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**CORRELATION AND CAUSALITY BETWEEN CONSUMER  
SENTIMENT AND STOCK MARKETS: EVIDENCE FROM SP 500**

Master's thesis in  
Finance and Accounting

**VAASA 2011**

**UNIVERSITY OF VAASA**

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**Faculty of Business Studies**

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<b>Major Subject:</b>	Accounting and Finance
<b>Line:</b>	Accounting and Finance
<b>Year of entering the university:</b>	2004
<b>Year of completing:</b>	2011

**Pages: 71**

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**ABSTRACT**

The purpose of thesis is to investigate the relationship and causality between two important consumer sentiment indices and the stock markets in United States. Used measures are monthly observations of Michigan Consumer sentiment MCSI and Conference board Consumer Confidence CCI. SP500 will represent the stock market and it will be divided in to 11 sector subsets to provide view in to the relationship among different industries. Statistical methods used in this thesis are Pearson r correlation test and Granger causality.

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**Keywords: Consumer confidence, Granger causality**

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## 1. INTRODUCTION

The understanding of the stock market trends and stock price development in relation to the Economical fundamentals is one of the most investigated areas in financial research. There are two types of economical indicators; the ones that give information about the pass times and the ones that hold the expectation about the future conditions. Different surveys that combine expectations among agents in the market, at least partially reflect the possible future economic conditions through rational expectation theory. The surveys about the optimism among private consumers are becoming more important financial indicators, also creating a challenge in interpreting the results. Different factors that affect the movements of the sentiment and expectations are very versatile and multidimensional to determine.

In previous literature the consumer expectation has been discussed to have a very essential predictive power towards future conditions. Optimistic expectations have positive effect to consumer spending and this indicates to the positive future in the whole economy. Still the empirical issues are whether consumer confidence is informative more of current than future consumption, and whether consumer confidence has any predictive power over and above any other standard economic macroeconomic variables. (Agemoclou & Scott, 1994: 104.)

Moreover than to the correlation in general, this thesis is looking in to more details of the effect of the consumer confidence to economy and stock markets. Causality relationships between stock markets, real economy fundamentals and the sentiment implications are very complex area, but when the correlation does exist, also some figures go ahead of others. Even though the correlation is proven to exist in majority of the studies, the theories and results are very inconsistent. This thesis is looking in to this research problem through numerous previous studies and empirical tests related to this particular area. Many turns in the sentiment are affected because of different factors such as; geographic location and demographic factors which are not necessarily rationally combined with general business conditions. The movement is not necessarily linear or rational because the conditions reflect also the sentiment factor in addition to economical fundamentals. (Dominiz & Manski, 2004: 63-64.)

The background for this thesis is provided by one of the cornerstone research in financial area, Fama & French (1970) efficient market hypothesis EMH. EMH assumes that if the markets react efficiently, all the information available that directly or indirectly affects the stock price is already merged in to the prices. This theory rationalizes the direction of the relationship to go from real economy to stock markets. The information that affects the stock markets is coming from the economical fundamentals and should adjust the stock prices in to the right level continuously. In another way saying, agents in the markets should get the impulse to make decisions based on rational economical fundamentals; such as the unemployment rate, inflation, consumer price index and other indicators reflecting the conditions. However the effect of individual opinion in the decision is impossible to isolate from the rational decision. (Dow & Gorton 2009:1088.)

The financial cycles that the world economy has gone through since the major collapse in 2008 has been evolving in a very volatile way. Volatility in the markets has been very unpredictable and strong. It is proven commonly that during downturns the markets tend to act in a more volatile way which could, at least partially be explained by the sentiment factor. When agents see that there is a decline, the mood is more buttoned up which makes individuals act less rationally; the actions can be more inconsistent in this case. The sudden credit crunch that shook up the world in 2008 and the overheated economic growth turning in to world wide recession faster than anyone could predict has really shown the unpredictable side of the markets.

There are several different views and analysis about the reasons for this volatility. Business cycle always fluctuates among years and the reactions against the tight economical conditions have been similar among consumers. This time the reasons that led the world economy to this point are very openly speculated in different Medias. Also the consumer is more focused and aware what should be done and what should not to avoid even worse economic condition. Economical interdependencies are translated to consumer and all the means possible are in usage to avoid the behaviour that would feed the bad conditions. Still the reactions are partly pandering the recession. Consumers have lost a part of their confidence based on the current situation and the expectations about the future vary quite dramatically.

This thesis is discussing about the consumer confidence and the relationship of this indicator against the stock markets performance in United States. The chosen indicator for stock markets is Standard and Poor's SP500 index that contains 500 of the largest companies listed in US.

Consumer confidence is determined as a degree of optimism in the markets among consumers related to the current and future economical conditions and personal financial situation. It determines how confident people are about making spending decisions and actions following it in the markets. So it explains in some extent the future spending and it is used widely among professionals. Through this it provides one of the key indicators about the future expectations. The assumption of Efficient Markets suggests against it. (Ludvigson, 2004: 29.)

## **1.1 Background**

The framework for the research is the market efficiency in the stock markets. How effectively macroeconomic information is adjusted to stock prices is one of the most investigated areas in the literature related to financial markets research. Consumer confidence is very frequently followed survey-based figure that is released monthly to provide information about the market sentiment. The role of the stock markets has increased significantly over the past decades in industrialized countries as one of the core signal for the state of the economy. The relationship between stock market reactions and real economy has always caused a lot research activity. However the pure market sentiment research activity history is a different point of because of the nature of it. The conclusions vary among studies and in addition to the basic theories, the background is quite inconsistent.

The empirical issues are whether consumer confidence is more informative about the current than future consumption. (Acemoglu & Scott, 1994:2.) Consumer confidence is viewed in many previous studies as a lagging indicator in economy. Lagging indicator means that the measured variable is following the development of the whole economy. So this suggests that consumer confidence has a long term trend with the whole economy but it does not provide additional information predicting the future conditions. This assumption about the nature of this indicator as a lagging one provides null hypothesis for this thesis. Null hypothesis suggests against it.

Previous related literature discusses a lot about the stock market reactions to sentiment related news announcements. The results whether the effect is significant or not, is varying a lot among different studies and in some of the related research areas the sentiment

is handled as certain kind of anomaly. Still the importance is inevitable. In some studies the alternation is partially explained by the research methods, data or business cycle trend. Also the complexity created by the noise factors in sentiment cause variation. (Jansen & Nahuis 2002: 90; Boyd, Hu & Jagannathan 2005: 140.)

The correlation between stock markets and real economy is measured to be quite strong during normal business cycle. According to the basic theory, stock markets should reflect this information effectively. There is some literature about the ability of the stock markets to also predict output growth. Jansen & Nahuis (2002: 90-91) claim in their research, that the predictive power in itself does not imply a causal relationship running from the stock market to the real economy. Stock markets may just act as an information processing black box. They also find that the relationship is driven by the expectations about the whole economy wide conditions rather than personal finances. This does imply that the confidence channel might be a separate transmission channel.

According to wide range of studies, the significance of the effect of macroeconomic news announcement appears to be stronger during the recession and tight economical conditions. This suggests that the volatility increases significantly during this time. For example Boyd & al. (2005) noticed this phenomenon in their study about how stock markets react to unemployment news. They find that market reaction appears to give more significant negative reaction during the recessions than when the similar negative shock has been released during expansion. Sadorsky (2001) studied the stock index volatility in technology industry specific sector using Pacific stock Exchange Technology 100 index and analyzed the volatility in relation to business cycle. Also Veronesi (1999) ended up to the same conclusion about the volatility being more visible in the stock markets during recession. Similar results repeat in the related literature.



Ludvigson & Lettau (2001) studied the relationship between consumption, aggregated wealth and stock returns. As a result they find that fluctuations in consumption- aggregated wealth ratio in some extent acts as a predictor of real stock returns and excess returns over a Treasury bill rate. This kind of result indicates for some inefficiency on the markets. The model they constructed implied that the log of consumption, labor income, and asset holdings share a common stochastic trend and the factors are co integrated. If expected consumption growth is not too volatile, stationary deviations from the shared trend among these three variables produce movements in the consumption-aggregate wealth ratio and predict future asset returns.

Ludvigson (2004) continued investigating the consumer confidence issue by outlining the research problem to the significance of the consumer sentiment and confidence surveys. She deliberates that if the consumer confidence surveys contain meaningful, independent information about the economy or do they simple repackage information already captured in other economic indicators. Moreover because the figure is built based on human expectations, which are very subjective, it is difficult to distinguish the subjective opinion from the rational expectation that is built on top of the economical fundamentals. In her research she also questions the amount of the future expectations effect because current and past are part of the figure and quite dominant.

Consumer confidence is one of the most important macroeconomic figures which differ significantly from other intensively followed figures. It is purely based on the agent vision about the current and future economic conditions. The information is gathered from the consumers directly so it already must hold some predictive power. During previous years this relationship is studied quite actively and the different barometers measuring consumer confidence and sentiment are followed more intensively. (Ludvigson, 2004: 29.)

Souleles (2004) research investigated the reliability of this figure by looking in to the micro level forecast errors. The frequent debate of the usefulness of this figure started immediately after the figure was released in 1940's. Souleles finds that forecast errors by people are systematically correlated with their demographic characteristics. Partially because of the time varying, group level shocks. Most of the surveys assume that the aggregate shocks affect all the households equally which is not true.

In some previous research Consumer confidence and consumer sentiment figures are reported highly correlated to stock returns. Jansen & Nahuis (2002) studied the stock market and consumer confidence in 11 European countries. They found that stock returns and sentiment are positively correlated in 9 of the 11 cases. They found that in a short horizon the stock returns Granger cause consumer confidence. This research provides the methodological background for this thesis.

Carrol (2003) looked in to the information channel point of view by investigating the information content of macroeconomic news to private, typical consumer who necessarily does not have a direct information source or knowledge to use all the relevant information to make rational decisions. Mainly the macroeconomic information comes from the public media and the agent makes the decisions based on this content in addition to their own subjective situation. The amount of information is endless and certainly a single agent decision holds several irrational assumptions but among all the the agents, based on rational decision theory, the error opinions should smoothen up. Against the assumption of EMH it seems that some agents have more information available than others.

Research by Otoo to consumer research claims that the change in the sentiment of the consumer is not affected by the change of the wealth. It claims that stock market is more of a leading indicator, which reflects to the future state of the economy. In the research it looks that the households which possess ownership in stocks, the reaction towards the declining stock markets is the same as the households which do not have stock ownership. In addition the research shows that the changes in stock prices affect more to overall economic expectations rather than own personal finances.

## **1.2 Purpose of this study and the Structure**

The purpose of this thesis is to investigate the causality relationship between Michigan consumer sentiment index MCSI and Consumer Confidence index CCI against stock market performance in US. In this research SP500 stock index represents the whole stock market portfolio. The stock index will be divided in to sectors to investigate industry specified reactions. This is to see if the stock prices in different industries act in a different way against consumer confidence n a long run. The sector split for this thesis is the industrial subset split under SP500 index; Energy, Materials, Industrials, Con-

sumer discretionary, Consumer staples, health care, Financials, information Technology, Telecommunication services and utilities.

First a correlation testing is done between the two indices and SP500 is looked in to with Pearsons's  $r$ -test. Secondly the regressions for the Granger causality testing are built. Granger causality method is often used in similar studies and it has shown to be the most accurate measurement when analyzing the causalities between two time series. In the previous literature the correlation between stock markets and consumer confidence has been shown to be very strong and the causality is running from the stock markets to consumer opinions. Based on the previous results the null hypothesis is positioned opposite. In addition the research is divided in to sectors to have a view how the results may vary among different industries.

In the second chapter the thesis discusses about the Efficient Market Hypothesis and rational expectations. This approach explains the way the information moves in the stock markets. It provides rational background to start with the research problem. Some basic stock evaluation methods are also looked in to.

Third chapter presents the Consumer confidence measures; Michigan consumer sentiment index and Conference board Consumer confidence. In addition some other confidence indices are represented. This chapter explains how the monthly data is gathered with the indices and how the results are published every month.

Fourth part of the thesis concentrates in to the theories and studies between consumer behavior and the relationship of consumer sentiment to the economy. The theories explaining the relationship between aggregate consumption, wealth and whole economy is looked in to.

Fifth chapter is discussing about the theories between consumer confidence and stock markets. This chapter provides background to the empirical analysis.

The sixth chapter presents the empirical analysis and the data used. First the chapter familiarizes the methods and models used in this thesis. Also the assumptions that are required by the chosen model related to the data and usage in previous studies is discussed. Then the research hypothesis is presented and finally the results of empiric tests are looked in to and opened. Last chapter draws conclusions about the empirical research and the whole thesis in general

## 2. MARKET EFFICIENCY AND STOCK MARKETS

Over the past decades the role of the stock market has evolved in industrial countries. The fundamental point of view has been extended significantly to contain the more complicated and indirect effects of the stock markets to real economy and vice versa. This has started a lot of research activity in this particular area of the relationship between macroeconomic news releases and stock market performance. The real economy fundamentals determine the stock market direction very strongly and the relevant information should be visible in the price development. (Jansen & Nahuis 2002: 90.)

The essence of the relationships in the market is the EMH approach; Efficient Market Hypothesis. It defines how well the market reflects the current situation in real economy. It also explains if the agents in the markets are acting rationally by using all the information available to make decisions. The theoretical literature has been discussing about three different well-known links between stock markets and real economy. The first one relates to consumption which is also known as the wealth effect. Briefly this is referring to the fact that how much money households are able and willing to spend now and in the future. Also the consumer is taking in to account the expected wealth in the future by evaluating the expectation of future incomes based on education and other demographic factors. The second one is investment as the theory behind representing this is Tobin's Q theory. The intent of this theory is to examine the causal relationship between  $q$  and the investment, he argued that if, at the margin,  $q$  exceeded unity, and firms would have an incentive to invest since the value of their new investment would exceed its cost. It is clear that if all such investment opportunities were exploited, the marginal value of  $q$  should tend towards unity. The third one is the balance sheet channel which implies to the credit market imperfections and the consequences for expenditure. (Jansen & Nahuis 2002: 90-91; Lindenberg & Ross 19813-4.)

This chapter of the thesis discusses about the market efficiency theories studied in the related literature and the rational expectation approach. Also some basic equity evaluation methods are presented in the modern finance theory. These theories provide background for the further investigations with tracking the relationship.

## 2.1 Rational expectations

The theoretical background for EMH is based on the rational expectation assumption. This approach is very widely used in macroeconomic research. Large proportion of the stock markets trend is affected by expectations and even more in this subtext where the stock market development is analyzed based on individual agent. Rational expectations is an essential part of the thesis as the consumer confidence is assumed to follow rational individual decisions and the agents should take in to account the relevant new information. The expectation is a major factor in the pricing of financial instruments.

Rational expectations are in line with the efficient markets hypothesis. The basic idea is that the rational expectations do not differ from optimal expectations because all the information in the markets should be in the expectations already. So when assuming that people take in to account all the available information, results should be rational. Some minor errors occur but the deviation should not be systematically irrational. (Mishkin 1982: 63.)

In the classic rational expectation model the rationality is unbounded, which is quite rarely true. One difference is how the information and the ability to calculate determine the rationality of the expectation. The bounded theories have been quite often classified as anomalies. Mishkin (1982: 63-64) investigated this area. There are some differing theories about the classification of these measurements. The weak form of rational expectations is based on the historical information of the target. The semi weak form takes in to account current public information and the strong form takes in to account all the information possible. It does imply that asset prices will eventually reflect the beliefs of agents making accurate decisions. (Sandroni, 2000: 1304-1306.)

However the rational expectation theory in itself does not make predictions related to human behavior, so according to the model it assumes that people do not make mistakes continuously and all the forecasts about the future are almost perfect, excluded random mistakes. So systematically wrong kind of approaches should not last in the markets because these type of methods will be eliminated quickly. Hellwig (1980) presented a model with competitive traders and noise trader. Competitive traders do not take in to account their effect on the price, but do take in to account the information conveyed by the price. The noise trader demands are exogenous, random and independent on fundamentals. Because of the noise traders the REE (Rational expectations equilibrium) is not

efficient. However the information is rarely available equally to all the agents in the markets. (Reny & Perry, 2006: 1232-1233.)

Permanent income hypothesis PIH is also a very natural setting to investigate the predictive power of consumer confidence. One of the central implications for the PIH is that the current consumption should indicate all the information available. However in the study of Souleles (2004, 43-44) this phenomenon also seems to be very dependent on different micro factors such as the fact that is the household classified as high income household or low income household. For example during an expansion high income households appear to receive a relatively good shocks and low income households continued to receive negative shocks. So the information appears to adjust consumer behavior in a different way among consumers from different demographic groups. In his research he finds that people forecast errors are systematically correlated with their demographic characteristics in the manner of time varying group-level shocks.

In the theories of John Maynard Keynes the consumer confidence figure could be referred more in a sense of animal spirit which indicates to a not fully rational decision making. The assumption that Keynes had about the sentiment of consumer was, that there is the instability because of the characteristic of human nature, that a large proportion of the positive activities raise more from irrational and spontaneous optimism rather than rational expectations based on mathematical interdependencies. He has done several studies related to this area and Keynes has provided a background for the research work in this area (Gerrard, 1994: 327).

## **2.2 Market efficiency**

The theory of efficient markets was originally derived from the *Random walk theory* by Kendall (1952). In his research about the economic time series he finds that the prices of the stocks and commodities do not follow the regular price cycle. Instead he noticed that the prices are following so called random walk, where based on the previous day information the price of tomorrow cannot be predicted. When the prices of the stocks are following the random walk the probability to the prices going up and down should be equal. If the stock price would be predictable based on the historical prices the market

would not be effective. The level would remain the same despite the new information that is available.

If the prices could be forecasted based only to the historical prices, investors could make profit based on old information and markets would be inefficient. So if the markets are assumed to be efficient, new information will adjust the stock markets to reflect the new situation continuously. This implies that evaluating the situation based on the own historical data of the stock markets, forecasting the future is not possible. Random walk as a term is a bit miss leading because the development of the stock price is not random, the exponential trend does exist and the business fundamentals are effecting the movements. The information that moves the stock prices is relevant but according to the framework of the research, there should not be a single agent who would possess some valid information before it is already visible in the asset prices. (Brealey, Myers & Allen 2006: 16-17.)

When the relationship between real economy and stock markets is discussed, one of the cornerstones in related literature is *the Efficient Market Hypothesis* EMH by Fama (1970), where the efficient market phenomenon framework is presented as it is now. Effective market theory assumes that all the relevant information is already reflected in the asset prices. So it would mean that the markets would adjust immediately as the new information appears and it is not possible to benefit from any arbitrage. In terms of the thesis research problem, this suggests that forecasting the stock market trend is not possible based on the consumer confidence, because stock prices are already reflecting the expectation component effectively.

The EMH model is criticized because several studies focused to this area have confronted the very significant weakness of it. Asset prices appear to be more frequently over/under priced in the markets when comparing to the real fundamentals over time. Different studies have provided different results but anyhow the framework is providing solid background to most of the research approaches in this area. Inefficiency can be one consequence of the very speculative economy where the future prices are often assumed to be predictable. EMH theoretical framework is considered quite weak in the modern research approach. Still it is providing such a solid background to many areas in financial research and a lot of models are built on top of it. (Umstead 1997: 427.)

The EMH requires few assumptions which changes the nature of it to very theoretical form. Assumption such as follows:

1. No taxation
2. All the agents in the market act rationally based on the economical fundamentals
3. All the households can take and give loan with similar terms, the interest rate is constant, the access to the markets is free
4. All the information is freely available and all the agents in the market have similar access to the information
5. There is no agent in the market that could affect to the prices with individual transaction because there are so many agents in the market
6. Equities are liquid and tradable whenever
7. No transaction costs

Definitions are divided in to three subsets; the weak form of the EMH, the semi strong form of the EMH and the strong form of the EMH. In the weak form of the EMH the information is restricted in to the historical prices, which is the subset that represents the inefficient markets. In this scenario the future return of the stock price is purely based on the historical prices. The prices do not adjust effectively to the new information. The semi strong subset tests whether the prices adjust to other than historical information taking in to account all the publicly available information. This information indicates to information such as macroeconomic news announcements and monetary policy decisions. In the strong form of the EMH all the public and private information reflects in the prices immediately. In the form of the strong efficient market no one has the opportunity to make outstanding profits. So it implies that there is no agents in the market who would have the opportunity to make outstanding profits, ignoring the informational gap between individuals. (Fama 1970: 1576-1577.)

In the EMH and rational expectations the model is not assuming that every single person is reacting to information as it would be expected. Whenever new relevant information appears, people update their expectations accordingly and it is assumed that some investors over react and some investor under react. This creates balance in some extent to the empirical evidence of the efficient markets. One basic requirement for this hypothesis is that the reaction follows normal distribution. EMH over time is an area of constant disagreement.



The basic structure of human information processing in psychology challenges the theory quite extensively. In the behavioral finance the phenomenon is referred as biases set up distortion. The cognitive biases are related to the fact that people make assumptions based on their experiences and not so heavily related to the real fundamental evidences. Other biases exist as well, which are related to very common human behavioral errors recognized in the area of human behavior research. The cognitive abilities are very tightly related to the decision making and this assumption in economy would have even more weight because of the complexity in decision making process. (Frederick 2005: 25-26.)

One of the evidences of the EMH weaknesses is the bubbles that have been caused by a very high amount of speculation in the market prices of the stocks. These bubbles tend to erupt when speculative, non-rational noise spread out and cause some common irrational selling behavior. This provides many agents an opportunity to take advantage of the situation and the sudden low price level. EMH does not assume completely that all the agents in the market act rationally or possess enough information. It assumes that the effect of these agents is not relevant for three reasons. First the noise that makes some agents act irrationally reverses the effect of each other. Also second assumption is that investors who are not successful in the market eventually disappear from the market since they lose. Third reason is that if the price is not in the right level the markets are effective enough that there is no delay. (Leger & Leone 2008: 229.)

### **2.3 Stock markets**

Shares in publicly traded companies are titles of ownership. In a way they present claims of firms present and future expected profits. Share prices of the company can be considered as the markets best estimate about the present and future profits. There are numerous reasons why the market value of the company differs from the replacement cost of its physical capital. Replacement cost of a firm's capital stock is determined as the price of the company's capital goods. This difference exists because of following reasons. One reason that is still strongly related to the company's performance is the intangible asset value. The invisible side of the assets such as; reputation, effective network, knowledge and other things difficult to concretize, already create the difference. The other relevant part of this area is related to the investment and Topin's Q theory which relates to the behavior of aggregated investment. This theory review the relation-

ship between firm value priced in the stock market and the replacement cost of the capital of the company. (Burda & Wyplosz 1997: 74-76.)

(1)  $Q = \text{market value of installed capital} / \text{replacement cost of installed capital}$

Combined market value of the companies should be quite close to the replacement cost. If the  $Q$  value is lower than 1, it looks that the market value of the company is lower than the cost of the firm's capital which is referring that the stock is under valued. Again if the value is higher than 1, the stock of the company is overvalued. So if company has lower  $Q$  than 1 the company has under valued market value and the company can issue more shares. (Burda & Wyplosz 1997: 74-76.)

Stock markets are very important source of information about the companies as well as the economy in a whole. Basically all the stocks should be correctly valued all the time and reflect the correct situation in the markets. More people have access to buy and sell stocks without major transaction costs and organizations in between. This has increased the market efficiency during past decades significantly.

## 2.4 Stock price evaluation

The focus of this thesis is in the correlation of consumer sentiment and stock markets. The efficient market hypothesis is the theory about how the information comes across in the stock markets. Stock prices reflect the value of anticipated future profits and cash flows of the companies. Since business cycle conditions impact the future profitability of firms, expectations about the business cycle effect the current value of the firm. So a large portion of the stock value can be determined as the expectation.

In general way the stock pays off to stock owners in two forms; cash dividends and capital gains or losses. There are many approaches to calculate stock price and one division is to calculate the today's stock price and calculate the stock price in the future. Still even though if the stock price of today is calculated, it contains the expected return component. The expected return is often called the market capitalization rate.

(2)  $\text{Expected return} = \text{DIV}_1 + P_1 - P_0 / P_0$

Where the current price of the stock is  $P_0$  and the price at the end of the year is expected to be  $P_1$ . The expected dividend is  $DIV_1$ . So the current price of the stock consist an expectation about the dividend, which is referring to the performance of the company; how much earnings company decides to deliver to the shareholders. The other expectation is the stock price, how much will the stock price increase or decrease. This factor is effect by the company's own performances but also the economical situation in general. (Brealey & al 2006: 57.)

When taking in to account the annuity factor the stock price can be evaluated for longer period, also including the exponential trend. The dividend discount model is a procedure for valuing the price of the stock by using predicted dividends and discounting them back to present value. In a basic financial theory the value of the stock is the future cash flows that investor can expect to gain. According to the DDM dividends are the future cash flows for the investment. The expected dividend value and the expected price of the stock in the year  $t$  is as follows.

$$(3) \quad \sum_{t=1}^H \frac{DIV_t}{(1+r)^t} + \frac{P_H}{(1+r)^H}$$

The theoretical efficient market hypothesis is again the simplified approach to the evaluation. All the valuable information should reflect in the stock price through dividend and the stock price component, information such as; company real performance, asset values and the development of the economical atmosphere. Also the consumer expectation about these fundamentals should reflect the price too because rational decision process includes the information from these same components.

According to EMH model it is not possible to earn abnormal and risk adjusted incomes so realized incomes equals expected incomes. Realized incomes  $R_{t+1}$  equals expected  $R_t E_{t+1}$  and unexpected noise is  $\delta_{t+1}$ . assumed to be zero.

$$(4) \quad \delta_{t+1} = R_{t+1} - E_t R_t + 1$$

$$(5) \quad E_t \delta_{t+1} = E R_{t+1} - E_t R_t + 1 = 0$$

The risk of a certain asset has a fundamental meaning to the expectations of the returns. One of the cornerstone models in this area is CAPM capital asset pricing model. The model calculates the expected return compared to the risk *beta*. Beta shows the return of the equity compared to the return in the markets. Perold (2004) derived in his study four assumptions to CAPM. First the investors are risk averse and they evaluate their investment solely based on expected returns and the standard deviation of return measured over the same holding period. Second assumption is related to EMH where CAPM assumes that capital markets are perfect in several senses: all assets are infinitely divisible; there are no transaction costs, short selling restrictions or taxes; information is available to everyone; all investors can lend and borrow at the risk free rate. Third assumption is that all investors have access to the same investment opportunities. Fourth is that investors all make the same estimates of individual asset expected returns, standard deviations of return and the correlations among asset returns. (Perold, 2004: 5-6.)

For the market to be in equilibrium, the price of each asset must be such that investors collectively decide to hold exactly the supply of the asset. In equilibrium the CAPM formula is given as follows:

$$(6) E_s = r_f + \beta_i(E(R_m) - R_f)$$

Capital asset pricing model is a fundamental contribution to our understanding of the determinants of asset prices. CAPM explains how the ownership of assets by diversified investors lowers their expected returns and raises their prices. In this thesis CAPM gives insight about the meaning of the risk in relation to the expectations towards returns and stock prices. Investor faces two types of risks in the market; systematic risk refers to the market risk which exists in the market and it cannot be eliminated through diversification of the investments and the other type of risk is unsystematic risk which investor can eliminate the risk by decentralizing the investments in the portfolio. (Perold, 2004: 22.)

### 3. CONSUMER CONFIDENCE

In modern economy many organizations and directions are interested in the market sentiment. To make the consumer and investor sentiment factors more understandable there are several attitudinal surveys which collect the information about the confidence on a monthly basis. Attitudinal surveys are used in short term forecasting of the market sentiment. These kinds of surveys collect micro level information about the expectations of the agents in the markets and gather this data in to one comparable figure to provide a view to the changes in the sentiment. Confidence is an individual opinion but through rational decision making individual makes decisions based on a facts, which suggests that consumer confidence is holding more or less information about economical fundamentals. Errors are assumed to smoothen up fast enough in this theory. Different consumer confidence indicators are seen as important pieces of information for the perceived current and future state of the economy. (Oest & Frances, 2007: 256-257.)

Attitudinal surveys constitute from simple questionnaires that handle the economical conditions now and in the future. Particularly during recession sentiment measures are closely tracked as the possible positive signals from the surveys could reflect more positive vision about the future. There are several different indices that measure the opinions of private consumer sector and the business world about the future expectations. Confidence indicators are used as a measure all over the world and the basic structure of the questionnaire is quite similar among different countries which make the indices quite comparable. The questions are usually multiple choices formatted, so the results are easier to combine and calculate. This way the complex data set informs in a very simplified way the consumer expectations in general. When the sample size of the people who attend to the survey is wider, the possible biased answers smoothen out and the average result is assumed to be rational. (Oest & Frances, 2007:256-257.)

In this thesis the focus is the confidence of private consumer. The purpose is to choose two of the most widely followed consumer confidence indices in the United States and among the world; Consumer Confidence index CCI and Michigan Consumer sentiment index MCSI. Previous related literature has shown that these two indices are strong leading indicators of the state of sentiment globally and are used frequently in similar studies. Also the method how these indices are constructed is widely known and reported.

Lately a lot attention has been given to the reliability of consumer expectations because of the very volatile market conditions. In some studies related to this area the degree of optimism of private consumers is used linearly to reflect the investor sentiment. Lemmon & Portniaguina (2006) used consumer confidence as a measure of investor optimism. They found that consumer confidence has become more accurate barometer of economic activity and of investor attitudes in the last 25 years. One interpretation is that the dynamics of the participation of households has changed over times. This suggests that there is a more direct link through investor activity among private households.

### **3.1 Business confidence indicators**

The expectations among the business world are measured with questionnaires about the future. In business confidence indicators (BCI) the questions are handling more directly the conditions by providing information about what kind of vision companies and the professionals working in the front line have about the future conditions. This can be interpreted quite straightforwardly to the future investments and production decisions. However the business scene must capture information about the private consumer expected behavior to have an extensive view about the rational decisions. Santero & Westerlund (1996) found that consumer confidence indicators are much less useful than business confidence indicators for economic analysis due to their much looser relationship with output movement. They find that business sentiment measures provide valuable information for the assessment of the economic situation and for prediction purposes. They also find that the results of these indicators vary considerably across countries.

Business sentiment measures derive from simple and rapid surveys, containing a small number of questions, generally of qualitative nature, which can be answered quickly by managers and are easy to translate in to statistical form. Business surveys typically cover business managers' judgments for example on the following points; production and employment, order inflows and stocks (foreign and domestic), levels of inventories of finished goods and material, expected price developments, the general economic situation of the country (past and future), limits to production, sufficiency of current production capacity, export expectation, current levels of capacity. (Santero & Westerlund, 1996: 6-7.)

One frequently followed BCI is the Purchase Manager Index which provides information about the manufacturing sector. The questions are made to 400 different purchase managers on a monthly basis to get information about the future production level, new order from the customer, inventories, employment level and speed of supplier deliveries. PMI provides more accurate view to the future conditions because the expectation is more strongly related to concrete activity in companies. It is considered one of the best indicators in terms of providing information about production of the factories. The opinions are measured as better, same or worse condition expectation. (Conference Board 2009.)

Another important survey is the Conference board CEO confidence index that is released quarterly by the Conference board and the chief executive magazine's CEO confidence index release monthly. The survey is based on a CEO's opinions about the future conditions. The questionnaire is made approximately to 100 CEO's asking about their views and opinions related to general future conditions and also more specified questions related to the industry. Surveys contain five components which are employment, the future confidence, current business conditions, investment confidence and current confidence. Also the CEO index does provide very high level of information content of the economical fundamentals because of the high professional knowledge. Also the information can be expected to be much wider for the agent that is in the position of a CEO compared to private consumer. In this content an individual decisions can already affect quite largely to economy when the agent is in very high position. For example through media and individual opinion that comes from a person that is assumed as professional in certain area, the opinion can have very far reaching effects. (Conference board 2009.)

### **3.2 Confidence indices used in this thesis**

In United States there are two indices that are the most frequently followed measures of consumer mood: Consumer confidence (CCI) released by the Conference board which is a non-profit business group functioning in the financial research area. Michigan consumer sentiment index (MCSI) released by the University of Michigan. Later in the text the Consumer confidence index is referred as CCI and the Michigan consumer sentiment as MCSI. (Dominiz 2003: 52-53.)

MCSI has a long history and the results are very widely followed by different directions all over the world. It has been published since 1940's but the structure has changed over the years. In the financial research area the Michigan index is used more widely than the CCI because of the longer view to the history. Also the Michigan sentiment questionnaire does include questions that cover more long term vision about the future economic conditions. However the CCI has a broader sample of households every month which could make it more informative measure of the consumer opinions. Larger sample size could reflect more rational result in terms of the smoothing effect. (Dominiz 2003: 52-53.)

The Michigan index was developed by George Katona and colleagues in the survey research center of the University of Michigan in the late 1940's. In the 1952 it was converted to a quarterly survey and in 1978 to a monthly survey. The Conference board CCI survey was founded later 1967 and in 1977 it was expanded in to a monthly survey. The most important methodological difference is the sample size, which affects to the sampling error and thus reliability in index construction. The other difference is the survey time and release schedule which are relevant when conducting the time series. The third difference is that in the MCSI the questions contain more longer term expectations questions which might effect for example in more positive responds than with questions that handle the near future (six months or less). The fourth one is the point of view. In MCSI two of the questions cover the own personal finance expectations and 3 of them about the financial conditions in general. In CCI only one question is handling the own personal finance directly. (Dominiz & Manski,2004: 52-53 ; Ludvigson 2004: 33-34.)

The two indexes broadly measure the same concept; the public confidence in the economy but the surveys are based on a slightly different questions and sometimes give different signals about the current and future expectations. This is also visible in the results of the empirical analysis of this thesis. Both the MCSI and CCI based their overall index on five questions which are part of broader survey of consumer opinions. In both of the surveys each of the five questions is given equal weight in the overall index. In addition to the overall index, both organizations report two component indexes in a timely manner: a present situation component and an expectation component. (Ludvigson, 2004: 30.)



### 3.3 The usage in practice

The monthly released figure is quite actively followed macroeconomic news announcement. The way a private consumer sees the future economic conditions is very essential information for many different institutions and companies. Investors, manufacturers, banks and government institutions use the figure to forecast the demand and partially adjust their activities according to the way the sentiment is fluctuating in a long run. Stock market analysts follow up the development of this figure on a monthly basis because it holds very essential information content about the future. The rational approach to take advantage of the consumer confidence information would be for example in a situation where company can take an action to reduce their production on consumer durable product when the confidence release shows negative expectations about the future. (Ludvigson 2004: 30.)

Also in a larger scale monetary policy decisions this information is valuable. If consumer sees the future more bright, it is expected to be visible in the booming economy; more purchases, more production, more tax income and the opposite situation would indicate opposite results. The information release provides a solid background for planning and preparing the larger scale decisions despite the fact that the measurement is very volatile and sometimes inconsistent. Government can take some actions in the monetary policy such as issuing lower tax to stimulate the economy and improve the consumer expectations. According to the University of Michigan survey research center, consumers anticipate changes in interest rates, unemployment, inflation, real gross domestic product and house sales. Consumer confidence is also shown to be a valid predictor of business cycle peaks and troughs. (Lemmon & Portniaguina, 2006: 1500.)

Most of the organizations and economists tend to use moving averages of the consumer confidence releases from few months to a half year time period. Moving average shows if a short term average of the consumer confidence index points is above in a long term, which indicates that it is upward momentum and vice versa. This provides more informative and solid tool for the predictive process. This is also done because of the quite subjective nature of the index and also quite small sample size. (Souleles, 2004: 40.)

### **3.4 Consumer opinion measurement method**

The measurement process for the consumer expectations is made monthly in both surveys; Consumer confidence index and Michigan consumer sentiment index. In both surveys the procedure and the approach is the same every month and it has been since the surveys were released. The purpose of the survey is to combine the micro level data of expectations to a single, combined figure. (Dominiz & Manski 2003: 54.)

The consumer confidence index which is released by the conference board makes the questionnaire to 5000 households every month. The survey consist 5 questions which are handling the following topics: current business conditions, expected business conditions for the next six months, current employment conditions, employment conditions for the next six months, total family income for the next six months. In Michigan Consumer sentiment survey the sample size covers 500 households. In both of the surveys the effective sample size is smaller than the planned in due to the fact if individuals want to answer the questions. The marginal of not getting feedback from every household varies quite significantly which may effect to the final results validity. (Ludvigson 2004: 34.)

On each survey two of the five questions ask respondents to assess present economic conditions. The Conference board present situation component takes a “snapshot” approach, asking respondents to evaluate current business conditions and job availability. Board survey asks particularly about the job prospects in the respondent area. As a result the CCI index present situation component closely tracks labor market conditions. Michigan asks respondents to comment on the advisability of big-ticket household purchases and to assess changes in their own financial situation. (Ludvigson, 2004: 31.)

These differences are reflected in the cyclical behavior of the two component indexes. Ludvigson showed in her earlier studies that Michigan index present condition generally peaks in the early stage of economic recovery, when growth is high. By contrast, the conference board’s present situation generally peaks in the late stages of the economic expansion, when unemployment is low and the level of economic activity is high. This suggests that the present condition component is not closely correlated between these two indices. The difference can also be partially explained by the sample size. (Ludvigson, 2004: 31-32.)

Later in the thesis the correlation of the CCI and MSCI will be explored with the log stationary time series samples. The results shows that two indices are significantly correlated but do provide slightly different results. Also the correlation compared to the stock indices to CCI and MSCI shows that they do correlate quite similarly with the different industries and the whole market, despite few abnormal discoveries. So this does indicate that these surveys do contain some valid connections. Third result is very heavily aligned with the research findings of Jansen and Nahuis (2003) which showed that the contemporaneous correlation is significant in all the European countries excluding Greece. Rising stock prices and rising sentiment tend to go hand in hand.

Both of the surveys are classified below in the question sets covering the present conditions and the future expectation of the surveys.

#### PRESENT CONDITIONS QUESTIONS:

##### MCSI

Q1: Do you think now is a good or bad time for people to buy major household items?  
Good time to buy/uncertain, depends/bad time to buy

Q2: Would you say that you (and your family) are better off or worse off financially than you were a year ago? Better/same/worse

##### CCI

Q1: How would you rate present general business conditions in your area?  
good/normal/bad

Q2: What would you say about available jobs in your area right now? plentiful/not so many/hard to get

#### EXPECTATIONS QUESTIONS:

##### MCSI

Q3: Now turning to business conditions in the country as a whole – do you think that during the next twelve months, we'll have good times financially or bad times or what?  
Good/uncertain/bad times

Q4: Looking ahead, which you would say is more likely – that in the country as a whole we'll have continuous good times during the next five years or so or that we'll have periods of widespread unemployment or depression or what? Good times/uncertain times/bad times

Q5: Now looking ahead – do you think that a year from now, you (and your family) will be better off financially or worse off, or just about the same as now? better/same/worse  
CCI

Q3: Six months from now, do you think business conditions in your area will be better/same/worse

Q4: Six months from now, do you think there will be more/same/fewer jobs available in your area

Q5: How would you guess your total family income to be six months from now? Higher/same/lower

### **3.5 Constructing the indices**

The math behind the indices is constructed in a way that it provides relative vision about the different answers. In a year when CCI was started the result was set to 100 which is representing the index benchmark figure. This value is adjusted monthly on the basis of a household survey of consumer opinions. (Ludvigson, 2004: 34-35.)

The two indices have some preliminary differences in constructing the raw response data. In the MCSI the diffusion measure is calculated by adding the negative and positive percentages plus 100. If the Percentage of positive responses would be 24 and the negative is 12 and the remaining percentage is neutral without information content, the index value would be  $100+24-12 = 112$ . After that the index is constructed by dividing the level by the base period level which is 110. After that the result is multiplied by 100. So example in the study of Ludvigson (2004: 34-35) the example yields  $(112/110)*100=101.8$ . The base year for MCSI is 1966.

In CCI the approach is slightly different. Conference board calculates the amount of positive responses and divides it with the sum of positive and negative responses. When using the same response percentages it is  $(24/(24+12))*100=66,7$ . The base period diffusion measure is 62,5 so the result is calculated by dividing the current month diffusion measure 66,7 with base period measure 62,5 and multiplied by 100. The resulting relative index value is compared to the value of 1985 which is the benchmark value because of its neutrality. It was not classified as economic booming nor decline so this provides smooth relativity. (Conference Board, 2009.)

Opinions of current conditions make up 40 % of the index and the future conditions cover the rest 60 % of the index calculation. The indicator reflects the financial health of households, spending power and confidence of the average consumer.

### **3.6 Information content of the index and criticism**

The way the confidence indicators are measured has raised a lot of discussion in the research. Dominz and Manski (2003) criticize in their study that the way Michigan index was constructed, was half century ago and does not hold the same level of relevance anymore. Though the information among agents has increased significantly also the amount of people functioning in the stock markets directly has increased.

Dominiz & Manski (2004 ) criticized in their research about asking consumers questions about business conditions, which they claim to be too distance and ambiguous. Most of the respondents are not expert economic forecasters. If the objective is to use expectations data to predict personal consumption, expectations for business conditions should be relevant only to the extent that they are an input into formation of personal expectations. The research suggests, that more questions about personal finance should be asked and eliminate the direct business conditions questions.

There is also a lot of discussion about the presence of the irrational element in consumer sentiment. For example the measures of consumer confidence respond to the tone and volume of economic news reports rather than the actual economic content. (Lemmon & Portniaguina, 2006: 1501.) In a manner of forecasting future conditions and moreover through consumer spending, Pickering & al. (1973) deliberated in their research that the

unpredictability of consumer durables purchases such as cars, are discretionary and this skews the forecasting power of consumer confidence. It has been argued that the durable purchasing behavior can only be understood through analysis of the complex psychological decision making process of individual consumer.

The figure has a very strong base in psychology and behavioral finance. It is a challenge to isolate the individual decision effect from the rational decision. Research made in the 70's by Pickering & al (1973) looked in to the problem where the consumer confidence index does not provide solid information to forecast the consumer expectations and future spending. A lot of details about the decision making are left uncovered when only certain details are measured. A simple questionnaire was constructed by investigating the influence of different factors to buying behavior. Particularly job expectations, economic progress issues and price development were important factors. Consumer behavior was also strongly indicated to be affected by temporary changes in income. This phenomenon would indicate in to rule-of-thumb consumers who adjust their sentiment in to the current situation immediately.

If the approach would be more structured and the effect of different parts could be isolated from this figure in more micro level, the consumer behavior research could possibly provide a very solid base to forecast the future stock returns and other economy development. Jensen & Nahuis (2002: 90-91) disaggregated the results in to its components to explore the nature of the relationship between consumer sentiment and the equity market. If the separate, independent confidence channel exists, stock market development should be more strongly correlated with expectations about the general economic situation.

Two of the most common dilemmas in relying on consumer confidence as an economic indicator are whether to focus on index level or month-to-month changes and whether to focus on the present conditions or the expectation component. There are differences between the two major indices. In case of CCI it is more useful to look in to the current and future indicator individually. The level of the present conditions component serves as estimate for the level of economic activity and the expectation is more aligned with the future growth. In Michigan case both of the components are closely correlated and in general provide an indicator of economic growth. (Ludvigson, 2004: 36.)

#### **4. THE RELATIONSHIP BETWEEN CONSUMER CONFIDENCE AND ECONOMY**

Consumer confidence is found to be one of the leading indicators in many macroeconomic forecasts concerning consumer spending. The meaning of the private consuming and the sentiment in the market are very frequently followed by many directions. The optimistic mood in the market shows that a consumer is willing to spend more which increases the level of production and investments made by the companies. If the measurements of consumer sentiment do not provide information about the future at least the index reflects the current situation and the mood among agents at the moment. Over 50 percent of the cross domestic product comes from private consuming which makes it quite dominant factor to the overall economy. The effect has been shown to vary between different countries when it comes to the private consuming and macro economy which indicates to some structural differences. (Oest & Frances, 2007: 256.)

Several theories and mechanisms have been proposed to explain the impact, in particular the lagged impact, of confidence on consumer spending. Consumer confidence contains information about the pass, present and the future development of the economy. Through the rational decision making process the figure can be assumed to contain information of many economical fundamentals. People should build their expectations based on the real economic fundamentals and possible forecasting errors occurred should smoothen out continuously. The predicting power of consumer confidence is used mainly in short term forecasting because the mood in the market is quite volatile. (Oest & Frances, 2007: 256.)

The volatility of consumer confidence is quite logically much higher than real economic development. The effect can be divided in to two subsets where the consumer confidence directly affects the real economy through the consuming decisions made by the agent to spend more or less. Different kind of features concerning house holds effect to the results and create variation. Also the consumer mood and decisions effect directly to stock markets via the investor decisions.

Based on previous studies the economic news announcements do have impact on the consumer sentiment. Especially the news announcement handling unemployment rates has a very strong and direct impact to consumer mood. If households see that employment situation looks bad in the future the spending decision reflects this information strongly.

#### 4.1 Permanent income hypothesis (PIH)

When the expected income gains have materialized consumption may go up as well. This assumption applies to so-called rule-of-thumb consumers, who relate their consumer behavior directly to their instantaneous income. On the other hand the permanent income hypothesis suggests that consumer want to balance out their permanent income earned over time and intend to keep their spending behavior steady over time by means of borrowing and lending. (Oest & Frances, 2007: 257.)

One interpretation is that the consumer surveys capture the information about the future expectations of income and wealth. People base their amount of consumption on what they consider as normal. Neoclassical consumption theory posits that consumers are forward looking and base their consumption decision, not to the current income but their expected discounted value of the lifetime resources, which is known as the permanent income hypothesis. The key element of the theory is that temporary changes in income should have quite weak effect on consumer spending behavior. A key implication in this is that the size of the revision in consumption ( $\beta$ ) due to an income innovation is equal to the size of the revision in permanent income ( $\chi$ ) due to the same income innovation. (Dejuan, Sieter & Wirjanto 2004: 1093.)

The standard mathematical model is presented as follow.

$$(7) C_{it} = Y_{pit}$$

Where C is consumption and  $Y_p$  is the permanent income.

Dejuan & al. (2004) revised this basic model which includes the nonhuman wealth, labour income, real interest rate and the expectation operator which includes all the information available to the consumer in time  $t$ . They made few assumptions to their equi-



librium model such as; transitory consumption, which might appear from taste shocks, is equal to zero and the real interest rate is constant and equal to the time preference. Income  $Y$  is exogenous and equal to the consumer consumption decisions. Under these assumptions, permanent income changes only in response to new information about the future path of labour income. They investigated 48 US states and the result indicated that hypothesis of  $\beta = \chi$  cannot be rejected in most of the states which suggests that PIH is a reasonable model for describing the response of state level consumption to state level income innovations. (Dejuan et al. 2004: 1092-1093.)

Based on the theory, consumption and income contain the permanent element and the transitory element. Milton Friedman, the creator of this theory claimed that a person will consume a constant proportion of permanent income. In low income households have higher propensity to consume and higher income households have higher transitory component in their spending. The model includes in addition to the real wealth also the education and experience, which is referring to the persons ability to earn more. In the general version of the permanent income hypothesis, consumption should not change because of unexpected rises in permanent income. In some forms PIH implies that consumption might be martingale. Under the martingale hypothesis, no variable other than current consumption should predict future. (Christiano, Eichenbaum & Marshall 1991: 419-420.)

#### **4.2 Properties of the economic model of behavioral finance**

Economical independencies and the human behavior are major part of financial research these days. Human actions and the causes for these actions can be analyzed through different elements, which are aiming to determine the trends. In the history many of the behavioral finance features were characterized more as market anomalies that could not be explained in any rational way. The confidence indicators may capture animal spirits, that is spending reactions having no economic rationale among agents. However the effect of the non rationale behavior should appear in only short term periods. The lagged impact of consumer confidence can also be explained by habit information which is the phenomenon that future consumption is driven by current consumption. (Oest & Frances, 2007: 256.)

Incentives have been shown to determine human behavior very heavily. People tend to act systematically and predictably when they consider a possibility for actions to be more advantageous or more disadvantageous. The distribution of human preferences is quite well characterized with normal distribution figure which is a base for several theories in financial research. People do have the tendency to act in a selfish and non selfish ways. Frey (1992) claims in his research that human behavior is not purely based on assumption of utility maximization but rather to five characteristics which are individualism, systematic reaction to incentives, distinction between constrains, selfishness and institutions.

The law of demand plays the central role in economic model of human behavior. It allows theoretically observe and explain empirically the human behavior. The law of demand is based on the macroeconomic theory about marginal substitution; relative price rise does not provoke a total or unexpected change in behavior but rather a more or less strong adjustment to changes. The marginal rate of substitution describes the rate which consumer is ready to give up in exchange for another while maintaining the same level.

$$(8) \quad \begin{aligned} MRS_{xy} &= -m_{indf} = -(dy / dx) \\ MRS_{xy} &= MU_x / MU_y \end{aligned}$$

In the standard assumption of marginal rate of substitution will be the same despite the direction of the exchange. Marginal rate of substitution is the amount of Y which consumer is willing to exchange for X locally. (Pekkarinen & Sutela, 2002: 208-210.)

### 4.3 Behavioral anomalies presented

In the economical development research there are a lot of areas that are determined as anomalies in human behavior. In some experimental psychological studies it is said that individual behavior systematically violates rationality. This can be quite heavily explained by the frame the news are represented. It is said that people react differently to identical economic programs dependent on the way the news is presented. For example when labor market conditions are formulated in terms of unemployment rather than when they are formulated from the employment point of view, reactions are different even when the context is same. This anomaly is called framing effect. (Frey, p. 172-173: 1992)

There are several anomalies which systematically deviate against rationality. In the following chapter few of those are presented as they were in Frey's (1992) book.

*Reference point Effect:* alternatives are evaluated by people not in terms of relative but often the status quo.

*Sunk Cost effect:* people have tendency to take foregone costs into account in their decision making

*Endowment effect:* goods in person's endowment are valued more highly than those not held in the endowment.

*Framing effects:* the way a decision problem is formulated and the way the information is presented has a marked effect on individual decisions

*Availability Bias:* recent, spectacular and personally experienced events are systematically overweighted when people make decisions

*Representativeness Bias:* people systematically misconceive prior probabilities, and are insensitive to sample size.

*Opportunity cost effect:* out-of-pocket monetary costs are given greater weight in the decision calculus than opportunity costs of the same size.

*Certainty effect:* outcome obtained with certainty are attributed greater weight in people's decisions than those which are uncertain even when the known expected utilities are the same.

Rational decision making process is in the background for these assumptions about these irrational human behavior features. Anomalies are classified as so called errors against the rational decision making that is happening continuously.

#### 4.4 Wealth effect and consumption

Wealth effect approach is a theory that is directly related to consumer decisions. The basic idea in wealth effect is the simple fact that when people have more wealth now and they are positive about the future wealth expectations, they spend more. By wealth this theory is referring to the income wealth and also to the wealth that is expected to become true in the future through investments that are expected to increase value in the future. So this theory is very tightly related to stock markets development research. During the bull market the wealth effect drives people to spend more, which powers the economy. But when the tables turn and the stock market face decrease, the effect is moving to opposite direction.

The empirical linkage between wealth and consumption is a classic research problem in finance and macroeconomics. The meaning of wealth effect is very frequently investigated area and some differing results have been found. When the effect of wealth increase or decrease is compared to aggregate consuming the effect has been proven to be weak. Ludvigson and Lettau (2001) investigated the trend and cycle in asset values and through this valuated the wealth effect on consumption. Against the wealth effect they find that surprisingly small fraction of the household wealth is related to the aggregate consumer spending. They find that log consumption  $C_t$ , log asset wealth  $a_t$ , and log labor income  $y_t$ , are co integrated. Since the consumption, labor income and wealth move to the same direction their annualized growth rates must be quite tied together in the long run. In the short run, wealth growth is much more volatile than consumption growth. The research suggests that wealth is not a random walk but instead displays mean reversion and adjusts over long horizons to match the smoothness of consumption and labor income. In U.S data they find that there is a significant transitory component in wealth that is unrelated to consumer spending. (Ludvigson & Lettau 2001: 817-820.)

The importance of the wealth effect relations for example to monetary policy decisions is essential. The movements in asset values should not effect the policy makers decisions for example in inflation targets if the finding suggests that most changes in asset values are transitory and unrelated to consumer spending which is the largest component of the aggregated demand. (Ludvigson & Lettau 2001: 816-817.)

## 5. STOCK MARKETS AND CONSUMER CONFIDENCE

As the chapter four was discussing more about the consuming effect to real economy and the behavioural finance background, the chapter five provides view to the relationship between consumer confidence and stock market development. This chapter also provides the background for the chapter 6 empirical research area.

The basic idea in consumer confidence and the stock market relationship research area is the fact that the investors follow the figure for the information content of the expected development in the future. Investors assume that the agents in general act rationally and the positive information about the future expectations of the sample group should affect to the investment decisions. Expected excess returns on common stocks appear to vary with the business cycle. This evidence does suggest that stock returns should be predictable by business cycle variables. (Ludvigson & Lettau 2001: 817.)

One example for the existence of the relationship is that the rising stock markets make consumer feel better about the future and this encourages them to spend more. This way of thinking differs about from the conventional wealth effect approach because the confidence channel in this approach. The wealth effect approach would be the personal wealth issue rather than wider economical conditions. Jensen & Nahuis (2003) investigated the correlation between stock markets and consumer confidence in 11 European countries over the years 1985-2001. They find that in 9 countries the consumer confidence and stock returns and the consumer sentiment have a positive correlation. The effect seems to move from stock market to the sentiment in short horizon. The stock market-confidence relationship is driven by expectations about economy wide conditions rather than personal finances. Mainly in this area of research the effect has been shown to move from the stock markets to consumer sentiment which suggests that it is not possible to predict future stock prices with consumer sentiment figure. The increase in equity values does boost consumer confidence but the reversal does not hold.

Two linkages have been proposed to analyze the relationship previously in the thesis and related research. The first one is more related to the wealth effect which means that higher stock prices mean higher wealth which creates greater optimism among investors. Jansen & Nahuis (2003) suggest that in Europe the effect of this is smaller because

in Europe fewer households invest in stocks than in US and a smaller portion of their wealth is tied to stock market development. The second indirect link is that agents in the market take the positive development as a sign of more favorable economic conditions in the future despite if they own stocks or not. In this case stock markets just provide information source.

### **5.1 Market sentiment and stocks**

Ludvigson & Lettau's (2001) research about the consumption-wealth ratio related to stock returns found that the fluctuations in consumption-wealth ratio were strong predictors of both real stock returns. The study was made with US stock market quarterly data. This finding implies in to very strong relationship. In the research it is shown that wide class of optimal models of consumer behavior implies that the log consumption-aggregate wealth ratio summarizes expected returns in stock markets.

The direction of the stock markets is explained by the systematic factors that are related to the macroeconomic development. The fundamentals such as the unemployment news, inflation, GDP and other realizations should also be aligned with consumer confidence measurement through rational expectations hypothesis. So this indicates that the real economy, stock markets and consumer confidence should be correlated. The stock markets reflecting the real economy is not always so straightforward. There are several paths that could lead the effect away from the rational path. Too high optimism or negative expectations are sometimes created by very subjective and non rational basis and the way news are presented in the media. (Ludvigson & Lettau, 2001)

On the other hand the effect other way around provides a different approach to the research problem. Choundry (2001) investigated the effect of stock market volatility towards consumer mood and spending through four different series of consumer expenditure; total real expenditure, real expenditure of durable goods, real expenditure of non-durable goods and real expenditure on services. Results in all four cases suggest a long run relationship between the consumer expenditure and its determinants (including stock market volatility). The life cycle hypothesis suggests that a decline in stock prices has a significantly negative impact on stock prices.

## 5.2 Stock markets and other macroeconomic news

Prices of the shares often move in erratic ways, dependent on the moment and the economic cycle. Aggregate economic activity affects to stock prices and stock prices are important determinants of aggregate economic activity. One important link is the wealth of the households. When stock prices rise, shareholders become richer and the mood for making larger scale purchase decisions is more positive. This suggests a very direct link in this area on research. However in the countries where people have less equity capital, this effect does not appear so clearly. (Jansen & Nahuis 2003: 95.)

The linkages between the markets and real economy are related to consumption, investments and credit channels. Also stock markets effect directly has been proposed to be one quite essential indirect link. The theory leans on the assumption that rising stock markets may make consumer feels better about the future and this way it to encourage them to spend more. Higher stock markets may boost consumption through two channels; the first is that higher stock prices mean higher wealth which was referred earlier. It has been discussed that this very direct effect is stronger in USA where more households do direct investments to stocks. The second channel is the indirect channel where agents read the signs of positive development in stock markets to be favorable in the future in the economy in general. In this content stock markets is the messenger of the current and future conditions. (Jansen & Nahuis 2003: 95.)

Stock market liquidity provides investors the ability to quickly and easily sell securities. The liquidity makes the stock market more effective in transmitting the information. It is very straightforwardly taken as a sign of bad economical condition if the stock market significantly goes down even though it might not indicate that in assumed extent. In modern theories stock market is sometimes considered as the primary indicator because of the efficiency in information processing. A company specified, unsystematic factors that affect the value of the stock smoothen out when the stocks are handled as a whole portfolio.

### **5.3 Business cycle effect**

The effect of the market conditions has been shown to have a major impact to the relationship of consumer confidence and stock markets. In the related literature the effect of negative shocks in consumer sentiment has been shown to have stronger impact on the stock markets during the bear markets. So this suggests that during Bull markets the negative shocks do not cause as major effect on stock markets. (Chen 2010.)

So the effect on the relationship varies strongly dependent on the markets. When the positive conditions apply the market participants are likely to over-estimate the significance of positive price signals in an optimistic climate and under estimate their significance in a pessimistic climate. A very dominating behavioral bias is that the current state of the economy affects to the reactions towards new information significantly (Leger & Leone 2008: 230.)

Stock market reaction is shown to be stronger during tight economic conditions to different macroeconomic news announcements. There is shown to be a very significant cyclical variation in reactions for example to the news related to monetary policy. The size of the stock market response to different news is shown to be almost double during bad economic times than during more positive prospects. (Basistha & Kurov 2008: 2607.)



## 6. THE EMPIRICAL ANALYSIS

In the empirical part the thesis is focusing in to the relationship between consumer confidence and stock markets in US among different industries. The focus is to explore if the consumer confidence could be the leading indicator and stock market would be the lagging indicator, and moreover if the relationship varies between different sectors. In previous studies the relationship is explored in to both directions. This chapter presents the results in empirical analysis about the relationship.

The method used in this research is Granger causality, which has been used in a previous related literature and considered as the most robust method for this type of research. Also Granger causality approach is quite simple to adjust for this type of study. The results in causality testing are quite often considered as preliminary and partially informative since the regressions built for causality testing only contain limited amount of information at the same time. Also the variables included in the regressions partially have features that refer to multicollinearity because the correlation is strong. (Mellin 2005: 48.)

### 6.1 Data

The data for the empirical analysis is gathered from February 1995 until February 2010. This 15 years view contains monthly observations of the stock index and consumer confidence figures from both indices MCSI and CCI. SP 500 index industry level split has been published as it is now since 1995. January 1995 is the benchmarking value 100 for the index.

All the data is modified before the testing because of the nature of the time series. To have the ability to compare the time series data between these two different indices the data is differentiated. The 1<sup>st</sup> difference is taken from the time series and the 1st logarithm to have the ability to test these two time series in same regressions.

Because the data is linear the autoregressive model is used. Several different regressions are formed in case of all the indices. First the regressions for CCI and MCSI historical values are formed with two lags. It is constructed in way that it contains only the histor-

ical data of the own history of the index. Same regressions are built to all of the stock indices separately. All of these regressions are called limited ones which imply that the regressions are containing data only about their own history. Second phase of the testing is to add the historical values of CCI and MCSI to all of the stock market regressions with 2 lags. All the regressions in this phase are tested to two directions. So the results show which way the effect is moving.

The thesis focuses on monthly observations of the relationship during the 15 years period sample. More frequent approach would not provide anything additional as the point of view is delimited in to the actual observations of the CCI and MCSI which are published on a monthly level. Some interesting volatility in between the release date could be caused by expectations and speculation. The focus is to explore the relationship in a long run.

## **6.2 Covariance and stationary time series**

Time series can be either Stationary or Non stationary. Stationary processes are the base for time series analysis. In statistical analysis it is assumed that the time series is a realization of some stochastic process. Stationary process is a stochastic process where parameters are not dependent on the time point but about the distance between certain time points. Time series that are not stationary such as econometric time series the processes can be differentiate and are integrated. (Granger & Newbold, 1986.)

In many situations it is not possible to obtain more than a single realization. Time series analysis is forced to adopt some restrictive assumptions about the way how means and co-variances can change over time. The assumption forces the time series to be stationary and provides access to deeper evaluation of the observations in economic time series data. In the stationary evaluation there should not be any trends, so time series are not usually stationary. Trend is usually visible in real life which makes evaluation process more challenging. (Granger & Newbold, 1986.)

The assumptions can be defined verbally with following assumptions; a time series variable  $Y$  is stationary when

1.  $E(Y_t)$  is the same for all values of  $t$
2.  $\text{var}(Y_t)$  is finite and the same for all values of  $t$ .
3.  $\text{cov}(Y_t, Y_{t-s})$  depends only on  $s$ , but not on  $t$ .

In a mathematical way the assumptions can be written as follow;

$$(9) \quad E(Y_t) = \frac{\alpha}{1-\rho}$$

$$(10) \quad \text{var}(Y_t) = \frac{\sigma^2}{1-\rho^2}$$

$$(11) \quad \text{cov}(Y_t, Y_{t-s}) = \frac{\rho^s \sigma^2}{1-\rho^2}$$

If  $|\rho| < 1$  the stationary occurs but other values for  $\rho$  is referring that the time series is not stationary. Thus the mean and variance are constant over time and the covariance between variables  $s$  periods apart depends only on  $s$  and not on  $t$ , the conditions for stationary are satisfied if  $\rho$  is less than 1. Time series can be stationary in terms of one characteristic for example the mean but not stationary in respect to another. This creates the category of strict or strong stationary process. (Koop 2007: 195-196.)

In time series analysis the problems is that the time series are usually stationary which requires operations. Stationary between time series can be measured for example with Dickey- Fuller test which is used in many previous studies. Jansen & Nahuis (2002: 91.) measured the time series stationary with augmented DF test. Economical time series are usually stationary and require changes. (Koop 2007: 195-196.)

As their first step Jansen & Nahuis (2003) examined the stationary features of the time series. They tested the data with augmented Dickey-Fuller test and Phillip Perron test and found that the log of the stock price indices and Consumer confidence are integrated level I1. Then they examined the co-integration with Johansen procedure which gave them conclusion that they cannot reject the hypothesis that the consumer confidence and stock prices are not co-integrated. This part of their research provides the conclusion

that there is no long run relationship between consumer confidence and stock prices. In the research they concentrate on the short run linkage in the relationship instead. (Jansen & Nahuis 2003.)

### 6.2.1 Data transformation

The time series for the stock market data and the consumer confidence data are transformed to stationary. In this variation the 1st difference is taken out from these results to eliminate the stationary trend, this indicates that the time series used will be integrated level 1. Then the series of observations are transformed in to logarithmic to eliminate the exponential trend which is visible in stock market data. Stationary process will have mean and variance that do not change through time, and the covariance between values of the process at two time points will depend only on the distance between the time points and not time itself. This means that the variance changes around its mean value with constant value. This assumption provides the basics to create some theory around the non stationary time series estimation. (Koop 2007: 195-196.)

The time series data is transformed in to stationary form to eliminate the seasonal trends and variation. Clearly visible seasonable variation is eliminated by taking the logarithm and 1<sup>st</sup> difference from the time series. If the variable  $X$  value  $X_0$  changes  $p$  % the new value  $X_1$  is

$$(12) \quad X_1 = \left(1 + \frac{p}{100}\right) x_0$$

$$(13) \quad \log(X_1) = \log(X_0) + \log\left(1 + \frac{p}{100}\right)$$

So the relative change in logarithmic time series is almost totally independent on the level and depends only on the change percent. This is an important detail concerning the nature of this study and the chosen empirical method. (Mellin 2005: 48)

In time series  $x_t$ ,  $t=1, 2, \dots, n$  the lag operator  $L$  is  $Lx_t = x_{t-1}$ . The difference operator  $D=1-L$  is

$$(14) \quad \begin{aligned} Dx_t = 1 - Lx_t &= x_t - Lx_t \\ &= x_t - x_{t-1} \end{aligned}$$

### 6.2.2 Stock market data description

SP500 is benchmarking the market portfolio in United States in a very extensive way and it is frequently followed index in the area of financial research and financial professionals among the world. SP500 is market-value weighted index which focuses on the large cap segment of the publicly traded companies. The coverage of the U.S equities is approximately 75% so it is very ideal proxy for the whole market. The index is commonly considered as an indicator of the U.S economy and also in some extent to the whole world economy. Other widely followed index is Dow Jones Industrial Average index. This thesis concentrates on the development of SP500 monthly closing rates which are aligned with the Consumer confidence and Michigan consumer sentiment index release dates. (Standard & Poor, 2010.)

Companies included to the index are traded in the NYSE or NASDAQ . There are a lot of other more specified restrictions to the companies that are included to the index. Certain guidelines are determined by Standard and Poor's and the index is adjusted to the changes in time. The variation among memberships is aimed to be as minimal as possible. The market capitalization for the company needs to be around 3,5 billion and the public float for the companies is required to be very frequent, over 50%. Also there are some restrictions related to the financial viability and the stock price ratios. Sector division balance is also maintained so the company industry classification contributes to the maintenance of the level between different industries in the index and the balance among these. (Standard & Poor, 2010.)

The SP500 index is divided in to different Industry divisions which are energy, materials, industrials, consumer discretionary, consumer staples, healthcare, financials, information technology, telecommunications and utilities. Ten of the largest companies represent approximately 20 percent of the whole index weight. The largest company

EXXON Mobil Corporation has approximately 3,2 weight in the index and it is part of the sector division; energy. The largest companies do have a major effect to the whole index as the 10 largest ones possess 20 percent of the index including 500 different companies. In this thesis the effect of the consumer confidence figure is compared to each of these industry sectors return in addition to the SP500 index as a whole. Below there is a chart which is representing the top ten for the largest companies in the states with the Index weight and the sector. (Standrs and Poor, 2010.)

**Table 1.** SP 500 largest companies measured by market value (2010)

Company	Index Weight	Sector
Exxon Mobil Corp	3,26	Energy
Microsoft	2,37	Information Technology
Apple	1,91	Information Technology
Johnson and Johnson	1,79	Health care
Procter and gamble	1,78	Consumer staples
Intl Business Machines corporation	1,73	Information Technology
AT&T	1,67	Telecommunications
JP Morgan	1,65	Financials
General Electric Co	1,62	Industrials
Chevron	1,56	Energy
	<b>19,34</b>	

The main index has been published since 1957 which provides a very long view to the history of the stock market trend in the States. The sector split stock return as it is today has been available since the beginning of 1995. The data period used in this thesis with both of the confidence indicators is monthly observation data starting from January 1995 and ending in January 2010.

The observations are gathered, when measuring the correlation, aligned with the monthly release date of the MCSI and Consumer confidence dates. With conference board consumer confidence the result of the monthly surveys is published every last Tuesday of the month. The observation data for SP500 and the sectors is gathered by using the last Tuesday of the month closing rate for the stock market index. There are few exceptions during the holidays such as Christmas days. In these cases the release date is earlier so the only error in this is that the time delay between the announcement and the

stock index closing rate grows but the information about the CCI is released. So the error cannot be that the closing rate observation would be before confidence announcement.

Jansen & Nahuis (2002) used monthly average of the stock market index, however in this research the index value in the following day after the CCI and MCSI are released is used. When measuring the Granger causality the previous month consumer confidence indicator is added to the regression of the previous month and current month SP500 index. (Jansen & Nahuis, 2002)

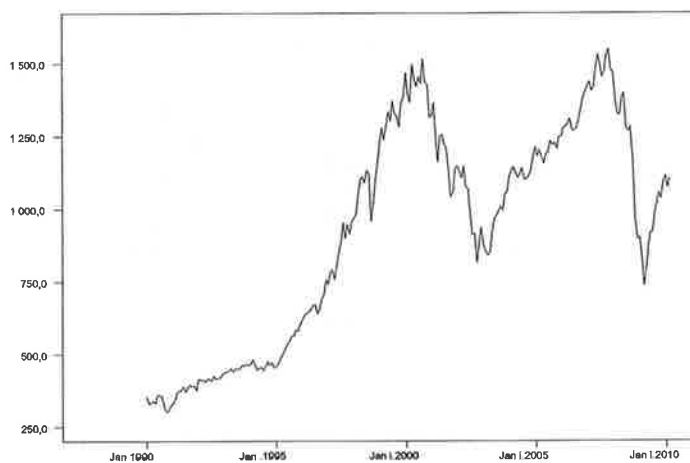
With Michigan consumer sentiment index the release date is not so structurally defined. It is published in the end of the month but it is not necessarily last workday of the month. The range of the release dates is last work day of the month or minus 1 to 5 days earlier. So in the Michigan sentiment index the used date for stock market observation closing rates is the last work day of the month. This indicates that there can be a time delay from 1 to five workdays between the announcements and the stock market observation. The purpose of the thesis is more to explore the relationship correlation with the 15 year period and to see the long term direction. The expectation of the consumer sentiment is usually already quite powerful determinant before the actual published result. Some financial organizations publish their expectations and these opinions effect to markets very heavily.

Below there are the absolute figures in a graphic chart to see the development of each index. The charts of the sub-indices are attached in the end of the thesis. The major collapse in 2008 and can be seen CCI, MCSI and SP500 very strongly which implies to the fact that there is a strong correlation between both of the indices and the market portfolio. This is just indicative in a manner that the indices are calculated in different ways but it does show the obvious movement to the same direction. The sample is 20 years which provides the view to the whole market cycle with few declines and the major economic expansion.

Consumer confidence shows that the deepest dive in 20 year history data was made in 2008 and 2009. The major market shock that appeared in November 2008 collapsed the rate for both of the confidence indices very dramatically. Same kind of deep dive was going on in the beginning of the 90's but as the graph shows, the drop was still milder then. Also the speed of the collapse looks to be more smooth and moderate back then. The reasons for the more aggressive reaction in this recession differentiate a lot and

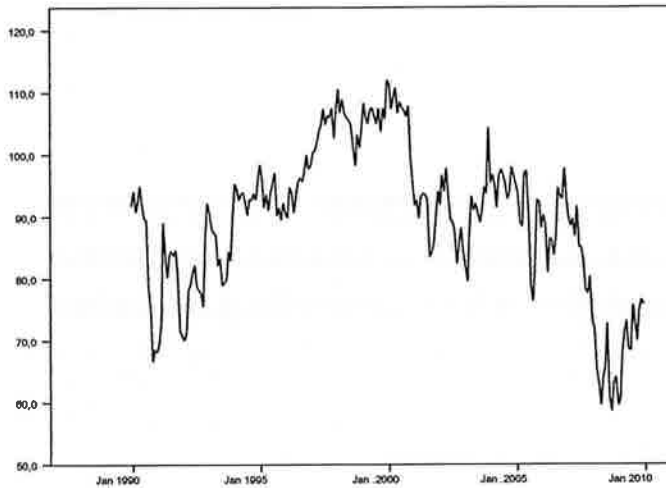
there can be several reasons for it. Could be that people are more directly exposed to this downturn than in the beginning of 90's throughout more wide spread direct stock ownership or other ways. This would imply in to one form of wealth effect theory. Other theory could be that people possess much more information about direction of the markets which reflects more effectively in the consumer opinions about the present and the future conditions. The unemployment is one very direct and strong factor which determines opinions.

Media plays a huge role in the opinions. The news about the conditions are informed in a very different way than 20 years ago. Also the usage of the internet sources have increased significantly which implies that the information is available more readily to all the consumers. Majority of the population in modern society have access to internet and different media. This has a major effect on the fluctuations without any doubt.

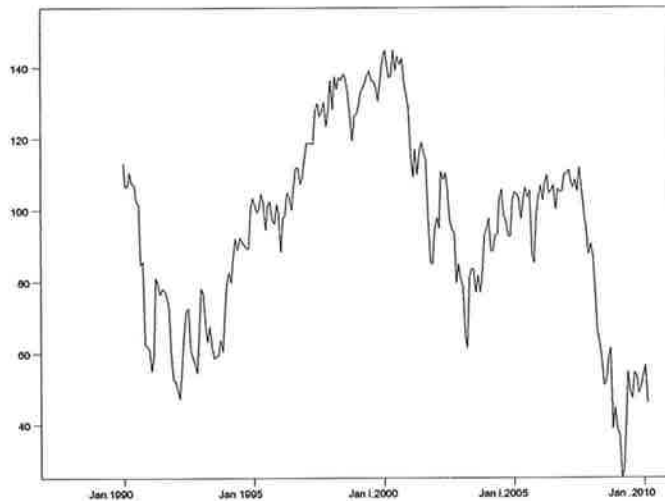


**Chart 1.** SP 500 Price index





**Chart 2.** Michigan Consumer sentiment index



**Chart 3.** Consumer confidence index

### 6.2.3 Consumer confidence data

Both of the important consumer confidence indicators are published on a monthly basis. Consumer confidence index released by the conference board is released every last

Tuesday of the month. The Michigan sentiment index result is published every last workday of the month. The data is gathered during the month via telephone interviews for randomly picked households. Both of the US indices have a major effect of the expectations about the economy globally. It is shown in many previous studies that the correlation between different countries against CCI and MCSI is significant. So the global economy looks to reflect a lot of the development of the US consumer expectations in some lag. This indicates that the indices are moving similarly with other economic figures.

The dataset can be divided to reflect the conditions of the personal finances or the general view to the whole economy. Charts in the previous chapter show the graph that describes the 20 years development of the personal expectations and the economic outlook of the MCSI and CCI. One of the main usage of the consumer sentiment information has been to measure temporary fluctuations in confidence. (Dominiz & Manski, 2004: 52.)

In the previous chapter the data of both indices is presented in a chart that provides view about the long term trend. In the chart it is visible that the trend is moving similarly between all the indices. Consumer confidence looks to have more steep reactions towards business cycles compared to stock market index. Consumer confidence is a very volatile figure and the reactions during downturns are more aggressive than during expansion.

### **6.3 Research approach and previous studies**

The chosen research method in the thesis is the Granger causality method. The same method has been used widely in the previous related research area. For example Jansen & Nahuis (2002) used Granger causality test when they investigated the causality relationships with European data. Ludvigson (2004) used the similar test to explore whether it would be possible to improve the model and predict future stock market income based on the consumer confidence monthly value. In terms of possible predictive power in consumer confidence can also vary in different states of market cycle. During downturn the attitudes can be more critical against the current economic situation which would be more strongly visible in CCI or MCSI index result. This could have a cause to stock markets but in terms of longer period effects it does not necessarily follow up this trend.

The Granger method requires some assumptions and limitations so reliable results can be provided in time series analysis. If two time series are in connection with each other by forming a balance in a long run the series are combined integrated. If this kind of integration exists in the long run it can be interpreted that the examined time series has a tendency to be balanced against each other. Jansen & Nahuis (2002) find that in most of the European countries which are included in the thesis, there are no long term relationship between consumer confidence and stock markets. The short run linkage is found in some of the countries and the contemporaneous correlation between equity prices and consumer sentiment is found.

In the research method the focus is to investigate if the stock market time series is caused by the time series of CCI or MCSI. If the future values of the stock market time series is more effectively defined with the passed values of its own and CCI or MCSI than just with the own pass values, it can be said that consumer confidence granger causes stock markets, which means that it precedes it. If only stock market history defines the trend better, then it can be assumed that the time series cannot be forecasted with any other values included in the regression. This relationship is explored by constructing autoregressive model with the Granger causality and then the consumer confidence figures are added in to the similar model. The regression coefficients are tested with F tests to see if the consumer confidence precedes the stock markets. (Granger & Newbold 1986.)

#### **6.4 Correlation test**

The statistical dependence between two linear variables is called correlation in statistical analysis. The relationship between the variables is the core point to start the empirical testing in the research. If the correlation is weak between two variables, it already provides a lot of information about the relationship, if the correlation is weak and two variables seem to be very weakly connected, conclusions can be drawn that the two variables do not effect to each other. Correlation is a measure of the relationship between two variables and it is useful because it can also predict in practice the possible relationship level. (Muijs, 2004.)

Correlation can be measured in many ways and it depends on the scale and the data that is used in testing. If the correlation is measured with ordinal scale the measurement is

usually non parametric type, such as Kendall's or Spearman's methods. These measures are based only on the order of the figures measured. With parametric time series correlation measurement, the requirement is that the variables are following normal distribution. In behavioral finance the distribution is defined as the distribution of human preferences. (Fray, 1992: 7.)

With parametric time series *Pearsons r* correlation coefficient is the most widely used and it provides the most simple measurement approach to linear dependencies between random variables. It is determined for distance and relationship scaled variables so it is used in financial research area frequently. It gives direct measurement of the intensity of the linear dependences. The meaning of the significance of these tests is great if the combined distribution is two-dimensional normal distribution. (Aldricht, 1995: 364.)

$$(15) \quad r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{(n-1)s_x s_y}$$

Pearsons r coefficient gives information about different aspects of the variables. A positive correlation figure indicates a positive direction. If consumer confidence is high and stock market index is high then the correlation can be said to be positive. Also this measure gives some indication about the strength of different variable. The closer the result is to +1 or -1, the more strong correlation it indicates to both directions. Consumer confidence and stock markets indices obviously go hand in hand, otherwise the markets would act irrationally, ignoring valid information but in this point of view the strength of different industries and the variation between these is more informative detail. So the positive correlation means that when the consumer confidence is positive and greater, the SP500 is also moving up. (Aldricht, 1995: 364.)

Jansen & Nahuis (2004) found that the rising stock prices and rising consumer confidence tend to go hand in hand. They did the research for 11 European countries and the results provided quite similar interdependencies among the countries. The contemporaneous correlation in UK based on their result gave the strongest correlation result. This could be referral to the fact that the private stock ownership is more widely spread in UK than in rest of the Europe by the time research was published. After the correlation is found, in most of the cases the Granger causality method implies to the direction. They chose the countries in Europe that they were able to get the dataset from 1986-2001. In this research the period of the data will be from the 1995-2010. The Time se-

ries index about the SP500 stock returns has been published since 1950's but the sub-sector split data is available as such from the year 1995.

The results in correlation testing is presented in charts below. In chart 5 the index is tested between SP 500 and CCI. In the chart 6. the stock market and MCSI is tested in a similar way.

**Table 2.** Correlation between SP 500 and Consumer confidence

SP 500				
0,279				
ENERGY	MATERIALS	INDUSTRIALS	COSNUMER DICR	CONS. STAPLES
0,025	0,225	0,305	0,317	0,184
HEALTH CARE	FINANCIALS	IT	TELECOMM	UTILITIES
0,137	0,292	0,242	0,233	0,106

**Table 3.** Correlation between SP 500 and Michigan consumer confidence

SP 500				
0,226				
ENERGY	MATERIALS	INDUSTRIALS	COSNUMER DICR	CONS. STAPLES
0,044	0,168	0,275	0,292	0,099
HEALTH CARE	FINANCIALS	IT	TELECOMM	UTILITIES
0,133	0,062	0,176	0,075	0,093

Both of the indices look to correlate significantly with the whole market portfolio. In the results the certain industries seem to correlate less significantly with the confidence and sentiment which would suggest that certain industries appear to be more dependent of the business conditions and expectations. In data sets energy, health care, telecommunications and utilities indices are not so significantly correlated with the CCI and MCSI. The correlation shows the long run relationship.

The Consumer discretionary correlates strongest in both of the indices. The index is structured in way that it includes companies producing discretionary type of products or services. These types of services consist of hospitality, entertainment and other areas similar that are more fragile during economic downturns. Rationally it should react more easily to the changes in sentiment. If the business condition expectations look to

be more negative in the future the consuming of the discretionary services should also follow this trend.

Also industrial sectors show quite strong correlation figure in both of the cases. Industrial sector fragility could be more heavily related to the confidence through the investment channel. The correlation analysis is not showing details about the length of the relationship but in industrial sector the effect would assume to appear in a longer lag.

In general CCI looks to correlate more significantly with SP 500 and sectors in almost all of the cases. One explanation for this could be the larger sample size of the survey which would smoothen out the results and keep the index more aligned with the stock markets. MCSI sample size is significantly smaller which would make the final result more volatile and dependent on individual opinions. CCI correlates with stock indices more strong in all the other cases than energy. Energy sector does not reflect strong correlation in either of the cases. This also provides some indications about the nature of this sector.

## **6.5 Granger causality**

The research method of the thesis is Granger causality which is a widely used in time series analysis. It has been used in similar studies before and the results suggest, that it provides better predictive ability compared to many other methods investigating similar area. In addition it is more simple approach to this kind of point of view. In conventional regressions investigator is interested in measuring the effect of an explanatory variable or variables on a dependent variable but it does not become evident which variable causes what. Regressions at the time series analysis is aiming to show if the explanatory variable may influence a dependent variable with a time lag. (Koop 2007: 75-78.)

In Granger causality the traditional regression analysis is extended to look in to the possibility that time series Y has been caused by another time series X if the current value of time-series Y can be predicted more accurately with the past values of Y and X than only with the past value of Y. In this case if the prediction power is stronger when Y is more predictable with X and Y, it can be said that X has Granger caused Y. If event X is in the past and event Y has happened later, it is obvious that X can cause Y but Y cannot cause X. If Granger causality holds it does not quarantine that X causes Y. If past

values of X have explanatory power for current values of Y it does suggest that X might cause Y. Granger causality method is only relevant with the time series variables. (Koop 2007,75-78 ; Jansen & Nahuis 2003: 91.)

The Granger causality investigation in the thesis is looking in to the possible causality relationship between consumer confidence and stock market performance by using the CCI and MCSI as the consumer confidence measures and the SP 500 index representing the stock market. All the time series are transformed to suite this methodology based on previous studies.

Jansen & Nahuis (2002: 92-93) formed following equations to test the Granger causality relationship between stock markets and consumer confidence

$$(16) \quad \Delta CC(t) = \alpha_c + \sum_{i=1}^k \beta_c(i) \Delta CC(t-i) + \sum_{i=1}^k \gamma_c(i) \Delta PS(t-i) + u_c(t)$$

$$(17) \quad \Delta PS(t) = \alpha_p + \sum_{i=1}^k \beta_p(i) \Delta PS(t-i) + \sum_{i=1}^k \gamma_p(i) \Delta CC(t-i) + u_p(t)$$

Where CC denotes consumer confidence, PS is the log of the stock price index, u is a disturbance and k is the maximum lag. In this model stock prices Granger cause consumer confidence if lagged stock market returns contain information that is not already contained in the past values of the consumer confidence index. The other equation shows the relationship other way around. A finding of the Granger causality to only one direction could be evidence of the view that the positive correlation reflects causality in to only one direction. If two-way causality is found, it indicates bidirectional causality. If there is no causality found it could indicate that the relationship can exist but it is extremely short-term or that common driving forces are the reason for the correlation observed. (Jansen & Nahuis 2002: 93.)

Then the next step is to do the F tests to show if the regressions explicable variables are even possible to explain by the explanatory values in this case they are the historical

values of the stock index data in regression one and in regression 2 and in addition the CCI and MCSI.

$$(18) \quad F = \frac{(RSS_R - RSS_{UR}) / m}{RSS_{UR} / (n - k)}$$

The  $m$  means the lag in consumer confidence,  $n$  refers to the amount of the observations in the sample and  $k$  means the amount of estimated parameters in the non limited regression. If the  $F$ -value is higher than the critical  $F$ -value in the chosen level of significance the hypothesis  $H_0$  can be abandon. This claims that adding the consumer expectation values in to the regression improves the predictability in the model. The test follows the  $F$ -distribution with  $m$  and  $(n-k)$ .  $M$  refers to the lag in the consumer confidence and Michigan sentiment,  $n$  is the amount of observations in the sample. (Granger & Newbold 1983: 257-260.)

The causality can appear in four different ways.

1. Unidirectional causality from stock index to confidence index. This is when the aggregated coefficients of the stock index values differ statistically significantly from zero. At the same time the aggregated confidence indicator coefficients do not differ from zero significantly.
2. Unidirectional causality from confidence to stock markets appears when the aggregated coefficients of the confidence differ significantly from the zero. At the same time the aggregated coefficients in stock index values do not differ significantly from the zero.
3. Bilateral causality appears when the values differ significantly from zero in both of the cases.
4. Independence appears when the coefficient do not differ significantly from zero in neither of the regressions.

In the Granger causality testing one can use autoregressive model if the time series are linear. In this case the data is linear so the autoregressive approach is good. Also the regulations of the stationary process with time series need to be considered here, so the



time series used are transformed to logarithmic. In case of using the non stationary time series data, a risk to get spurious results increases. In regression the Consumer confidence and Michigan sentiment indexes are dependent on the SP 500 whole market portfolio and industry subclasses. There is no relationship between independent variables. (Granger & Newbold 1983: 257-260.)

- H0            Consumer confidence does not improve the forecasting power of the stock market regression
- H1            Consumer confidence improves the forecasting power of the stock market

The error term  $u$  is assumed to be zero and not auto correlated so the assumption is that the term is not dependent on the history values, which suggests that the values are random. Also the variance is expected to be invariable in time which is aligned with the expectation about the stationary process that usually does not imply to economical time series. (Granger & Newbold, 1986: 257-260.)

## 6.6 Results

The following charts represent the results of Granger causality tests between the differentiated SP 500 stock index values and consumer confidence figures. All the tests for the limited and unlimited regressions are made with two lags. In all the charts the results are presented in a way that first the unlimited regressions F-test p values are shown in 2 lags and below the unlimited regressions both ways to see the possible improvement. In some cases the causality is visible in both directions. In case of some indexes the historical values do not seem to have any causal relationship in this model at all.

**Table 4.** Results between SP 500 , CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
SP 500 → SP 500	0,049*	0,595
CCI → SP 500	0,865	0,542
SP 500 → CCI	0,000***	0,362
MCSI → SP 500	0,315	0,921
SP 500 → MCSI	0,000***	0,768

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In case of SP 500 whole market portfolio the causality runs strongly from the stock market towards the whole market portfolio. In lag 1 the limited regression shows more significant results than in either of the unlimited models which indicate that the historical values of SP 500 can be assumed to be more accurate predictors of the index than with addition of lagged values of CCI and MCSI.

When looking in to the relationship other way around the lagged values of the stock market index improves the unlimited regression p value very significantly in both cases. This means that adding the log values of stock index in to the CCI and MCSI regressions, the model improves. In both cases it can be said that stock markets Granger cause the consumer sentiment. This indicates that null hypothesis cannot be rejected in significance of 0,001 and H0 remains.

**Table 5.** Results between CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
CCI → CCI	0,642	0,210
MCSI → MCSI	0,470	0,01**

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

The chart 8 shows the p-values for consumer confidence and MCSI causality. This chart provides the comparison background for the conclusions. According to the results the values of the consumer sentiment indicators does not imply to a strong predictive power with the historical values of itself. MCSI shows some statistically significant p-values in lag 2.

**Table 6.** Results between Energy index, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Energy → Energy	0,755	0,439
CCI → Energy	0,294	0,982
Energy → CCI	0,825	0,659
MCSI → Energy	0,294	0,982
Energy → MCSI	0,328	0,118

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

When looking in to the Energy sector the statistically significant causality does not appear. It looks that in the case of lags 1 and 2 the significance improves in case of the causality running from stock index to consumer confidence in both cases. Also in case of correlation Energy sector did not seem to have significant correlation against CCI or MCSI.

There could be many reasons why this independence phenomenon exists. Energy industry is not so heavily exposed to business cycles in terms of the nature of energy business. The consumption remains quite constant despite the economic fluctuation. Through this conclusion the result does seem quite rational. The weight of the energy sector in the whole market index is very high and dominating. The largest company Exxon alone has over 3,2 % index weight in SP 500 also being the largest publicly traded company in the world by market cap.

**Table 7.** Results between Materials, CCI

Direction	p value	
	lag 1	lag 1 & 2
Materials → Materials	0,000***	0,079*
CCI → Materials	0,957	0,175
Materials → CCI	0,839	0,004**
MCSI → Materials	0,833	0,983
Materials → MCSI	0,263	0,001***

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In materials sector the causality is running from the stock market to consumer confidence significantly in lag 2. In materials the results show that the causality effect is more long term. With both indices the stock markets can be assumed to improve the model in lag 2 which could indicate the nature of the companies included in the index.

**Table 8.** Results between Industrials, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Industrials → Industrials	0,04**	0,206
CCI → Industrials	0,212	0,441
Industrials → CCI	0,000***	0,535
MCSI → Industrials	0,024**	0,818
Industrials → MCSI	0,000***	0,563

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In industrials sector the causality can be seen to both directions. In a short run the unlimited regression looks to improve the p value significantly in both cases. MCSI shows causality from consumer sentiment to stock markets. When comparing materials and industrials sectors the difference in lags can be seen. Definition for this could be the fact that the industrials sector has more rapid and straight effect to consumer opinions. This could hold for many reasons such as the industrial sector visibility among private investors or the position of industrial sector as an employer. Other way around as the result partially shows the effect from consumer confidence to stock markets can be interpreted through demand. If consumer confidence is weakening the demand for services and goods is lower which affects to industry production levels. This result indicates that the result difference between materials and industrials sector do provide some information about the nature of the industry.

**Table 9.** Results between Consumer discretionary, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Consumer Discr. → Consumer Discr.	0,034**	0,018**
CCI → Consumer Discr	0,000***	0,506
Consumer Discr → CCI	0,391	0,187
MCSI → Consumer Discr	0,226	0,736
Consumer Discr → MCSI	0,000***	0,978

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

The consumer discretionary index contains the kind of companies that would be assumed to be the most vulnerable to the fluctuations in consumer behaviour. Results show that in case of CCI the causality runs from the CCI index to stock prices and no other way around. This result indicates that the consumer confidence index precedes the direction of the stock market index. Though this result is only seen in the case of CCI. In MCSI the direction is vice versa. The same kind of relationship applies other way around strongly. Both effects appear in lag 1. The result in CCI does seem rational because of the nature of the companies included in to this index. Like the name of the index indicates the companies included in to it are providing services and products that are very dependent of the good and the bad times. Many of these companies are functioning in the area of hospitality, entertainment and discretionary retail. The CCI has stronger correlation with stock market and it has more reliable sample size of the households included in the questionnaire.

**Table 10.** Results between Consumer staples, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Consumer staples → Consumer staples	0,167	0,643
CCI → Consumer staples	0,740	0,704
Consumer staples → CCI	0,007**	0,605
MCSI → Consumer staples	0,670	0,649
Consumer staples → MCSI	0,034**	0,503

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

Consumer staples index represents the companies that provide services and products that has quite constant demand, independent of the business cycle. In this case results vary when comparing to consumer discretionary index. In a short run in both cases the causality moves from stocks towards consumer opinions. The values improve significantly in both indices but other way around the causality assumption does not hold.

**Table 11.** Results between Health care, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Health care → Health care	0,925	0,670
CCI → Health care	0,334	0,697
Health care → CCI	0,017**	0,655
MCSI → Health care	0,847	0,578
Health care → MCSI	0,002***	0,630

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In Health care sector the short term causality runs from the stock markets towards consumer sentiment. In USA health care business index contains in addition to more traditional health care and pharmaceutical corporations, also companies that function in the area of health insurances. The own historical values of the health care index does not look to have any predictive power in this case according to the p value. Especially in CCI case, adding the lagged values improve the p value in some extent but still the results don't show any strong statistical significance.

**Table 12.** Results between Financials, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Financials → Financials	0,025**	0,496
CCI → Financials	0,506	0,112
Financials → CCI	0,000***	0,303
MCSI → Financials	0,424	0,755
Financials → MCSI	0,000***	0,995

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In Finance sector the predictability seems to be strongest among all the cases in a short run. The causality runs from stock markets towards consumer sentiment and the forecasting power of the regression improves significantly in lag 1. This obvious causality can be speculated to exist because of many things related to the nature of the industry. Finance sector includes financial institutions that have direct effect as a credit channel which effects to consumer opinions. Also some directions in the index have wide visibility in public and through this their position has a strong effect to consumer behavior.

**Table 13.** Results between information technology, CCI and

Direction	p value	
	lag 1	lag 1 & 2
Information Technology -->Information Technology	0,798	0,780
CCI--> Information Technology	0,772	0,015
Information Technology -->I	0,001***	0,047**
CCI --> Information Technology	0,290	0,779
Information Technology --> CCI	0,002	0,015

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

Information technology index is the only index in the sample that shows that the causality is running strongly in both lags from stock markets to consumer behavior. In the chart the lag 1 and 2 both show significant causality though the significance is weakening in lag 2. Information technology index contains companies providing solutions and software products for different industries.

**Table 14.** Results between Telecommunications, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Telecommunications --> Telecommunications	0,064*	0,810
CCI --> Telecommunications	0,544	0,937
Telecommunications --> CCI	0,002	0,845
CCI --> Telecommunications	0,09*	0,250
Telecommunications --> CCI	0,001***	0,911

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In telecommunications sector the short run causality goes from stock markets towards consumer confidence in both cases. In lag 2 no causality is visible in neither of the cases. Telecommunication industry is vulnerable for business cycle effect in some extent. Telecommunication index has a very small weight in the whole portfolio and there are not too many companies included in the telecommunications index.

**Table 15.** Results between Utilities, CCI and MCSI

Direction	p value	
	lag 1	lag 1 & 2
Utilities → Utilities	0,064*	0,810
CCI → Utilities	0,831	0,776
Utilities → CCI	0,244	0,817
MCSI → Utilities	0,831	0,685
Utilities → MCSI	0,104	0,477

p-values: 10% (\*), 5%(\*\*), 1%(\*\*\*)

In utilities the causality does not seem to exist in neither of the cases. In correlation testing phase of the thesis, Utilities index did not seem to have strong correlation with either of the indices. This indicates that the sector is not moving tightly in to same direction with the consumer sentiment. Many of the companies in Utilities sector operate in electric services and companies generating power. This industry is also very much independent of the market fluctuations and the movements are quite constant over time.

## 6.7 Conclusions

The thesis is handling the relationship and causality between consumer confidence and stock markets in United States. The null hypothesis for the empirical part was that monthly Consumer Confidence figure and Michigan consumer sentiment figure would not have predictive power against stock markets. If the predictive power would appear this finding would indicate some inefficiency in the market so it would be a finding against the efficient market hypothesis. The method used is Granger causality, which is a method that has been used successfully in similar area of research before. The sample



period is monthly observations of SP 500 stock index and CCI and MCSI figures from 1995 to 2010. Also all the regressions are tested with 2 lags.

According to the correlation test results, both CCI and MCSI correlate with stock markets. This indicates that the relationship exists and indices tend to move in to same direction in a long run. The whole SP 500 portfolio correlates with both indices, CCI showing slightly stronger relationship. In sector level approach the correlation test shows that both of the indices correlate significantly with Materials -, Industrials - , Consumer Discretionary-, IT- and Tele communication services indices. Also both of the indices show lower correlation with Utilities- and Energy sectors.

The second part of the empirical results in Granger causality shows quite straightforwardly that stock market precedes consumer opinions. This indicates that the H0 placed in this thesis cannot be rejected. In previous studies the results have been reported to show very similar results and they have been aligned with efficient market hypothesis in a long run. Consumer confidence and market sentiment lag behind stock markets. However the sector split shows some differing results which indicate that the causality is moving in to 2 directions.

The anomalous results arise when the data is divided to sector level. The only significantly anomalous result can be found from consumer discretionary index where the results indicate that Consumer confidence figure granger causes stock index in lag 1 significantly and there is no causality running from stock markets in this case. MCSI does not provide similar results. In CCI the sample size of consumers is significantly larger, which could offer one explanation for the differing results. Consumer discretionary index contains companies that provide services and products that are sensitive to market conditions.

Previous research in the area of the relationship between consumer expectations and stock markets has been showing very similar results. Stock markets act as the leading indicator and the reactions in the common sentiment follow this trend in a long run. This confirms the informative role of the stock markets in the modern economy as well. Positive correlation is reported to appear in several studies in similar area.

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## **APPENDIXES**

### **MICHIGAN CONSUMER SENTIMENT SURVEY:**

#### **PRESENT CONDITIONS QUESTIONS:**

Q1: Do you think now is a good or bad time for people to buy major household items?  
Good time to buy/uncertain, depends/bad time to buy

Q2: Would you say that you (and your family) are better off or worse off financially than you were a year ago? Better/same/worse

#### **EXPECTATIONS QUESTIONS:**

Q3: Now turning to business conditions in the country as a whole – do you think that during the next twelve months, we'll have good times financially or bad times or what?  
Good/uncertain/bad times

Q4: Looking ahead, which you would say is more likely – that in the country as a whole we'll have continuous good times during the next five years or so or that we'll have periods of widespread unemployment or depression or what? Good times/uncertain times/bad times

Q5: Now looking ahead – do you think that a year from now, you (and your family) will be better off financially or worse off, or just about the same as now? better/same/worse

**CONFERENCE BOARD CONSUMER CONFIDENCE SURVEY**

**PRESENT CONDITIONS QUESTIONS:**

Q1: How would you rate present general business conditions in your area?  
good/normal/bad

Q2: What would you say about available jobs in your area right now? plentiful/not so many/hard to get

**EXPECTATIONS QUESTIONS:**

Q3: Six months from now, do you think business conditions in your area will be better/same/worse

Q4: Six months from now, do you think there will be more/same/fewer jobs available in your area

Q5: How would you guess your total family income to be six months from now? Higher/same/lower

