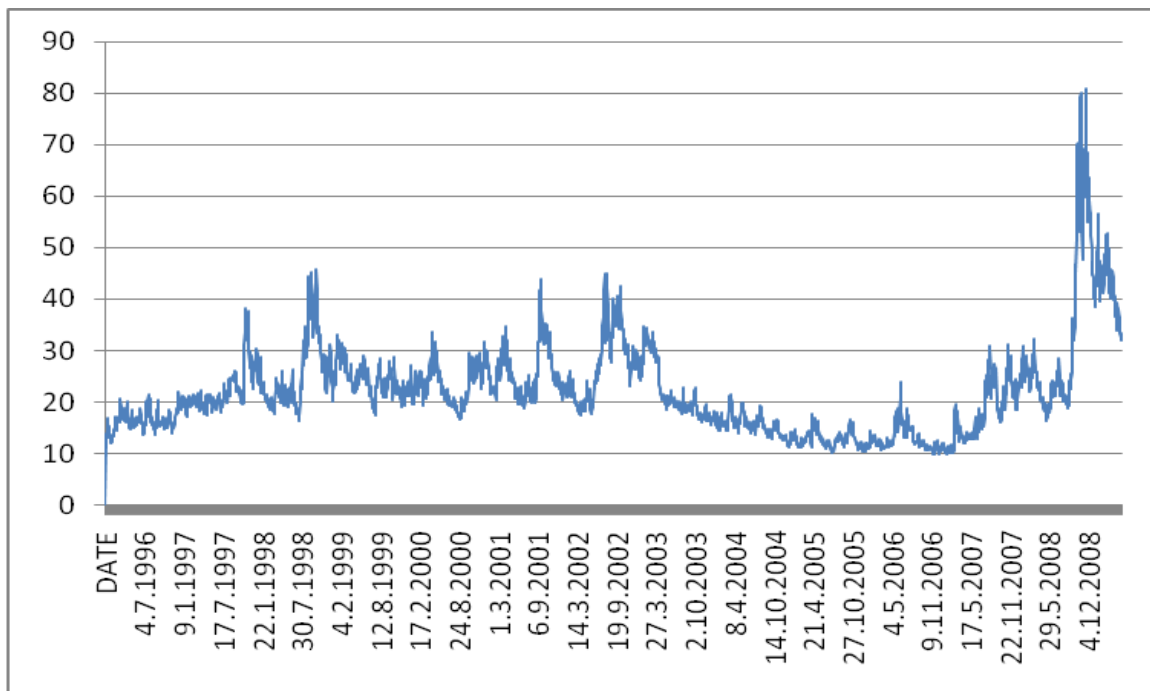
### 6.3.2 Chicago Board Option Exchange Volatility Index, VIX

Volatility Index VIX has been said to be the most “standard” stock market volatility (Fleming, Ostdiek and Whaley 1995). VIX is sensitive to changes in stock market volatility and that is why it represents changes in conditional stock market volatility. This is why we can find some marks of the world’s financial crisis in VIX.

In Figure 3 we can see the Chicago Board Options Exchange Volatility Index (VIX). Volatility index usually rises when there are uncertainty in the market and when financial asset returns decline. The volatility index exhibits a strong temporal relationship with stock market returns. There is a large negative contemporaneous correlation between VIX changes and Standard & Poor 100 index that measures the market changes in the USA. The negative correlation suggests that there is an inverse relationship between expected volatility and stock market prices. Negative stock market moves are accompanied by large absolute changes in expected volatility than are positive market moves (Fleming, et al. 1995: 300).

It can be seen in figure 3 below that the uncertainty in the market increases in year 1997 and continues until 2003. The Asian financial crisis started in 1997 and immediately after began the Russian financial crisis which ended in the end of 1998. In 2007 the uncertainty of the market started to rise because of the Subprime crisis. In summer 2008 the VIX started to rise extremely rapidly until the index reached its peak of 80,86 in 20.11.2008. Because the central banks started to recover the economies worldwide the market started to calm down after the peak but still uncertainty was strong. During the Asian and Russian financial crisis the VIX variation was 36 but in the Subprime crisis the variation was 200.

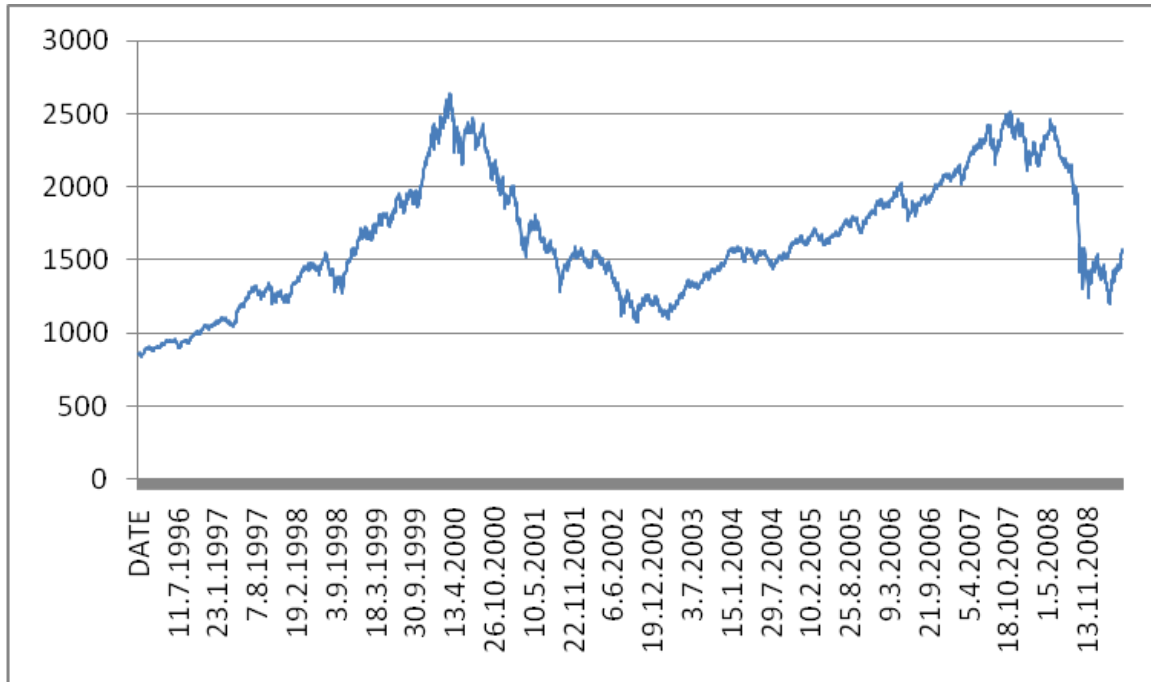




**Figure 3.** Chicago Board Options Exchange Volatility Index (VIX)

### 6.3.3 Dow Jones Islamic Market Index

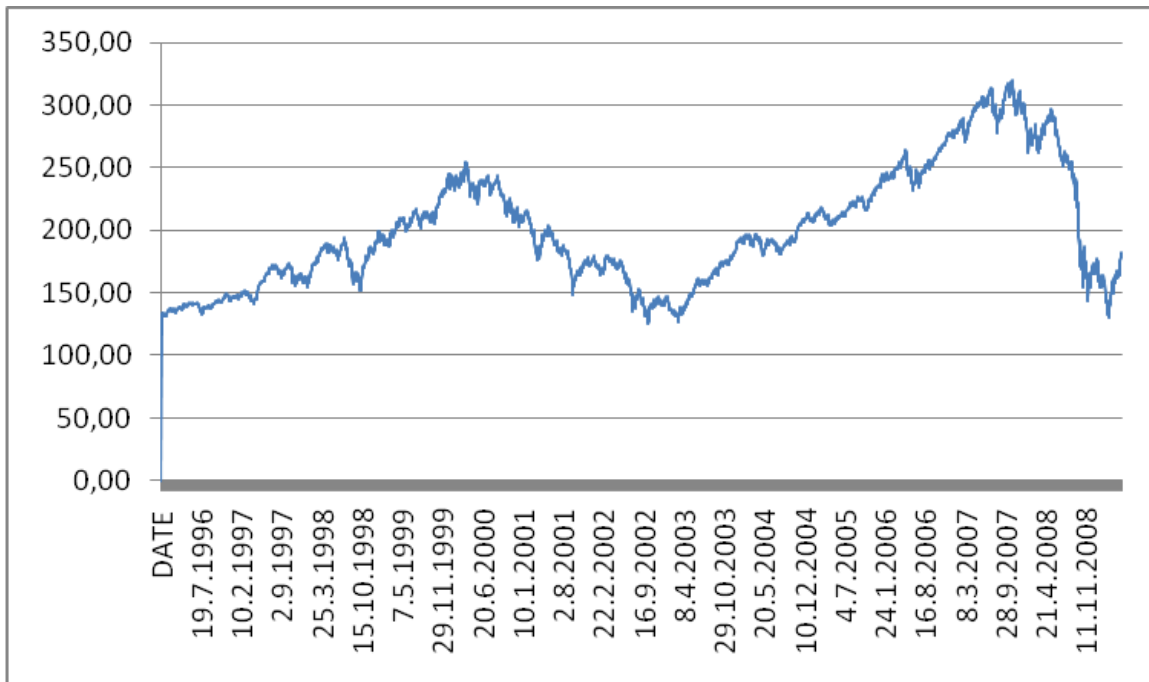
In figure 4 is Dow Jones Islamic Market Index. We can see the Index started to rise approximately at the same time as VIX. DJIMI grew until the so called IT-boom ended but we can see little rebounds in the Index during the 1997 and 1998. We can also see that the index has been higher in 2000 than it was before the subprime crisis 2007 contrary to the DJWI in figure 5. The difference of these times are that the profile of these crisis were little different. The subprime crisis began after the misuse of heavy leverage. As shown before table 2 DJIMI prohibits investments to firms that have strong leverage base. We can also see from the figure 4 that the damage made by the Subprime crisis was severe. The index dropped in 4 months from 2512 points (31.10.2008) to 1204 points (3.3.2009). That means -52% drop.



**Figure 4.** The Dow Jones Islamic Market Index

#### 6.3.4 The Dow Jones World Index

Below in figure 5 is presented the Dow Jones World Index. The figure looks almost the same as DJIMI but the rise before Subprime crisis is stronger. DJWI was rising in the end of the 90's but the IT-boom ended the growth. From 2003 DJWI was growing until the Subprime Crisis started. DJWI grew much higher before the Subprime Crisis than in the IT boom, contrary to the DJIMI. Also like DJIMI, DJWI had its peak in 31st of October in 2008. The value was then 320. After that the decline was severe and in 3<sup>rd</sup> of March in 2009 the value was 132. The drop was approximately -59%. During the Asian and Russian financial crisis we can see in the figure 5 that there were two rebounds in the figure. This means that **even if** the Asian and Russian crisis were much smaller, they really had effect on world's stock market.



**Figure 5.** The Dow Jones World Index

#### 6.4 Descriptive statistics of the index returns during the crisis times

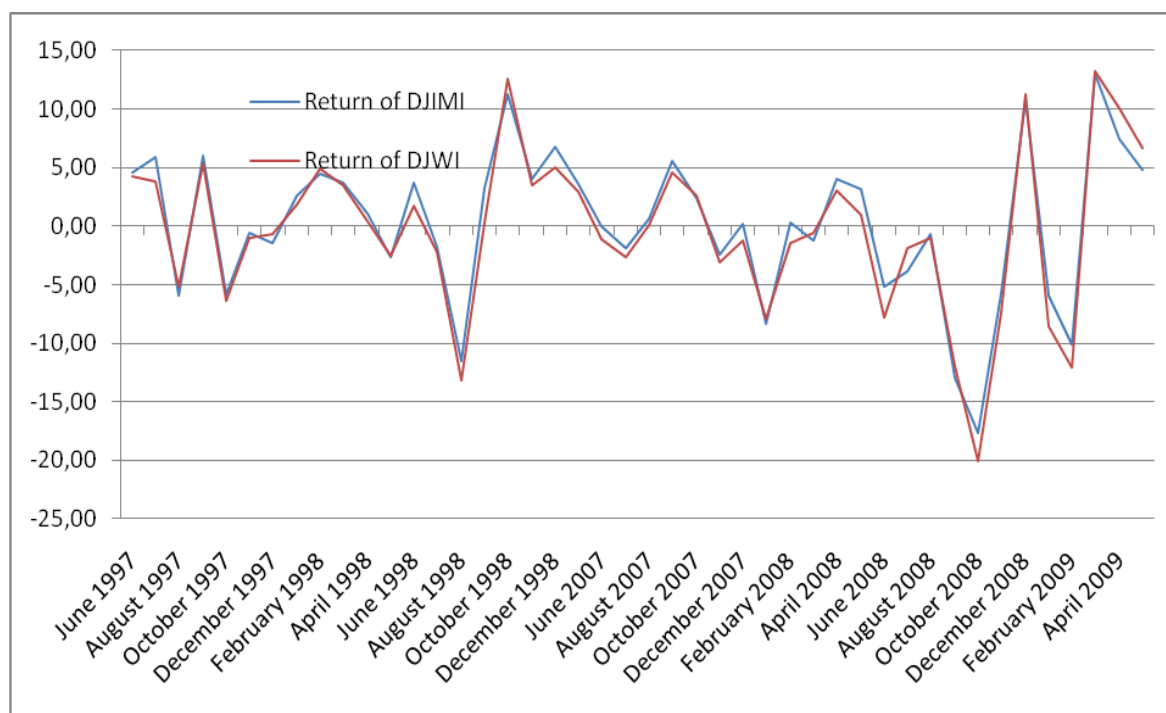
Above was presented the data in the long run. Now we concentrate on the percentage monthly returns of the indexes during the actual financial crisis time (1997-1998, 2008-2009). The calculations are made with Microsoft Excel program.

**Table 4.** Descriptive statistics from the monthly raw returns of DJIMI and DJWI in Asian, Russian and Subprime crisis

STATISTICS	DJIMI	DJWI
Mean	0,166	- 0,389
Standard Error	0,969	1,031
Median	0,452	- 0,221
Standard Deviation	6,428	6,836
Sample Variance	41,322	46,736
Kurtosis	0,526	0,802
Skewness	- 0,542	- 0,462
Range	30,764	33,354
Minimum	- 17,713	- 20,069
Maximum	13,050	13,284
Sum	7,313	- 17,149
Count	44	44
Confidence Level (95,0 %)	1,954	2,078

These descriptive statistics are more important than in table 3 because these numbers are from the actual crisis times (totally 44 months in June 1997 - June 1998, July 1998 – December 1998 and May 2007 – May 2009), and are calculated from the monthly return. From the mean returns we can see that the value is higher with DJIMI than DJWI. DJIMI has 0,16 % and DJWI -0,39% Standard deviation is really close to each other. This means that the returns around the mean act almost in the same way. The variance of the DJIMI is less than DJWI. The kurtosis in both indexes is positive that means the peaks of the both indices are above the standard deviation. Both indexes have negative skewness and that tells us that the peaks are turned to the left side of the standard deviations peak. From the minimum values we can see that the DJWI is much lower and goes to -20% when DJIMI goes only -17%. The both minimum values are in

October 2008. The maximum values are really close to each other. The maximum value (13%) is also in the same in March 2009. In Figure 6 raw returns of the two indexes are presented together.



**Figure 6.** Raw returns of DJIMI and DJWI in the period of June 1997- Dec 1998 and June 2007 – April 2009.

From the raw returns in figure 6 we can see that both indexes are moving close to each other. The downward spikes in 1997 and 1998 can be seen much clearer now than in figure 4 and 5 but also that the returns of the indexes are almost the same. During the subprime crisis the returns are more clearly different from each other.

## 7. EMPIRICAL RESULTS

This part of the study presents the findings of the empirical results. It shows whether DJIM Index gives higher returns compared to DJW Index. First the normal distribution is tested and then all the returns are put together and analyzed. After this, the financial crisis are separated and analyzed one by one. The statistical testing will be done with excel programs data analysing application. This gives t-tests p-value for testing the hypothesis and also the coefficients of the measurements. Fama and French stated in 1993: "As testimony to the success of this simple procedure, the correlation between the 1963-1991 monthly mimicking returns for the size and book-to-market factors is only -0,08" (Fama et al. 1993: pp.9). This is why the correlation between the factors is not done in this thesis.

### 7.1 Testing normal distribution

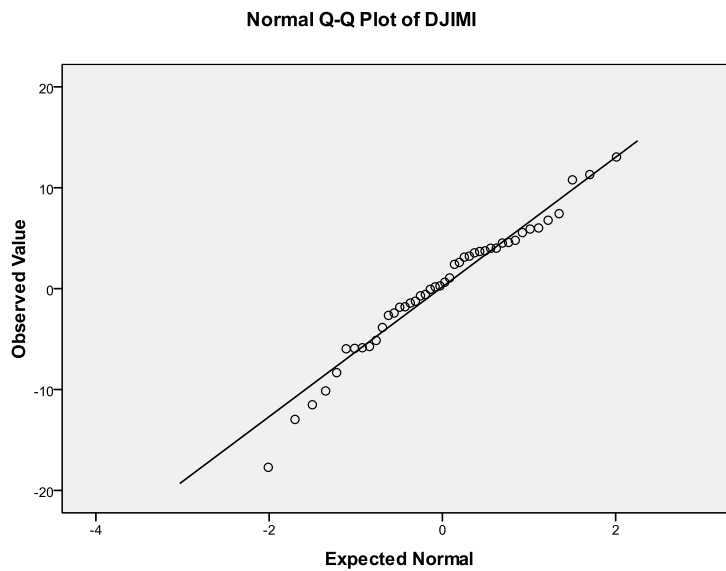
Index returns Normal distributions are tested with Kolmogorov-Smirnov and Shapiro-Wilk tests. The results are interpreted so that if the significance levels of the indexes are over than 5% the measurements are normally distributed. In the table 5 we can see the results from Kolmogorov-Smirnov and Shapiro-Wilk tests.

**Table 5.** Test results from Kolmogorov-Smirnov and Shapiro-Wilk

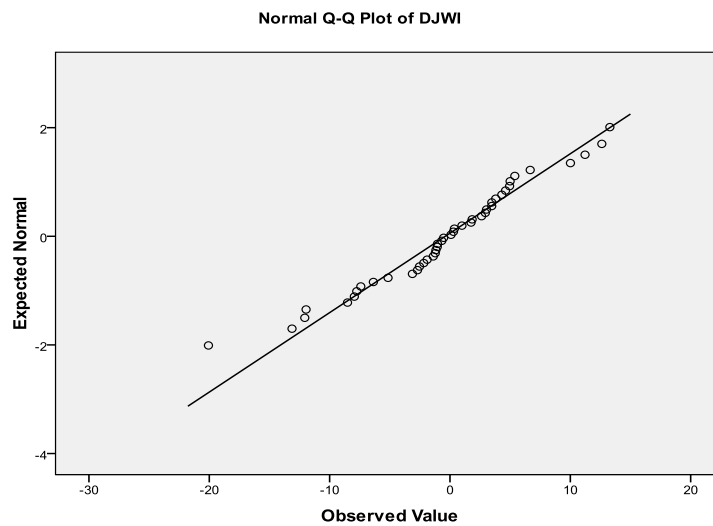
Tests of Normality						
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DJIMI	0,091	44	0,200*	0,974	44	0,405
DJWI	0,118	44	0,143	0,970	44	0,296
a. Lilliefors Significance Correction						
*. This is a lower bound of the true significance.						

The results clearly show that the returns from the indexes are normally distributed. Tested with both tests, Kolmogorov-Smirnov and Shapiro-Wilk, the

results are more over 5% significance level. In the table the results are under the name of Sig. With Kolmogorov-Smirnov test the results for DJIMI and DJWI are 0,2 and 0,143. With Shapiro-Wilk test the results for DJIMI and DJWI are 0,405 and 0,296. With these results we can start analysing the returns. Below are the pictures of the normal distributions of DJIMI and DJWI.



**Figure 7.** Normal distribution of DJIMI.



**Figure 8.** Normal distribution of DJWI.

## 7.2 Results from all three financial crisis

In this subchapter are presented the results when all the three crisis times are put together. This is how we can see the whole picture of the crisis times return movements. In table 6 we can first see the coefficients of determinations. R Squared is 0,9921. This tells us that 99.2% of the index's monthly returns are explained by the factors of the Fama French model. Also the adjusted R Squared is really close to R Square. In the Combining of the entire three crises we get the amount of the observations 44 months.

**Table 6.** Coefficients of determination of the data from all crisis (Asia, Russia and Subprime) and regression results.

<i>Regression Statistics</i>				
Multiple R	0,9921			
R Square	0,9843			
Adjusted R Square	0,9832			
Standard Error	0,8294			
Observations	44			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0,4326	0,1261	3,4290	0,0014
World - t-bill	0,9606	0,0199	48,0745	5,21543E-37
SMB	-0,0343	0,0458	-0,7495	0,4579
HML	-0,1636	0,0261	-6,2581	2,04914E-07

In the table 6 we can also see the results of the Fama French model and the statistical test results. First the T-tests P-value for the intercept gives the result of 0,0014. That is smaller than the significance level 0,05. This means that we reject  $H_0$ . The most common policy in statistical hypothesis testing is to establish a significance level, denoted by  $\alpha$ , and to reject  $H_0$  when the P-value falls below it (Aczel & Sounderpandian 2006 pp: 285). The intercept is 0,4326. That means if the markets risks are neutralized so that all the factors are 0 the



DJIMI gives approximately 0.41% absolute abnormal returns in one month. The coefficient of World – T-bill is 0,96. This means the traditional beta of the index. As the crisis times are degreasing periods (DJWI raw returns -17%) in the stock market, this means that with Islamic ethical screening we can make better results. DJIMI goes down less than DJWI. SMB factors coefficient value is -0,03. This means that index is primarily large cap. The coefficient of HML is -0,16. This defines that the interpreted index DJIM Index contains mainly low book-to-market stocks. These stocks can be defined as growth stocks.

Reasons for DJIMI succeeding better than DJWI are many. Hussein et al found in 2005 that investing in DJ Islamic Market index in bear market gives less profit than conventional investing. They highlighted that in the bear market tobacco and alcohol industry is giving excellent results but it is prohibited for Islamic index to take this account. In these results the weight (25 months) of the subprime crisis that means that subprime crisis has strongest influence to the results got from all three crisis times put together. As Subprime crisis was launched by the huge use of leverage this means that Islamic ethical investing has made assumingly better result. We can assume that the prohibition of highly leverage firms has made the result better in these circumstances.

## 7.2 Results from Asian Financial crisis

In table 7 are the coefficients of determinations of the Asian Financial Crisis. The R Squared is 0,87 which means that the factors explains 87% of the index returns. The Asian Financial Crisis consists of 13 months but as the Russian financial crisis comes right after the Asian financial crisis it is quite gloomy when the other ended and when the other began.

**Table 7.** Coefficients of determination and the regression results of the data from Asian financial crisis.

<i>Regression Statistics</i>				
Multiple R		0,990455605		
R Square		0,981002305		
Adjusted R Square		0,97466974		
Standard Error		0,662946685		
Observations		13		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0,464269186	0,192808917	2,40792383	0,03938287
world - t-bill	0,939729574	0,071106075	13,21588303	3,37058E-07
SMB	-0,107971145	0,060700628	-1,778748405	0,108991386
HML	-0,331230834	0,124664316	-2,656981915	0,026174946

In table 7 are results of the regression and the statistical tests. From the P-value we can see that these results are statistically significant with the significance level 0,05 and we reject the  $H_0$ . When  $H_0$  is rejected this gives us the information that DJIMI is giving absolute abnormal return of 0,46% and that world – T-Bill, which is considered to be the traditional beta of the index, is 0,94. SMB factors coefficient value is -0,11. This means that index is primarily large cap. The coefficient of HML is -0,33. This defines that the interpreted index DJIM Index contains mainly low book-to-market stocks. These stocks can be defined as growth stocks. In this period DJIMI gave raw returns of 15,6 % and DJWI 10%.

### 7.3 Results from the Russian financial crisis

In table 8 are the coefficients of determinations of Russian financial crisis. The R Squared is 0,99. This means that almost all the returns are explained by the factors used in the Fama-French model and there are not possibilities to make large differences with the Islamic screening. The Asian and Russian financial crisis happened in a row and the time when the other ended and when the other started is gloomy. In this study we are using 6 months timeline for the Russian financial crisis.

**Table 8.** Coefficients of determination and regression results from the Russian financial crisis.

<i>Regression Statistics</i>				
Multiple R	0,995090198			
R Square	0,990204503			
Adjusted R Square	0,975511258			
Standard Error	1,24133955			
Observations	6			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	1,353241397	1,145182512	1,181682	0,358801
World - t-bill	0,813735436	0,086483356	9,409157	0,011107
SMB	0,250176262	0,358313471	0,698205	0,557307
HML	-0,107708006	0,200236561	-0,5379	0,644492

In table 8 are the results of the regression and the statistical tests. The P-value shows us that these results are not statistically significant as the 0,35 is above the significant level 0,05. This means that  $H_0$  is not rejected in this test. The DJIMI is not giving absolute abnormal returns but is almost equal to 0. The loadings for the SMB and HML factors can be interpreted the index to be

mainly large growth stocks. The index beta is 0,81. The raw returns for the DJIMI at this period was 12% and for the DJWI 6%.

#### 7.4 Results of the Subprime crisis

In this subchapter are presented the results from the time Subprime crisis. The Subprime crisis is the strongest crises in the group of the three selected crisis. The period is 25 months and during that time DJWI made raw return of -33% DJIMI -20,35%. In table 9 are presented the figures of the statistical coefficients of determination. The values are from the Subprime crisis May 2007 to May 2009. Here the R Squared is 0,99. This means that 99% of the results are explained by the factors used in the regression.

Under in the table 9 are the results of the regression. As said before, the period was strongly descending. From the intercepts P-value we can see that test is statistically significant. The  $H_0$  is rejected as 0,035 is smaller than 0,05. The table 9 tells us that when all the other factors (DJWI-T-bill, SMB and HML) are 0 then DJIMI-T-bill gives 0,35% absolute abnormal return. DJIMI gives better average return during Subprime crisis. We can also see this from the figure 6 where are the raw returns put together. The index beta here is 0,97. When the coefficient value of DJWI-T-bill is observed it is sure that in descending Subprime crisis DJIMI is making less loss than DJWI.

**Table 9.** Coefficients of determinations and the results of DJIMI minus T-bill monthly returns during the Subprime crisis.

<i>Regression Statistics</i>				
Multiple R	0,9950			
R Square	0,9901			
Adjusted R Square	0,9887			
Standard Error	0,7486			
Observations	25			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0,3508	0,1564	2,2425	0,0358
World - t-bill	0,9753	0,0235	41,4156	1,27476E-21
SMB	0,0660	0,0677	0,9743	0,3409
HML	-0,1987	0,0325	-6,1044	4,66894E-06

From the SMB and HML coefficients we can see the loadings of the factors. SMB loading 0,06 means that the index consists primarily large cap. If the value would be greater than 0,5 the index would consist primarily small cap. HML loading is -0,198 and this means that the index is primarily growth stocks. If the value would be more than 0,3 the index would consist primarily value stocks.

## 7.5 Summary

The index data was received from Vaasa University data library. The data consists of 44 monthly returns of the DJIMI and DJWI. In the beginning of the empirical results chapter the normal distribution of the indexes was tested. The indexes were tested to be normally distributed as all the results were above 0,05 significance level. Then the regression analysis was made with the combined data from all the three crisis periods. In accordance with the results  $H_0$  was

rejected. The intercept value gave the information that in these crisis times DJIMI is doing better than DJWI. The value was 0,432. SMB and HML loadings gave the information that DJIMI was mainly large growth stocks.

After this the crisis were separated. The Asian financial crisis gave p-value of 0,039 when the level of not rejecting  $H_0$  was 0,05. This means that DJIMI over performs compared when all the other factors are 0 and the intercept gave the result of 0,46%. The loadings for the factors in Asian crisis gave the information that the index was mainly large growth stock. From the Russian financial crisis the results were that  $H_0$  was not rejected as the p-value 0,35 was greater than 0,05 but the intercept was 1,35. During that time the index was mainly large growth stocks. The results from the Subprime crisis were interesting. P-value was 0,035 so  $H_0$  was rejected. The intercept coefficient 0,35 was interpreted so that during the crisis period DJIMI is making absolute abnormal returns compared DJWI when all the other factors were zero. During that period the index was mainly large growth stocks.

The better results of DJIMI from the Asian and Subprime periods were probably caused by the prohibition of investing to a high leverage firms, banks and insurance industry. The index was protected little better against the crisis as the risk taking was smaller. The betas for these crises were under 1. Especially the Subprime crisis had severe effects to the world economy not as much as Asian and Russian financial crisis which were not as damaging as seen from the volatility index in figure 3.

## 8. CONCLUSIONS

This thesis was studying the performance of the Islamic Ethical Investing during times of financial crisis. Islamic Ethical Investing started to grow rapidly in the 1990s. Nowadays Islamic Ethical Investing is common subject in the field of investments. The motivation behind this thesis was the publicity of Islamic world in the media nowadays. The basis for this thesis, Ethical Investment revisited: Evidence from Dow Jones Islamic Indexes, was written Hussein and Omran in 2005. They found that DJIMI underperforms during bear market but over performs counterparts during bull market. Because the Subprime crisis has effected world economy strongly, the interest towards financial crisis investing started to grow. In this thesis the final results say that DJIMI over performed DJWI during the Subprime crisis but not during the Asian and Russian crisis.

The meaning of this study was to find out how the DJIMI performs in the crisis times. The results are not what were expected as Hussein et al 2005 had contrary results of the bear market period. But we have to notice that especially Subprime crisis was highly descending market period for the stocks worldwide. The Asian, Russian and the Subprime crisis periods were selected because they happened after the DJIMI was founded in 1996 and those crises particularly were emphasized on finance. 44 months were selected to this study and the raw monthly returns were DJIMI 7% and DJWI -17%. DJIMI has an independent supervisory board to screen the companies worldwide with the ethical rules of Islamic *Shari'ah* law. The screenings are made every half year. The index data for this thesis was from the University of Vaasa data library and the factor data was from Kenneth French data library as stated earlier. The Index data was found to be normally distributed and the factors were not correlating together.

The method used in this thesis was to calculate the returns with Fama French multifactor model that was created by Eugene Fama and Kenneth French in 1992 and 1993. The multifactor model neutralizes the anomalies of firm size (SMB) and book-to-market (HML) effect. As DJIMI consists of all sized and valued companies it was reasonable to choose this model. Fama French model is criticized but still it is believed to give the most accurate results.

Thesis results provide important and interesting findings. The results of the Fama French model gave the information that DJIMI can make abnormal returns compared to the DJWI over the entire crisis times periods. When the

crisis times were separated, Russian financial crisis gave results that were not significant as but investing during Asian crisis to the DJIMI gave abnormal returns. Asian and Russian crisis happened right after another in 1997 to 1998. The Subprime crisis on the other hand started 2007 and still continued in 2009 and it gave significant results. During the Subprime crisis the results were that DJIMI gave absolute abnormal returns of 0,35% when other factors were zero. The factor loadings for the regression gave the information that DJIMI consisted of mainly large growth stock and the beta of the index was 0,97.

It remains difficult to explain the good results of DJIMI in these crisis times, but it may be that the exclusion of high leveraged firms and banks were the main reasons. But these results cannot be generalized to all financial crisis times as the Russian financial crisis did not give significant results. The question is what is the exact role of the leverage ratio in determining firm performance under different market conditions? More specific investigation of behaviour of DJIMI is needed to draw general conclusions.

In the future it would be interesting to investigate the moves of DJIMI during crisis times in more short periods using daily data. How does the DJIMI react inside the crisis period for different macroeconomic and firms specific news and how well would DJIMI do in different continents? The returns could be measured also with different models, like CAPM or with APT and by using different kinds of macroeconomic factors. It would be also interesting to compare DJIMI with other ethical indexes, maybe with index screened through Christian values. And it would be also interesting to see how DJIMI did during the IT crisis in 2003.



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