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# The relationship between advertising and household loans

Master thesis within Business Administration

Author: Daniel Sahlin, Gustav Sjögren

Tutor: Helén Andersson

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## Master Thesis within Business Administration

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| **Author:** | **Daniel Sahlin, Gustav Sjögren** |
| **Tutor:** | **Helén Andersson** |
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# Abstract

**Background:** Advertising expenditures are increasing on a yearly basis. An interesting question emerges from this: What are the macroeconomic effects of increasing advertising spending? Does the aggregate consumption increase or does it only rearrange consumption between different products and markets? The relationship between advertising and consumption was found in the literature, this relationship was further developed and the relationship between advertising and household loans emerged as an interesting subject.

**Purpose:** An econometric analysis method was used to test the relationship between the aggregated advertising expenditure and the aggregated sum of household loans, in order to investigate whether advertising spending cause changes in the use of total household loans in Sweden.

**Conclusion:** Our research did not conclude that aggregate advertising spending causes changes in the use of total household loans in Sweden. However, evidence was found which supports that household loans cause advertising expenditures. An implication of the findings is that the relationship between aggregated sum of household loans and advertising might be as interrelated as between advertising and consumption, and should be further researched. Another implication is that it might not be appropriate to purely look at advertising and consumption to increase the further understanding of the two variables. Introducing household loans as a funding variable to the consumption function can be seen as a new and interesting approach.

# Content

## Figures

## Formulas

## Tables

# 1 Introduction

*This section will provide the reader with a background of this thesis. It includes an introduction to the theories in this area as well as a problems discussion that addresses interesting problems related to the topic. The purpose and three hypotheses are presented in the end.*

## 1.1 Background

The subject for this thesis originates from an idea proposed by Prof. Adele Berntd from the University of Johannesburg in South Africa. This idea was communicated to us via Prof. Helén Andersson at the Jönköping International Business School in Sweden. Prof. Adele Berntd had collected statistics regarding advertising expenditures from different companies in the Johannesburg region. What she found from these figures was that advertising expenditure had increased on a yearly basis. Two interesting questions emerged: firstly does advertising expenditure increase in other countries outside of South Africa? Secondly, what are the effects of advertising?

A brief look at statistics regarding the aggregated advertising expenditures in Sweden showed a similar trend as the one in South Africa. Since the statistics provided by Prof. Adele Berntd were inconclusive the authors decided to focus explicitly on Sweden. A literature review regarding the effects of advertising was conducted, the focus of this thesis continued at the aggregated macro-economic level.

Jacobson and Nicosia (1981) recognizes four research traditions on different levels. They investigate the relationship between advertising and: (1) Brand or company image, (2) Product sales, (3) Industry context and, (4) Macroeconomic variables.

> *"The study of the possible macroeconomic effects of advertising is relevant to a better understanding of the 'functioning' of any economy"* (Jacobson & Nicosia, 1981, pp. 30)

Research on the macroeconomic level is concerned with the relation between advertising and different phenomenons in the economy. One such phenomenon recognized as more important is consumption (Ekelund and Gramm 1969; Duesenberry, 1967; Ackley, 1961). One finds two opposing view in this field. Firstly, one recognizes scholars who advocate the notion that there is a causal link between aggregated advertising expenditure and aggregated consumption (Peel, 1975; Jung & Seldon, 1995; DiPietro, 2007). An overall increase of advertising per capita leads to an overall increase of consumption per capita. An implication of such a relationship is that adjustment in one of the variables would adjust the other as well; based on that a third variable can be excluded. For a government it could be used as a control function to stabilize the economy, besides the tool of changing interest rates.

Secondly, one recognizes the opposite, where scholars do not find a casual relationship (Schmalensee, 1972; Chowdhury, 1994). An overall increase of advertising per capita does not lead to an overall increase of consumption by capita; instead it rearranges the consumption within the market.

Advertising is a broad term that consists of numerous types of actions. It includes TV-commercials, magazine ads, store signs, search word optimization, and many more (See appendix Advertising spending). One cannot argue against the fact that corporations spend money on advertising. Hence, it must have some beneficial effects on revenue. If it does not in the end create revenue for the corporations why then would they choose to spend money on advertising?

When thinking about the opposing views one can further recognize the complexity of the issue. The old question: *"What came first the egg or the hen?"* surfaces as an analogy. Does advertising lead to consumption or does consumption lead to advertising? It has been proven that an increase in consumption leads to an increase in advertising (Schmalensee, 1972; Quarles and Jeffres, 1983), which is conceivable as companies reserve a part of their earnings for future advertising. Some recent research has however showed the possible existence of a two-way relationship (Jung & Seldon, 1995; Ashley, Granger & Schmalensee; 1977).

Furthermore, ever since research on advertising begun there has been an ongoing debate whether advertising is good or bad. Albion and Farris state: *"A major point of divergence between the two main streams of research into the economic impacts of advertising is whether advertising should be regarded as persuasive or informative in nature"* (Albion & Farris, 1981, pp. 38). Basically, advertising as information describes how the consumer is helped by advertising to make good rational decisions. The school of thought that sees advertising as persuasive, argue that advertising promotes irrational consumption behaviors, which are unhealthy; both on an individual and societal level (DiPietro, 2007). They argue that the persuasive nature of advertising creates wants and needs for things that we actually do not need.

## 1.2  Problems discussion

In the previous body of text the terms advertising and consumption were used. After reviewing the literature related to the relationship between these two variables, one finds a great deal of discussions on whether advertising is good or bad. One could ask two simple questions: what is consumption? Is it good or bad? According to Keynesian economics, consumption is the purchase of products and services out of the disposable income that does not go to savings (Ackley, 1961). Related to the latter question, DiPietro states that: *"We live in a world of scarcity in which there are limited resources. The maximization of happiness from*

*these scarce resources requires two efficiencies. The first is efficiency in production, and the second is efficiency in consumption"* (DiPietro, 2007. pp. 65).

DiPietro (2007) implies that consumption is not something that is necessarily good; his statement is quite controversial when investigating how wealth/welfare is measured. A debated and often used measure of wealth is the Gross National Product (GNP), the formula on how to calculate this number is: consumption + investments + exports – imports. This implies that consumption is good for the wealth and welfare of a nation. Hence, growth in consumption leads to growth of GNP, which ultimately leads to growth of wealth and welfare. Since the 1970s the Swedish average annual GNP growth has been 2,2% (Ekonomifakta, 2007). With DiPietro's statement of "a world of scarce resources" in mind, how long can we have this growth until all of our resources' are depleted? On the website of the Swedish government it states that economic growth has to be sustainable. Can annual growth be sustainable? What does 2% annual growth of GNP means? By dividing 70 with 2 one gets the doubling time of 35 years. That means that if our GNP is 1 today in one lifetime (70 years) our GNP would reach 4. And in another lifetime our GNP should reach 16! With this in mind one could easily state that sustainable economic growth is an impossible theorem because of the world's finite resources.

As we have seen in the background chapter, in the field of advertising research there has been extensive research conducted in the past hundred years or more. Interestingly, no real evidence on the effects of advertising has been presented. The views on advertising are as conflicting as the ones made between market economy and central planned economy. However, since companies spend money on advertising it has to have some effect.

The trend in the past decade in Sweden is that household loans increase related to the income. Why do we need to take all these loans? One could argue that loans are not dangerous as long as one can pay the interest and the mortgage. Loans provide an option for people to finance consumption on important things like housing. However, there are not only positive effects of the possibilities of having a loan. There has for example been a recent debate about short-term loans that one can make only by sending a text message from a mobile phone. From the time that one sends the text message it takes about 15 minutes until the money is deposited into ones account. Sounds like a very innovative and convenient service. However Kronofogdemyndigheten predict that they will receive around 10 000 (Kronofogdemyndigheten, 2007) reports of people who cannot pay their debts from these kind of loans. The mere existence of these loans shows that they are profitable for the companies providing them. But, can it be said that the companies are taking their responsibility when providing a service (supported by advertising) that puts people into debts they cannot pay? This could be evidence that consumers finance their consumption

with money that they do not have and that regulations might be needed to avoid this.

Can this be evidence that supports (Galbraith, 1967; Chowdhury, 1994; DiPietro, 2007) view of advertising as a persuasive force that alters people's spending and saving habits? Also, that this persuasive force creates irrational consumption behaviors that is unhealthy both for the individual and society. DiPietro argues that savings are affected by consumption. If the consumption increases related to the income level and the savings level decreases related to the same income level (DiPietro, 2007). If this is true people would need to finance their additional unneeded consumption either by loans, or the expense of future savings. If advertising expenditure effects consumption and this over consumption is paid by loans one could argue that their might be a relationship between advertising expenditure and the use of loans. Hence, it would be interesting to investigate the relationship between advertising and the use of household loans in Sweden.

How can his relationship be investigated? This thesis will investigate the relationship between these two phenomenons on an aggregated level using econometric methods. These methods can be considered as "objective" however, the results have to be analyzed and conclusions drawn which make it more subjective in nature. The results are concluded from an aggregated level and suggest a generalization of the truth. Although one could ask the question whether the "objective truth" is out there to find? And if we have the correct tools to conduct such a daunting task?

## 1.3 Purpose

An econometric analysis method will test the relationship between the aggregated advertising expenditure and the aggregated sum of household loans, in order to investigate whether advertising spending cause changes in the sum of total household loans in Sweden.

### 1.3.1 Hypotheses

H1. Aggregated advertising expenditure and the aggregated sum of household loans is co-integrated.

H2. There is a causal relationship from the aggregated sum of household loans to the aggregated advertising expenditure.

H3. There is a causal relationship from the aggregated advertising expenditure to the aggregated sum of household loans.

# 2  Theoretical framework

*In this part of the thesis relevant theories are presented. They are used as a framework for the thesis in order to be able to fulfill the thesis purpose and answer the hypotheses.*

When doing research in the field of advertising there are four different traditions depending on what is being studied and the level of aggregation *"The **first research tradition** concerns the effects of the advertising of a specific brand, product, or image of a company. The **second research tradition**… …assesses whatever advertising contributes to the sales of a product or a products class level. The **third research tradition** consists of studies of the advertising economic effects at the industry level."* (Jacobson & Nicosia, 1981, pp. 29)

The fourth research tradition concerns issues regarding advertising and macroeconomic effects. This tradition is used to answer questions that the first three cannot; due to that it is a *"quantum jump to generalize the results of industry studies to the macro effects of advertising in an economy and society"* (Jacobson & Nicosia, 1981, pp. 30). Question's the fourth research tradition may be able to answer at which the first three fails is suggested by Jacobson & Nicosia (1981, pp. 30): *"Does advertising contribute to economic growth? Under which conditions does the contribution vary, e.g., according to the phase of business cycle? … … -To which extent do advertising expenditures affect consumer sentiments, aspirations and expectations?"* Another approach discussed is the question if advertising expenditures will alter people's consumption patterns? Making them consume today at the cost of savings (Chowdhury, 1994).

A question related to the purpose of this study and which also can be related to the fourth research tradition is if there is a relationship between aggregate advertising and aggregate sum of household loans. Loans are considered in this thesis as a type of consumption, which has further effects on other kind of consumption. It is an interesting topic, as consumption is recognized as more important than other variables when researching advertising and the macro economy because of the consumption function, which lay at the heart of the Keynesian macroeconomics (Ekelund and Gramm 1969; Duesenberry, 1967; Ackley, 1961).

The frame of reference will be presented in chronological order. At the end of each chapter a short summary and comment on how it relates to the purpose of this thesis will be presented in bold. Also the authors will in the final chapter argue why the purpose is interesting and where it is derived from. A conceptual model is presented in order to visualize the purpose and the thoughts of the authors. Moreover, based on the conceptual model that is derived from the frame of reference, three hypotheses will be presented.

## 2.1    The Galbraithian argument

J.K Galbraith is arguably one of the most famous economists in the 20<sup>th</sup> century. Along side being a teacher at Harvard and serving four presidents he wrote a long list of books and articles. According to Quarles and Jeffres: *"One of the most resistant unresolved questions in economics is whether advertising is capable of causing a nation's consumers to spend income they might otherwise save… …The question was popularized by an academic maverick, John Kenneth Galbraith, who saw advertising as a high priest of a cult of materialism, a cult that reveres acquisition and gratification above all else"* (Quarles and Jeffres, 1983, pp. 4).

In his book, "The Affluent Society", Galbraith argues that, as a society becomes more affluent (wealthy), private corporations' need to induce consumer wants through marketing and advertising. Since there is a scarcity of resources the increased consumption of commercial goods and services comes at a price, namely the neglecting of the public sector and its services. Furthermore, Galbraith argues that the way in which these demands and wants are created relate to debt. Increased level of debt in order to consume is a step in the process in which new demands are created. Advertising and competition work together in the society to create demand. It affects both those who can afford to satisfy these demands and those who cannot. Those who cannot immediately afford to pay, use loans in order to finance their consumption (Galbraith, 1959). Furthermore in his book "The New Industrial State", Galbraith argues that the classical economic theory does not apply in the modern capitalistic societies. For example the supply and demand model becomes unbalanced since suppliers use extensive amounts of advertising to increase the demand for their products. Hence, Galbraith argues that the term perfect competition does not exist in a modern capitalistic society (Galbraith, 1967).

**The purpose of this thesis fits into the fourth research tradition, as it is advertising and sum of household loans at an aggregated level that are investigated. Furthermore, the ideas by Galbraith presented above serves as a foundation for the purpose of this thesis.**

## 2.2    Advertising as information or persuasion

There has been extensive research conducted on the subject of advertising, a constant debate whether advertising is bad or good has been evident. *"A major point of divergence between the two main streams of research into the economic impacts of advertising is whether advertising should be regarded as persuasive or informative in nature"* (Albion & Farris, 1981, pp. 38). In this paragraph, prior research concerning these two conflicting views is presented. However, when doing a literature review on the previous research on the technical aspects of macro-economic affects on advertising. One finds that previous studies focus extensively on relationships and casualties between the phenomenon of advertising and other macro-

economic variables, but do not focus on the bad or good of advertising as a phenomenon.

### 2.2.1 Advertising as information

In their article "Is advertising rational?" Davis, Kay, and Star (1991) argue whether advertising is rational or not. It opposes the view of Doyle (1968) and Galbraith (1986); the authors do not think that advertising persuades people to buy things that they do not want to consume. *"Advertising is not a process by which gullible consumers are persuaded to buy things they do not want, according to the authors of this paper."* (Davis et al, 1991, pp. 1)

On the contrary they view advertising as a means of providing information to rational consumers. The purpose of the article: *"Our objective here is to outline the alternative account of advertising and to subject it to some empirical scrutiny. We also outline some implications of this view."* They use personal ads in magazines as an example when arguing for their case on rational consumers. The following argument is used; there is no reason to lie in order to get a date easier, for example lying about physical appearance. The reason for this is because the lie will be obvious at the first date and there will not likely be a second date. The authors argue that advertising provides information on quality, it reveals the market position and it provides factual information. Furthermore they state: *"It is not so much the claims made by advertisers that are helpful, but the fact that they are willing to spend extravagant amounts of money on a product that is informative."* (Davis et al, 1991, pp.1)

The result of their paper consists of three pieces of evidence. By analyzing different advertising ratios the authors argue their case. Firstly, the ratio of advertising and sales is analyzed; they find some support for their alternative view. Secondly, according to the authors there is evidence found when analyzing the relationship between advertising/sales ratios and purchase frequency. Lastly, the analysis of the relationship between quality and advertising intensity provides ambiguous evidence supporting their view.

### 2.2.2 Advertising as persuasion

The effect of advertising expenditure on household consumption: the cross country evidence by DiPietro (2007) is divided into six sections; the first three provide an overall theoretical view on the relationship between advertising expenditure and household consumption. The fourth section discusses and presents a consumption function for estimation. A fifth section presents results from a cross-country regression of household consumption and advertising expenditure. The sixth and final section provides a conclusion.

In his first section he argues why rational behavior is important. *"We live in a world of scarcity in which there are limited resources. The maximization of happiness from these scarce resources requires two efficiencies. The first is efficiency in production, and the second is efficiency in consumption. Efficiency in*

*production, or, rational production, requires that we maximize output from any give amount of resource input, or, what amounts to the same thing, that we minimize resource use for any give level of output. Efficiency in consumption is similar to efficiency in production. Efficiency in consumption, or, rational consumption, means getting the most we can out of consumption goods, or, using the least amount of consumption goods possible to achieve a given level of happiness"* (DiPietro, 2007. pp. 65).

The second section argues that the danger of advertising is its ability to undermine rational decision-making. He argues that advertising affects can alter the human psyche. *"Specifically, advertising promotes, glamorizes, and extols irrational decision-making. It sells the idea that you are happy when you let yourself go, disregards relevant constrains and logical considerations, and act irrationally"* (DiPietro, 2007. pp. 66). In order to describe why advertising is so dangerous in terms of creating misconceptions, DiPietro uses the following analogy. Perfectly normal and well-educated women become abducted by evil villains are given heroin injections against their will. This continues for a long period of time until these women become stuck in their addiction to heroin. After a long period of time external observers view these women as drug addicts and prostitutes. These observers condemn the women because the do not know the injustice that caused the addiction.

In the third section the conflict between the business interests in advertising versus the public interest. DiPietro argues that if advertising would not increase household spending there would be little or no advertising at all. *"..It is an uncontroversial fact that an enormous amount of money is devoted to advertising. Since business decisions are made on a rational basis, the force of competition weeding out people who choose to behave otherwise, it follows that advertising must be successful in augmenting consumer demand for business products"* (DiPietro, 2007. pp. 66). This fact, according to DiPietro, causes several potential social problems. The first problem is savings. If consumption increases related to a given level of income, the savings related to the same level of income decreases. According to DiPietro, this problem is evident in The United States of America where Americans are saving too little for the future in terms of retirement savings. Secondly, DiPietro see advertising problematic because it defines how others see us. *"To the extent we adopt the advertised views of the ways other see us, and to the extent we become sensitive to these perceived views, our psyches have been altered so that we are walking the irrational advertising tune and not our own"* (DiPietro, 2007. pp. 67). The third issue concerns the throw away society that advertising promotes. It opposes the rational approach of trying to get as much as possible out of the consumption goods.

The fourth section presents the consumption function. This function consists of two parts: income per capita and country advertising. Together with data from the World Advertising Research Center (WARC 2004) a cross country analysis is conducted.

In the fifth section the cross country empirical findings are presented. Four different sets

of regressions are used in order to analyze the affects of advertising on household consumption. These sets are cross-country regressions for the year 2002.

1. Regressions of household final consumption expenditure per capita on total advertising per capita and various forms of advertising per capita

2. Regressions of household final consumption expenditure per capita on the level of total advertising expenditure and on the levels of the various forms of advertising expenditure

3. Regressions of the percentage of household final consumption expenditure to gross national income on total advertising per capita and various forms of advertising per capita

4. *Regressions of percentage of household final consumption expenditure to gross national income on the level of total advertising expenditure and the levels of various forms of advertising expenditure*

The results from these regressions indicate a positive relationship between consumption and advertising.

The final and sixth section concludes that rational consumers are important in a world of scarcity. DiPietro argues that business will continue to advertise as long as there is a positive relationship between advertising and household consumption. The empirical findings of the article indicate a positive relationship between advertising and consumption. *"This means, within the theoretical gestalt of this paper, that human beings in a capitalist system without any checks on advertising have a major social problem"* (DiPietro, 2007. pp. 73).

**When looking at research within the field of advertising and macro-economic effects of advertising one finds the proponents hold different views. These views are arguably highly subjective. As seen above Davis, Kay, and Star (1991) argue that advertising is informative in nature. And there is no such thing as a "gullible consumer". DiPietro (2007) oppose this view and argue that advertising is a most persuasive force that alters peoples spending behaviors, which are unhealthy for both the individual and the society.**

## 2.3 Previous studies on the relationship between advertising and macroeconomic variables

During the years, there have been several quantitative studies conducted where different techniques, and data has been used, to investigate the relationship between advertising and different macroeconomic variables. The common denominator is the belief that advertising affects the level of aggregate demand (Schmalensee, 1972). The results have been varying accordingly to the number of researchers. The reason why advertising is interesting to study and compare is because the results will give *"a better understanding of the 'functioning' of*

*any economy, especially one that has entered a postindustrial affluent state"* (Jacobson & Nicosia, 1981, pp. 29). This chapter will present a review of those earlier studies to address findings already made in this area of research. This is done in order to put the thesis into a context and clarify the intent of the purpose in this study. In this chapter methods and techniques is mentioned which have been utilized when doing research in this field of research. They are not further explained other than by name in the chapter as they are not used as a method in this thesis.

## 2.3.1 Early research

Borden (1942) was the first one who led a major study of the relationship between advertising and different macroeconomic variables (Jacobson & Nicosia, 1981). The question he wanted to answer was *"Does advertising help or hinder the successful functioning of the economy and the advance toward a greater measure of well being?"* (Borden, 1942, pp. 649) He made this by using graphical analysis, comparing annual advertising data (1919-1940), with variables such as national income. One of the findings in the study was that advertising might accentuate fluctuations in the business cycle. And that advertising is used more during economic booms than during economic depressions. It was not proven whatever the advertising caused cyclical fluctuations or not (Borden, 1942).

There are some criticisms presented by Jacobson & Nicosia (1981) concerning Borden's study. He did not use a complete set of data, excluding some media and local advertising. Further the use of a turning point analysis is a method that does not take into consideration autocorrelations between data. Moreover turning point analysis does not make use of the internal information in the examined time series. Because of this the significance of their data is uncertain (Jacobson & Nicosia, 1981; Ashley, Granger and Schmalensee, 1980).

**Introduction of the consumption function**

Ackley (1961) confirmed the importance of the consumption function, which played a central role in the Keynesian macroeconomics. The idea, which was both theoretical and empirical, supported by e.g. budget studies, was that the variables in Classical macroeconomics was not enough to stabilize the economy. Classical macroeconomics emphasized the importance of (1) the interest rate as defense against savings-investment disturbance and (2) flexible wage-price level defense against threats to full employment (Ackley, 1961). But he recognized that these two variables were not enough to manage if you want to stabilize the economy, you had to use the consumption function as well. Two key aspect of the consumption function is that (1) real consumption expenditures are a stable function (there is a correlation) of income and (2) the marginal propensity to consume is positive but less than the total amount of consumption and saving related to income, i.e. you can not spend and/or save more money than your income consist of. The

way in which the consumption function affects the economy works in two ways. A reduction in present consumption will permit greater future consumption (investment) through (1) enabling future dissaving and (2) through the larger future income, by which the large wealth will earn (Ackley, 1961).

Ackley (1961) also raised the question if there is a lag in the correlation between income and consumption. The lag could for example be caused by that one is not able to consume income that has not already been earned or the psychological effects of consumption i.e. waiting for a new model of a product to consume even if the present model could have been consumed right away. The first cause of lag was however neglected because it presumes that there are no available savings from previous time periods to consume. If there were a lag he recognized that future research would need to be conducted with high frequent data measures, there might not be enough to make annual measures.

On the subject of advertising and consumption Ackley (1961) said that there might be a link between selling efforts and consumption, but that there was little reason to pay attention to that. This was because it at the moment there had not been any independent measures of the effect of selling efforts and that there are not any fluctuations in the short run (Ackley, 1961).

Verdon, McConnelland and Roesler (1969) aimed at looking to total the expenditure of advertising and comparing it to variables in the business cycle e.g. aggregate demand. They did this by comparing *"(1) peaks and troughs for advertising expenditures and business cycles, (2) changes in the amplitude of variation in advertising and aggregate series, and (3) the direction of movement and degree of relationship among advertising and aggregate series"* (Verdon, McConnelland and Roesler, 1969, pp. 2). Their finding was that variations in advertising do not contribute to economic stability. What they found was that advertising lagged behind the business cycle at cyclical turning points. Generally but not always, advertising expenditure strengthens upturns in the business cycle and accentuated downturns, which support the findings of Borden (1942).

Criticism to their research is that they did not use complete data, but only national advertising, which is regarded as only 30% of the total advertisement. Furthermore the same criticism is applied to the method as in Borden's study.

Their result correspond to the notion that advertising is a cost which companies in good times spend more on, but in bad times may be the first cost to be cut.

**Relating consumption to advertising**

Two other separate research studies supported Ackley's (1961) theory and further established that notion of the important connection between advertising and consumption. They stated that a link between advertising and the economy, must be established with consumption because it corresponds to better than GNP and/or industrial productions (Ekelund and Gramm, 1969; Duesenberry, 1967).

The purpose of Ekelund & Gramm's (1969) study was to investigate if advertising, as an extension of the consumption function, could be used as a tool to promote economic stability. By doing this they rejected Verdon's et al. (1969) notion of the importance in the relationship between advertising and aggregate demand. They argued that advertising would not noticeable affect the demand of government investment and spending (Ekelund & Gramm, 1969).  Instead their method was to use regressed de-trended advertising data on current and lagged advertising by looking at past, present and future advertising expenditures. They used that data on de-trended personal consumption expenditures. Data of quarterly national advertising expenditures in the period 1949-1960 was fulfilling Ackley's (1961) recognition of the importance to use high frequent data.

They did not find any significant relationship between advertising and aggregate demand and their equations explained little variation (Jacobson & Nicosia, 1981). Their conclusion was that even if advertising affects the economy there might be other variables that are more cost-effective to manage for the purpose of stabilization. Critiques to their study were that they had serious correlation problems and that they excluded local advertising data (Jacobson & Nicosia, 1981).

**Advertising is a barrier of entry**

In his book Schmalensee (1972) investigates the relationship between advertising and different variables. He did not look at this as much on a macro-economic level but looked for example instead at the cigarette industry, using annual data 1955-1967. However he made some interesting findings related to the macro-economic level. First he saw that companies tend to spend some percentage of their sales on advertising. The advertising expenditures tended to adjust rapidly to changes in consumption. This would explain the findings that consumption affects adverting expenditures with a little lag found by some researchers (Schmalensee, 1972; Verdon, McConnelland and Roesler, 1969; Borden, 1942).

He suggested that sales affect advertising, which in turn affect sales again. This he called a *"simultaneously system with attendant estimation problems of identification and consistency"* (Schmalensee, 1972, pp. 243). Further his standing was that national advertising does not influence aggregate consumption. He also stated that advertising is a barrier of entry in industries. Another important finding was that the effects of advertising was reduced

quickly often within a year. This supports Ackley's (1961) notion that research in the subject had to be done with high frequency data. However you could question if this also was overall true in other industries besides the cigarette industry.

The next researchers to investigate the issue were Taylor and Weiserbs (1972). As noted by another researcher (Schmalensee, 1972) they thought that advertising is a barrier of entry in a market. Furthermore they stated that advertising is used to successfully shift the demand between individual products but that there where little agreement that advertising affect aggregate consumption. Their purpose, by the use econometric methods, was once again to examine if advertising has an effect on the aggregate consumption function, but this time with another method approach which was a two-stage least-squares procedure. A method used to investigate the integration between time series but which not can be used to explain to the complete relationship between time series. They used annual data from 1929 to 1968. They were the first researchers to find evidence that advertising affects aggregated consumption in both directions. Consumption leads to more advertising which had been proven found by researchers before, but more important that advertising affects aggregated consumption, it seemed clear that advertising affect the economy in some way (Taylor and Weiserbs, 1972). Although their findings support the Galbraithian argument and the basic presumptions in this thesis, we must question their findings, due to their incomplete method and data set. Following the critique of their own research they did however also say that it should not be stated definitely. This was because of the possible restriction of their technique and aggregation errors. Other researchers critiqued (Jacobson & Nicosia, 1981; Ashley, Granger and Schmalensee, 1980) the use of annual data, which do not allow detection of relationships within the year and the lack of measurement variation. They also agreed with the authors own critique that the model used may be wrong, because such technique are not intended for use in detecting casual detection.

**In relation to the purpose the section above add the notion that advertising expenditure is an interesting and important macro-economic variable.**

**Concluding the research conducted before the Granger method, one see the introduction of the consumption function as an important addition to macro-economic models as well. It helps connecting advertising to consumption, and therefore recognizing advertising as an interesting macro-economic variable. The research confirms that an increase in consumption seems to increase the amount of advertising. This is because the advertising budget is based on the actual sales from the previous period. It was still unclear if the direction worked in the other way as well, due to the imperfections in the methods used. Further findings recognize a time lag of the advertising variable at turning points. It adds to the notion that**

**advertising costs is the first to be cut or at least the first to be adjusted in the cyclical behavior of companies budgets and that is affecting the overall economy which can be seen on an aggregate level. Lastly it was found that most of the effects of advertising decrease within a year, also an important finding when using the Granger method as the correct use of lag length is important.**

### 2.3.2    Granger causality method

Measuring the correlation (similarities in strength and direction between two graphs) between variables such as advertising and consumption would according to Granger (1969) not be enough to construct a complete understanding about the relationship between two time series. The reason is that some correlations may be spurious and not useful, as there might be a third variable that cannot be accounted for. For example there is a correlation between teacher's salaries in the UK and the consumption of alcohol in the UK. Another example is that ice cream sales are correlated to shark attacks on swimmers (Lethen, 1996). In both examples it would be highly unlikely that one causes the other but that there exists other hidden variables affecting both. There is a correlation but no causal connection.

By using the Granger causality approach with the question if variable **X** (in a time series), causes variable **Y** (in another time series), a researcher wants to see how the value of the existing **Y** can be explained by past values of **Y**. And then by adding lagged values of **X** add to explanation of the relationship.

This does in practice imply that if you find a variable that is Granger causing another variable in a certain direction or both, manipulation of one would affect the other.

To reduce spurious results the process of finding Granger causality also involves finding out other relations between the time series. Such relations include looking at correlation, integration and the investigation to see if there exists co-integrating vectors. Hence, you are not only looking at the correlation, co-integration and causality, you are looking at a further developed relationship between the time series. This is combined to produce an answer to if there is a relationship between the different variables. Hence, in this thesis the word relationship is used as a generic term for the combined correlation, co-integration and causality of two time series.

A further developed discussion and explanation of the different relationships are presented in chapter 3.

### 2.3.3    Research post Granger Method

With the introduction of Granger's approach to detect causal relationship there was new tools created to test if there is a deeper relationship than correlation between aggregate

advertising and aggregated consumption.

Ashley, Granger and Schmalensee (1980) were also the first ones to do a major study with the new techniques. Their opinion was that previous studies had problems in handling the direction of causality, faulting previous methods used by others and recently by Taylor and Weiserbs (1972). Furthermore, they stated that there had not been any formal test of hypotheses.

Their purpose was to find if short-term variations in aggregate advertisement affects the level of consumption spending. The method used was based on Grangers approach on causality with the Box-Jenkins technique. They argued that it was the best technique available to measure causation in a bivariate (two variables) time series context (Ashley, Granger and Schmalensee, 1980). Data sample was quarterly and stretched the years 1956-1975.

They found that fluctuations in aggregate consumption cause fluctuations in aggregate advertising, although disagreeing with the previous methods used, they agreed with previous findings done by Taylor and Weiserbs (1972), Schmalensee (1972), Verdon, McConnelland & Roesler, (1969), Borden (1942). They did not find any evidence that aggregate consumption affect aggregate advertising more than within quarters. But because of the restrictions in the techniques used, they could not say if advertising affect consumption, consumption affect advertising or if there are a two-way relationship.

Critique proposed by them was that the observation time was not long enough and that they had used data seasonal adjusted by others. This was agreed upon of Berntd (1991) in Seldon and Jung (1995); Jacobson & Nicosia (1981) also critiqued the exclusion of local advertising in the data sample.

**Reviewing conditions for an ideal research design**

Jacobson & Nicosia (1981) which have done a most comprehensive study, stated in an article that previous studies had problems of inconsistency because the used of different data and methods, something that can be agreed upon doing a literature review. Their purpose was not only to investigate if there is a causal relationship between advertising and the economy at an aggregated level but also suggest a plan for further investigation. By identify strengths and limitations of different theoretical, statistical and empirical approaches they tried to develop an ideal research design, a plan for systematically inquiry.

To fulfill the first purpose they used the Granger approach, using booth the Sims test and the Pierce-Haugh technique which booth makes use of the Box-Jenkins procedures. They used annual data of advertising and personal consumption expenditures 1929-1977. To

fulfill the second purpose they made a review of the literature.

The findings indicate that there might be an overall budget effect on how consumers allocate their income between consumption and savings. Jacobson & Nicosia (1981) state that their findings established evidence that there may be some causal relationship between advertising and consumption within the year, but the direction could not be found, due to the limitations of the Granger approach of not being able to decide direction within periods (chapter 3.2.5). Second there also was the possibility of a feedback relationship for a period longer than a year. One cannot say which variable is affecting the other. Third they noted that advertising in previous years seems to influence current consumption and that consumption in previous years may influence advertising in current year. This could be interpret as related to Schmalensee's findings that the relationship may be a simultaneously system (Schmalensee, 1972). Both the techniques employed supported these findings but the findings could only not be seen as definitely (Jacobson & Nicosia, 1981). Further they noted the problems of using annual data in research; they also stated that no cross-country research had been done. One of the implications of their study they argued was that private and public sector should construct a suitable data sample covering the three conditions of (1) high data frequency (2) coverage of all mass-media (3) true time history of the behavior of advertising and related sectors. Another implication is that *"public policy makers would find it difficult to manage the economy by affecting advertising by fiscal and monetary policies"* (Jacobson & Nicosia, 1981, pp. 37).

**Viewing the moral responsibilities of advertising**
In their study Quarles & Jeffres state: *"one of the most resistant unresolved questions in economics is whether advertising is capable of causing a nation's consumers to spend income they might otherwise save"* (Quarles & Jeffres, 1983, pp. 4) they also refer to Jacobson & Nicosia (1981) saying that *"this relationship represents the core question in the study of macroeconomic effects of advertising"* (Quarles & Jeffres, 1983, pp. 4). They also recognize the problems stated by Jacobson & Nicosia (1981) about the inconsistency in the methods and data samples used. Furthermore, they raised the question formulated by Ackley (1961) about if there is a time lag. The problems encountered when developing methods and doing research within the area, they direct to that the previous available research methodology. Which was *"couched in language that needed considerable translation to fit an empiricist's view of the world, but they also implied causality"* (Quarles & Jeffres, 1983, pp. 4)

The purpose of their study was to investigate the relationship between advertising and national consumption (both house-hold and governmental consumption). In their opinion three different conditions have to be fulfilled in order to show that increased advertising causes increased consumption.

1. That advertising and consumption is correlated. They argue that this have been proven because nations with higher advertising expenditures also have higher consumption expenditures. You would however wonder if not a third hidden variable could have been overlooked in that statement.

2. That increased consumption does not cause increased advertising. This relate to other researchers notion (Jacobson & Nicosia, 1981; Ashley, Granger and Schmalensee, 1980) that in which way(s) the causality is directed is hard to find.

3. That the correlation between advertising and consumption is not a coincident

They used a new analytical path analysis evaluation technique, which allowed them to address issues of causal priority. The data used was annual cross-nation data of world advertising expenditures during 1974. This is a big contradiction of the other researchers which state that data most be of high frequency and during a long period of time (Jacobson & Nicosia, 1981; Ashley, Granger and Schmalensee, 1980). Quarles & Jeffres (1983) defended themselves arguing that the technique they used allowed them to use data from one single year. Though they admit the problems of there own inference is limited to only one year and hence could the results maybe not be applied in any other given year. Replicating the study for other years could solve this.

Results from the study show little evidence of the Galbraith's view of advertising. It implies *"a picture of spending, severely constrained by disposable income – a world where advertising has little room to maneuver in any efforts to draw spending from savings"* Quarles & Jeffres (1983, pp. 13).

The authors also lay forward a new view of the problem critiquing that previous research has disregarded the most important factor. Namely that *"perhaps the most critical question to ask about advertising and about our culture in general is how it affects the individual's and the nation's ability to deal with this tension and the frustration that results when material expectation exceed economic ability"* Quarles & Jeffres (1983, pp. 13).

Sturgess & Wilson (1984) agree with previous studies when saying that studies *"trying to test the Galbraithian argument hypothesis have suffered from an inability to detect the direction of any causal flows and may have only detected spurious relationships"* Quarles & Jeffres (1983, pp. 4). As Jacobson & Nicosia (1981) they also had two purposes, where one was to look at the deficiencies in most of the econometric work, which has found significant effects, and the other was to investigate if advertisement has any significant macroeconomic effects in West Germany and Great Britain. They used the Granger approach by implementing the procedure of Box-Jenkins, a method which also Jacobson & Nicosia (1981) and Ashley, Granger and Schmalensee (1980) used. Data sample consisted of annual data 1974-1980 on most advertising expenditures in the two countries. Although they seem to fulfill one of the data conditions when having a comprehensive database you could argue that the period of time is to short and that the frequency is wrong. They did not find any correlations, which

may depend on the poor data sample. Their conclusion is that any attempt to control advertising to obtain macro policy objectives may be ineffectual.

**New techniques utilized**

Chowdhury (1994, pp. 1) state: *"Macroeconomic effects of advertising are essential for the understanding of the working of a developed country"*. He support Quarles & Jeffres (1983) saying that it may be because of this that policy makers have attempted to resolve the issue whether advertising expenditures can cause consumers to spend income they might otherwise save. Furthermore, Chowdhury (1994) agree with previous research and state: *"statistical inference procedures used in most of the previous studies, e.g. graphs, correlation coefficients and simple regressions are not appropriate for deriving casual relationships."* The purpose of his study was to *"reinvestigate the relationship between advertising and various economic variables using recently developed time series techniques"* (Chowdhury, 1994, pp. 1).

The method used was a co-integration and causality approach by employing vector autoregressive techniques (VAR). The data sample was annual data of different macroeconomic variables 1960-1991.

He found no evidence of any relationship between advertising and the macroeconomic variables investigated, among them the consumption function. The only relationship found was between unemployment, which is unidirectional. His findings contradict the findings of Schmalensee (1972), Ashley et Al. (1977) and Quarles and Jeffres (1983). At last he say that the newly developed techniques used in his study cold be used in future research.

**The possibility of a two way relationship emerge**

Jung & Seldon (1995) state that the reason why firms advertise is to increase the demand for the goods they produce, this would lead to more consumption in the companies' products. When looking at the first research tradition of advertising (Jacobson & Nicosia, 1981) advertising would decrease the demand of other firm's goods, in fact a null-sum game. When looking at a higher level it would instead be interesting to investigate if aggregate advertising affects aggregate consumption. If this was true it would suggests that consumers are spending on the expense of future savings (Chowdhury, 1994; Quarles & Jeffres, 1983; Ackley, 1961) affecting the business cycle (Jung & Seldon (1995). The purpose of their study was to consider the relationship between aggregate advertising and aggregate consumption.

The method used resembles the one used by Chowdhury (1994). The Granger approach was used to make causality test supported by error correction models, which would perform better than Chowdhury's (1994) method.

The data sample consisted of annual data 1947-1988. Jung & Seldon (1995) recognize the

criticism put forward by other research (Schmalensee, 1972; Ashley, Granger and Schmalensee, 1980; Jacobson & Nicosia, 1981) saying that the use of annual data is not enough. Jung & Seldon (1995) defense the data sample they use by saying that much advertising is made in the fourth quarter and the effect of it would remain in the following years. *"And even if all advertising did occur on January 1 of a year, some of the largest depreciation estimates still allow a small proportion of advertising to linger past January 1 of the subsequent year… …Furthermore, if the remaining advertising effects of the previous year are, in fact, small then any test for a significant effect of last year's advertising on this year's consumption is more stringent than if the remaining effects were large"* (Jung & Seldon, 1995, pp. 579).

The study found a two way relationship in that not only does consumption affect advertising, as previous research by Schmalensee (1972), Ashley et Al. (1977), Quarles and Jeffres (1983) has shown but contradicting Chowdhury (1994). The converse is also true, aggregate advertising affect aggregate consumption. The reason of the new findings in their study they state depend on the comprehensiveness in their data sample, assumption of another lag in time or that they used new and better (as they argue) technique.

The implications of their research could be that policies encouraging aggregate advertising increasing demand could be used to control the business cycle (Jung & Seldon, 1995). But it should be warned at to use, because consumption today would lower savings today and lower future investment. Furthermore other variables than advertising, may be better suited to stable the economy, a statement supported by Ekelund & Gramm (1969).

**In the section above evidence of a two-way relationship between advertising and consumption emerge. Furthermore, methods for testing causal relationships and testing of hypotheses provide a foundation to the Galbraithian argument. The chapter shows the importance of research methods in order to avoid spurious results. These methods will be used as a foundation to the method in this thesis.**

**Quarles and Jeffres (1983) introduce the moral responsibilities related to over-consumption and dept; and how this put a strain on the society and the individual. These moral judgments can be related to Galbraith's view of advertising, consumption and debt. It also vaguely supports DiPietro's (2007) opinions of advertising as a persuasive force, when people can not pay for their consumption. In relation to the purpose of this thesis to test the Galbraithian argument, the direction of causality must be tested and the only method that is recognized at this point to be able to test such a relationship is the Granger methodology.**

## 2.4  Synthesis

In chapter 2.2 the question whether advertising is informative or persuasive in nature, is showed by reviewing two prominent advocates of the two points of views. During the literature review of the subject it should be noted that more articles relating to the persuasive nature was found compared to the informative nature of advertising. Galbraith (1967) argues that advertising creates wants that causes the consumer to buy things that they do not need at the cost of savings. The visualization below portrays Galbraith's argument, however studies that test the arrow from consumption to dept/loans and dept to advertising has not been found during the literature review.
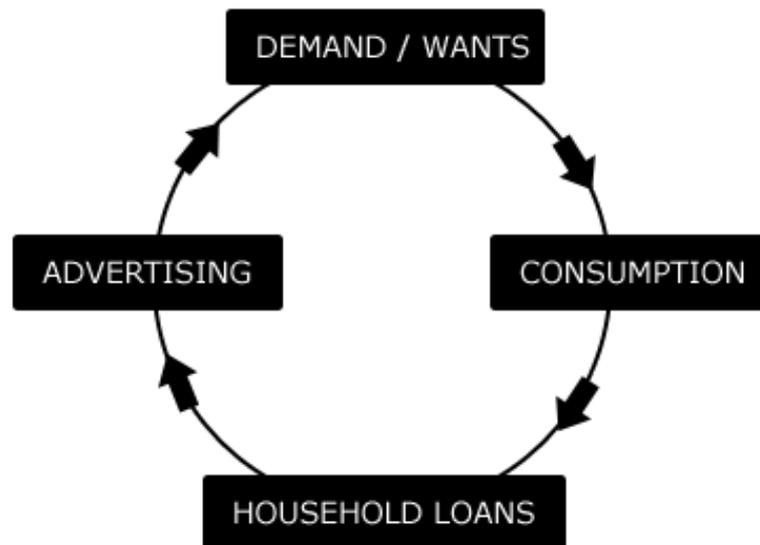


Figure 1 Visualization of Galbraith's argument

Ever since Galbraith (1959) popularized the relationship between advertising and consumption, researchers have tried to test his argument. In the "Pre Granger period" no confirmed evidence was found, one could argue that during this time there where no tools available to test causality and the data that where used was poor. These deficiencies where pointed out by Ashley, Granger and Schmalensee who in 1980 did a study with new techniques that were able to test hypotheses. Following this study research where presented that focused on the new techniques, mostly by using the Granger approach and the Box-Jenkins method. In 1995 Jung & Seldom presented research that showed a two-way relationship between advertising and aggregated consumption. The reason why they are able to show a relationship can be that the data and tools have improved significantly during the years, hence improving the evidence of such causality. On the following page a visualization off the two-way relationship between advertising and consumption is presented.
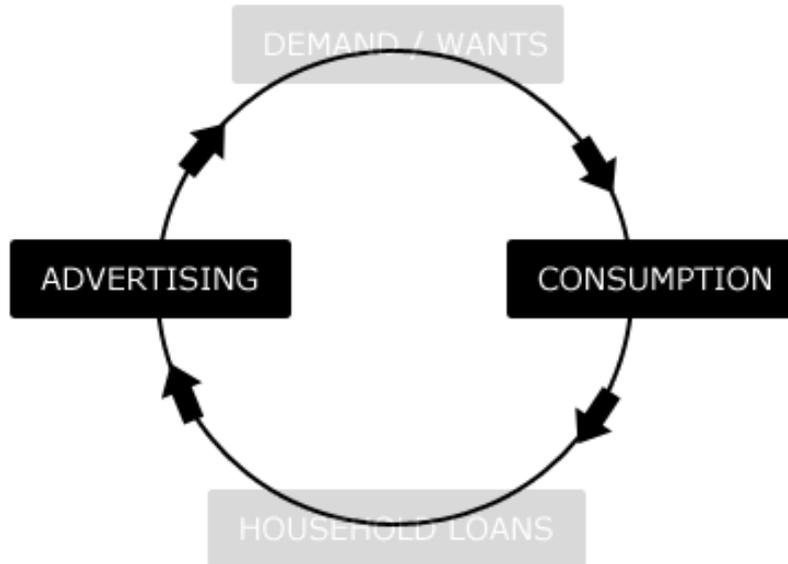
Figure 2 Visualization of the two-way relationship between advertising expenditures and consumption

## 2.4.1 A conceptual model

In the frame of reference summaries after each chapter provide links from the research to the purpose of this thesis. However, one part of the purpose is missing and that is household loans. The reason why a test of the relationship between advertising and household loans will be conducted is related to the sentence in the purpose; "investigate whether advertising spending cause's changes in the use of total household loans in Sweden". One could argue that if the Galbraithian argument is true, there should be a relationship between advertising and household loans. Hence, the authors argue that it is interesting to test this relationship. Hypothesis one tests whether the variables are related to each other by testing the co-integration. Hypothesis two and three test whether there exist a casual relationship between the two. Furthermore, they test the direction of these casual relationships.
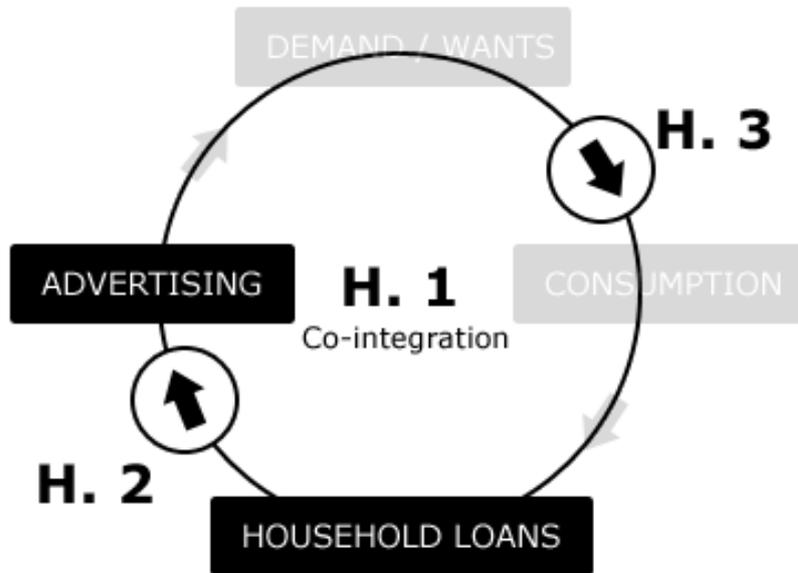
Figure 3 Visualization on the conceptual model used to describe hypotheses related to this thesis

To the hypotheses presented in the introduction we add Granger to H2 and H3. The hypotheses will test the Granger causal relationship between the variables.

H1. There is a co-integration between aggregated advertising expenditure and aggregated sum of household loans.

H2. There is a Granger causal relationship from aggregated sum of household loans to aggregated advertising expenditure.

H3. There is a Granger causal relationship from aggregated advertising expenditure to aggregated sum of household loans

# 3 Method

*This chapter discusses the research method used, why it was chosen and which decisions that must be considered.*

The purpose of this thesis is by using an econometric analysis method; test the relationship between the aggregated advertising expenditure and the aggregated sum of household loans, in order to investigate whether advertising spending cause changes in the sum of total household loans in Sweden. In order to answer the purpose the authors have chosen to look at the relationship between these two variables from an aggregated level. Secondary data have been exclusively used in this thesis; the data is aggregated and portrays total-advertising expenditure and household loans in Sweden. After the literature review, it was evident that econometric methods where the most useful. They can be used to test correlation, co-integration, causalities and hypotheses. If one were to label the method used related to research methodology, one could argue that it is quantitative and positivistic in nature.

Within the area of comparing various macroeconomic variables with advertising there have been several methods used. In the first years where methods such as graphical analysis, turning point analysis, regression and two-stage least-squares procedure used. Neither of those found any a significant relationship because they were not really constructed for that kind of research (Ashley, Granger and Schmalensee, 1980). They can be said not to have asked the complete question.

It was by the introduction of Granger's methods, of analyzing economic time series with common trends, to find causality and the following direction, which researchers had a theoretical chance to really answer those kinds of questions. Those methods have been implemented by numerous other researchers in several econometric studies (Enders, 2004), and it earned him the Nobel Prize in 2003[1]. His method has also been applied regularly by marketers, social scientist, by forecasters and will contribute in the future examination of time series in various research areas (Didow and Franke, 1984).

The major significant studies done in the field of macroeconomics and advertising have since the introduction of the Granger approach utilized it heavily (Ashley, Granger and Schmalensee 1980, Jacobson & Nicosia, 1981; Sturgess & Wilson, 1984; Chowdhury, 1994; Jung & Seldon, 1995). Although Quarles and Jeffres (1983) explained the working

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[1] See official webpage of the Nobel prize:

http://nobelprize.org/nobel_prizes/economics/laureates/2003/index.html

relationships of the variables in a simplistic manor, they used another method which could be argued as not valid and constructed, e.g. by themselves. Hence when testing for the relationship between different macroeconomic variables and aggregate advertising the Granger causality approach is the only existing method that can be used to develop a deeper understanding the relationship of different variable beyond correlation and co-integration. As this work is concerned at looking to aggregate advertising and aggregate consumption of household loans, we use the Granger causality approach as an outline.

**Reflection of the references**

Early on the authors of this thesis aimed to provide a frame of reference that described the different views along the continuum. Two opposite views was found, simplified a debate whether advertising is "bad" or "good" both on the macro and micro level. For example in the chapter regarding advertising as information or persuasion (see 2.2) two total opposite views on the matter emerged. When reading the different articles one gets the impression that the researchers had already made up their mind before conducting the collection of data and the analysis. DiPietro (2007) argues very strongly for his case and his study can be seen as subjective. However as mentioned in the background (1.1), one could question the idea about an "objective truth". Interestingly enough DiPietro (2007) put moral judgments on individual people based on results from an econometric analysis of an aggregated level. This can be seen as quite troublesome since he did not conduct any qualitative research on the individual micro level.

The work of Jacobson & Nicosia (1981) provided an outside view of the research within this field prior to the year 1981. In their comprehensive literature study one can find some criticisms and reflections related different works. The article by Ashley, Granger and Schmalensee (1980) can be seen as more objective; their main task seems to be to test the Granger causality method. One could link the authors in the frame of reference to different political views and/or economical schools; for example Galbraith (1959, 1967) who was a supporter of the Keynesian view of economics.

In conclusion one has to be aware of the subjective nature of research, the authors of this thesis are aware of the subjectivity in research. However, the method used can be seen as objective in nature although the analysis and conclusions are vulnerable to subjective judgments.

## 3.1  Data

Since the purpose concerns testing variables on an aggregated level (chapter 1.3), therefore, data is needed in order to test the co-integration and causality between the two variables. The variable aggregated advertising expenditure; represent the quarterly fluctuations in

advertising expenditure in Sweden. Aggregated household loans refer to the quarterly differences between the total sums of loans to the households from the monetary institutes (banks etc). Data describing advertising expenditure in Sweden was collected from Institutet för Reklam- och Mediestatistik (IRM). Furthermore, Statistiska Central Byrån (SCB) provided the data related to consumption of household loans. The data used in this thesis is quarterly from the year 1996 to 2007.

Jacobson and Nicosia (1981) argue that there are three necessary qualities of the data that needs to be met.

**(1) Frequency**

Firstly time frequency is considered, it is not enough to have annual data. *"At the present stage of our knowledge, one needs to use advertising and consumption expenditure data of a quarterly, or even a monthly, frequency"* (Jacobson and Nicosia, 1981, pp. 33). When looking at the statistics that are available through IRM and SCB a quarterly data set is the most valid one according to Jacobson and Nicosia (1981). The statistics on a monthly basis only dates back a few years. Thereby it limits the amount of observations and the period of time.

**(2) Comprehensiveness**

Secondly, Jacobson and Nicosia state: *"that studies using high-frequency data were limited by a serious lack of* comprehensiveness in the advertising data, for they exclude very large proportions of advertising expenditures" (Jacobson and Nicosia, 1981, pp. 33). The data from IRM is divided into the different advertising channels (see Advertising spending). This enables us to carefully examine the different variables that make up the aggregated advertising expenditure variable, in the quest to have as long time series as possible (quality 3). Since the quarterly data from SCB regarding consumption of household loans starts from year 1996 the aim is to have quarterly advertising expenditure data starting from that same year. The following variables where subtracted from total aggregated advertising expenditures: text TV, distribution appendices, advertisement bulletin, magazine one shot, and store media. These variables only make up a small portion of the total sample (<5%), therefore the authors argue that it is a trade-off in order to get a data set with a long period of time. Three variables, no-cost journals, no-cost magazines, and Internet do not have registered data from 1996; the reason for this is that they are new types of channels. Hence, we argue that they can be in the data set starting from 1996. Before 1996 the spending in these channels was zero.

**(3) Period of time**

Lastly, the data have to cover a period of time as long as possible. Jacobson and Nicosia

(1981) state that *"the longer the period of time observed, the greater the researcher's ability to test for possible causal relationships and to observe how such relationships behave over time, including the detection of structural change"* (Jacobson and Nicosia, 1981, pp. 33). One could then ask the question how long is a long period of time? Didow and Franke (1984) state: that if the data set consists of 50 observations it is a satisfying data set. The data set in this study consists of 43 observations; this could be seen as a source of limitation of the thesis. The authors are aware of this limitation; however one could argue that since the data set is close to 50 observations it is still valid.

## 3.2 Testing strategy

A testing strategy was constructed; this strategy was used to plan and structure our work. The testing strategy is presented below.

**Preliminary analysis –** By assessing the time series conclusions can be made, both individual and related to each other, about the characteristics of the time series. Future conclusions can also be compared to test the plausibility of the findings.

**Removing seasonality in data** – Often cyclical characteristics do occur in time series with quarterly data. Some of the test requires data where this seasonal dummy variable has been accounted for.

**Measuring correlation** – This is the first stage to find a possible causality. The time series must be reasonable correlated if a conclusion about causality can be made. Correlation is a measure how much the direction and strength of time series accord with each other.

**Testing for co-integration** – When testing for co-integration, the aim is to se if the time-series are affecting each other in some way or if booth is affected correspondingly to an invisible variable, such as the market cycles. Two time series could for example be affected by shocks in the economy (the oil crisis, IT bubble etc.).

**Testing for causality** – Finally we see if one time series can be used to predict or change another by testing for causality.
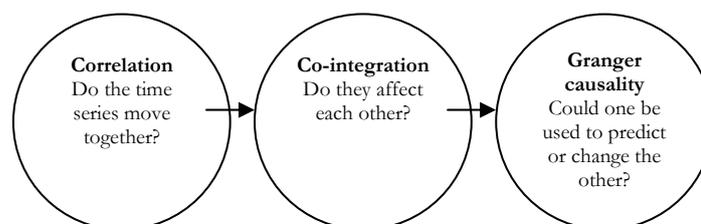


Figure 4 Testing strategy

In the following chapters the testing strategy is presented in more details. It is conducted in

steps and those steps follow the numbering of the chapters. E.g. Step **1** is presented in chapter **3.2.1** step **2** in **3.2.2** and so on.

The computations in the different steps will be aided by the use of EViews. By using EViews computinal errors can effectively be avoided.

## 3.2.1 Preliminary analysis

When working with statistical data it is important to assess the data by doing a graphical analysis (Enders, 2004). By doing this you will find out the characteristics of the series. When working with time series it could be important if the series is stationary or non-stationary. A stationary time series is having a constant mean and a constant variance. A non-stationary time series have booth a varying mean and variance. Example of the two kinds of time series is provided in Figure 5 Stationary time series and Figure 6 Non-Stationary time series.
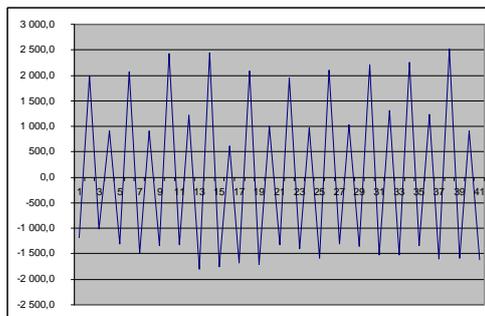


Figure 5 Stationary time series
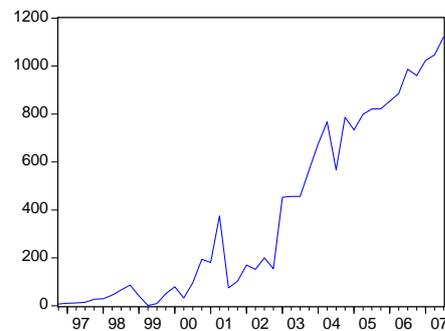


Figure 6 Non-Stationary time series

Time series can also be stochastic (Figure 6 Non-Stationary time series does also show stochastic characteristics) in that the values are seemingly random. This is the most common when looking at economic time series (Enders, 2004). It is because shocks that not can be predicted and new innovations, the whole time bombard the actual economy (Liu, Granger and Heller, 1992).

## 3.2.2  Removing seasonality in data

Time series that are based on monthly or quarterly data often follow a cyclical behavior, which repeats itself; this is called seasonality (Quantitative Micro Software, 2005). Granger in Ghysels (2001, pp. 121) say that such time series "*have an observable component consisting of a fairly constant shape repeated every twelve months*".

The underlying component causing this behavior can be extracted relieving the time series from these cyclical repetitions. The preliminary analysis of the time series used show clear signs of seasonality, hence compensating for this seasonality is required, especially when

testing for co-integration. The seasonality of the advertising variable is the most obvious and could easily be explained by the cyclical behavior of how companies are advertising. Typically much advertising is done before summer in Q2 and before Christmas in Q4. Jung & Seldon (1995) partly confirm this saying that a large portion of the advertising is typically spent in the fourth quarter. A seasonal trend could also see in the sum of consumption variable.

Granger in Ghysels (2001, pp. 132) states that the compensation of seasonality should be adjusted, as it is *"statistically important in that it is a major contributor to the total variance of many series. The presence of the seasonal could be said to obscure movements in other components of greater economic significance… … Because of their dual importance, it is desirable to view this component as clearly as possible and, thus, the interference from the season should be removed."*

Granger in Ghysels (2001) show that two series $x_{1t}$ and $x_{2t}$ may seem to be stationary when they are made up by stochastic seasonal series, $s_{1t}$ and $s_{2t}$ and components without property, $y_{1t}$ and $y_{2t}$.

$$x_{1t} = y_{1t} + s_{1t}$$
$$x_{2t} = y_{2t} + s_{2t}$$

*"If $s_{1t}$, $s_{2t}$ are important components, then it is clear that even if they are not strictly related, so that they do not have any causes in common, it is virtually impossible to analyze properly the relationship between $x_{1t}$, $x_{2t}$ without using a seasonal adjustment procedure. This is because $s_{1t}$ and $s_{2t}$ will certainly appear to be correlated, with the maximum correlation between $s_{1t}$ and $s_{2t}$-k where k is the average distance between the seasonal peaks of the two series. Such spurious relationships are disturbing, and thus an adjustment is required"* Granger in Ghysels (2001, pp. 142).

Formula 1 Removing seasonality

There is a concern of autocorrelation that one time series are automatically adjusting to the other, between the two time series that would generate spurious results if no adjustment for seasonality would be done.

When removing the seasonality in the data we are using a moving average multiplicative method. The alternative would be to use a moving average additive method. The difference between the two methods is their ability in forecasting data; therefore empirical test needs to be made to conclude which is more appropriate (Diewert, Alterman and Feenstra, 2004). In our case is no forecasting needed, hence we can choose which of the methods to use.

The algorithm for adjusting data works as follows (Quantitative Micro Software, 2005).

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The series is denoted to be filtered by $y_t$.

1. The centered moving average of $Y_t$ computed as:

   $x_t=(0,5y_{t+2}+y_{t+1}+y_t+y_{t-1}+0,5y_{t-1})/4$

2. The ratio is $T_t=y_t/x_t$.

3. The seasonal indices are computed. The seasonal index $i_q$ for quarter $q$ is the average of $T_t$ using observations only for quarter $q$.

4. We then adjust the seasonal indices so that they multiply to one. This is done by computing the seasonal factors as the ratio of the seasonal index to the geometric mean of the indices:

   $s=i_q/(\sqrt[4]{i_1 i_2 i_3 i_4}\ )$

5. This s is the reported scaling factors in the series. The interpretation is that the series $y$ is $s_j$ percent higher in period $j$ relative to the adjusted series.

6. The seasonally adjusted series is obtained by dividing $y_t$ by the seasonal factors $s_j$.

---

Formula 2 Removing quarterly seasonality

## 3.2.3 Measuring the correlation

To answer hypothesis 1 explicitly and hypotheses 2 & 3 partly, the matter whether the two time series are correlated is needed to be investigated. If there would to be no correlation there would be no causality.

The correlation answers to if the strength and direction of two variables is similar. A value is received when doing a correlation test, which ranges from 1.0 to -1.0. A number more separated from 0 means that there is a strong positive or negative correlation e.g. 1.0 or -1.0.

Whether there is a strong correlation also depends in which field the research is done. In the field of social sciences a correlation value of 0.5 is strong; it would in the field of physics be considered as a weak correlation.

A mathematical formula for measuring the correlation of a function of raw scores and means was developed by Pearson (Pearson, 1895 in Rodger and Nicewander, 1988) as following:

$$r = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{\left[\sum (X_i - \bar{X})^2 \sum (Y_i - \bar{Y})^2\right]^{1/2}}$$

Formula 3 Correlation

## 3.2.4 Testing for co-integration

According to Nelson and Plosser (1982) in Chowdhury (1994) and Engle & Granger (1987) there exist unit roots in most macroeconomic time-series. Further they state that time series exhibit stochastic non-stationarity due to this unit root. Engle & Granger (1987) state that a linear combination of two or more non-stationary time series can be said to be stationary. If a stationary linear combination exists is the non-stationary time series co-integrated. *"The stationary linear combination is called the co-integrating vector and may be interpreted as a long-run equilibrium relationship among the variables"* (Quantitative Micro Software, 2005, pp. 537). The hypothesis behind is that random shocks in the economy have long lasting effects (Engle & Granger, 1987).

This is important before doing a causality test, as it must be decided whether there exists a common unit root. *"If variables follow a unit root process, it can lead to spurious results when the levels of the variables are used for estimation purposes because the variance of the process becomes infinite. In that case, least squares estimation with levels variables is clearly inappropriate".* (Jung and Seldon, 1995, pp. 580)

First we start by estimating the auto correlation function (ACF) which generates a diagram. An example is shown in Figure 7.

```
Date: C7/08/00   Time: 09:36
Sample: 1963 1994
Included observations: 32
```

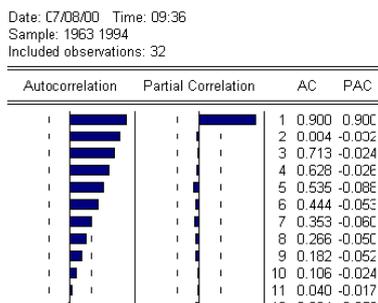| Autocorrelation | Partial Correlation | | AC | PAC |
|---|---|---|---|---|
| | | 1 | 0.900 | 0.900 |
| | | 2 | 0.004 | -0.032 |
| | | 3 | 0.713 | -0.024 |
| | | 4 | 0.628 | -0.028 |
| | | 5 | 0.535 | -0.088 |
| | | 6 | 0.444 | -0.053 |
| | | 7 | 0.353 | -0.060 |
| | | 8 | 0.266 | -0.050 |
| | | 9 | 0.182 | -0.052 |
| | | 10 | 0.106 | -0.024 |
| | | 11 | 0.040 | -0.017 |

Figure 7 Example Auto correction function (ACF)

The auto correlation (AC) in the diagram is generated by following equation:

$$\tau_k = \frac{\sum\limits_{t=k+1}^{T}(Y_t - \overline{Y})(Y_{t-k} - \overline{Y})}{\sum\limits_{t=1}^{T}(Y_t - \overline{Y})^2}$$

The partial autocorrelation (PAC) is generated by following equation:

$$\phi_k = \begin{cases} \tau_1 & for \quad k \;=\; 1 \\[2mm] \dfrac{\tau_k - \sum\limits_{j=1}^{k-1}\phi_{k-1,j}\tau_{k-j}}{1 - \sum\limits_{j=1}^{k-1}\mathcal{O}_{k-1,j}\,\tau_{k-j}} & for \quad k \;>\; 1 \end{cases}$$

Formula 4 Auto Correction formula

If the Auto correlation (AC) decreases geometrically with increasing lag length there is a sign that the series follow a low order autoregressive process (AR). If also the partial auto correlation is significant positive at lag length 1 and near to zero at other lag lengths the pattern of autocorrelation can be captured by an auto regression of order one (AR(1)) which indicates non-stationarity (Johnson, 2005).

If the auto correction function shows that the time series follow an AR it is valid to perform a pretest for integration using the equation estimated by MacKinnon (1991, 1996), which is an extension of Dickey and Fuller's (1979) work. This tests the hypothesis that the time series is non-stationary. The procedure is a test for a unit root. When performing an integration test on time series consisted by quarterly data the following Augmented Dickey-Fuller test is performed (Formula 5).

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + ... + \beta_p \Delta y_{t-p} + v_t$$

The test statistic, known as the Augmented Dickey Fuller (ADF) test, is the ratio of $\beta_2$ to its calculated standard error obtained by OLS regression. The null hypothesis is $H_0$:$y_t$-I(1); that is $y_t$ is not stationary in levels. The null is rejected if $\beta_2$ is negative and significantly different from zero. (Chowdhury, 1994)

If $\qquad\qquad H_0$: $\beta_2 = 0$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ there exists a unit root

$\qquad\qquad\quad H_1$: $\beta_2 < 0$ reject null hypothesis   no unit root

Formula 5 Augmented Dickey Fuller test

Ender's (2002) propose the use of lag lengths that are multiples of 4. Also as lag lengths is best decided by estimating the time between "cause and effect" a lag length of 4 would be accurate, according to Schmalensee's (1972) notions that the effects of most advertising

decrease within one year (4 quarters). You could also decide which lag length to include by using the Akaike Information Criterion (AIC) (Akaike, 1974). By doing this we can estimate the maximum period of lags mathematically. We are booth setting a lag length to multiples of 4 and by using the AIC as we support Schmalensee's findings but also recognize the importance in including effects that could remain for a longer period. According to Enders (2004) AIC is calculated as follows:

*AIC = -2l/T+2k/T*

Where *l* is the log likelihood:

$$l = -\frac{T}{2}(1 + \log(2\pi) + \log(\hat{e}'\hat{e}/T))$$

Formula 6 Akaike Information Criteria

When interpretation of the results of the Augmented Dickey Fuller test is conducted the aim is to see if test statistic value is negative and significant different from zero. It must also exceed the critical value of 1%, 5% and 10%. If this is fulfilled the time series have a unit root and signs of non-stationary. If booth series contain a stochastic trend and exhibit non-stationarity we want to se if the stochastic characteristic of the time series moves together, correspondingly to an underlying long-term relationship (Engle & Granger, 1987), we proceed by testing the co-integration. There are two different methods when testing for co-integration, Engle & Granger (1987) and Johansen (1988). Jung & Seldon (1995) state that the Johansen co-integration test is more valid as there is no need of prior knowledge of the co-integration vectors, in cases when those are unknown. As we do not know the co-integration vectors we use the Johansen (1988) test. The method have however some known limitations. Firstly, in that wrong lag length and missing dummy variables could result in spurious results. It is also sensitive to test time series with few observations (Harris et al., 1995). The Johansen methodology utilizes Vector Auto regression (VAR) to test the co-integration.

A VAR model is a description of a set of $k$ endogenous variables which are measured over the same sample period ($t = 1, \dots , T$) as a linear function which is made up only by their past evolution. The variables are composed of a $k \times 1$ vector $y_t$, which has as the i$^{th}$ element $y_{i,t}$ the time $t$ observation of variable $y_t$. (Johansen, 1988)

Consider a VAR of order p:

$$y_t = A_1 y_{t-1} + \dots + A_p Y_{t-p} + B x_t + \varepsilon_t$$

$y_t$ is a k-vector of non-stationary I(1) variables, $x_t$ is a d-vector of deterministic variables, and $\varepsilon_t$ is a vector of innovations. The VAR can be rewritten as,

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + B x_t + \varepsilon_t$$

Where:

$$\Pi = \sum_{i=1}^{p} A_i - I, \qquad \Gamma i = -\sum$$

If the coefficient matrix $\Pi$ has reduced rank $r < k$, then there exists $k \times r$ matrices $a$ and $\beta$ each with rank $r$ such that $\Pi = a\beta'$ and $\beta'y_t$ is I(0). $r$ is the number of co-integrating relations and each column of $\beta$ is the co-integrating vector.

The method is to estimate the $\Pi$ matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced rank of $\Pi$ (Quantitative Micro Software, 2005).

If the level data $y_t$ and the co-integration equations have no linear trends following case is considered.

$$H^*(r): \Pi y_{t-1} + B x_t = \alpha(\beta' y_{t-1} + \rho_0) + \alpha_\perp \gamma_0$$

Formula 7 Johansen Co-integration test

The co-integration test is nested so if the trace test is showing no co-integration the "maxeigenvalue" test might say the opposite. If contradicting results is obtained, so that the "maxeigenvalue" test is showing on co-integration but the trace test not, there exists a co-integrating equation as it is a two-stage test. If it is the other way around no co-integration exists. If booth test show co-integration the indications is very strong

## 3.2.5 Granger causality

As mentioned in the theoretical framework, only measuring the correlation between variables is according to Granger (1969) not enough. As some correlation may be spurious and not useful as there might a third variable that cannot be seen (recall the example of the correlation between teacher's salaries in the UK and the consumption of alcohol in the UK).

By using the Granger causality approach with the question if variable **X** (in a time series), causes variable **Y** (in another time series), you want to see how the value of the existing **Y** can be explained by past values of **Y**. You should then by adding lagged values of **X** be able

to add to explanation of the correlation. A lagged value is a value that shows later in a time series e.g. a company invest an amount in advertising, the result will hopefully be shown later in sales. The time between the first investment and the increase in sales is the lag.

*"**Y** is said to be Granger-caused by **X** if **X** helps in the prediction of **Y**, or equivalently if the coefficients on the lagged **X**'s are statistically significant. Note that two-way causation is frequently the case; **X** Granger causes **Y** and **Y** Granger causes **X**. It is important to note that the statement '**X** Granger causes **Y**' does not imply that **Y** is the effect or the result of **X**. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term"* (Quantitative Micro Software, 2005, pp. 222).

When conducting the Granger causality test you need to assess the time lag, considering the longest time from which one of the time series can be used to predict the other. The use of Granger causality test may result in the following outcomes with or without lag, they are related to our study could the outcome be the following

1. **One-way** relationship. Increase in total expenditures of household loans increase the total advertising expenditures.

2. **One-way** relationship. Increase in total advertising expenditures will increase total expenditures in the consumptions of loans.

3. **Two-way** relationship. Total increase of advertising expenditures increase total consumption of loans, but an increase in total consumption of loans does also increase the total advertising expenditures. If this occurs without lag you can not say what way the affect runs.

4. **No,** there is no relationship, meaning that total advertising expenditures do not increase total consumption, instead it rearrange the spending within different kinds of consumption.
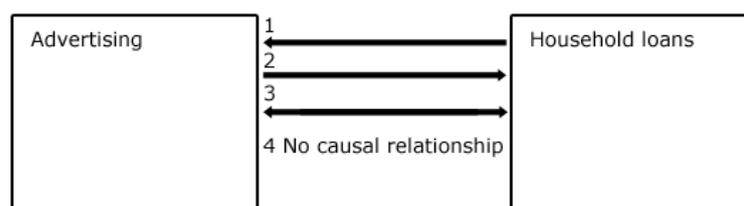


Figure 8 Possible outcomes from a Granger causality test

In order to conduct a Granger causality test, a lag length is needed. Lag lengths are a widely discussed subject because it affects the test significantly. According to EViews: *"In general, it is better to use more rather than fewer lags, since the theory is couched in terms of the relevance of all past information".* (Quantitative Micro Software, 2005, p. 376)

After deciding on a lag length bivariate regressions of the following form test the null hypotheses.

Bivariate regressions:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + ... + \alpha_l y_{t-1} + \beta_1 x_{t-1} + ... + \beta_1 x_{-1} + \varepsilon_t$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + ... + \alpha_1 x_{t-1} + \beta_1 y_{t-1} + ... + \beta_1 y_{-1} + u_t$$

Null hypotheses:

$$\beta_1 = \beta_2 = ... = \beta_1 = 0$$

Formula 8 Granger Causality

When conducting a Granger causality test in EViews one gets the following result (Figure 11). The results answer whether the null hypothesis can be discarded or not. In the example below, the null hypothesis "GDP does not Granger Cause CS" cannot be discarded since the probability is more than the significant levels (1%, 5% and 10%). The second null hypothesis can be discarded since the probability (2.4E-05) is less than the significant level (1%, 5% and 10%). Which means that the there is a one-way relation ship between CS and GDP.

```
Pairwise Granger Causality Tests
Date: 10/20/97   Time: 15:31
Sample: 1946:1 1995:4
Lags: 4

 Null Hypothesis:                    Obs    F-Statistic   Probability

 GDP does not Granger Cause CS       199     1.39156       0.23866
 CS does not Granger Cause GDP               7.11192       2.4E-05
```

Figure 9 Example of result from Granger causality test in EViews

## 3.3    Reliability and Validity

In this chapter the terms reliability and validity will be discussed. Both strengths and shortcomings will be presented.

Reliability can be said to be the trustworthiness of the data and the analysis of it. In this thesis only secondary data have been used. Hence, the authors do not fully understand how it has been collected and its limitations. However, since the method of the thesis need time series it would be impossible for the authors to collect the data needed.

Two sources were used when collecting the data. Institutet för Reklam- och Mediestatistik (IRM) was used to allocate data regarding the advertising expenditure in the Swedish market. IRM reports the actual advertising investments in different media channels;

therefore it can provide a measurement of the Swedish advertising market. The information has a net value since eventual commissions and discounts have been deducted before. IRM argue that net advertising investments are the most valid data to found ones analysis of the total advertising market and its individual groups. IRM's measuring method is based on surveys where the actors in the media market provide information regarding sales (including tax, excluding vat), production and commissions during a given time period. In certain cases IRM makes estimations based on information on advertisement tax provided by Riksskatteverket (RSV). This source was found when searching the website of Högskolebibliotetek in Jönköping[2] One could argue and say that this adds to the trustworthiness of the source. Furthermore, no other sources that presented the same detailed data regarding the advertisement expenditure in Sweden were found. Also when using IRM as a search word in search engines e.g. Google, many well know magazines and journals referred to IRM. This also implies that the source is arguably trustworthy.

The latter variable in our purpose is consumption of household loans. In order to find the corresponding data Statistiska Central Byrån (SCB) was contacted. SCB is a department for both official and other governmental statistics. Their objective is to coordinate and support the Swedish system of official statistics. Since SCB is the official source of official economic statistics in Sweden, the authors argue that the source is both trustworthy and the most valid one to use. Furthermore SCB is said to be objective and have no insensitive to distort the data.

Validity in research methodology relates to the degree that what should be measured is being measured. The econometric methods used in this thesis have been used and developed when testing macro-economic variables as advertising and consumption. In relation to this thesis the authors argue that because of this the method can be considered as valid.

Generalisability relate to whether the result from a study can be considered to be a general truth. For example, if the result from a study of a certain company could be applicable to other companies. This thesis looks at the problem from an aggregated level. The variables used consists of aggregated data in Sweden, therefore the results are general to Sweden. Therefore, the results may not be generalized onto every country in the world. However, the method used in this thesis could be used in order to analyze data from other countries.

All research is concerned with the issues of subjectivity/objectivity. This thesis use secondary data and well established econometric methods for the analysis. Also the raw

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[2] http://www.bibl.hj.se/ acc.2007-12-30

data and methods used are transparently presented without any subjective distortion from the authors. However, the part where the authors value the findings and use them to answer the purpose can be considered as more subjective in nature.

# 4 Empirical findings

*This chapter presents the empirical findings for this thesis.*

## 4.1 Preliminary analysis

The graphs' in Figure 10 and Figure 11 are the representations of the two time-series aggregate advertising expenditures (ADS) and the aggregate sum of household loans (LOAN). It is expressed as raw data and no manipulation has been made to these graphs compared to the values found in the appendices'.
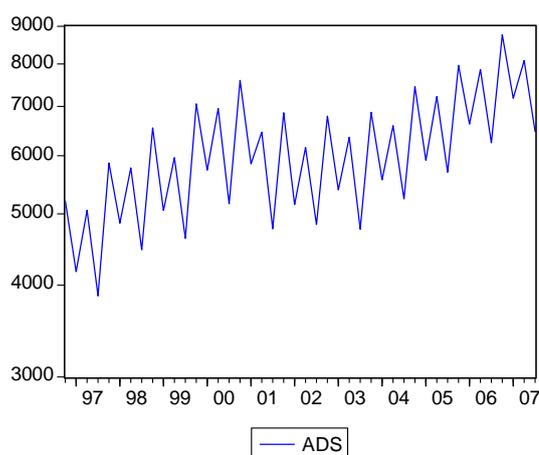
Figure 10 Advertising graph
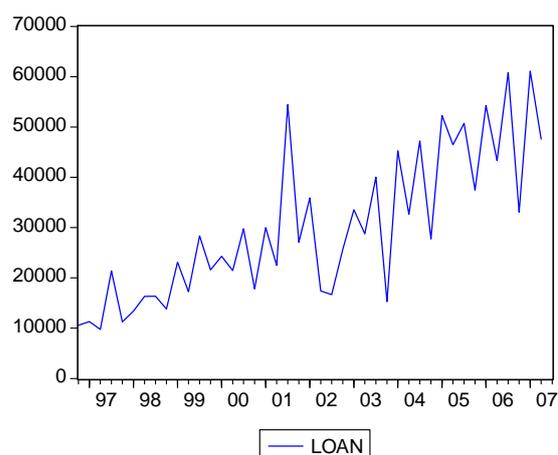
Figure 11 Loan graph

Table 1 shows the descriptive statistics of the two graphs. It is presented in raw data (ADS, LOAN) rounded to integer and in logarithmic form (ADS (LOG), LOAN (LOG)) rounded to two decimals. The logarithmic form shows a better comparison of the two time series. The mean value is the average change per period. Standard deviation is the average spread from the mean value and maximum and minimum values express the highest and lowest spread from the mean value.

| Descriptive statistics, unadjusted data | | | | |
|---|---|---|---|---|
| | Mean | Standard deviation | Maximum | Minimum |
| ADS | 6070 | 1135 | 8760 | 3868 |
| LOAN | 30128 | 14781 | 61108 | 9764 |
| ADS (LOG) | 8.69 | 0.19 | 9.08 | 8.26 |
| LOAN (LOG) | 10.19 | 0.52 | 11.02 | 9.19 |

Table 1 Descriptive statistics, unadjusted data

## 4.2 Removing seasonality

Figure 13 and Figure 14 are graphs showing how much companies spend on advertising. The first figure shows the unadjusted time series for aggregate advertising data (ADS) and is the exact same as in Figure 10. The second figure shows the time series adjusted for quarterly seasonality (ADSSA) as described in chapter 3.2.2. They are showed to clarify the difference between unadjusted advertising data and seasonal adjusted advertising data.
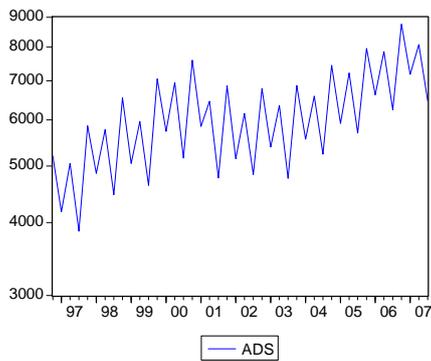


Figure 12 Advertising graph
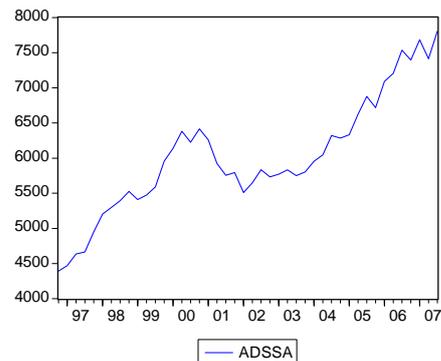
Figure 13 Advertising graph seasonal adjusted

Figure 14 and Figure 15 below show the changes in the aggregate sum of total household loans. The first figure (LOAN) shows unadjusted raw data, it is the same as in Figure 11. The second graph (LOANSA) show quarterly seasonal adjusted data generated by the method described in chapter 3.2.2. They are showed to clarify the difference between unadjusted sum of total household loans data and seasonal adjusted sum of total household loans data.
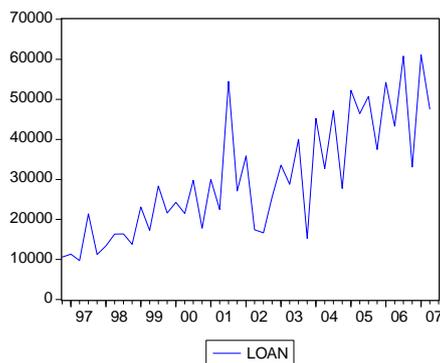


Figure 14 Loan graph
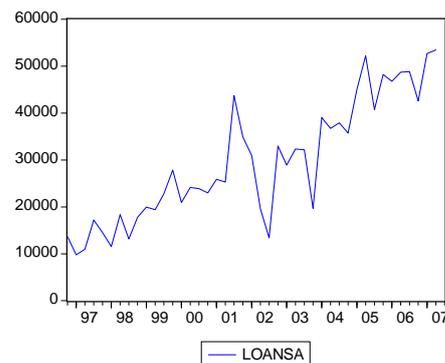
Figure 15 Loan graph seasonal adjusted

In Figure 16 below is the seasonal adjusted data for both time series advertising and loans presented, together in logarithmic form. This puts the graphs on the same scale and enables comparison of the two quarterly seasonal adjusted time series. The blue graph is the advertising spending, the same as Figure 13. The red graph is the sum of household

loan, the same as Figure 15.
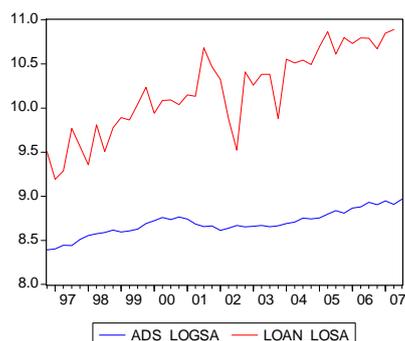


Figure 16 Advertising/Loan seasonal adjusted (logarithmic)

Table 2 show the descriptive statistics for the two graphs after being quarterly seasonal adjusted. The values are based on the graphs in Figure 13 and Figure 15. The values in parenthesis is the descriptive values of each time series before being seasonal adjusted, the same as in Table 1.

| Descriptive statistics, seasonal adjusted data | | | | |
|---|---|---|---|---|
| | Mean | Standard deviation | Maximum | Minimum |
| ADSSA | **6023** | **841** | **7806** | **4393** |
| | (6070) | (1135) | (8760) | (3868) |
| LOANSA | **29696** | **13070** | **53438** | **9781** |
| | (30128) | (14781) | (61108) | (9764) |

Table 2 Descriptive statistics, seasonal adjusted data

## 4.3 Correlation

In Table 3 the results after measuring the correlation between the different time series are presented. For example the correlation between ADS and ADS is 1.0000, as expected because they are the same time series. The values are generated by using the method in chapter 3.2.3.

| Correlation matrix | | | | |
|---|---|---|---|---|
| | ADS | LOAN | ADS (adjusted) | LOAN (adjusted) |
| ADS | **1.000000** | | | |
| LOAN | **0.243253** | **1.000000** | | |
| ADS (adjusted) | **0.692227** | **0.754751** | **1.000000** | |
| LOAN (adjusted) | **0.578634** | **0.910802** | **0.832324** | **1.000000** |

Table 3 Correlation matrix

Because of that the correlation between ADS and LOANS not was that high as expected the correlation with different lag lengths was calculated too. Table 4 show the correlation if the time series starting point would have been adjusted by following lag lengths.

| Correlation ADS\LOANS with calculated lag | |
|---|---|
| Lag | Value |
| 0 | **0.2433** |
| 1 | **0.7482** |
| 2 | **0.2049** |
| 3 | **0.5474** |
| 4 | **0.0060** |
| 5 | **0.3621** |

Table 4 Correlation ADS\LOANS with calculated lag

## 4.4 Co-integration

**Auto Correlation Function**

By using the auto correlation function (ACF) described in chapter 3.2.4. The following diagram was generated. The values indicate the presence of non-stationarity. If the geometrical shape of the bars in figures (18-21) matches example Figure 7 in chapter 3.2.4 (by showing a falloff to zero in AC and values near 1.000 in lag 0, and close to zero in the other lags in Partial Correlation (PAC)), it indicates non-stationarity. Figure 17 show the ACF applied to **unadjusted** advertising data and Figure 18 show the ACF applied to **unadjusted** household loan data.

**Diagrams generated from auto correction function (ACF) on *unadjusted data*.**
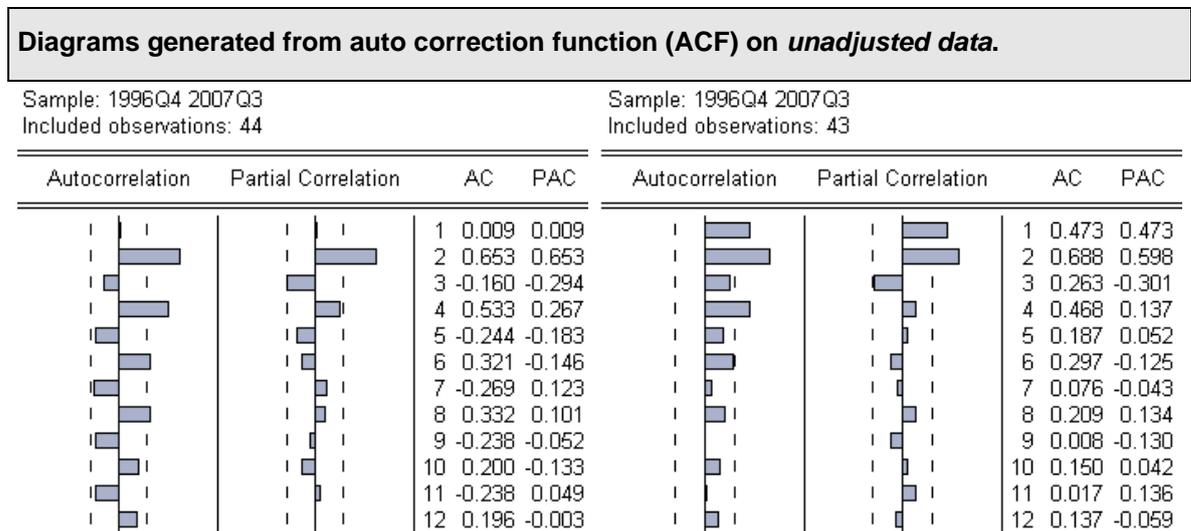


Figure 17 ACF Advertising          Figure 18 ACF Loans

Figure 19 show the ACF applied to **quarterly seasonal adjusted** advertising data and Figure 20 show the ACF applied to **quarterly seasonal adjusted** loan data.

**Diagrams generated from auto correction function (ACF) on *seasonal adjusted data*.**

Sample: 1996Q4 2007Q3
Included observations: 44

| Autocorrelation | Partial Correlation | | AC | PAC |
|---|---|---|---|---|
| | | 1 | 0.812 | 0.812 |
| | | 2 | 0.620 | -0.117 |
| | | 3 | 0.441 | -0.079 |
| | | 4 | 0.294 | -0.029 |
| | | 5 | 0.185 | -0.006 |
| | | 6 | 0.125 | 0.048 |
| | | 7 | 0.078 | -0.028 |
| | | 8 | 0.057 | 0.026 |
| | | 9 | 0.043 | -0.007 |
| | | 10 | 0.014 | -0.059 |
| | | 11 | -0.013 | -0.011 |
| | | 12 | -0.028 | 0.013 |

Sample: 1996Q4 2007Q3
Included observations: 43

| Autocorrelation | Partial Correlation | | AC | PAC |
|---|---|---|---|---|
| | | 1 | 0.804 | 0.804 |
| | | 2 | 0.674 | 0.079 |
| | | 3 | 0.534 | -0.080 |
| | | 4 | 0.400 | -0.080 |
| | | 5 | 0.375 | 0.224 |
| | | 6 | 0.250 | -0.247 |
| | | 7 | 0.216 | 0.119 |
| | | 8 | 0.151 | -0.077 |
| | | 9 | 0.095 | 0.022 |
| | | 10 | 0.092 | -0.000 |
| | | 11 | 0.102 | 0.202 |
| | | 12 | 0.084 | -0.226 |

Figure 19 ACF Advertising (Adjusted)

Figure 20 ACF Loans (Adjusted)

**The Akaike information criteria**

By using the Akaike criteria (Formula 6) explained in chapter 3.2.4, a value of **36.53842** is calculated. A mathematically calculated value of 36.5 periods is equal to nine years (36.53842/4=**9,134**). Because our sample size is to small related to that value it cannot be used instead the values found in the literature is used.

**Unit root test (Augmented Dickey Fuller test)**

Table 5 shows the results from the integration test (Formula 5), explained in chapter 3.2.4, which is conducted to test for non-stationary, which must be true to perform a final co-integration test. The test is made on time series having an AR and AR(1) (derived from the results from AC and PAC in ACF). Figures grayed out cannot be considered to meet the demand of rejecting the null hypothesis, and is thereby not integrated. The values are calculated on 0,2,4,8 lags in level (having AR) and 1$^{st}$ difference (having AR(1)).

| Augmented Dickey-Fuller Test statistics | | | | |
|---|---|---|---|---|
| Lags | 0 | 2 | 4 | 8 |
| **ADS (adjusted)** | | | | |
| Level | **-1.325333** | **-1.894056** | **-1.854043** | **-2.487166** |
| | (-4.186481)* | (-4.198503)* | (-4.211868)* | (-4.243644)* |
| 1st diff | -5.060897 | **-2.099933** | **-3.578803** | **-1.312171** |
| | (-4.192337) | (-4.205004)* | (-4.219126)*** | (-4.252879)* |
| **Loan (adjusted)** | | | | |
| Level | -5.096150 | **-3.204522** | **-1.863378** | **-1.577493** |
| | (-4.192337) | (-4.205004)** | (-4.219126)* | (-4.252879)* |
| 1st diff | -9.957725 | -4.467171 | **-4.056783** | **-2.403815** |
| | (-4.198503) | (-4.211868) | (-4.226815)*** | (-4.262735)* |
| * All (1%, 5%, 10% critical level) ** 5%, 10% critical level *** 1% critical level | | | | |

Table 5 Test results Augmented Dickey Fuller

## Co-integration test

Table 6 gives the test results from the co-integration test between seasonal adjusted advertising and seasonal adjusted loans by using the lag interval 2 to 8 (derived from the results in Table 5). The values have been calculated on trend and intercept as founded in the preliminary analysis, using Formula 7 in chapter 3.2.4.

| Unrestricted Co-integration Rank Test (Trace) | | | | |
|---|---|---|---|---|
| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
| None * | **0.515141** | **36.12711** | **25.87211** | **0.0019** |
| At most 1 | **0.287278** | **11.51459** | **12.51798** | **0.0731** |

**Trace test indicates 1 co-integrating eqn(s) at the 0.05 level**
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

| Unrestricted Co-integration Rank Test (Maximum Eigenvalue) | | | | |
|---|---|---|---|---|
| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
| None * | **0.515141** | **24.61252** | **19.38704** | **0.0079** |
| At most 1 | **0.287278** | **11.51459** | **12.51798** | **0.0731** |

**Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level**
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-value

| Normalized co-integrating coefficients (standard error in parentheses) | | |
|---|---|---|
| ADS_SA | LOAN_SA | @TREND(97Q1) |
| **1.000000** | **0.153447** | **-196.7942** |
| | (0.03628) | (38.8598) |

Table 6 Co-integration test results 2-8 lags

## 4.5    Granger causality test

This chapter shows the results from the Granger causality test. The results are derived from Formula 8 in chapter 3.2.5. Table 7 Granger Causality test results, with the different lags lengths and a column with the corresponding significant level show the results, grayed results indicates that the null hypothesis can be rejected. The Granger test was conducted on seasonal adjusted data, as the results from the augmented Dickey Fuller test (Table 5) and Co-integration test (Table 6) suggests. By testing the data set the authors are able to analyze the results from different viewpoints. The lag length used was 2-8, which is based on our empirical findings (Table 5, Table 6) and the literature (Schmalensee, 1972; Jacobson & Nicosia, 1981; Ender, 2004). This is important because as mentioned above, that the lag lengths are critical when doing Granger causality tests.

The column "significant level" describes whether the null hypothesis can be rejected or not, and at which significant level. If the null hypothesis can be rejected the statement can not be said to be true.  The "x" indicates that the hypothesis cannot be rejected, hence the statement is true. For example: in the fourth lag below, the hypothesis "LOAN does not Granger Cause ADS" has a probability of 0,013, which is within the 5% (and 10%) significant level, hence it can be rejected, and the finding that **Loans Granger cause Advertising,** can be concluded. However, the second hypothesis "ADS does not Granger Cause LOAN" have a probability of 0,25 which is more than 5% and (10%) hence the hypothesis can not be rejected at the 5% significant level and the findings that **advertising do not Granger cause loans,** can be concluded. These results indicate that **there is a one-way causal relationship from household loans to advertising at lag length four and six.**

| Granger causality test results | | | | |
|---|---|---|---|---|
| Lag | Null Hypothesis: | F-Statistic | Probability | Significant level |
| 2 | ADS_SA does not Granger Cause LOAN_SA | **2.67173** | **0.08282** | **10%** |
|  | LOAN_SA does not Granger Cause ADS_SA | 2.22365 | 0.12287 | x |
| 3 | ADS_SA does not Granger Cause LOAN_SA | 1.28364 | 0.29618 | x |
|  | LOAN_SA does not Granger Cause ADS_SA | 2.05947 | 0.12459 | x |
| 4 | ADS_SA does not Granger Cause LOAN_SA | 1.43696 | 0.24607 | x |
|  | LOAN_SA does not Granger Cause ADS_SA | **3.79385** | **0.01301** | **5%** |
| 5 | ADS_SA does not Granger Cause LOAN_SA | 0.90725 | 0.49089 | x |
|  | LOAN_SA does not Granger Cause ADS_SA | 1.99269 | 0.11190 | x |
| 6 | ADS_SA does not Granger Cause LOAN_SA | 1.09156 | 0.39562 | x |
|  | LOAN_SA does not Granger Cause ADS_SA | **2.94411** | **0.02683** | **5%** |
| 7 | ADS_SA does not Granger Cause LOAN_SA | 0.80783 | 0.59044 | X |
|  | LOAN_SA does not Granger Cause ADS_SA | 1.89851 | 0.12080 | X |
| 8 | ADS_SA does not Granger Cause LOAN_SA | 0.95497 | 0.49879 | X |
|  | LOAN_SA does not Granger Cause ADS_SA | 1.74228 | 0.15611 | X |

Table 7 Granger Causality test results

# 5 Analysis

*In this section the empirical findings will be analyzed using the theoretical framework. The analysis will build a foundation in order to be able to answer hypotheses.*

The foundation of the analysis chapter will be the three hypotheses. These will be analyzed based on the empirical findings and the theoretical framework. The result from the analysis will provide a foundation to the conclusion and the concluding discussion. The analysis follows the same structure as the method part and the empirical findings.
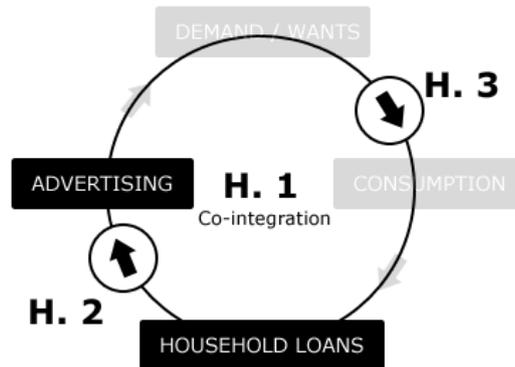


Figure 21 Visualization off the conceptual model used to describe hypotheses related to this thesis

## 5.1 Preliminary analysis

The ADS time series (Figure 10) show some signs of being stationary as it derivates every period. It is however obvious that a seasonal dummy is affecting the time series with peaks in $2^{nd}$ and $4^{th}$ quarters. Adjustment will most likely be needed later in the analysis so that spurious results can be avoided. And because the time series need to be non-stationary when conducting the Granger causality test.

Both by looking at the advertising time series graphically (Figure 10) and when looking at the descriptive statistics (Table 1), a trend is sighted. It is shown as the time series inclines over time and that the mean value in the descriptive statistics is positive. There is also an intercept present at 2000-2001 most likely due the IT bubble.

In the loan time series (Figure 11), signs of seasonality cannot be seen that obvious, only in the end do the series start to show some signs. An interpretation of that is that there might have been unrest in the loan market before the IT bubble, but that the market stabilized after the burst. It is also hard to say with certainty if the series is completely stationary or non-stationary even if non-stationarity is more likely. The loan time series do also show clear stochastic elements in that a random walk is present.

Furthermore, the same overall rising trend with positive mean value (Table 1) and the

intercept present around the time of the IT bubble occurs in the loan time series as well. The intercept seems to affect the time series slightly later for loans than advertising. It indicates that advertising is affected before loans or even that advertising affects loans in the short time horizon if no third variable is affecting them both.

By comparing the two series by logarithmic values can the conclusion be made that they have the same concluding characteristics (Table 1). Only the standard deviation is noticeable different, this indicated that there is larger fluctuations in the loan time series. At the time for the intercept in 2001 is advertising increasing more than the mean value of the descriptive statistics, which may indicate that it, accentuate fluctuations in the business cycle.

**The preliminary graphically analysis shows similarities in the trend between the two time series. The advertising time series have clear signs of seasonality, but which not as obvious, can be seen in the loans time series. Further the analysis can not answer to if the time series is stationary or non-stationary. However, the advertising time series show clear indications of being stationary, which may depend on the seasonal dummy. Mathematically methods will be needed for both series to conclude if they are stationary or non-stationary. Further is the cyclical turning point of the IT bubble crisis showing that advertising was affected before the sum of loans.**

## 5.2 Removing seasonality

It becomes after adjusting the advertising time series (Figure. 14) for seasonality, obvious that the time series is non-stationary. It also becomes more obvious that there is a trend but also an intercept, which occur, in early 2000. Further it could be interpreted that the interception has not affected the overall advertising expenditures the following years, as the levels are the same in the end of the time series as if that interception had not occurred. There were a dip the following years but the levels have revived. After removing seasonality, stochastic elements can be seen in the advertising time series as well.

Removing seasonality for the loan time series (Figure 15) does not change the characteristics that much. This might be because it is non-stationary before seasonality. In that case should not seasonal adjusted for the loan time series be used when testing for co-integration. It will however be answered when doing the ACF test.

After seasonality adjustment is the differences (minimum, maximum and standard deviance) in the descriptive statistics (Table 2) smaller, as expected, in both time series.

It becomes, when looking at the two series together in logarithmic form (Figure 16), even

more obvious that the series is slightly shifted. For example the effects of the IT bubble are showing earlier in the advertising time series than in the loan series. This further supports the same findings made in the preliminary analysis.

**After seasonal adjustment the advertising time series show clear indications of being non-stationary. Loan time series do not change that much and still can no conclusion be made of the stationarity status. Further both the time series show a drift at the cyclical turning point of the IT bubble crisis, when compared in logarithmic form.**

## 5.3 Correlation

The correlation matrix (Table 3) shows the correlation between the series when they are both in unadjusted format and in adjusted format.

The correlation between advertising and loan is when unadjusted ~0.24, which is interpret as being very low and presenting no correlation between those time series. It was however expected when doing a preliminary analysis that it would be due to the seasonality in the advertising series. Therefore the correlation between those series is calculated with lag. The correlation value is then when using one lag calculated to **~0.75** which is considered to be a strong correlation. Chowdhury (1994) say for example that 0.85 is very strong. Further the correlation is higher at every second period, which can be derived from the characteristic of the advertising graph, having a seasonal dummy (Figure 12).

The correlation between the two adjusted time series is ~0.83 which if following Chowdhury (1994) can be considered to be very strong. It can then be considered that the correlation between the two series is significant (~0.75 unadjusted data, ~0.83 adjusted data).

**The correlation analysis show that the two time series is very strong correlated. For the unadjusted time series calculated with lags (~0.75). For the seasonal adjusted without calculated lags (~0.83). The result ends the first part of the testing strategy (Figure 4) and concludes that the time series move together.**

## 5.4 Co-integration

**Auto Correlation Function (ACF)**

The auto correction function (ACF) indicates that the unadjusted time series (Figure 17, Figure 18) are stationary because that the values **do not** fall of geometrically as exemplified by Figure 7. The partial correlations (PAC) does also indicate stationarity, which support the notion of the series being stationary at first level since the first values are near one but

the following near zero. Since only non-stationary series can be used when testing for co-integration they need to be adjusted. This supports the predictions of a seasonality dummy in the advertising time series when we did the primary analysis. Surprisingly it does also show the presence of stationarity in the loan time series. Something that was not anticipated when doing the analysis after removal of seasonality.

The ACF do show that both the adjusted series (Figure 19, Figure 20) follows the characteristics of being non-stationary. Therefore would an augmented Dickey Fuller test only be valid to test on the adjusted time series and not the unadjusted time series.

**The Akaike information criteria**

When calculating on the maximum lag time with Akaike information criteria, a value of ~36 is calculated. This indicates that the effect of advertising remains for 36 quarters or 9 years. This is considered to be a very long time but not unreasonable because it is the exact same value as Jung & Seldon (2005) calculated with another set of time series. It is however important to say that it could only be a small portion of the advertising effect that remains and that most of the effect die of within the year, as Schmalensee's (1972) findings show. It also has implication for the further research in this thesis as we have no chance of testing such a long relationship since the time series is to short (44 in total). Hence we can only test causality with shorter time lag intervals. In this case findings from Schmalensee (1972) and Enders (2002) will be used. Only will periods (lag times) shorter than 8 (0-2 years) be investigated. And more emphasize will be put on periods which are multiples of 4 (derived from that initially data is quarterly).

Further is the finding of remaining advertising effects after 9 years interesting, since Jung & Seldon (2005) calculated on aggregate consumption and we calculated on household loans.

**Unit root test (Augmented Dickey Fuller test)**

The findings from the ACF indicated that only adjusted time series can be used when proceeding to test for co-integration. Hence only quarterly seasonal adjusted time series (Figure 16) is used when performing the Augmented Dickey Fuller test.

In Table 5 the results from the Augmented Dickey Fuller test are presented. Results which are grayed out do not support that the time series with corresponding lag time passes the test. To pass the test must the test statistic value be greater than the critical level value, which is presented in parenthesis and also lower than zero (Chapter 3.2.4).

The test results suggest there is a unit root for advertising time series in level with 0 to 8 lags. In 1st difference there exists unit root from 2 to 8 lags. For the loans time there exist unit roots for 2 to 8 lags in level and 4 to 8 in 1st difference.

The augmented Dickey Fuller test concludes that both series contains a stochastic trend, which also was found in the primary analysis. Time series also exhibit non-stationarity, hence they are integrated and a test for co-integration with the lag interval 2-8 is conducted.

Since both series was integrated of order one calculated on lags 4-8 (Table 5), the co-integration test is made with those variables. But it is also includes lags 2-8; even if the loan series did not show unambiguous results of integration of order one for the loan time series, hence lag interval 2-8 is used for the co-integration test.

**Co-integration test**

First part of the co-integration test (Table 6), the **trace test**, indicates that there exists a co-integrating vector at 5% level. It is because **it can** reject the null hypothesis, that there exists **none** co-integrating equations (0.0019). And **it can not** reject the null hypothesis, that there exists **at most 1** co-integrating equations (0.0731).

Second part of the co-integration test (Table 6), the **Maximum Eigenvalue** test, also indicates that there exists a co-integrating vector at 5% level. It is because **it can** reject the null hypothesis, that there exists **none** co-integrating equations (0.0079). And **it can not** reject the null hypothesis, that there exists **at most 1** co-integrating equations (0.0731).

However, it must be noted that it was close that rejection of the null hypothesis, of there being **at most 1** co-integrating equation, was possible. As the received values was 0.0731, compared the level value of 0.05. The co-integration is weak.

Because both tests indicate a co-integrating equation at the 5% level the conclusion can be made that the time series is co-integrated. There is a long term relationship between the both variables.

**ACF (both AC and PAC) indicate that the quarterly seasonal adjusted time series is non-stationary but the unadjusted is stationary. The Augmented Dickey Fuller test confirms that the adjusted series is non-stationary, and that the time series can be tested for co-integration with lag interval 2-8. The Akaike information criteria indicate that advertising effects remains for 9 years, which would mean test for 36 lags. Both co-integration tests indicate that there exists a co-integration equation. The result ends the second part of the testing strategy (Figure 4) and concludes that one of the time series could be used to predict or change the other.**

## 5.5  Testing the Granger causality

After testing for correlation to see if the time series move together and for co-integration to see if one of the time series could be used to predict or change the other, a Granger causality test was conducted as the requirements of non-stationarity was fulfilled. The dataset with quarterly seasonal adjusted time series was used.

The test results (Table 7) indicates that there is a Granger causality supporting that **the sum of household loans Granger causes advertising** at lag 4 (0.01301) and 6 (0.02683) at 5% level. At other lag times is that direction also consistently occurring but is not within the 5% level.

**No indications** are found showing that **advertising Granger causes household loans**.

As mentioned before Granger tests are sensitive to how many lags that have been used. The empirical findings support that view as well. As mentioned in the theoretical framework it has been suggested that most of the effects of advertising disappears within one year, hence recommended lags in our case would be 2-8. Applying this to the empirical findings would then support H2 while rejecting H3 and a possible two-way relationship.

**The Granger causality test suggests that the sum of household loans Granger causes advertising but no evidence is found of the opposite direction. It support arrow 1 in Figure 8. The result ends the third part of the testing strategy (Figure 4) and concludes that the sum of household loans could be used to predict or change the advertising spending.**

# 6 Conclusion

*The aim of this section is to summarize our analysis and thereby answer whether hypotheses is supported or not. This will fulfill the purpose of this thesis.*

The purpose of this thesis is by an econometric analysis method test the relationship between the aggregated advertising expenditure and the aggregated sum of household loans, in order to investigate whether advertising spending cause changes in the sum of total household loans in Sweden.

In order to answer the purpose the following three hypotheses where constructed. The results are concluded below under each hypothesis:

**H1. Aggregated advertising expenditure and the aggregated sum of household loans is co-integrated.**

Correlation tests and integration tests was conducted to identify if the time series aggregate advertising expenditures and sum of house-hold loans was non-stationary. The analysis (chapter 5.3 and 5.4) of the results confirmed non-stationarity and a co-integration test were made. The analysis of the test results from the co-integration test (chapter 5.4) indicated that there existed a co-integrating equation, *analysis supports hypothesis 1 (H1).*

**H2. There is a Granger causal relationship from the aggregated sum of household loans to the aggregated advertising expenditure.**

After the findings of a co-integrating equation between the two time series the direction of Granger was causality tested. Analysis of the test results (chapter 5.5) indicate that aggregate sum of household loans Granger causes aggregated advertising expenditure. *Analysis supports hypothesis 2 (H2).*

**H3. There is a Granger causal relationship from the aggregated advertising expenditure to the aggregated sum of household loans.**

Analysis of the test results (chapter 5.5) do not indicate that aggregated advertising expenditure Granger causes aggregated sum of household loans. *Analysis do not support hypothesis 3 (H3).*

By answering the hypotheses and by concluding that our research did not find indications that aggregate advertising spending causes changes in the use of total household loans in Sweden, the purpose is fulfilled.

An additional finding was that the value received from calculating the Akaike information criteria is exactly the same as findings made by Jung & Seldon (1995). An implication of

that result is that the relationship between aggregated sum of household loan and advertising might be as interrelated as between advertising and consumption, and should be further researched. Another implication is that it might not be appropriate to just look at advertising and consumption to increase the further understanding of the Galbraithian argument. Introducing household loans as a funding variable to the consumption function can be seen as a new and interesting approach.

The knowledge that there exists a relationship between the variables investigated is interesting in a practical way, since the time series is correlated and co-integrated which means that one can be used to predict the other. Further a change in aggregate sum of loans could be used to predict a change in aggregate advertising spending 2-8 quarters later. The supply of money by banks and the state in the society would to some extent control the aggregate advertising spending. This thesis provides an indication that the control of money in the system could be used to handle fluctuations in the economy.

# 7 Discussion

*This chapter provides further discussion of the thesis regarding: research methods, findings, future research topics and managerial implications.*

Could one really be sure that correlations, co-integrations and causalities are true? Of course a mere correlation can be spurious and Granger causality may not show causal relationship at its true meaning. Therefore, one should be very careful when drawing conclusions from findings of these sorts. Evidence of this controversy can be found in the theoretical framework, none of the conclusions in these articles are certain. Some authors state that there are indications of relationship, some do not. There are also, several limitations and conflicting evidence between the different articles.

**Own criticism to our study**

It should be noted that the greatest limitation to this study is its limited number of observations. Also as mentioned in the method part (chapter 3.2.5), Granger causality is not always causality in its proper meaning. It cannot be proven that a third invisible variable can be ruled out or not; for example the possibility that ordinary consumption may influence the consumption of loans, interest rates and the supply of money. But there seem to be some kind of relationship. The Granger test can however be used by predicting one time series by having values by the other.

Furthermore, the authors of this thesis have not formal education regarding econometric methods and macro economics. This can be seen as a limitation, since there might be limitations in the use of the method that we are unaware of. However, people having more knowledge within the subject of statistics and econometrics have been met for guiding consultation. Further, it can also be seen as a positive thing since we might see this subject from a different point of view than a researcher with extensive formal education.

In the theoretical framework there has been an emphasis on advertising and not that much on loans. It is because during the process of investigating the subject the journey started from the advertising and consumption perspective. But because loans is related to as a kind of consumption, the topic loans is arguable well covered.

**Problems during the research process**

The most striking issue that the authors encountered was how to analyze the empirical findings. Also, as discussed before the issue of different lag lengths is troublesome.

The most reoccurring problem that research in this field faces is the lack of good data sets. And it can be supported as we have faced the same problem. The data set was relatively

good and trustworthy; however it consisted of too few observations. The time series of aggregate sum of household loans could also have been replaced by aggregate sum of lent money to households, each year. But such data was not available. Similar problems with poor data sets and wanted data sets can be found when studying this research field the past fifty or sixty years.

**Interpretation of the findings**

The analysis of the results would indicate that advertising expenditures and household loans relate to each other; both in the short and long run, supported by hypothesis 1. There is also Granger causality from aggregate household loans to aggregate advertising expenditures.

There were no findings supporting, the direction of a Granger causality from aggregate advertising to aggregate household loans. When drawing conclusion from the analysis, the question comes into mind if they are evidence. That our interpretation of the Galbraithian argument, which say that advertising spending cause changes in the use of total household loans in Sweden, is not true?

It may be that there is something other than advertising that is affecting the household use of loans or that consumption has greater effects than expected. For example this could be how easy it is to be approved for a loan and/or interest levels. One could argue that if banks would not issue loans all the advertising in the world would not make consumers buy things with money they do not have. However, advertising may still cause consumers to spend at the expense of savings. Furthermore it may also be that during good times people feel an atmosphere of being monetary richer and therefore they are ready to apply for more loans. Advertising would then be more dependent on the fluctuations in the economy, and its ability to affect fluctuations would not be that great.

Since the dataset regarding household loans consists of all loans issued to the household's it would be interesting to distinguish those loans which are more short-term and conduct a similar hypothesis test. Doing this one could argue that the short-term loans are more related to irrational buying behaviors which are not related to necessary things like housing. It could also be that, the kind of advertising we used as a variable was more persuasive than informative. And that it do not relate to household consumption to the degree we anticipated. Another reason why the direction in the relationship (hypothesis 3) can not be found may be related to our dataset and the number of observations. One must also bear into mind that only one research before, using the same method outline, have been able to support that causal direction. In this research area, with contradictions, different techniques used and different opinions argued for, no final method has yet been agreed upon, as being

able to confirm or deny the casual direction. At last one must reflect the possibility that there is no casual direction at all supporting the Galbraithian argument.

Regarding the evidence that support hypothesis 2, a one-way Casual relationship from household loans to advertising expenditure, when calculating with 4 lags (1 year). This may be evidence that support the research of Schmalensee (1972), who found that companies use a percentage of their sales as a budget for advertising. Meaning that when loans are issued they are used, hence companies sell more, and will receive larger budgets. With this in mind one could argue that companies' sales can be related to household loans. It is not so strange, when thinking about all the things that most people could not buy without applying for a loan: cars, houses, computers etc. And if the companies are doing well this means an increase GNP which is a measure of welfare as discussed in the problem discussion (chapter 1.2) This could be evidence that shows how the interest rates effects the economic growth.

**The findings related to previous research**

Related to Borden's initial question: "*Does advertising help or hinder the successful functioning of the economy and the advance toward a greater measure of well being?*" (1942, pp. 649). Our findings suggest that there is a relationship between advertising and the functioning of the economy. But the findings can not support that advertising could be used to change how much household loan. However, the opposite is supported, that the sum of household loans, which is en extension of the supply of money and interest rates (the functioning of the economy), could be used to change how much companies advertise.

Furthermore, Borden (1942) stated that advertising might accentuate fluctuations in the business cycle but that it was not proven whatever the advertising caused cyclical fluctuations or not. The statement was supported by Verdon, McConnelland and Roesler (1969), but they also said that advertising caused the fluctuations. From our study a clear fluctuation can be seen in 2001. The advertising variable seems to accentuate it, which is an indication which supports Borden's (1942) and Verdon, McConnelland and Roesler's (1969) findings. One difference is that our advertising variable fluctuated earlier than the loan variable, which could be interpreted as advertising causing the fluctuation but not as it is lagged behind. But as it only is one fluctuation, no certain conclusions can be made. Borden (1942) also state that advertising is used more during economic booms than during depressions, which is supported by that advertising spending decreased during the recession present in our data in 2001.

Ackley (1961) cemented the consumption function as important to the economy. An aspect which we support, but to which we also add the supply of money through household loans as an alternative viewpoint. He also mentions lags as a reason to used high

frequent data. We agree to that and claim that choosing the correct amount of lags is crucial and difficult.

Schmalensee (1972) findings indicate that consumption affects adverting expenditures with a little lag, but not that national advertising influence aggregate consumption. This was supported later by Ashley, Granger and Schmalensee (1980), Jacobson & Nicosia (1981) and Quarles & Jeffres (1983). Our findings support those findings related to the relationship from consumption to advertising

Schmalensee (1972) also state that the effects of advertising is reduced quickly often within a year. But by using findings from the Akaike Information criteria that advertising effect can be present up to 9 years, we can only partly support Schmalensee's other finding. Most of the advertising effects may decrease within one year but some effects may remain up to 9 years after. However, it must be noted that calculating advertising effects by a formula do not tell the whole picture and can only be said to be valid when looking at an aggregate level, no generalization can be made. However, it would to some degree, support the presumption in this thesis that consumption and household loans both are interrelated to advertising effects. Maybe is it so that the change in the sum of household loans is more accurate to look at than consumption when looking testing the Galbraithian argument. Since household loans also include a demand function of money which introduce a new viewpoint in the research area.

Ekelund & Gramm (1969) and Chowdhury (1994) did not find any relationships of causality between advertising and consumption. Their results are not supported in this thesis, since a casual relationship in the direction from household loans to advertising was found. Taylor & Weiserbs (1972) found a two-way direction and Jung & Seldon (1995) found a two-way causal direction. Their results only partly supported in this thesis since only a casual relationship in the direction from household loans to advertising was found

The authors of the articles reviewed in the theoretical framework have different results and even if some found relationships and others did not. Ekelund & Gramm (1969), Jacobson & Nicosia (1995), Quarles & Jeffres (1983) and, Seldon & Jung (1995), state that other variables other than advertising may be better suited to stable the economy and promote economic stability. We agree partly to that, by stating that adjustment of the interest rates is more effective. But even if the causal relationship from aggregate advertising to aggregate household loans was not established in this thesis, we see the option of using policies to change advertising is a supplementary tool. Because it is our belief that aggregate advertising causes aggregate consumption which also then should be traced in aggregate consumption of household loans. We support the Galbraithian argument and disagree with the statement that advertising just rearrange consumption.

# References

Ackley, G. (1961) *Macroeconomic theory*, New York: Macmillan, 1961.

Akaike, H. (1974) "A new look at the statistical model identification", *Automatic Control, IEEE Transactions*, Dec 1974 Volume: 19, Issue: 6 pp. 716-723.

Albion, M.S. and P.W. Farris (1981) *The advertising controversy, evidence on the economic effects of advertising,* Auburn house publishing company Boston, Massachusetts

Ashley, R., Granger, C.W.J., and Schmalensee, R. (1980) "Advertising and Aggregate Consumption: An Analysis of Causality", *Econometrica*, 48, 1980, 1149-1167.

Borden, N. H. (1942) *The Economic Effects of Advertising*, Chicago: Richard D. Irwin, Inc.

Broadbent, S. (ed) (1981) "Advertising works", *Papers From the IPA Advertising Awards*, Holt, Rhinehart & Wilson 1981.

Brozen, Y. (1974) "Is Advertising a Barrier to Entry?", *Advertising and Society*. New York: New York University Press, pp. 79-109.

Chowdhury, R. A. (1994) "Advertising Expenditures and the Macro-Economy: Some New Evidence", *International Journal Of Advertising*, 1994, 13, 1-14.

Davis, E., Kay, J. & Star, J. (1991) "Is Advertising Rational?", *Business Strategy Review*, Autumn 1991.

Dickey, D.A. and W.A. Fuller (1979) "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, 74, 427–431.

Didow Jr., N.M., Franke, G.R. (1984) "Measurement Issues in Time-Series Research: Reliability and Validity Assessment in Modeling the Macroeconomic Effects of Advertising", *Journal of Marketing Research*, Vol. 21, No. 1 (Feb., 1984), pp. 12-19.

Diewert, W.E., Alterman, W.F., Feenstra, R.C. (2004) "Time Series versus Index Number Methods of Seasonal Adjustment", *Discussion Paper No.: 04-06*, Department of Economics the University of British Columbia, Vancouver, Canada.

DiPietro, W.R. (2007) "The Effect Of Advertising Expenditure On Household Consumption: The Cross Country Evidence", *Journal of Global Business Issues*; Winter 2007; Vol.1, Issue 1, pg. 65.

Doyle, P. (1968) "Advertising Expenditure and Consumer Demand", *Oxford Economic Papers*, 20pp, 395-417.

Duesenberry, J. S. (1967) *Income, Saving and the Theory of Consumer Behavior*, Cambridge:

References

Harvard University Press.

Ekelund, R.G. and Gramm, W.P. (1969) "A reconsideration of Advertising expenditures, aggregated demand and Economic Stabilization", *Quarterly Review of Economics and Business*, 9 (Summer), 71-77.

Enders, W. (2004) *Applied Econometric Time Series 2nd edition,* Wiley Series in Probability and Statistics, 2004.

Engle, R.F. and Granger, C.W.J. (1987) "Co-integration and Error Correction: Representation, Estimation, and Testing," Econometrica, 55, 251–276.

Etzioni, A. (2004) "The Post Affluent Society", Review of Social Economy, 62(3), pp.407-420.

Galbraith, J.K (1958) "The Affluent Society" Houghton Mifflin 1998 Boston, MA USA

Galbraith, J.K (1967) "The New Industrial State" Houghton-Mifflin; 2d ed., rev edition (1971)

Galbraith, J.K. (1986), "The Anatomy of Power", Hamish Hamilton Ltd. London 1986.

Ghysels, E. (Editor) (2001) Essays in Econometrics, Volume I: Collected Papers of Clive W. J. Granger. West Nyack, NY, USA: Cambridge University Press, 2001, pp. 121. http://site.ebrary.com.bibl.proxy.hj.se/lib/jonhh/Doc?id=10070198&ppg=143 acc. 2007-01-06.

Hansen, A. H. (1960) *Economic Issues of the 1960's*, New York: McGraw-Hill Book Company.

Harris, F. H. deB., McInish T.H., Shoesmith G.L., Wood R.A. (1995) "Cointegration, Error Correction, and Price Discovery on Informationally Linked Security Markets", *The Journal of Financial and Quantitative Analysis*, Vol. 30, No. 4 (Dec., 1995), pp. 563-579.

Hay & Morris (1991) "Industrial Economics and Organization: Theory and Evidence", *Oxford University Press*, 1991.

Galbraith, J.K. (1986) *The Anatomy of Power*, Hamish Hamilton Ltd. London 1986.

Jacobson, R. and Nicosia, F. M. (1981) "Advertising and Public Policy: the Macroeconomic Effects of Advertising", *Journal of Marketing Research*, 18, 29-38.

Johansen, S. (1998) "Statistical Analysis Cointegration Vectors", *Journal of Economic Dynamics and Control*, September 1988, pp. 231-254.

Johnson, R. R. (2005) A Guide to Using EViews with *Using Econometrics: A Practical Guide*, Pearson Education, Inc., publishing as Pearson Addison Wesley,

References

http://wps.aw.com/aw_studenmund_useecon_5/38/9847/2520910.cw/index.html, acc. 2007-01-06.

Jung, C. & Seldon, B. (1995) "The Macroeconomic Relationship Between Advertising and Consumption", *Southern Economic Journal*, Vol. 61, No. 3, (Jan., 1995), pp. 577-587.

Klein, L. (1951) as quoted in Brems, H., *Product Equilibrium Under Monopolistic Competition*, Cambridge: Harvard University Press.

Kronofogdemyndigheten (2007) *Obetalda SMS-lån. Konsekvenser hos kronofogden*, [Online], Förebyggande Kommunikation FOK-teamet, http://www.kronofogden.se/nyheterpressrum/nyheter/2007/nyheter2007/20070828nysta tistikomsmslan.5.383cc9f31134f01c98a80008752.html acc. 2007-01-06.

Lethen, J. (1996) *Correlation and Causation*, [Online]. Texas A&M University, Statistics faculty. http://www.stat.tamu.edu/stat30x/notes/node42.html, acc. 2007-01-06.

Liu T., Granger C.W.J., Heller W.P. (1992) "Using the Correlation Exponent to Decide Whether an Economic Series is Chaotic", *Journal of Applied Econometrics,* Volume 7, Issue S1, pp S25 - S39.

Nelson, P. (1970) "Information and Consumer Behaviour", *Journal of Political Economy*, March/April 1978(2), pp. 311-329.

Nelson, P. (1974) "Advertising as Information", *Journal of Political Economy*, July/August 1982(4), pp. 729-754.

MacKinnon, J.G. (1991) *Critical Values for Cointegration Tests,* Chapter 13 in R. F. Engle and C. W. J. Granger (eds.), Long-run Economic Relationships: Readings in Cointegration, Oxford University Press.

MacKinnon, J.G. (1996) "Numerical Distribution Functions for Unit Root and Cointegration Tests", *Journal of Applied Econometrics*, 11, 601-618.

MacKinnon, J. G., A. A. Haug, and L. Michelis (1999) "Numerical distribution functions of likelihood ratio tests for cointegration", *Journal of Applied Econometrics*, forthcoming.

Milgrom, P. & Roberts, J. (1986) "Price and Advertising Signals of Product Quality", *Journal of Political Economy*, 1986, vol. 94, no. 4.

Parsons, L. and R. L. Schultz (1974) *The Impact of Advertising on the Aggregate Consumption Function: I. Preliminary Results*, Paper No. 443, Institute for Research in the Behavioral, Economic and Management Sciences.

Peel, D. (1975) *Advertising and Aggregate Consumption*, in K. Cowling et al. (ed), Advertising

and Economic Behaviour. London: Macmillan.

Quantitative Micro Systems (2005) *EView's 5.1 Users Guide.* Quantitative Micro Software, LLC.

Quarles, R.C. and Jeffres, L. W. (1983) "Advertising and National Consumption: a Path Analytic re-examination of the Galbraithian Argument", *Journal of Advertising*, 12, 4-13, 33.

Riksbanken (2008) *Riksbanken Penningpolitik* [online], Svenska Riksbanken, http://www.riksbank.se/templates/SectionStart.aspx?id=8717, acc. 2007-01-09

Rodgers, J. L. And Nicewander, W. A. (1988) "Thirteen Ways to Look at the Correlation Coefficient", *American Statistician*, Feb88, Vol. 42 Issue 1, pp. 59, 0003-1305.

Verdon, W.A., McConnell, C.R. and Roesler, T.W. (1969), "Advertising expenditures as an Economic Stabilizer, 1945-1969". *Quarterly Review of Economics and Business*, 8, 7-18.

Schor, J. (1998) *The Overworked American: Why We Want What We Don't Need*, New York: Harper Collins.

Schmalensee, R. (1972) *The Economics of Advertising*, Amsterdam: North-Holland Publishing Company.

Simon, J. (1970) *Issues in the Economics of Advertising*, Urbana: University of Illinois Press.

Solow, R. M. (1967) "The New Industrial State or Son of Affluence", *Public Interest*, 9 (Fall), 100-108.

Sturgess, B. T., Wilson, N. (1984) "Advertising Expenditure and Aggregate Consumption in Britain and West Germany: An analysis of Casuality", *Manegerial and Decision Economics*, Vol. 5, No. 4, (Dec., 1984), pp.219-227.

Taylor, L. D. and Weiserbs, D. (1972) "Advertising and the Aggregate Consumption Function", *American Economic Review*, 62, 642-655.

Telser, L.G. (1964) "Advertising and Competition", *Journal of Political Economy*, Dec 1972, pp. 537-562.

literature

# Appendices

Advertising spending

Difference in sum of loans

# Advertising spending

| | NEW | MAG | TV | RAD | CIN | OAD | FMA | FNE | CAT | DAD | INT | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK | M SEK |
| 1996Q4 | 2 226,2 | 443,7 | 729,4 | 86,9 | 22,1 | 148,3 | | | 875,5 | 671,4 | | **5 203,4** |
| 1997Q1 | 1 932,0 | 417,5 | 652,1 | 76,9 | 18,2 | 118,1 | | | 330,7 | 621,5 | 8,2 | **4 175,2** |
| 1997Q2 | 2 234,6 | 538,5 | 734,5 | 112,8 | 16,1 | 185,1 | | | 557,0 | 666,3 | 10,0 | **5 054,9** |
| 1997Q3 | 1 733,5 | 338,3 | 558,3 | 92,0 | 18,3 | 140,7 | | | 330,1 | 644,4 | 12,8 | **3 868,3** |
| 1997Q4 | 2 421,1 | 530,9 | 920,1 | 133,7 | 30,3 | 159,1 | | | 902,3 | 737,9 | 30,6 | **5 866,0** |
| 1998Q1 | 2 085,0 | 524,5 | 728,0 | 87,1 | 16,0 | 156,5 | | 191,2 | 353,8 | 684,7 | 33,6 | **4 860,4** |
| 1998Q2 | 2 386,6 | 625,5 | 849,3 | 148,4 | 14,8 | 179,1 | | 248,2 | 595,8 | 679,6 | 47,9 | **5 775,2** |
| 1998Q3 | 1 926,3 | 418,8 | 603,5 | 129,4 | 13,3 | 156,0 | | 149,6 | 353,1 | 671,0 | 49,4 | **4 470,4** |
| 1998Q4 | 2 527,3 | 586,5 | 1 023,2 | 152,2 | 30,2 | 158,1 | | 277,8 | 965,3 | 748,5 | 76,0 | **6 545,1** |
| 1999Q1 | 2 070,4 | 525,2 | 802,9 | 102,4 | 17,8 | 152,6 | | 226,5 | 396,5 | 676,8 | 83,0 | **5 054,0** |
| 1999Q2 | 2 299,7 | 657,6 | 882,4 | 139,8 | 11,9 | 176,0 | | 291,6 | 667,8 | 720,9 | 117,8 | **5 965,5** |
| 1999Q3 | 1 857,8 | 430,2 | 651,5 | 129,9 | 14,1 | 163,6 | | 193,3 | 395,7 | 683,2 | 114,5 | **4 633,8** |
| 1999Q4 | 2 526,9 | 637,7 | 1 097,3 | 164,3 | 26,2 | 185,1 | | 346,9 | 1 081,8 | 808,9 | 181,5 | **7 056,6** |
| 2000Q1 | 2 234,7 | 620,1 | 902,8 | 120,5 | 16,0 | 189,2 | | 264,6 | 408,9 | 706,2 | 273,0 | **5 736,1** |
| 2000Q2 | 2 599,1 | 740,4 | 1 090,5 | 169,0 | 15,7 | 253,4 | | 343,2 | 688,8 | 747,7 | 309,3 | **6 957,0** |
| 2000Q3 | 1 950,1 | 509,2 | 738,8 | 130,8 | 16,0 | 187,5 | | 249,6 | 408,2 | 737,5 | 233,3 | **5 160,9** |
| 2000Q4 | 2 553,8 | 704,0 | 1 226,6 | 172,1 | 30,7 | 218,1 | | 375,4 | 1 115,8 | 904,5 | 297,8 | **7 598,7** |
| 2001Q1 | 2 177,6 | 666,0 | 887,8 | 119,2 | 19,0 | 168,5 | | 308,8 | 432,8 | 831,5 | 235,6 | **5 846,7** |
| 2001Q2 | 2 271,6 | 712,7 | 914,4 | 143,1 | 17,0 | 205,6 | | 351,7 | 728,9 | 855,3 | 256,8 | **6 457,1** |
| 2001Q3 | 1 722,2 | 458,6 | 667,4 | 112,2 | 11,6 | 165,1 | | 233,8 | 432,0 | 785,9 | 182,2 | **4 770,9** |
| 2001Q4 | 2 153,7 | 573,8 | 1 039,7 | 133,4 | 31,5 | 202,4 | | 337,1 | 1 180,8 | 921,6 | 288,7 | **6 862,6** |
| 2002Q1 | 1 841,9 | 495,6 | 822,8 | 100,1 | 18,6 | 167,7 | | 282,5 | 376,5 | 801,1 | 241,8 | **5 148,5** |
| 2002Q2 | 2 088,6 | 639,4 | 905,2 | 132,0 | 18,3 | 209,1 | | 340,9 | 634,1 | 836,2 | 352,1 | **6 155,9** |
| 2002Q3 | 1 674,9 | 443,7 | 665,9 | 117,0 | 16,3 | 197,2 | | 252,5 | 375,8 | 828,0 | 265,4 | **4 836,6** |
| 2002Q4 | 2 123,1 | 548,7 | 1 052,5 | 131,3 | 25,6 | 223,1 | | 352,0 | 1 027,3 | 941,1 | 366,1 | **6 790,8** |
| 2003Q1 | 1 853,8 | 518,1 | 832,1 | 93,1 | 18,2 | 168,4 | 92,2 | 280,6 | 366,2 | 873,7 | 295,1 | **5 391,5** |
| 2003Q2 | 2 110,9 | 635,4 | 981,0 | 123,8 | 19,6 | 220,8 | 175,4 | 323,0 | 591,6 | 873,9 | 300,9 | **6 356,3** |
| 2003Q3 | 1 653,4 | 400,7 | 669,5 | 106,5 | 12,8 | 217,6 | 66,3 | 231,2 | 298,5 | 861,5 | 248,1 | **4 765,9** |

| | |
|---|---|
| **NEW** | **New**spaper |
| **MAG** | **Mag**azines |
| **TV** | **T**ele**v**ision |
| **RAD** | **Rad**io |
| **CIN** | **Cin**ema |
| **OAD** | **O**utdoor **Ad**vertising |
| **FMA** | **F**ree **Ma**gazines |
| **FNE** | **F**ree **Ne**wspapers |
| **CAT** | **Cat**alogs |
| **DAD** | **D**irect **Ad**vertising |
| **INT** | **Int**ernet |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2003Q4** | 2 155,5 | 539,4 | 1 035,3 | 123,8 | <span style="color:red">19,6</span> | 218,1 | 120,2 | 348,0 | 1 015,5 | 977,2 | 320,1 | **6 872,7** |
| **2004Q1** | <span style="color:red">1 826,9</span> | 502,5 | 818,3 | 96,6 | 13,5 | 205,9 | 96,9 | 355,3 | 333,0 | 968,6 | 344,3 | **5 561,8** |
| **2004Q2** | 2 086,2 | 621,4 | 1 033,9 | 141,0 | 11,2 | 243,5 | 168,5 | 425,5 | 560,9 | 948,1 | 350,4 | **6 590,7** |
| **2004Q3** | 1 688,8 | 442,4 | 754,7 | 121,7 | 9,2 | 223,4 | 74,8 | 301,5 | 332,4 | 949,0 | 342,4 | **5 240,2** |
| **2004Q4** | 2 250,5 | 590,8 | 1 142,2 | 131,9 | 24,7 | 251,8 | <span style="color:red">128,4</span> | 464,1 | 908,7 | 1 132,0 | 417,6 | **7 442,8** |
| **2005Q1** | 1 908,1 | 520,0 | 912,3 | 106,0 | 14,4 | 225,7 | <span style="color:red">100,0</span> | 404,0 | 282,3 | 991,8 | 451,6 | **5 916,1** |
| **2005Q2** | 2 270,5 | 655,5 | 1 105,8 | 144,6 | 17,6 | 269,4 | 174,8 | 474,3 | 560,6 | 1 064,4 | 484,0 | **7 221,5** |
| **2005Q3** | 1 783,3 | 460,0 | 815,1 | 123,0 | 15,0 | 241,0 | 63,2 | 350,6 | 340,6 | 1 038,7 | 469,2 | **5 699,6** |
| **2005Q4** | 2 334,6 | 623,2 | 1 310,3 | 141,3 | 20,8 | 264,3 | 119,8 | 499,0 | 871,9 | 1 203,4 | 568,9 | **7 957,5** |
| **2006Q1** | 2 065,0 | 589,7 | 1 038,3 | 127,3 | 14,6 | 210,9 | 106,9 | 445,4 | 312,0 | 1 046,7 | 668,3 | **6 625,1** |
| **2006Q2** | 2 374,6 | 695,4 | 1 259,0 | 161,1 | 20,0 | 299,8 | 195,0 | 505,8 | 528,5 | 1 112,8 | 703,4 | **7 855,4** |
| **2006Q3** | 1 926,9 | 477,7 | 852,5 | 148,7 | 15,1 | 247,1 | 68,0 | 398,4 | 335,0 | 1 069,5 | 708,3 | **6 247,1** |
| **2006Q4** | 2 481,3 | 651,1 | 1 396,3 | 167,3 | 24,0 | 309,6 | 127,5 | 560,2 | 855,0 | 1 267,0 | 921,1 | **8 760,4** |
| **2007Q1** | 2 202,2 | 587,6 | <span style="color:red">1 069,1</span> | 132,2 | 19,1 | 233,8 | 101,2 | 468,3 | 310,8 | 1 092,7 | 962,1 | **7 179,0** |
| **2007Q2** | 2 397,0 | 728,4 | 1 248,2 | 172,3 | 20,8 | 265,1 | 197,7 | 515,7 | 501,7 | 1 099,6 | 934,2 | **8 080,8** |
| **2007Q3** | 1 932,8 | 482,9 | 908,2 | 155,6 | 16,9 | 235,5 | 65,1 | 376,5 | 363,3 | 1 009,7 | 924,1 | **6 470,6** |

# Difference in sum of loans

| | | | |
|---|---|---|---|
| **1996Q4** | 10624 | **2002Q2** | 17432 |
| **1997Q1** | 11351 | **2002Q3** | 16682 |
| **1997Q2** | 9764 | **2002Q4** | 25641 |
| **1997Q3** | 21440 | **2003Q1** | 33562 |
| **1997Q4** | 11266 | **2003Q2** | 28785 |
| **1998Q1** | 13402 | **2003Q3** | 40030 |
| **1998Q2** | 16350 | **2003Q4** | 15289 |
| **1998Q3** | 16387 | **2004Q1** | 45278 |
| **1998Q4** | 13823 | **2004Q2** | 32667 |
| **1999Q1** | 23120 | **2004Q3** | 47207 |
| **1999Q2** | 17261 | **2004Q4** | 27764 |
| **1999Q3** | 28379 | **2005Q1** | 52267 |
| **1999Q4** | 21630 | **2005Q2** | 46456 |
| **2000Q1** | 24289 | **2005Q3** | 50703 |
| **2000Q2** | 21475 | **2005Q4** | 37483 |
| **2000Q3** | 29774 | **2006Q1** | 54244 |
| **2000Q4** | 17843 | **2006Q2** | 43324 |
| **2001Q1** | 30006 | **2006Q3** | 60808 |
| **2001Q2** | 22509 | **2006Q4** | 33085 |
| **2001Q3** | 54449 | **2007Q1** | 61108 |
| **2001Q4** | 27110 | **2007Q2** | 47552 |
| **2002Q1** | 35897 | **2007Q3** | |
| **2002Q2** | 17432 | | |
| **2002Q3** | 16682 | | |
| **2002Q4** | 25641 | | |

Appendices