



**THE EFFECT OF INCREASING INTEREST RATES ON CONSUMERS DE-  
POSITS IN FINLAND**

Lappeenranta–Lahti University of Technology LUT

Bachelor's Programme in Strategic Finance and Analytics, Bachelor's thesis 2023

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Examiner: Post-doctoral researcher Roman Teplov

## ABSTRACT

Lappeenranta–Lahti University of Technology LUT

LUT School of Business and Management

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### **The effect of increasing interest rates on consumers deposits in Finland**

Bachelor's thesis

2023

47 pages, 3 figures, 8 tables and 14 appendices

Examiner: Post-doctoral researcher Roman Teplov

Keywords: Interest rates, deposit, inflation, consumer confidence, regression analysis

The aim of this bachelor's thesis is to investigate the effects of rising interest rates on the deposits of Finnish consumers. The research divides deposits in three distinct categories: overnight, term, and investment deposits. The aim is to provide better understanding of the consequences of rising interest rates on various deposit instruments, which can support earlier research related to individuals' consumption behaviour.

This study was conducted using quantitative research methods and linear regression analysis. Data was collected for a total of 45 months between 2020 and 2023 on variables such as different deposit variations, interest rates, inflation, and consumer confidence. In addition to the interest rates, inflation and consumer confidence play an important role in making consumer deposit decisions.

The results of the study indicate that the rise in interest rates has had an increasing effect on term and investment deposits, but overnight deposits have decreased during the survey period. The conclusions can be drawn that there has been a reduction in consumption coupled with an increase in savings. This suggests that consumers are adopting a more cautious stance towards the future, as diminished confidence in the economy is attributed to both inflation and increasing interest rates.

## TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

LUT-kauppakorkeakoulu

Kauppätieteet

Hanna Pikkarainen

### **Korkojen nousun vaikutus suomalaisten kuluttajien talletuksiin**

Kauppätieteiden kandidaatintutkielma

2023

47 sivua, 3 kuvaa, 8 taulukkoa ja 14 liitettä

Tarkastaja: Tutkijatohtori Roman Teplov

Avainsanat: Korko, talletus, inflaatio, kuluttajien luottamus, regressioanalyysi

Tässä kandidaatintutkielmassa tavoitteena on selvittää korkotason nousun vaikutuksia suomalaisten kuluttajien talletuksiin. Talletukset on tutkimuksessa jaoteltu kolmeen kategoriaan, yön yli -, määräaikais- ja sijoitustalletuksiin. Tavoitteena on saada kattavampi kuva korkotason nousun vaikutuksista eri talletusinstrumentteihin, jolla voidaan tukea aikaisempaa tutkimusta liittyen yksilöiden kulutuskäyttäytymiseen.

Tutkimus suoritettiin kvantitatiivisin tutkimusmenetelmin sekä siinä käytettiin lineaarista regressioanalyysia. Dataa kerättiin yhteensä 45 kuukaudelta vuosien 2020–2023 välisenä aikana muuttujista, kuten eri talletusvariaatiot, korkotaso, inflaatio ja kuluttajien luottamus. Korkotason lisäksi inflaatiolla ja kuluttajien luottamuksella on tärkeä rooli kuluttajien talletuspäätösten tekemisessä.

Tutkimustulokset osoittivat, että korkotason nousulla on ollut kasvattava vaikutus määräaikais- ja sijoitustalletuksiin, mutta yön yli talletukset ovat vähentyneet tarkasteluajanjaksolla. Tulosten perusteella kulutus on vähentynyt ja säästäminen lisääntynyt. Tästä voidaan päätellä kuluttajien olevan varautuneempia tulevaisuuden suhteen, kun inflaatio ja korkotason nousu on vähentänyt luottamusta taloutta kohtaan.

## Table of contents

1	Introduction .....	7
1.1	Objectives and research questions .....	8
1.2	Delimitations .....	9
1.3	Theoretical framework .....	10
1.4	The structure of the thesis .....	11
2	Theoretical background .....	12
2.1	The European Central Bank and monetary policy .....	12
2.1.1	Factors affecting the interest rate .....	13
2.1.2	Finland and the European Central Bank .....	16
2.2	Bank deposits and different varieties .....	17
2.2.1	Overnight deposits .....	18
2.2.2	Term deposits.....	19
2.2.3	Investment deposits.....	19
2.3	Research hypotheses .....	20
3	Research methodology .....	22
3.1	Multiple regression analysis.....	22
3.2	Estimated models .....	24
4	Empirical study.....	26
4.1	Data description and variables .....	26
4.2	Regression model for overnight deposits.....	27
4.3	Regression model for term deposits.....	29
4.4	Regression model for investment deposits.....	31
4.5	Main findings .....	32
5	Discussion.....	34
6	Conclusions .....	36
	References	

## Appendices

Appendix 1. The policy interest rate of the ECB

Appendix 2. Scatter plots of the overnight deposit model

Appendix 3. RESET test

Appendix 4. Breusch-Pagan test

Appendix 5. Residual scatterplots

Appendix 6. VIF-test of independent variables

Appendix 7. Overnight model residuals

Appendix 8. Distribution of the overnight deposit model

Appendix 9. Scatter plots of term deposits model

Appendix 10. Term model residuals

Appendix 11. Distribution of the term deposits variable

Appendix 12. Scatter plots of investment deposits model

Appendix 13. Distribution of the investment deposits variable

Appendix 14. Investment deposit model residuals

## Figures

Figure 1. Theoretical framework of the thesis

Figure 2. Annual growth rate of deposits in Finland from January 2020 to August 2023 (Suomen Pankki, 2023)

Figure 3. Dependent and independent variables

## Tables

Table 1. Description of the variables

Table 2. Linear regression estimation method for model 1.

Table 3. Correlation between overnight deposits model variables

Table 4. Linear regression estimation method for model 2.

Table 5. Correlation between term deposits model variables

Table 6. Linear regression estimation method for model 3.

Table 7. Correlation between investment deposits model variables

Table 8. Main findings of the variables

# 1 Introduction

In the last few years world has faced many crises, which has affected on economy in overall picture. Interest rates have been historically low for a long time until last year after which the rise has been extremely fast. Consumer indebtedness has been a significant economic phenomenon in Finland and many other developed countries over the past decades. At the same time, interest rates have fluctuated at exceptionally high levels in a brief period. In addition to this, financial stability risks have also increased after the rise as the euro area households have become more indebted during low interest rates. (Suomen Pankki 2023a) Indebtedness has complex impacts on the financial situation that vary across individuals and economic circumstances. The more indebted consumer focuses more on increased debt costs, which can lead to lower savings. On the other hand, indebtedness can increase saving motivation, and therefore increase the number of deposits.

Debt has a massive influence on economic performance, as it influences consumers' economy as well. Previous studies show that periods of volatility increase consumers' willingness to increase their own savings, which is reflected in an increase in deposits. Mody, Ohnsorge and Sandri (2012, 114) examined the effects of the Great Depression and the uncertainty it brings to consumers. They found a negative correlation between uncertainty and the savings rate, which is why consumers' increased willingness to save in 2007-2009 was driven by caution about the future. A sense of uncertainty may persist in consumer perceptions, allowing the effects of crises to linger longer.

Finland is a cyclically sensitive economy, strongly influenced by various economic phenomena. Changes in interest rate fluctuations are a familiar economic event, therefore its changes are well studied national economic phenomena. Penczar (2023, 4589) studied how the regulatory framework affects bank financing models at EU level. The study showed that high government legislation has a negative impact on the number of deposits in countries. In countries with higher legislation, consumers invest more of their money in other instruments than bank deposits. Kuosmanen, Nabulsi and Vataja (2015) investigate the connections between the Nordic money markets and real economies. According to the study, these economies are similar and have a similar trend in financial markets, but still the relationships between the Nordic countries differ.

Although there are many previous studies related to the interest rate level and its changes, they usually focus on the European Union (EU) level or a comparison between other countries. While comparing with other countries provides insights into Finland's situation, it falls short in providing sufficient details about the specific behaviors and preferences of Finnish consumers. The consumers' point of view best brings out how the rise in interest rates affects the daily life of Finnish people through economic factors. Many studies also focus on the borrower's perspective, therefore less focus has been given to savers. It is important to understand the behavior of savers, as it is an important part of the economic cycle and has a significant impact on financial institutions. This bachelor's thesis aims to fill the research gap, bringing a Finnish perspective on the research topic. The rise in interest rates is a current issue, therefore it is important to conduct further research on the subject.

### 1.1 Objectives and research questions

The topic of the work is to find out how the rise in interest rates has affected the economic situation of consumers in Finland. The aim is to find out whether the rise in interest rates has had a significant effect on deposits and to compare the results to the time before the rise in interest rates. It should be considered that there are several factors behind these economic effects which affect on household deposits, but this thesis focuses on the following variables in addition to rising interest rates, such as the impact of inflation and consumer confidence when creating mathematical models. Inflation has a significant effect on interest rates and thus on consumer deposits, which are also affected by consumer confidence. Central banks raise interest rates to control inflation, so it is an important matter to bring a deeper understanding to this work. In other hand, consumer confidence indicates consumer behavior, which in turn is reflected in an increase or decrease in the number of deposits. As previously shown, recourse for the future has had a positive effect on the increase in saving, therefore is good to take consumer confidence into account in this research.

Three research questions aim to answer the main issue to achieve the results of the thesis. The main research question is:

*Question 1: How the rise in interest rates has affected on consumers deposits in Finland?*



The main research question is supported by two sub-research questions formed as follow:

*Question 2: How does the deposit behaviour of consumers change because of the rise in interest rates?*

*Question 3: What was the deposit behaviour of Finnish consumers before the rise in interest rates?*

The aim of the sub-research questions is to investigate how consumers' consumption behaviour and thus saving has changed after the rise in interest rates. It is also preferable to research which variables affect deposits in general. When these sub-questions are deconstructed, the main research question will be answered.

## 1.2 Delimitations

The theoretical framework is divided into two categories and contains research of the European Central Bank and its monetary policy and how it impacts on the interest rates. The second section focuses on bank deposits and their variations. The theoretical framework has been constructed using these two main concepts to provide a comprehensive picture of the evaluation on interest rates and deposits and related aspects in terms of this research.

The topic of this thesis is to study the effects of rising interest rates in Finland. The topic is strongly related to the nation's internal changes as macroeconomic phenomena change. Since the research topic is relatively new, data and information have been collected from the past few years. Data collection is limited to the period between 2020 and 2023, as the rise in interest rates occurs in 2022. It is important to study the period before the rise in interest rates so that a reliable comparison can be made in terms of this thesis. The focus of this study is on Finnish consumers, therefore the scope of research is confined to the geographical context of Finland. Since it is a member of the EU and has a strong influence on Finland, such as monetary policy, the EU is examined in a theoretical background and used for data collection.

As a macroeconomic phenomenon, the impact of rising interest rates affects the national economy at both macro and microeconomic levels. Its effects therefore produce different outcomes for individual operators. This paper focuses on comparing the effects of rising

interest rates only from the point of view of Finnish consumers. All households in Finland are considered consumers and are not subject to restrictions related to their nature.

### 1.3 Theoretical framework

This study does not consider all the factors affecting the number of deposits but rather focuses on the key elements below that are essential for the work. Figure 1 outlines the theoretical framework of this thesis, i.e., the factors used to examine changes in deposit amounts.

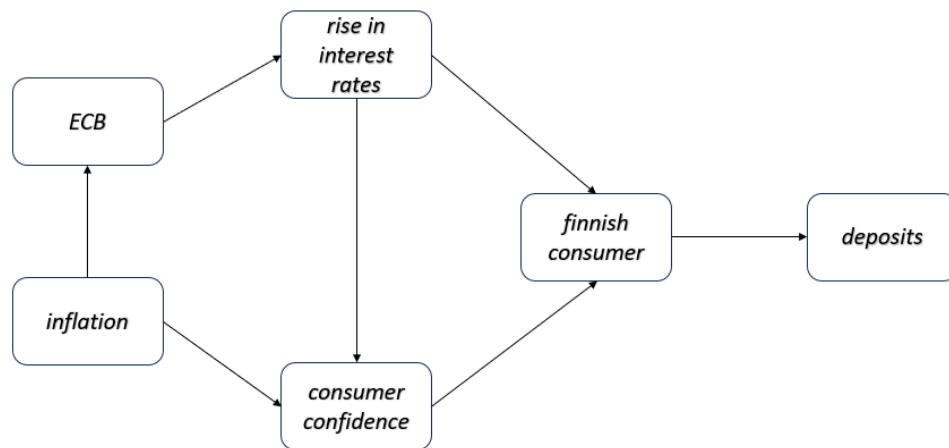


Figure 1. Theoretical framework of the thesis

Inflation has a holistic effect on these economic factors, because not only does it increase uncertainty in consumers, but it also increases future inflation expectations, which raise the intensity of the cycle. Inflation has a positive effect on interest rates, as prices rise, central banks raise interest rates to curb this phenomenon (Mallik & Bhar 2011, 621). On the other hand, as inflation rises and the real interest rate becomes negative, the market value of deposits decreases. After deducting inflation from the nominal interest rate on deposits, a real interest rate is obtained. (Sadeghi, Tayebi & Roudari 2023, 936) Thus, the popularity of deposits is expected to decline unless the interest rate on deposits rises above inflation. Goyal and Parab (2019) suggest that there is a negative relationship between consumer confidence and inflation, as poor prospects for the future increase inflation expectations. However, Blanchflower and Bryson (2023) findings indicates that high inflation reduces confidence, which is expected to lead to an increase in the deposit volume, rather than a decline. Therefore, interest rates play an important role in determining consumers' deposit decisions.

## 1.4 The structure of the thesis

The research is divided into six chapters and the first chapter includes the introduction of the thesis and what this study is going to investigate. This chapter reviews the research questions and sub-research questions and the goals of the thesis. The introduction includes delimitations of the work and why this topic should be more studied today. Older studies regarding to the same topics are also reviewed in this paragraph and finally theoretical framework is presented end of the first chapter.

The next chapter contains the theoretical part of the study and discusses the monetary policy controlled by the European Central Bank and how it affects in the changes of interest rates. This section includes the review of different deposit variations, and lastly the research hypotheses of the thesis are presented. The third chapter introduce the research methodology of the study and how data is collected to conduct reliable research. Based on the data, mathematical models have been created, which are presented at the end of the section.

The empirical study of the work is reviewed in the fourth chapter which contains the background of the variables used in the study and the research results of the created mathematical models and their main findings. The last two chapters include the discussion and conclusions of the research as well as the assessment of reliability and presents further possible research proposals.

## 2 Theoretical background

This chapter presents the theoretical background of the study. First, there is a comprehensive review of the European Central Bank (ECB) and the monetary policy it steers. The chapter discusses the level of interest rates and what factors influence its changes, and what role the ECB plays in it. The chapter also examines in more detail the relationship between Finland and the ECB and the history after joining the European Union. The end of the chapter discusses the different forms of deposits and how they are changed in the last couple of years, and lastly the hypotheses of the thesis are presented.

### 2.1 The European Central Bank and monetary policy

The main objective of the ECB is to maintain price stability, such as inflation rate level in 2 %, and to support the general economic policies of the European union. These objectives aim for balanced economic growth, competitive market economy, social progress, and reduction of unemployment. (Hartmann & Smets 2018, 5) The most important instrument of monetary policy is the policy interest rate, which the central bank uses to regulate market interest rates. (Suvanto & Kontulainen 2016, 73).

When the central bank injects funds into the financial system through the purchase or borrowing of securities, interest rates start to decrease, and the economy starts to recover. This is also known as expansionary policy. Conversely, the contractionary policy reduces the money supply and therefore raise interest rates, leading to a reduction in borrowing and consumption, and can thus help curb inflation. This form of policy is typically necessary when the economy overheats, and inflationary pressures grow too strong. However, it is important for central banks to apply such policy measures cautiously so as not to cause excessive recession or other adverse effects on the economy.

The roles of central banks have changed in recent decades and at the same time, their importance in global economy has increased. Various crises have destabilized the global economy throughout history, such as the double-dip recession due to financial crisis in 2007-2009 started the euro area sovereign debt crisis in 2008-2013. In an uncertain economic environment is challenging to conduct a consistent and systematic monetary policy, causing

challenges for central banks. (Hartmann et al. 2018, 8) Despite these difficulties, the European Central Bank has succeeded in stabilizing the euro areas money market, even though it was founded in erratic period of global financial markets (Dominiquez 2006, 68-76).

Interest rates have been lower and less volatile in European countries than before founding the union (Dominiquez 2006, 68-76). On the other hand, a study by Ferrara, Hernando and Macroni (2018) states that real interest rates began to decline already in the 1980s and interest rates have fallen to historically low levels by the present time. Over time, this has led to an increase in consumer consumption and indebtedness, which has a negative impact on traditional forms of savings, such as bank deposits.

While interest rates are one central instrument of central banks in monetary policy, due to complexity of the economy, it must consider other economic situations as well. As noted before, the financial and euro area debt crisis hampered the implementation of monetary policy in the last decade, the crises of recent years have also affected the ECB's monetary policy decisions today. The COVID-19 pandemic and the Russian invasion war in Ukraine caused new problems for central banks. After the Russian invasion of Ukraine in 2022, energy prices began to rise, causing disruption to the world economy. Even before that with COVID-19, the prices of services and commodities had risen. These led to mounting pressures on central banks to raise interest rates to maintain price stability. (Euro ja talous 2023) Central banks play a key role in crisis management, in which a strong and flexible monetary policy plays an important role. The effects of the change in the policy rate are a complex process that requires balancing between different economic objectives.

### 2.1.1 Factors affecting the interest rate

Interest rates are affected by several different factors, which central banks must consider when making interest rate policy. Deposits are an important part of the economy, as they affect consumers' financial performance, and at the same time they are an important source of income for the bank. The primary function of commercial banks is financial intermediation, where consumer deposits play an important role in its management. (Gavurova, Kocisova & Rozsa 2019, 43) Since the interest rate chosen by banks affects the amount of savings they attract, it is important to understand what factors affect these interest rates.

According to Gavurova et al. (2019, 55) changes in interest rates are influenced by both internal and external factors, in particular demand and supply for money, inflation, bank performance, monetary policy, interbank interest rates, economic performance, exchange rate developments, concentrations in deposit market, loans received from consumers, and capitalisation. The pricing strategy of the bank determines the appropriate level of interest to maintain its profitability and ability to provide competitive financial services to customers.

If sufficient funds are not flowing into the banking sector, they will not be able to guarantee loans to households or businesses, which can at worst lead to a lack of confidence in the banking sector. Therefore, banks must be aware of the optimal interest rates to maintain consumers' willingness in keeping their funds without the costs becoming too high. The level of interests should exceed at least the level of inflation to make it profitable for consumers to keep their funds in the bank. (Gavurova et al. 2019, 42-43)

Deposits are part of households' consumer behaviour, and different models and theories have been developed to predict their fluctuations. To understand the causes of interest rate fluctuations, the background of those changes must be understood. As mentioned earlier, the central bank's main objective is price stability, which it seeks to achieve by changing the policy interest rate. John Taylor has developed a monetary policy rule that allows the central banks to regulate the short-term policy rate (Tervala 2010, 165). The policy is named after its developer and is presented as follows:

$$i_t = r_t^* + \pi_t + \alpha(\pi_t - \pi_t^T) + \alpha(y_t - y_t^P) \quad (1)$$

in which,

$i_t$  = policy rate

$r_t^*$  = real interest rate

$\pi_t$  = inflation

$\pi_t^T$  = inflation target rate

$y_t$  = gross domestic product

$y_t^P$  = potential gross domestic product

In its simplicity, the model describes how the central bank should set policy interest rates, taking inflation and economic activities into account. Parameter  $\alpha$  measures how strongly the central bank relate to the deviation of inflation from the inflation target, therefore the higher the  $\alpha$ , the more strongly the central bank raises the interest rate. (Tervala 2010, 162-165) In 2022, inflation peaked 9,1 %, which is clearly above the central bank's inflation target of 2 % (Tilastokeskus 2023b). Regarding to the Taylor rule, it is clear why the European Central Bank has raised the policy interest rate at a rapid pace in the same year.

The rise in interest rates in 2022 is by no mean an exceptional event when considering the history of the economy decades back. On the other hand, the period of zero-lower bound on interest rates, or even negative interest rate territory, is exceptional. The diverse crises that unfolded, including the financial crisis and a deep regression, exerted detrimental effects on the public finances of Europe after 2008. The deteriorated economic situation of the governments forced them to pursue expansionary monetary policy to adapt to the effects of the crises. This led to an increase in the euro area's public debt from 65 % to 90 % by 2013. High unemployment and the negative output gap in 2012-2013 fell the headline inflation to negative in 2015. (Hartmann et al. 2018, 28-36)

Concerns about deflation and still slowly developing inflation forced the ECB to make new operations in their monetary policy. The ECB was the first major central bank to lower the policy interest rate below zero in order to conduct expansionary monetary policy. Another approach by banks is to reduce lending standards. Although the economy strengthened, the underlying inflation remained at low levels, which is why the further expansionary monetary policy was considered appropriate. The key policy rates were expected to remain their present level until summer 2019, or as long as necessary. (Hartmann et al. 2018, 28-36)

There is a reason why price stability is one of the main tasks to be performed by central banks. High inflation, like other economic disruptions, can cause distrust of banks in the views of consumers. According to Blanchflower et al. (2023, 214), rising interest rates due to higher inflation further weakens consumers' confidence, which can at worst lead to bank run, where depositors withdraw their deposits from the bank at the same time. This happened in the bankruptcy of American Silicon Valley Bank when depositors withdrew their funds from the bank at the same time (Euro ja talous 2023).

This has put pressure on central banks to raise interest rates to halt price increases and reduce money demand, therefore in July 2022, the ECB Council decided to raise interest rates for the first time since 2011. The policy interest rate has been raised since then between 0,5-0.75 % at a time (Appendix 1.). The ECB raised interest rates to 4.5% for the last time in September 2023. Based on current estimates, the ECB Governing Council expects inflation to reach its medium-term target of 2,1 % in 2025 with these interest rate adjustments. (European Central Bank 2023) Achieving the inflation target can trigger several reactions in the economy, and deposits are one key part of this cycle. In general, economic operators need to adapt to changing circumstances and find a balance between saving and consumption, even if the future seems uncertain.

### 2.1.2 Finland and the European Central Bank

Finland is part of the euro area, meaning there is no national monetary policy, but it is decided by the Eurosystem together with the ECB. As a member of the Euro system, the Bank of Finland participates in preparation and decision-making of its monetary policy. (Sorsa 2020, 16). Finland joined the European Monetary and Economic Union (EMU) in 1999, thus it gave up the possibility of conducting its own national monetary policy. As a result, Finland is part of the European Central Banks' domain and being responsible for the operability of the euro areas monetary policy in Finland. The primary objective of the Bank of Finland is also to maintain price stability moderate in addition to other important aims, such as issuing banknotes, money supply, managing foreign reserves, ensuring the efficiency of the payment system, and receiving deposits from other banks. (Suvanto et al. 2016, 144-145)

Finland is a small euro area economy with an open export-led economy, as it is dependent on other EU member governments and their economies. Although Finland's accession to the European Union has brought benefits to Finland, such as an increase in export demand, the ECB has been criticised for its inefficiency in coordinating different capitalisms and leading them equally (Suvanto et al. 2016, 8). Rosenberg (2020) studied the effects of various monetary policy shocks on house prices in Finland and the euro area. The results of the study showed that interest rate shocks have a larger and faster effect on Finnish house prices compared to other euro countries. The observations about the effects of policy rate shock are also stronger and more permanent in a small open economy compared to monetary union.



## 2.2 Bank deposits and different varieties

Changes in interest rates affect differently on bank deposits, based on their nature. In this thesis investigated deposits are divided into *overnight* deposits, *term* deposits and *investment* deposits. Which deposit solution each consumer ends up with is affected by the financial situation of a consumer or what kind of return they hope to get from the investment. Households keep a significant part of their assets in overnight deposit accounts, as they are easy to convert into liquid assets (Tuhkanen 2006, 89). As the minimum goal of savers and investors should be to preserve the real value of assets, it is important to allocate funds more profitably.

The effects of these changes extend from consumers' daily financial decisions to macroeconomic phenomena. In addition, various factors such as inflation and the employment situation affect how funds are allocated or saved. One recent study by Hwang (2024) shows, that households loss aversion increases their willingness to save when they are preparing for the future during crises. As the COVID-19 pandemic reveals a rapid increase in bank deposits (Cherrat and Prigent 2023, 936), a certain mannerism can be noticed in consumers behaviour throughout history. Figure 2. reveals the changes in deposits in the summer of 2022 after the rise in interest rates. The biggest changes have occurred in investment deposits as their expected return has increased.

As deposits play a significant part of the functioning of the financial system, banks need to determine the optimum level of deposits' interest rate in their deposit policies. It is a reward to consumers for keeping funds in deposit products but at the same time it represents a cost to the bank. (Gavurova et al. 2019, 42) According to Grigorian and Manole (2017, 2851), banks experienced a massive deposit outflow of almost EUR 400 billion by the end of 2012 due to economic crises. By examining historical patterns and drawing insights from them, it is easy to comprehend the reasons behind the substantial increase in deposit interest rates observed in 2022, as banks want to prevent distrust among consumers and increase their willingness to keep funds in the banks.

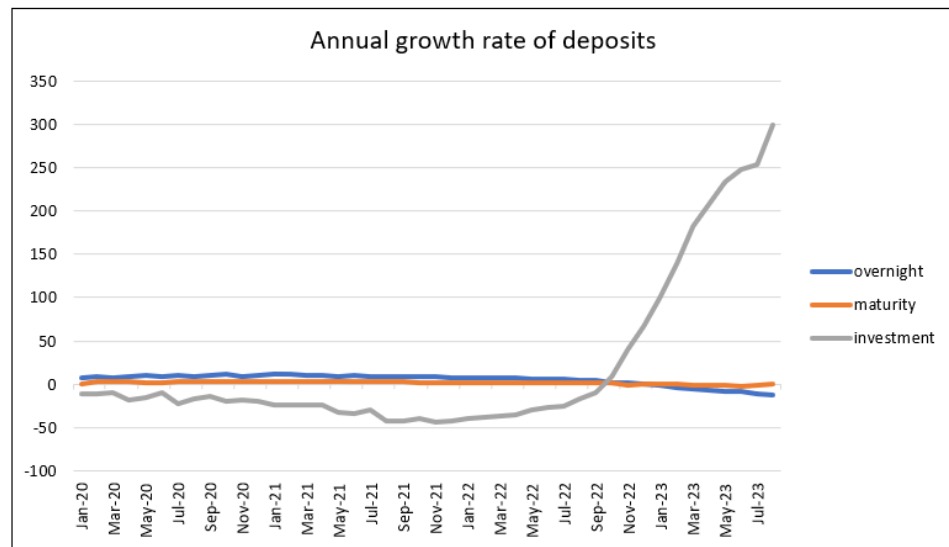


Figure 2. Annual growth rate of deposits in Finland from January 2020 to August 2023 (Suomen Pankki, 2023)

### 2.2.1 Overnight deposits

Overnight deposits include practically consumers transaction accounts, from which all their income and expense flow. Interest rates on current accounts are very low and are therefore are not the best option to save funds. Although most of the deposit funds are held in transaction accounts, the popularity of overnight deposits has decreased. Overall, EUR 100,5 billion of funds was stored in consumers transaction accounts, but in August 2023 the amount decreased 25,3 % to EUR 75,1 billion (Figure 2.). It can be said, according to the chart, that consumers want a better return on their assets, therefore they choose more productive targets to preserve their funds. Overnight deposits are easy to convert into liquid, therefore some of the consumers' savings are used for income losses that have increased due to inflation, which contributes to reducing this statistic (Mäki-Fränti & Silvo 2023, 6).

Rising interest rates have short-term and long-term effects on income and therefore on deposits as well. Indebted households have suffered from a rapid rise in interest rates as the loan costs have increased. (Euro ja talous 2023). According to the assumptions, this deposit instrument decreased the most compared to other deposits, as consumers transfer funds to higher-yielding instruments or increased expenses.

### 2.2.2 Term deposits

In a deposit with agreed maturity the customer deposits a predetermined amount into an account specified by the bank and holds the assets in the set period. The deposit cannot be withdrawn before the agreed time limit, and banks often offer short-term deposits ranging from a few months to a year. Long-term deposits maturity can be up to several years, depending on the bank's assortment. The interest rate for term deposits is determined by the amount of the investment, the time, and the level of the market rates, and it is paid when the deposit matures with the invested deposit capital. (Tuhkanen 2006, 95)

In the past recent years, the popularity of term deposits has grown in Finnish consumers after the rise in interest rates (Suomen Pankki 2023b). In the beginning of 2020 in January, households term deposits were over EUR 4,7 billion and in August 2023 the amount was EUR 8,3 billion (Figure 2.). Therefore, the amount of term deposits has increased by 76,6 % by the the end of the survey period. The percentage increase in term deposits in addition to investment deposits its due to the increase in the interest rates, as consumers reallocate their funds to get better return on assets. Hwang (2024) studied consumer behaviour and the study shows an increase in savings in crisis situations and similar behaviour can be observed today as well. Disorganization and various events in the world have created uncertainty in the present, creating the need to generate a sense of security for the future.

### 2.2.3 Investment deposits

Investment deposits are similar to term deposits offered by the bank where the return of the asset is tied to the value change of other instrument, such as security, deposit or currency. As with term deposits, the customer receives the invested capital and interest return when the investment matures. Contrary to term deposits, where the liabilities lie on an account for a certain period, in this form of investment consumer must rely on the bank's expert's knowledge in investing the funds. Therefore, it is not a direct investment in the underlying asset but a deposit in a bank through which the consumer can benefit from the positive development of the market. (Tuhkanen 2006, 96-97)

Investment deposits were in January 2020 EUR 8,1 billion, and in August 2023 EUR 26,1 billion (Figure 2.). Investment deposits are found to be negative almost throughout the

review period which can be explained by low interest rates before the rise. There is a positive dependence between interest rates and investment deposits as one rises, another variety becomes more common, and vice versa. Lian, Ma and Wang (2019, 2142-2143) argued that consumers' risk appetite increases when interest rates are low, in which reason the largest cash flows are usually allocated to shares during that period. In simplicity, the relationship can be examined using a share valuation metric that calculate the present value of the stock which is presented as follow (Brealey, Myers & Allen 2014, 20):

$$PV = \frac{CF}{(1 + r)^n} \quad (2)$$

in which,

$PV$  = present value

$CF$  = cash flow

$r$  = discount rate

$n$  = time

When inspecting the formula, can be noticed when the variable  $r$ , i.e., the rate increases, the definition of the divisor increases. This allows decisions to be made that the increase in interest rates has had a negative impact on the present value of shares which may have affected the attractiveness of investment deposits after the summer of 2022 (Figure 2.).

### 2.3 Research hypotheses

Based on previous research and theory, hypotheses are formed to support the research questions presented in the introduction. Previous studies, such as Hwang (2024), have shown that consumers' willingness to save money changes in crisis situations. Crisis situations usually lead to increased concern about unemployment, therefore individuals begin to prioritize saving and reduce consumption. Observations by Cherrat et al. (2023) suggests, that during the COVID-19 pandemic, the volume of deposits experienced a significant increase. Lian et al.

(2019) on the other hand stated that at a time of low interest rates, consumers' risk appetite increases, which contributes to reducing transactions to low-yielding accounts.

Increasing interest rates exert a detrimental influence on the overall economy. Consequently, it is reasonable to assume that such rate hikes could adversely affect consumers' views regarding both the current and future economic conditions.

Based on the theory, the research hypotheses have been formed as follows:

*H<sub>1</sub>: A rise in interest rates decrease overnight deposits*

*H<sub>2</sub>: A rise in interest rates increases term deposits*

*H<sub>3</sub>: A rise in interest rates increases investment deposits*

Numerous research findings indicate shifts in consumer behavior during periods of instability, shaped by economic variations and the influence of financial institutions. As Gavurova, et al. (2019) presented, deposits serve an important revenue for banks. This observation leads to insights into the rationale behind the escalation of interest rates, suggesting that banks aim to encourage consumers to maintain funds within their accounts.

### 3 Research methodology

This chapter focuses on methodology used in this bachelor's thesis. The section reviews the linear regression model method, which has been chosen as the appropriate estimation method for this work. The chapter presents the variables that have been selected as the subject of research for this study and finally presents the created mathematical models.

#### 3.1 Multiple regression analysis

Regression analysis is a statistical method that attempts to explain a single explanatory variable with one or more explanatory variables as efficiently as possible. This method is called the least-square method (OLS) because the sum of the squares of the distances calculated from the straight of the observation points is minimized. In regression analysis, the variables must follow a normal distribution and the measurement scale must belong to either an interval or a ratio scale. However, nominal, and ordinal scale variables can be included in the model if dummy variables are used in the estimation. In this case, the variable is encoded so that it receives the values 0 or 1. In this study, all variables are continuous and belong to either an ordinal or a ratio scale, so no transformations have been performed on the variables in that respect. Variable transformations are often used to transform a nonlinear model into a linear form, but the procedures do not always turn out the desired results. (Heikkilä 2014, 222-223)

A multiple linear regression analysis has more than one independent variable, which make predictions for the dependent variable and is presented as follows:

$$y = \beta_1 + \beta_2 x_2 + \dots + \beta_K x_K + e_i \quad (3)$$

in which,

$y$  = dependent variable

$\beta_1 \beta_2$  = coefficients

$x$  = independent variable

$e_i$  = error term

The estimated model requires a high level of variation explained, over 0,6 (60 %) for the predictions to be considered reliable. The aim of the model is to find as many variables as possible to explain the studied phenomena, in order that the explanation variation rate does not remain too low. Linear regression is a multi-stage model with many different stages, which involves several assumptions that the model must meet before making the estimate. It is important to detect and correct the violations in assumptions if possible. (Hill, Griffiths & Lim 2018, 203-204; Heikkilä 2014, 235) All assumptions in regression model which needs to be detected, are presented as follow:

1. *Correctly specified econometric model and the relationship between x and y is linear*
2. *Exogeneity, where the explanatory variable is not correlated with the error term*
3. *Homoscedasticity, where the explanatory variables are not perfectly correlated with each other*
4. *The observations are independent of each other, meaning their error terms are not correlated with each other*
5. *No exact linear relationship exists between the explanatory variables, i.e. multicollinearity*
6. *The explanatory variable y and the error term are normally distributed, but this assumption is optional*

If these underlying assumptions are not met, the model may give incorrect results in terms of coefficients or standard errors, which should be considered when reporting the results. Linear regression is a relatively stable method even when the assumptions are not fully met, therefore deviations from the assumptions can also be considered in the analyses. (Hill et al. 2018, 203-204; Heikkilä 2014, 235)

A linear regression model can be considered an appropriate research method for this study, as one explanatory variable is attempted to be observed with several explanatory variables. The study focuses on four variables thus are created for the estimation model, such of deposits as dependent variable, interest rate, inflation, and consumer confidence as independent

variables. Dependent variable deposits are divided into overnight, term and investment deposits to achieve better results, but the variables are commonly referred to as deposits in this study for simplicity (Figure 3.). The objective is to determine the extent to which changes in the independent variables explain the fluctuations observed in the dependent variable.

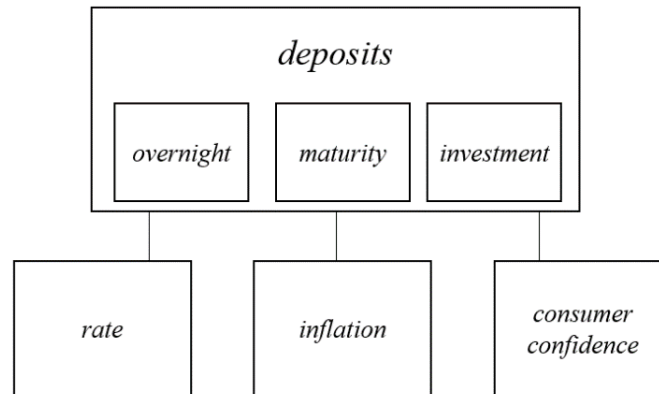


Figure 3. Dependent and independent variables

### 3.2 Estimated models

The impacts of the selected variables on each other have not been previously studied in the same context as in this research. However, based on the theory, it can be assumed that the independent variables rate, inflation and consumer confidence, effect on the dependent variable deposits, as they all have a connection with each other. To test the statistical relevance of the relationship between dependent and independent variables, models 1, 2 and 3 are presented as follows:

$$\text{overnight}_{it} = \beta_0 + \beta_1 \text{rate}_{it} + \beta_2 \text{inflation}_{it} + \beta_3 \text{trust}_{it} + e_{it}$$

$$\text{maturity}_{it} = \beta_0 + \beta_1 \text{rate}_{it} + \beta_2 \text{inflation}_{it} + \beta_3 \text{trust}_{it} + e_{it}$$

$$\text{investment}_{it} = \beta_0 + \beta_1 \text{rate}_{it} + \beta_2 \text{inflation}_{it} + \beta_3 \text{trust}_{it} + e_{it}$$



These models examine the effects of independent variables on individual deposit instruments to obtain a more detailed analysis of the variation of independent variables on the dependent variable.

All models have the same independent variables, but assumptions for the dependent variable vary depending on the deposit instrument. The interest rate level is assumed, according to research hypotheses, to have a negative effect on overnight deposits, and a positive effect on term and investment deposits. It is assumed that the rising interest rates are supposed to reduce consumers' interest in keeping funds in poor-performing transaction accounts, which is why their number is declining. Inflation is expected to have a negative effect on deposits, as it increases, the value of money decreases if the interest rate is lower than inflation. Consumer confidence is assumed to have a positive impact on overnight deposits, but a negative impact on term and investment deposits. When confidence in the economy is strong and uncertainty about the future decreases, consumption increases and the investment enthusiasm of assets through term and investment deposits is lower.

## 4 Empirical study

This chapter focuses on the empirical part of the study. The empirical section of the bachelor's thesis was conducted as a quantitative study, enabling the elucidation of causal relationships using data and a constructed model. The data have been collected from January 2020 to September 2023 to provide evidence of the effects of rising interest rates on consumers deposits. The used data is being analysed by using Stata program. Finally, the main findings of constructed mathematical models are presented.

### 4.1 Data description and variables

The data was collected from three sites which produce numerical statistics from on economic topics, such as the Bank of Finland, Statistics Finland, and Eurostat. Data have been collected on the following phenomena: consumers deposits, interest rates, inflation, and consumer confidence. The information found on consumers deposits and the interest rate level is held by the Bank of Finland. The consumer confidence indicator is measured by Statistics Finland, which studies consumers' expectations about the economy and intentions to make economic decisions. Data is collected through online and phone surveys. (Tilastokeskus 2023c) Inflation rate is found by the Eurostat, which is the statistical office of the European Union (Eurostat 2023).

*Table 1. Description of the variables*

<b>Variable</b>	<b>Description</b>	<b>Unit</b>
overnight	total amount of overnight deposits	EUR (€)
maturity	total amount of term deposits	EUR (€)
investment	total amount of investment deposits	EUR (€)
rate	interest rate level	Percent (%)
inflation	inflation	Percent (%)
trust	consumer confidence	Percent (%)

Data has been collected from beginning of 2020 until September 2023, which resulted in 45 observations for each variable from this period. When data is collected over a longer period, it is more convenient to answer the research question. Given that small data of less than 30

observations should not be used in multiple regression analysis, but rather in a simple regression analysis with a single dependent and independent variable (Hair, Black & Anderson, 2014, 170).

All the different varieties from the dependent variable deposits and the independent variable rate receive only positive values, while the other independent variables inflation and trust receive both positive and negative values. When inflation is negative, it turns into deflation, which means a decline in prices for goods and services. Negative consumer confidence indicates a lack of trust in the economy, which results in less purchasing decisions decrease and the desire to save increases.

#### 4.2 Regression model for overnight deposits

The first regression model explains overnight deposits at interest rates, inflation, and consumer confidence. First, scatter plots are created that visually present the patterns of variables, allowing the relationship between the variables to be examined in relation to the dependent variable (Appendix 2.). If a straight line were to be fitted between the observation points, it would be noticed that the interest rate has a negative effect on overnight deposits and therefore higher interest rates reduce overnight deposits. When examined at the scatter plots of inflation and overnight deposits from Appendix 2, can be stated that there is no linear relationship between these variables. With consumer confidence, a linear relationship can be observed from the scatter, although it is not very strong. Also, the observation points of these two scatter patterns are more diverged, so the ratio of these scatter patterns is considered weak. A regression model is created for the explanatory variables, and it is found that the model is statistically significant, as the p-value is 0,000.

The models R-squared describes how well the model fits to explain the variables. In a multiple regression model is also beneficial analyse the adjusted R-squared, as it considers the diversity of the model and if extra variables have been added to the model that do not increase its reliability but increase R-squared rate of the model. (Hill et al. 2018, 153). In this regression model, the R-squared is 79,05 %, and the adjusted R-squared is 77,52 %, which indicates a statistically robust level of explanation, meaning that the independent variables explain almost 80 % of the variation of the dependent variable. All variables are statistically significant at 1, 5 and 10 % risk levels. The highest coefficient belongs to the rate variable,

and it has a negative value. This implies that for every one unit increase in interest rates, overnight deposits decrease by EUR 834 156. As inflation increases by one unit, the number of deposits increases by EUR 1878, while as confidence increases, their amount increases by EUR 379.

*Table 2. Linear regression estimation method for model 1.*

overnight	Coefficient	Std. err.	P>t	[95% conf. interval]	
rate	-834155.7	76355.19	0.000	-988358.1	-679953.3
inflation	1878.435	294.6626	0.000	1283.351	2473.518
trust	397.367	133.4554	0.005	127.8482	666.8857
_cons	103102.9	1521.351	0.000	100030.5	106175.4
Prob F >	0.0000				
R-squared	0.7905				
Adj R-squared	0.7752				

When examining model specification with Ramsay's RESET test, the null hypothesis that the model is correctly specified, is rejected (Appendix 3.). The test suggests that enhancing the model through the inclusion of additional variables or transformations could be beneficial. One of the assumptions behind linear regression analysis is homoscedasticity. Appendix 5 contains residual images that can be used to detect possible heteroskedasticity. From the residual scatter plot, it is evident that the data points increase with larger values, indicating heteroskedasticity. (Hill et al. 2018, 167). Breusch-Pagan test has been conducted to examine whether this condition holds true for the model seen in Appendix 4. The p-value of the test is 0.302, which means that the null hypothesis of homoscedasticity remains valid.

Correlation is also an important metric to consider the mutual connection between variables. The correlation varies between  $-1$  and  $1$ , which can be used to detect possible multicollinearity, where the variation of the independent variable can be caused by the variation of another independent variable. (Hair et al. 2014, 161) Multicollinearity should be considered if the correlation is remarkably strong between two or more independent variables.

Table 3. Correlation between overnight model variables

Variable	overnight	rate	inflation	trust
overnight	1.0000			
rate	-0.7590	1.0000		
inflation	0.1203	0.3493	1.0000	
trust	0.2251	-0.3964	0.6637	1.0000

When looking at the correlation matrix of the model, the highest correlation is found to be between overnight and rate. The correlation between the variables trust and inflation of 0.6637 attracts interest as it is found to be strong for which reason a possible multicollinearity is suspected. However, according to the VIF test, multicollinearity is not found between explanatory variables (Appendix 6.). The last assumption of linear regression on the normal distribution of the residuals and the variable  $y$  can be examined with the help of a histogram. Appendix 7 shows the graph and the results of Shapiro Wilk's test for the residuals, where the null hypothesis of normal distribution remains valid. When looking at the normal distribution of the variable  $y$ , we notice that in this case the null hypothesis of normal distribution is rejected (Appendix 8). Examining the model shows that the deviation from the normal distribution is minimal. In other words, the observed data pattern closely resembles a normal distribution with only minor deviations.

### 4.3 Regression model for term deposits

The second model explains term deposits with the same variables as in the previous model. The scattering patterns show a similarity compared to the previous model. In this model, the interest rate has a positive effect on deposits, as their returns improve. Inflation and consumer confidence do not seem to have a linear relationship with the dependent variable in this model either (Appendix 9.). The model is statistically significant, with a p-value of 0.0000 and the adjusted R-squared of 95,89 %. It is noteworthy to pay attention to a this high of value, when the degree of explanation ratio is close to the value 1 as it means perfect collinearity. This usually speaks of multicollinearity between independent variables, which can be investigated using a correlation matrix. Also in this model, there is a clear correlation between the variable's inflation and trust (Table 5.), but the previously performed VIF test rejected the assumptions of multicollinearity (Appendix 6.). All variables in the model are statistically significant and increase in the interest rate has a positive effect on deposits, while

inflation and trust have a negative effect. A rise in the interest rate by one unit leads to a EUR 188361 increase in term deposits. Conversely, if inflation rises by one unit, deposits decrease by EUR 353. Similarly, an improvement in consumer confidence results in a decrease by EUR 43 in deposits.

*Table 4. Linear regression estimation method for model 2.*

maturity	Coefficient	Std. err.	P>t	[95% conf. interval]	
rate	188361.7	6332.881	0.000	175572.2	201151.2
inflation	-353.0864	24.43924	0.000	-402.4424	-303.7303
trust	-43.56794	11.06876	0.000	-65.92176	-21.21412
_cons	1318.668	126.1805	0.000	1063.842	1573.495
Prob F >	0.0000				
R-squared	0.9617				
Adj R-squared	0.9589				

According to the RESET test, variable or model transformations should be made for the model, therefore the null hypothesis is rejected. Appendix 2 shows the results of the Breusch-Pagan test and states that the null hypothesis of homoscedasticity remains valid in this model as well. When histograms and the Shapiro-Wilk test (Appendix 11) are used to check the normal distribution of the  $y$  variable, it can be observed that the variable is not normally distributed. Most of the values in the variable are smaller than the average, which makes the distribution skewed to the right. The observed trend can be attributed to the relatively low quantity of term deposits, which experienced growth following the increase in interest rates observed in the later part of the study. The residuals of the model are normally distributed, which is illustrated by a histogram and the Shapiro-Wilk's test (Appendix 10.).

*Table 5. Correlation between term deposits model variables*

<b>Variable</b>	maturity	rate	inflation	trust
maturity	1.0000			
rate	0.8553	1.0000		
inflation	-0.1365	0.3493	1.0000	
trust	-0.1661	-0.3964	0.6637	1.0000

#### 4.4 Regression model for investment deposits

In the third model, the dependent variable is investment deposits. The observation points for each variable are spread scattered, and there is no discernible linear connection (Appendix 12.). When looking at the lines drawn on the graphs, the interest rate and inflation would have a positive relationship. Based on previous studies, the connection between trust and investment deposits is negative, which can be stated to be true in this model. This suggests that when consumer confidence falls, there is a tendency to allocate more funds to investment deposits.

*Table 6. Linear regression estimation method for model 3.*

investment	Coefficient	std. err.	P>t	[95% conf. interval]	
rate	726764	49808.83	0.000	626173	827354.9
inflation	242.6727	150.8323	0.115	-61.9393	547.2847
trust	-35.6187	53.46873	0.509	-143.601	72.3636
_cons	-3048.692	621.6175	0.000	-4304.074	-1793.31
Prob F >	0.0000				
R-squared	0.9048				
Adj R-squared	0.8984				

When the regression model is created, the first attention is paid to the value of adjusted R-squared and the independent variables. The explanatory ratio is very high, with a value of 89,84 %, although the variables inflation and trust are not statistically significant, which also partly speaks of multicollinearity. The correlation table still shows a connection between inflation and trust (Table 7.). However, the answers to the research questions are obtained based on this information, as the rate is statistically significant in the model.

*Table 7. Correlation between investment deposits model variables*

<b>Variable</b>	investment	rate	inflation	trust
investment	1.0000			
rate	0.9452	1.0000		
inflation	0.4306	0.3493	1.0000	
trust	-0.4515	-0.3964	0.6637	1.0000

When interpreting the histogram of the investment deposit, it is noticed from Appendix 13 that the variable does not follow a normal distribution, which is also supported by the Shapiro Wilk's test. Both null hypotheses of the RESET test and the Breusch-Pagan test are rejected, meaning that the model is heteroscedastic and not valid enough in its form. These should be considered when doing the analysis and examining the results, as this estimator is no longer necessarily the best option for predicting the results. The assumption of a normal distribution of the residuals can be left valid, with the p-value of Shapiro Wilk's test being 0.06699 (Appendix 14.).

#### 4.5 Main findings

The results are summarized in the table below, where the effects of various factors as well as their key relationships can be easily observed.

*Table 8. Main findings of the variables*

	<b>overnight deposits</b>	<b>term deposits</b>	<b>investment deposits</b>
<b>interest rate</b>	negative	positive	positive
<b>inflation</b>	positive	negative	positive
<b>consumer confidence</b>	positive	negative	negative
<b>hypothesis</b>	√	√	√

Model 1 examined overnight deposits and its hypothesis was  $H_1$ : *A rise in interest rates reduces overnight deposits*. The results show that an increase in interest rates reduces overnight deposits, therefore the research hypothesis for this model remains valid (Table 8.). Increased costs due to inflation and indebtedness contribute to forcing consumers to use their savings. Some of the funds will also be transferred to more productive instruments. Trust had a positive effect on the number of deposits, although previous studies suggest that as consumer confidence decreases, saving increases, meaning the correlation should be negative. The nature of deposits is likely to influence this phenomenon. As financial confidence strengthens, consumption increases, allowing more funds to be held in current accounts from which they can be converted into liquid. The impact of inflation on overnight deposits was positive, which can be considered unusual. According to assumptions, the effect of inflation



on deposits would be negative, as higher inflation diminishes the value of assets in transaction accounts.

Model 2 examined term deposits with the same variables and the research hypothesis was formed as  $H_2$ : *An increase in interest rates increases term deposits*. The findings suggest that the rise in interest rates has led to an increase in term deposits, therefore the hypothesis remains valid in this model. The results support previous studies and assumptions in which consumer confidence and inflation negatively affect the amount of term deposits (Table 8.).

Examining investment deposits in model 3 had the most problems when forming the estimation model, as the variable rate was the only statistically significant one. Based on the results, conclusions can be drawn for the research question and the research hypothesis, which was  $H_3$ : *An increase in interest rates increases investment deposits*. According to the results, investment deposits and interest rates have a positive connection, and the research hypothesis remains valid as well in this model (Table 8.). In the model, inflation had a positive and trust a negative impact on investment deposits. However, direct conclusions cannot be firmly derived from these variables, as the most deficiencies in estimating the variables were found in this model. The only statistical variable was rate, but problems were also identified in the model specification, therefore the results should be analyzed carefully.

## 5 Discussion

This chapter consists of the findings of the empirical part and discuss the previous literature of the study. The aim of this section is to answer the main research question as well the sub-research questions.

It was decided to study the topic between 2020 and 2023, when interest rates began to rise in the summer of 2022. The study was conducted by collecting data for 45 months (about 4 years) on interest rate changes, inflation, and consumer confidence, and using linear regression analysis to examine the relationship between variables. The research aimed to specifically concentrate on Finnish consumers, as no entirely comparable study has been conducted previously. In this study, deposits were examined based on their distinct features, categorizing them into overnight, term and investment deposits. Each deposit type possesses its own characteristics, and the impact of increased rates, inflation, and consumer confidence varies across these diverse forms of deposits.

Changes in interest rates are by no means a special occurrence in the economy, therefore research on the subject is not difficult to find. In reference to the previously discussed theories, several studies advocated the notion that during critical periods, there is a comprehensive impact on consumer sentiment and economic decision-making. According to Hwang (2024), consumer inclination toward saving rises as they prepare for the future as the economy derails for the worse. Cherrat et al. (2023) also endorsed this perspective, noting an increase in the number of deposits during the COVID-19 pandemic. Conversely, studies such as those by Blanchflower et al. (2023) stated that decrease in consumer confidence can also lead to a bank run, which in turn reduces the number of deposits in the bank. In 2012, financial crisis situations escalated into bank runs worth hundreds of billions, confirming this assumption (Grigorian et al. 2017, 2851).

The results of this study partly support Hwang's (2024) and Cherrat et al. (2023) view of increased deposits and partially support Blanchflower et al. (2023) point of view, where deposits decrease as trust decreases. The study findings indicated that the correlations between interest rates and different deposit instruments were all strong. The adjusted R-squared for every model formed based on linear regression analysis were also high, which is desirable

when creating mathematical models, but in the model of investment deposits the adjusted R-squared was too high and required further research into the causes.

The sub-research questions are answered based on the results discussed in the previous paragraphs. Since the rise in interest rates, the review period has had different effects on deposit behaviour in terms of its magnitude and direction. Interest rates have had a negative impact on overnight deposits, indicating a decrease in consumption. It is important to consider that not all assets are presumed to be automatically transferred to term or investment deposits under analysis in this study. As previously discussed, both term deposits and investment deposits have a positive relationship with the interest rate. The effects can also be considered depending on the consumer's financial situation before interest rates rise. Individuals experiencing a reduction in income due by increases in prices and interest rates may encounter increased difficulties in saving after the rise occurs. Conversely, individuals with existing liquid assets may find it easier to accumulate their assets in higher-yielding instruments.

## 6 Conclusions

The aim of this paper was to investigate the effects of rising interest rates on the deposits of Finnish consumers. Deposits play an important role in influencing consumers' financial well-being, while simultaneously serving as an integral part of the financial system and contributing to the functioning of banks. The results show an increase in total deposits at the end of the review period. Although a large part of consumers' funds has been kept in overnight deposits and their share has decreased the most, the popularity of investment deposits and time deposits has grown. The period of zero interest rates lasted for a long period until 2022, when consumers were accustomed to high consumption and the possibility of obtaining a low-cost loan, which led to high levels of consumer indebtedness.

When interpreting the results, it can be observed that savings behaviour on deposits was less pronounced before the increase in interest rates. It is reasonable that during times of low interest rates, individuals may not choose to allocate funds to term, or investment deposits given their relatively modest returns. However, what stands out is the significant amount held in low-interest transaction accounts. A significant number of overnight deposits suggests that Finnish consumers may not allocate their funds in a sufficiently profitable manner, which should be considered.

The short time dimension and small data of the study have a major impact on the results and reliability of the study. The results of the study cannot be generalized to apply to the overall fluctuations in interest rates since the research is limited to examining the deposits of Finnish consumers. However, this thesis offers a suitable understanding of the effects of interest rate changes on consumer behavior, taking different perspectives into account.

There have been no previous studies on the exact same topic, so finding suitable comparisons for this study is challenging. Based on this research, it can be noted that deposits increased overall during the review period, which suggests that Finnish consumers are more reserved towards the future. However, given the current importance and intrinsic interest of the topic, further research would be useful. Since deposits are generally defined as one form of saving, research could be expanded to examine consumer indebtedness, thus gaining a broader understanding of consumer behavior and their role in the economy.

Recent crises, such as the Russian war of invasion and the preceding COVID-19 pandemic, have had multifaceted impacts on the economy and continue to affect it at the time of publishing this thesis. The increases in interest rates began to show effectiveness in controlling inflation, when the ECB announced that it will stop raising the policy interest rate in September 2023. The ECB expects inflation to reach its medium-term goal of 2,1 % by the year 2025. It is not yet certain what the future new norm will be in terms of market interest rates and how they will affect the number of deposits in the future. Fluctuations in interest rates are part of the economic cycle and will level out over time, to which consumers should also adapt to maintain financial stability.

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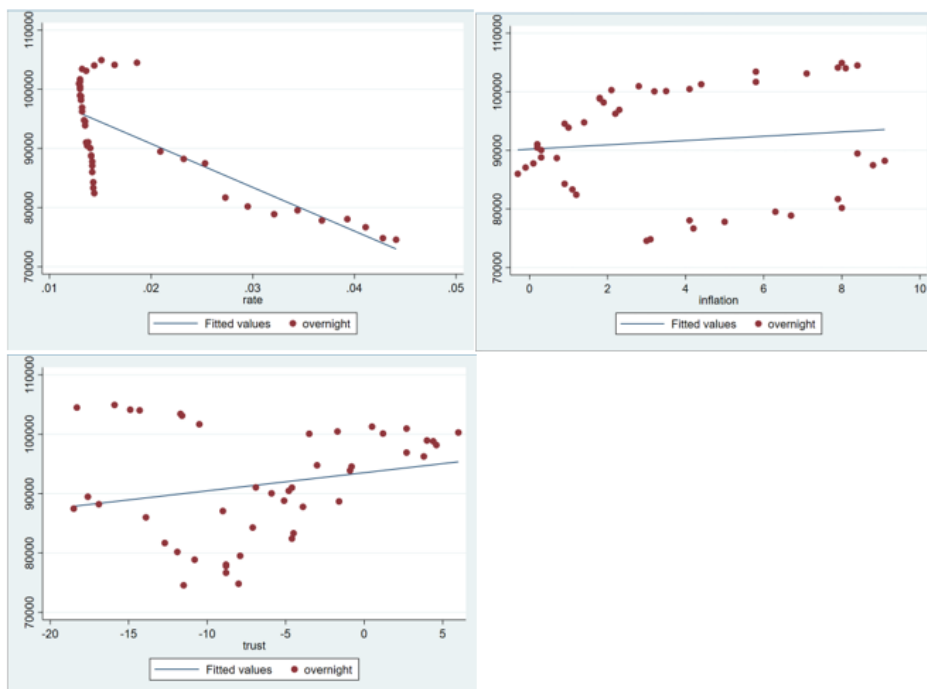


Appendices

Appendix 1. The policy interest rate of the ECB

2020	January	0,00	2022	January	0,00
	February	0,00		February	0,00
	March	0,00		March	0,00
	April	0,00		April	0,00
	May	0,00		May	0,00
	June	0,00		June	0,00
	July	0,00		July	0,00
	August	0,00		August	0,00
	September	0,00		September	1,25
	October	0,00		October	1,25
	November	0,00		November	2,00
	December	0,00		December	2,50
2021	January	0,00	2023	January	2,50
	February	0,00		February	3,00
	March	0,00		March	3,50
	April	0,00		April	3,50
	May	0,00		May	3,75
	June	0,00		June	4,00
	July	0,00		July	4,00
	August	0,00		August	4,25
	September	0,00		September	4,50
	October	0,00		October	4,50
	November	0,00		November	4,50
	December	0,00			

Appendix 2. Scatter plots of the overnight deposit model



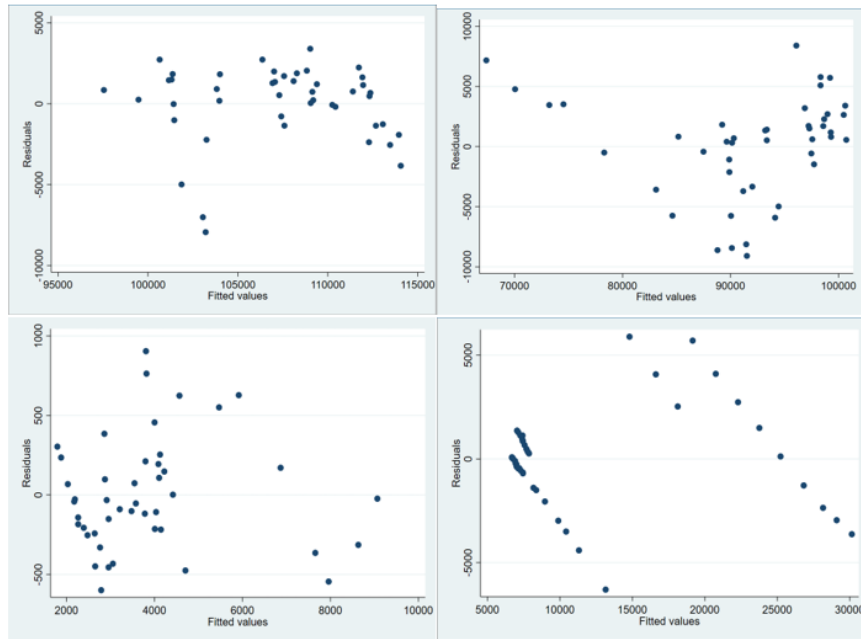
## Appendix 3. RESET test

<pre>. ovtest Ramsey RESET test for omitted variables Omitted: Powers of fitted values of overnight  H0: Model has no omitted variables  F(3, 38) = 20.85 Prob &gt; F = 0.0000  . ovtest Ramsey RESET test for omitted variables Omitted: Powers of fitted values of investment  H0: Model has no omitted variables  F(3, 38) = 28.01 Prob &gt; F = 0.0000</pre>	<pre>. ovtest Ramsey RESET test for omitted variables Omitted: Powers of fitted values of maturity  H0: Model has no omitted variables  F(3, 38) = 10.56 Prob &gt; F = 0.0000</pre>
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## Appendix 4. Breusch-Pagan test

<pre>. estat hettest Breusch-Pagan/Cook-Weisberg test for heteroskedasticity Assumption: Normal error terms Variable: Fitted values of overnight  H0: Constant variance        chi2(1) = 0.99 Prob &gt; chi2 = 0.3202 Breusch-Pagan/Cook-Weisberg test for heteroskedasticity Assumption: Normal error terms Variable: Fitted values of investment  H0: Constant variance        chi2(1) = 9.35 Prob &gt; chi2 = 0.0022</pre>	<pre>Breusch-Pagan/Cook-Weisberg test for heteroskedasticity Assumption: Normal error terms Variable: Fitted values of maturity  H0: Constant variance        chi2(1) = 1.02 Prob &gt; chi2 = 0.3114</pre>
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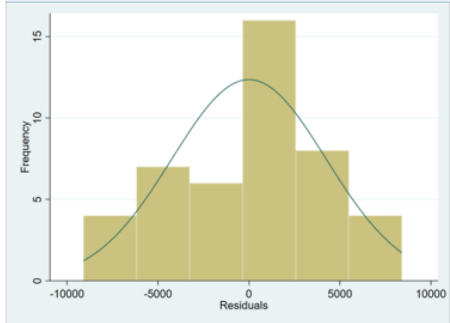
## Appendix 5. Residual scatterplots



## Appendix 6. VIF-test of independent variables

Variable	VIF	1/VIF
trust	1.89	0.528649
inflation	1.82	0.550678
rate	1.21	0.829559
Mean VIF	1.64	

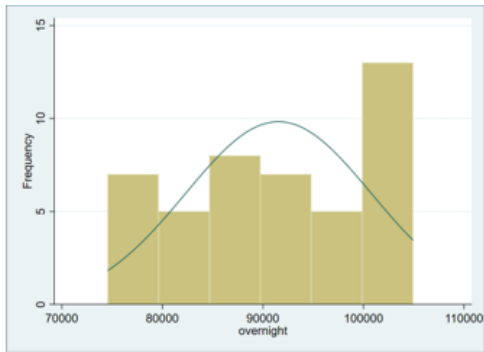
Appendix 7. Overnight model residuals



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
resid_over	45	0.95511	1.944	1.409	0.07943

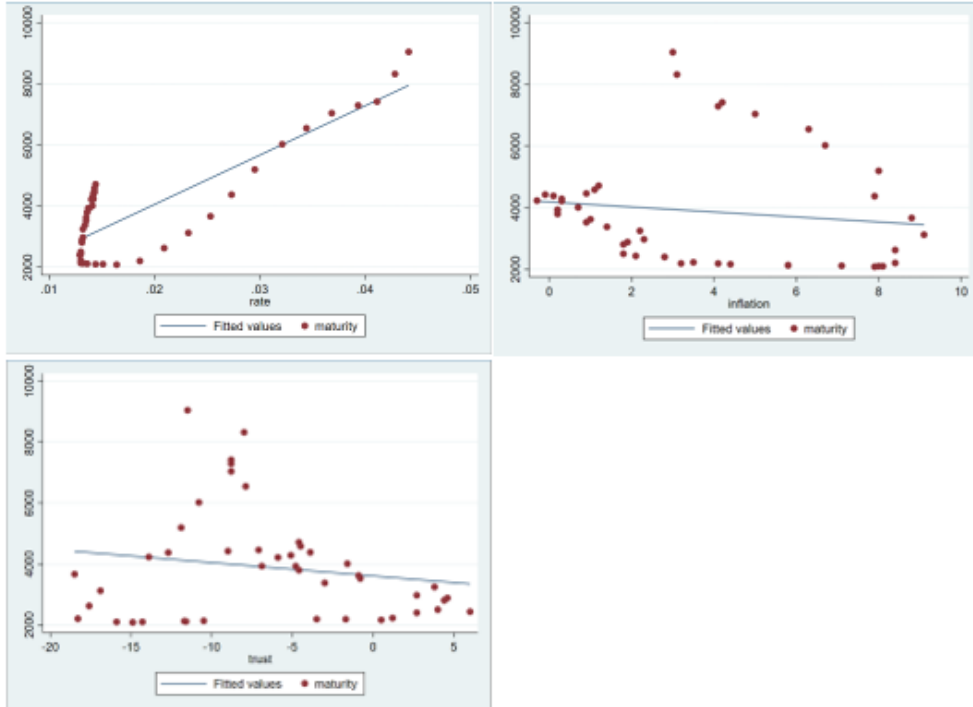
Appendix 8. Distribution of the overnight deposit model



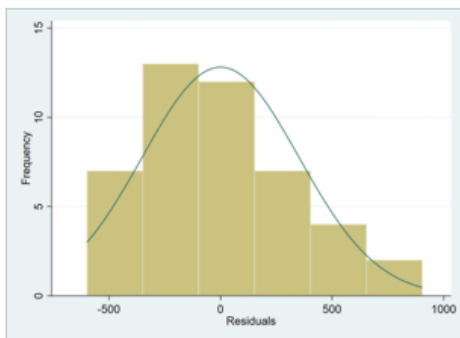
Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
overnight	45	0.94054	2.575	2.004	0.02251

Appendix 9. Scatter plots of the term deposits variable



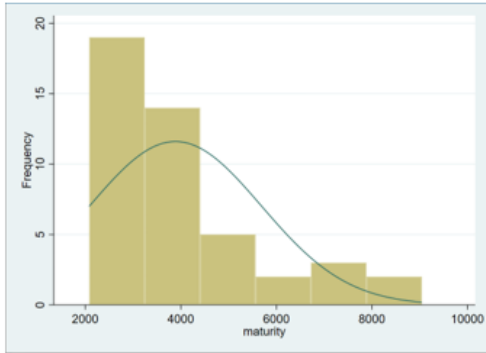
Appendix 10. Term model residuals



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
resid_mat	45	0.96624	1.462	0.805	0.21041

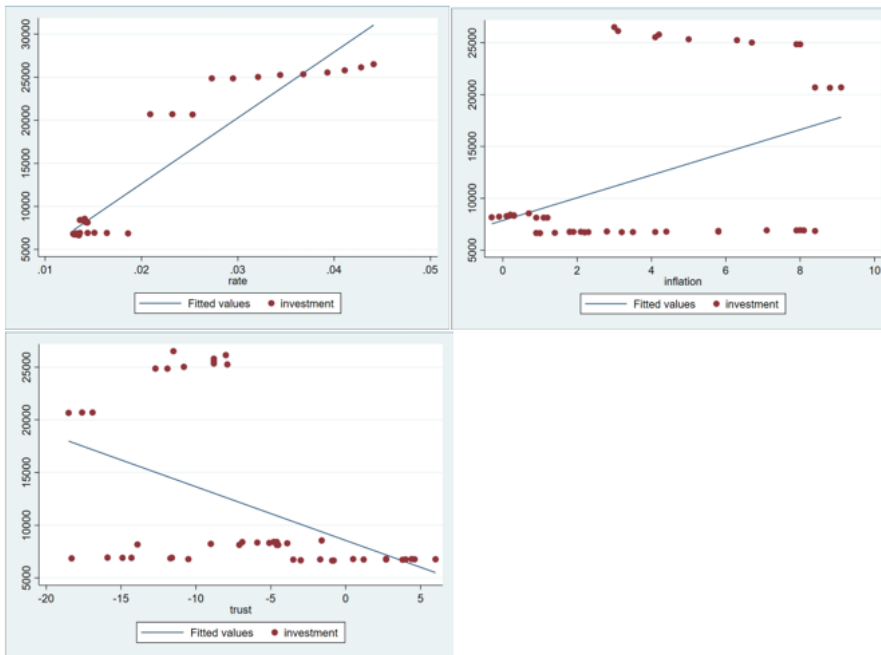
Appendix 11. Distribution of the term deposits variable



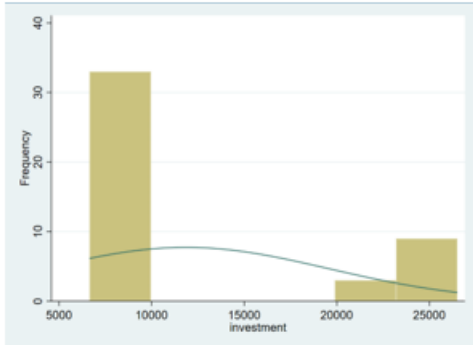
Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
maturity	45	0.86065	6.035	3.810	0.00007

Appendix 12. Scatter plots of investment deposits model



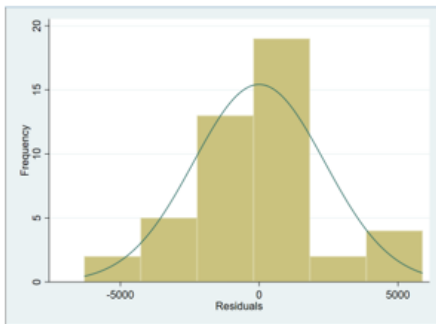
Appendix 13. Distribution of the investment deposits variable



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
investment	45	0.64284	15.466	5.804	0.00000

Appendix 14. Investment deposit model residuals



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
resid_inv	45	0.95317	2.028	1.499	0.06699