



**THE INFLUENCE OF SOCIOECONOMIC STATUS ON THE MORTGAGE
INTEREST RATE HEDGING DECISION OF FINNISH BORROWERS IN A
CHANGING INTEREST RATE SITUATION**

Lappeenranta–Lahti University of Technology LUT

Bachelor's Programme in Business Administration, Bachelor's thesis

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Milla Ylönen

Examiner: Junior Researcher Essi Janhunen

ABSTRACT

Lappeenranta–Lahti University of Technology LUT

LUT Business School

Strategic Finance

Milla Ylönen

The influence of socioeconomic status on the mortgage interest rate hedging decision of Finnish borrowers in a changing interest rate situation

Bachelor's thesis

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This bachelor's thesis concerns the decisions of Finnish mortgage borrowers regarding mortgage interest hedging. The purpose of the thesis was to find out whether the socio-economic background of the borrowers affects the decision on mortgage interest hedging. The study was carried out as a quantitative study. The data to be analyzed was obtained through a questionnaire implemented via the Internet. The research methods were binary logistic regression analysis and analysis of variance. The goal of the study was to find groups of people to whom it would be worthwhile to target mortgage interest rate protection marketing.

There are many previous studies on the choices related to taking out a mortgage. Studies have examined the effects of personality traits, willingness to take risks, and some socioeconomic factors on choices. However, the previous research data mainly concerns the choice between adjustable and fixed rate mortgages. There is almost no data available on the factors influencing interest rate hedging decisions. The purpose of this study was to fill this research gap.

The study did not find statistically significant connections between socio-economic factors and the mortgage interest rate hedging decision. Instead, connections were found between the size of the mortgage and willingness to take out the hedge. Interest rate hedging was significantly more likely to be taken out for the largest mortgages, over 300,000 euros, than for smaller mortgages. In addition, the timing of taking out the mortgage clearly influenced the probability of interest rate hedging. In 2022–2023, hedges were significantly less likely to be taken than in 2020–2021.

TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

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Kauppätieteet, Strateginen rahoitus

Milla Ylönen

Suomalaisten asuntolainanottajien sosioekonomisen aseman vaikutus lainan korkosuojauspäätökseen muuttuvassa korkotilanteessa

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Tämä kandidaatintutkielma käsittelee suomalaisten asuntolainanottajien päätöksiä asuntolainan korkosuojaamisen suhteen. Tutkielman tarkoituksena oli selvittää, vaikuttaako lainanottajien sosioekonominen tausta päätökseen asuntolainan korkosuojaamisesta. Tutkimus toteutettiin kvantitatiivisena tutkimuksena. Analysoitava data hankittiin Internetin kautta toteutetun kyselylomakkeen avulla. Tutkimusmenetelminä olivat binäärinen logistinen regressioanalyysi sekä varianssianalyysi. Tutkimuksen tavoitteena oli löytää ihmisryhmiä, joille asuntolainojen korkosuojausten markkinointia kannattaisi erityisesti kohdentaa.

Aiempiä tutkimuksia asuntolainan ottamiseen liittyvistä valinnoista löytyy paljon. Tutkimuksissa on tarkasteltu esimerkiksi persoonallisuuden piirteiden, riskinottohalun sekä joidenkin sosioekonomisten tekijöiden vaikutuksia valintoihin. Aiempi tutkimusdata kuitenkin koskee lähinnä valintaa vaihtuva- ja kiinteäkorkoisen asuntolainan välillä. Tietoa korkosuojauspäätöksiin vaikuttavista tekijöistä ei ole juuri saatavilla. Tämän tutkimuksen tarkoituksena oli täydentää tätä tutkimusaukkoa.

Tutkimuksessa ei löydetty tilastollisesti merkitseviä yhteyksiä sosioekonomisten tekijöiden ja asuntolainan korkosuojauspäätöksen välillä. Sen sijaan yhteyksiä löytyi asuntolainan koon ja korkosuojaushalukkuuden väliltä. Suurimpiin, yli 300 000 euron asuntolainoihin, otettiin korkosuojaus huomattavasti todennäköisemmin kuin pienempiin asuntolainoihin. Lisäksi asuntolainan ottamisen ajankohta vaikutti selvästi korkosuojaamisen todennäköisyyteen. Vuosina 2022–2023 otettiin korkosuojauksia huomattavasti vähemmän kuin vuosina 2020–2021.

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1 Introduction

In January 2021, inflation in the euro area began to accelerate strongly worldwide. The economic recovery after the COVID-19 pandemic caused demand-pull inflation, while rising prices of energy, raw materials and semi-finished products caused cost inflation in Europe (Maranzano & Romano, 2023). When market interest rates started to rise after a long period of zero interest rates in 2022, the expenses of households with mortgages increased even more. As a result of these factors, the number of completed housing transactions declined (Statistics Finland, 2023a). This downward trend can be seen in Figure 1.

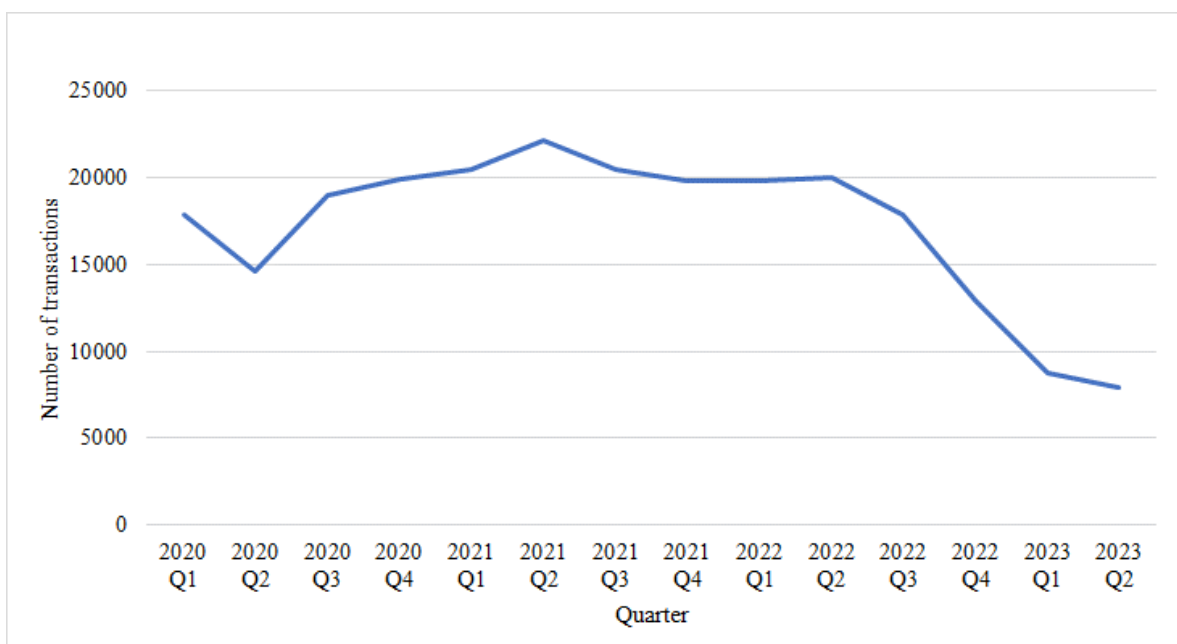


Figure 1. Numbers of transactions of old dwellings in housing companies in Finland (quarterly)

Choices related to a mortgage are very important decisions for household risk management because mortgage usually exposes to interest rate risk. As market interest rates rise, mortgage payment installments can become large and cause difficulties for households to repay the loan. It is even possible to get into a situation where the apartment must be sold. One way for households to protect their financial situation from macroeconomic fluctuations is

mortgage interest rate hedging. When using interest rate hedging, an upper limit is set above which the interest rate cannot rise, i.e., the interest rate cap. When using an interest rate collar as a hedging method, a lower limit called the interest rate floor is also set (Digital and Population Data Services Agency, 2021). A fixed interest rate can also be considered a hedging method, because when using it, the interest rate remains the same throughout the loan period. Interest rate hedges also protect the bank, as they reduce the loan repayment risk. For banks, the hedges sold to mortgage borrowers are also a way to make more profit from mortgages. Interest rate caps and fixed interest rates are set so that the bank will probably get additional income if the customer chooses some of them. When consumer confidence in Finland has decreased due to inflation and rising interest rates (Statistics Finland, 2023b), banks can have a good opportunity to earn income by offering various means of interest rate protection to mortgage customers. By targeting marketing to suitable target groups, this could be done more efficiently. Targeting is best done by finding the groups of people who are likely to be more willing to protect their mortgage interest rates.

Connections between borrowers' characteristics and traits and their mortgage choices have been examined quite a lot before. Borrowers with higher level of education and those who are more financially sophisticated, are more likely to choose the adjustable-rate mortgage (ARM) over the fixed-rate mortgage (FRM) (Coulibaly & Li, 2009; Worthington, 2009). Older people and people who avoid risk can benefit more from fixed-rate mortgages (Van Hemert, 2010). According to Gui et al. (2022), the household's annual income was the most significant socio-economic factor in predicting mortgage decisions. In previous studies, race, marital status, or family size have not seem to affect the mortgage choices very much (Coulibaly & Li, 2009; Gui et al., 2022). It has been examined, how borrowers with different risk types would select their mortgage interest rates: the high-risk borrowers find ARM more attractive than the low-risk borrowers (Posey & Yavas, 2001).

As FRM is an interest rate that remains the same during the loan period, it can be considered a lower-risk option than ARM. Using ARM brings predictability to household's expenses. Personality traits and some socioeconomic factors have been seen to be good predictors of financial risk taking and payment defaults (Letkiewicz & Heckman, 2019). They found that those with lower levels of conscientiousness and higher levels of neuroticism managed their finances worse. Low-educated and unemployed people had a higher risk of payment defaults (Letkiewicz & Heckman, 2019; Oksanen, Aaltonen & Rantala, 2015). Male gender and

young age have been seen to increase the risk of financial risk behavior and payment defaults (Oksanen, Aaltonen & Rantala, 2015). According to Gui et al. (2022), an individual's psychological characteristics had a greater influence on mortgage choices than socioeconomic and demographic factors. Their research found that consumer's needs for safety, love and belonging, and agreeableness were related to avoiding risks and financial loss, whereas risk-seeking, decision-making and the need for esteem, for example, were more likely to lead to profit-seeking and higher risk-taking.

There is not much research data to be found about what kind of people decide to use interest rate hedging on their mortgage in the form of an interest rate cap or collar. Most of the research on the topic is related to the choice between ARM and FRM. There is not much data to be found on whether the prevailing interest rate affects the interest rate hedging decisions of people in different socioeconomic positions in different ways or whether there are differences in the choice of interest rate hedging method. There are hardly any studies on Finns' mortgage decisions. It is also good to research mortgage issues separately for different countries, because there can be big differences between countries even in what kind of mortgage products are available.

In recent years, the interest rate situation has changed rapidly. In June 2022, the six-month Euribor rate turned positive after almost seven years of negative interest rates. The 1 % limit was exceeded in August 2022, and already in October 2022 the interest rate exceeded the 2 % level. The 3 % limit was exceeded in February 2023 and the 4% limit in September 2023. At the time of publication of this paper, the six-month Euribor is still at around 4 %. This changing situation brings a good opportunity to study what kind of interest hedging decisions different people make in a very exceptional time. (Bank of Finland, 2023a)

1.1 Research aims and research questions

The aim of this thesis is to use a survey to find groups of people who are most interested in taking out interest rate protection for their mortgage. The research target is people who have taken out a mortgage in the last four years, or who plan to take out a mortgage within the next year. With the help of the results, banks can market and recommend their interest hedging products to groups of people who are typically interested in hedging their mortgages. To approach this topic, two main research questions have been formulated:

“How do different socioeconomic factors affect the willingness of mortgage borrowers to take interest rate hedge on their mortgage?”, and

“How does socio-economic status affect interest rate hedging decisions in different interest rate situations?”

To refine the research topic, three sub-questions for the research have been set:

1. How much do the mortgage borrowers' age, education level, annual household income and family size affect whether they take out interest rate hedge for a mortgage?
2. Does the prevailing interest rate affect the choice of interest rate hedging for mortgage?
3. Which interest rate hedging methods are preferred by people of different socioeconomic statuses?

1.2 Constraints

The research was limited to Finnish mortgage borrowers because the research was carried in Finland and the questions asked to the borrowers were set regarding the mortgage products offered in Finland. The time limit was implemented so that the survey concerned those who took out a mortgage in 2020-2023 and those who were planning to take out a mortgage in 2024. This time range had been chosen because it includes the period of zero interest rates and the period when the 6-month Euribor was around 4 %. In this way, the effect of interest rates on the mortgage choices of different groups of people could also be investigated.

The research was carried out as a questionnaire survey. The questionnaire was created via Webropol, which means that it could be answered on the Internet. The link to the survey was shared in Facebook groups related to buying and building an apartment, as well as in groups related to investing and money matters. It is possible that searching for respondents in property-related discussion groups influenced the characteristics of the respondent population. It can be assumed that those of a higher socio-economic status prefer to discuss wealth accumulation than those of a lower status, and therefore the respondent population may be, for example, more educated than average and they can have higher household incomes.

The obtained research results were analyzed by using logistic regression analysis. Logistic regression analysis looked for probabilities that people with certain socio-economic factors choose interest protection for their mortgage. Analysis of variance was also performed to compare the distributions in hedging choices between differently educated people and people in different professional statuses. When interpreting the results regarding those planning to take out a mortgage, it must be remembered that for them it may only be a preliminary idea to take it. There is no certain information about whether they will eventually take the mortgage. This can introduce uncertainty into the results.

1.3 Structure of the thesis

This thesis consists of five main chapters: introduction, theoretical framework, research material and methods, research results, and summary and conclusions. In the introduction chapter, the background of the research, the justification for the research topic, the research questions, and the constraints of the topic are presented. The chapter on the theoretical framework presents the Finnish mortgage market, different interest rate protection options, and previous research information on how borrowers make mortgage-related decisions. Hypotheses are also set in this chapter based on previous research. In the research material and methods chapter, the data collection methods and a descriptive analysis of the data are introduced. In the research results chapter, the results of statistical analysis of the survey data are presented, and they will be compared to the research hypotheses. Finally, in the conclusions section, the conclusions from this research are reviewed, possible topics for further research are discussed, and the reliability of the results is evaluated.

2 Theoretical framework

This chapter introduces the concept of socioeconomic status, mortgage borrowing in Finland, as well as the types of mortgages and interest hedging methods available on the Finnish market. The chapter also talks about socioeconomic status on a conceptual level and reviews previous research on the effects of people's socioeconomic status and other personal characteristics on their decisions regarding mortgages.

2.1 Mortgages in Finland

A mortgage is a secured loan that is used to buy an apartment or a detached house. If the mortgage repayment is neglected, the lender keeps the collateral, which often includes the apartment itself. At the end of 2022, Finnish households had a total debt of 137 billion euros, of which 70 % were mortgages. There were 867 700 households with a mortgage, which was 31 % of all Finnish households. The households with mortgages had an average of 110,000 euros in mortgage. In 2022, the long-continued increase in the average amount of mortgage turned to a decrease, being 0.5 % lower than the previous year. The largest average mortgage amounts were for those living in Uusimaa (150,700 euros) and Åland (130,100 euros) areas. (Statistics Finland, 2023c)

The banking sector in Finland is very large and concentrated (International Monetary Fund, 2023). A few larger banks control the majority of the country's banking sector. For example, up to 69 % of the country's mortgage stock is in the two largest banks, Osuuspankki and Nordea, as can be seen in Figure 2 (Bank of Finland, 2023b). In addition, the connections of Finnish banks to other banks in the Nordic countries are strong. The International Monetary Fund IMF stated in its report (2023), that Finnish banks are sensitive to liquidity disturbances in difficult circumstances and that it would be necessary to further enhance the supervision of the financial system in Finland.

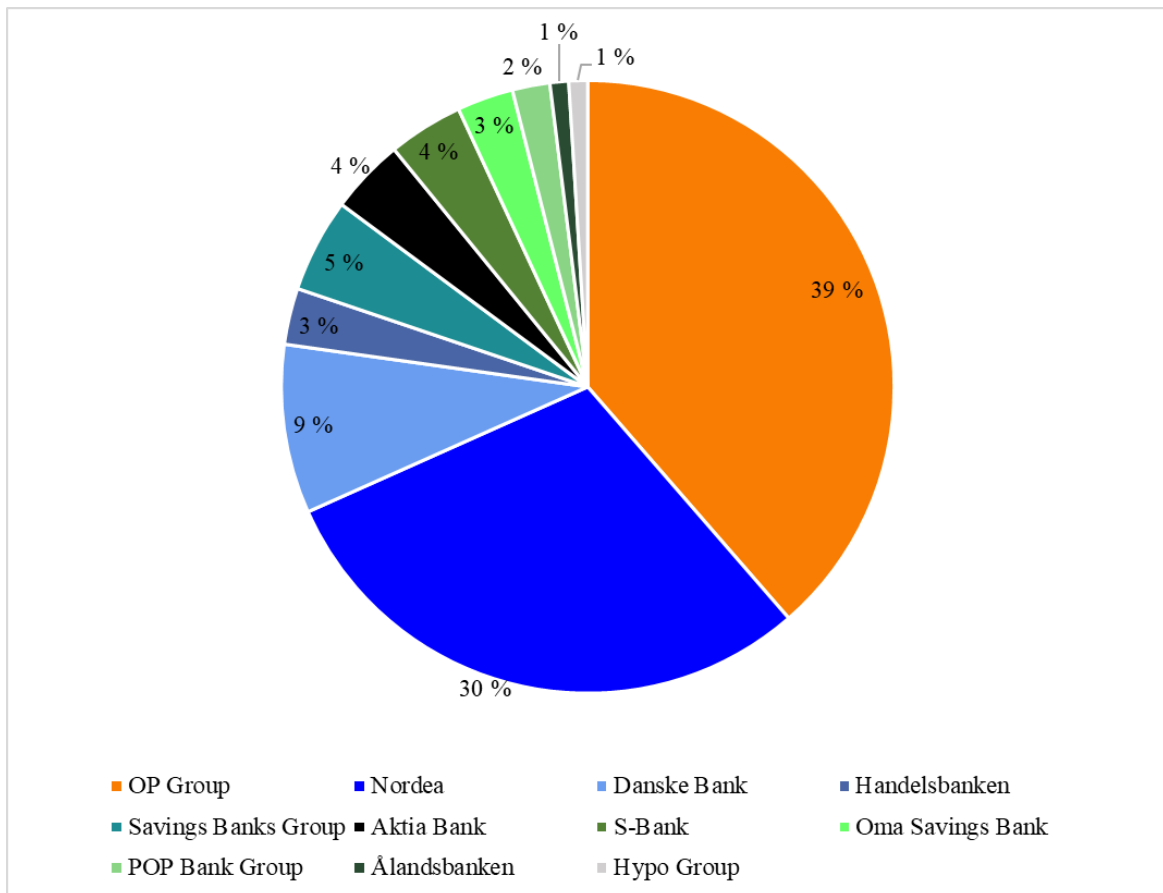


Figure 2. Shares of Finnish credit institutions in the Finnish mortgage stock (%) in October 2023

2.1.1 Types of mortgages

Mortgages traditionally offered to consumers are divided into two main types: Fixed-rate mortgages (FRM) and adjustable-rate mortgages (ARM). In fixed-rate mortgages, the borrower pays the same nominal interest rate throughout the entire loan period or for a specific, pre-agreed period, after which the reference rate may change to adjustable-rate version. Adjustable-rate mortgages are tied to a reference interest rate, and the amount of the payment instalment or the length of the loan repayment period change as the interest rate changes. (Albertazzi, Ongena & Fringuellotti, 2019)

Finnish banks generally offer mortgages with three different repayment methods, which are equal payments, equal instalments, and fixed annuity loan. When using the equal payments (also called annuity loan), the repayments, including instalment and interest, remain the same at the beginning of the loan term. The repayment amount changes when the interest rate

changes. At the beginning of the loan period, the repayment includes a larger share of the interest. As the loan gradually repays, the interest portion of the repayment decreases. This is a good repayment method for those who want to know exactly the length of the loan period. However, it requires that the household's repayment ability withstands a possible rise in interest rates. (Nordea Bank Abp, 2023a; OP Financial Group, 2023a)

In case of equal instalments, the monthly instalments always remain the same. A change in the interest rate changes the repayment amount. If the interest rate remains the same, the share of the interest in the instalment decreases during the loan period. If the mortgage borrower wants to pay higher payments at the beginning of the loan period, this repayment method is good. As the loan capital decreases with repayments, both the interest portion of the repayment and the payment of the amount decrease. (Nordea Bank Abp, 2023a)

If the length of the loan period does not matter, but the borrower wants to know exactly the size of the monthly instalment, the best option is fixed annuity loan. In this repayment method, the repayments remain the same throughout the whole loan period. In case of an increase in the interest rate, the loan term is extended. (Nordea Bank Abp, 2023a)

A bullet repayment (also called "lump-sum payment") also exists as a repayment method, but it is usually used only for temporary financing. In the case of bullet loans, the entire loan capital is repaid in one go. However, there may be several interest payment dates. Bullet loans are taken, for example, in situations where a new apartment is bought before the sale of the previous one. (OP Financial Group, 2023a)

2.1.2 Mortgage interest rate hedging

In Finland, there are three mortgage interest rate hedging methods provided by the banks. The offer of interest rate hedging methods varies depending on the bank, so some banks provide only some of the hedging options. The most popular option, the interest rate cap, sets an upper limit for the interest rate paid by the mortgage borrower, which the interest rate cannot exceed under any circumstances. However, when market interest rates fall, the interest rate paid by the borrower can also fall. For the cap, the customer must pay a hedging fee to the bank. Banks may have restrictions on how long the interest rate cap can be taken. (Danske Bank, 2023a; Nordea Bank Abp, 2023b; OP Financial Group, 2023b)

The second hedging method is the interest rate collar, which sets both upper and lower limit for the interest rate. The borrower does not have to pay a hedging fee for the collar. However, the interest rate always has a certain lower limit below which the mortgage's interest rate cannot fall, even if market interest rates fall below it. The interest rate paid by the borrower moves freely within the collar according to the reference interest rate chosen for the mortgage. (Danske Bank, 2023b; Nordea Bank Abp, 2023b)

The previously introduced fixed interest rate also serves as hedging against interest rate increases. Depending on the bank, fixed interest rate can be taken either for the entire loan period or for part of the loan period. Banks may also have a minimum requirement for the mortgage to grant an FRM. A fixed interest rate causes special arrangements if the borrowers want to pay off the mortgage early. They then must pay the bank compensation for unpaid interest. However, the benefit of a fixed interest rate is that the loan service costs are precisely known to the customer in advance. (Danske Bank, 2023b; Nordea Bank Abp, 2023b)

Dokko & Edelstein's (1991) theoretical model showed that households with a high mortgage relative to their income had a greater incentive to hedge against interest rate risk. However, they interpreted that full protection against interest rate risk is generally not optimal for typical households (Dokko & Edelstein, 1991). Households must therefore carefully weigh the benefits and drawbacks of interest hedging in relation to their risk tolerance. It is not possible to predict all the things affecting the economical fluctuations that will happen in the world, such as wars and pandemics.

2.2 Mortgage choices

The choices made by households regarding the selection of mortgage products are very significant financial decisions. Buying real estate or an apartment is a big investment, which often takes a very long time to pay back. Therefore, it is important to think in advance about the possible financial consequences of the decisions made. Mortgage borrowers can be assumed to make their mortgage-related decisions in such a way that they maximize their own expected benefits (Posey & Yavas, 2001). However, when starting to make decisions regarding taking out a mortgage, borrowers must have enough information, so that they can maximize their benefits. It is important to know what kind of loan terms there are available

and what kind of loan agreement is best for one's own household. It is possible to get information about different types of mortgages and loan terms from the bank, websites or nowadays even from social media.

Previous literature and empirical studies related to mortgage decisions mainly focuses on the choice between adjustable-rate mortgage (ARM) and fixed-rate mortgage (FRM). Research data on the effects of borrowers' socio-economic status, financial knowledge, personality traits and willingness to take risk on the choice of mortgage reference rate is available. However, research data on decisions related to mortgage interest rate hedging is very scarce and requires further research.

A large heterogeneity has been observed in mortgages taken out in the Euro area in terms of whether people prefer to take out FRMs or ARMs. For example, in Germany, France and the Netherlands, fixed-rate mortgages are preferred, while in Austria, Greece and Italy, more adjustable-rate mortgages are taken out. As much as 72 % of these differences were explained by demand factors, while banks' supply explained only 19 % of the variation. The demand for variable-rate mortgages was increased by, for example, large changes in inflation, high financial literacy and a strong negative correlation between the unemployment rate and short-term interest rates. (Albertazzi, Ongena & Fringuellotti, 2019)

The pricing of mortgages greatly influences the choice of a mortgage contract. Phillips & VanderHoff (1991) found that the choice of mortgage contract depended very much on the level of ARM and FRM interest rates prevailing at the time of taking out the mortgage. If the level of the adjustable interest rate was significantly lower than the level of the fixed interest rate, this price difference had a significant effect on the increase in the choice of ARM. In addition, the choice was influenced by the regional price level of the apartments. (Phillips & VanderHoff, 1991). Devine, McCarthy & O'Toole (2023) also found the significant effect of price difference between interest rates: a 1% increase in the price of a fixed rate reduced the choice by up to 3%.

The expected interest rate also affects borrowers' mortgage decisions. It has been observed that borrowers do not like to take ARM when interest rates are expected to rise (Sa-Aadu & Sirmans, 1995). According to Devine, McCarthy & O'Toole's (2023) research, borrowers chose mortgage products based on the level of interest rate they expected in the future. In their research, those who expected interest rates to rise were more likely to choose a fixed

rate, and those who expected interest rates to fall were more likely to choose a variable rate. Expectations of falling interest rates influenced the choice of mortgage up to twice as much as expectations of rising interest rates. (Devine, McCarthy & O'Toole, 2023).

2.2.1 Socioeconomic status, personal traits, and mortgage choices

Socio-economic background can affect what kind of skills an individual must search for and receive information on the matter. Bucks and Pence (2008) found that those with higher education and higher incomes were more aware of the terms associated with their loans than those with less education and lower income levels. It is therefore possible that those in a weaker socio-economic position make worse decisions regarding their mortgage from a financial point of view. Those with less education and less financial understanding choose FRM more often than the high-educated ones (Coulibaly & Li, 2009). ARM can be a more difficult type of contract to understand, so that can be a reason to choose the FRM if the person is not so aware of financial matters. Highly educated people also better understand that the fixed interest rate usually becomes more expensive during the loan period (Worthington, 2009). Also, the interest rate cap or collar usually generates additional costs for the mortgage borrowers. On the other hand, it also acts as a kind of insurance for them.

Higher education and financial knowledge have been found to be linked to making correct predictions about the expected interest rate levels. They have also been found to make wiser decisions regarding their mortgages from a financial point of view. However, these borrowers' characteristics have a lower explanatory power than the interest rate level and interest rate expectations. (Devine, McCarthy & O'Toole, 2023)

Cheng, Zhenguo & Yingchun (2011) found that women did less work to find the best interest rate for their mortgage than men. They were less familiar with interest rates than men and trusted more what someone else recommended to them. Thus, they ended up paying higher interest rates on their mortgages. The choices made by the borrower regarding the loan can also depend on the person's risk type. According to the study of Posey & Yavas (2001), the high-risk borrowers found ARM more attractive than the low-risk ones. Coulibaly & Li (2009) noticed that people who avoid risks typically have a lower level of education and take out smaller mortgages and usually choose FRM. However, the results of the effects of risk preferences on choices are not completely uniform. Devine et al. (2023) found no clear

difference between a person's risk profile and mortgage choice, although the result may have been due to the characteristics of the measure they used.

2.3 Hypotheses

Since it has previously been established that low education is connected to choosing a fixed interest rate, it can be assumed that choosing interest rate hedge would also be more common among people with a lower level of education. Those with higher education can be expected to work in a higher position and receive higher monthly incomes. Therefore, it can be assumed that people in management positions and those with higher incomes choose interest rate hedge less often. In addition to socio-economic variables, this study also examines the effects of the size of the mortgage and the time of borrowing on the choice of interest rate hedging. It can be possible that people with higher amount of mortgage take interest rate hedge more often, because when interest rates rise, the monthly loan instalment can become considerably large if the mortgage is large. Since interest rates have previously been found to greatly influence decisions related to taking out a mortgage, that is probably the case here as well. It can also be assumed that in the years of lower interest rates (2020 and 2021) interest rate hedges have been taken more than when interest rates have risen, because in later years the interest rate hedge may no longer be seen as useful.

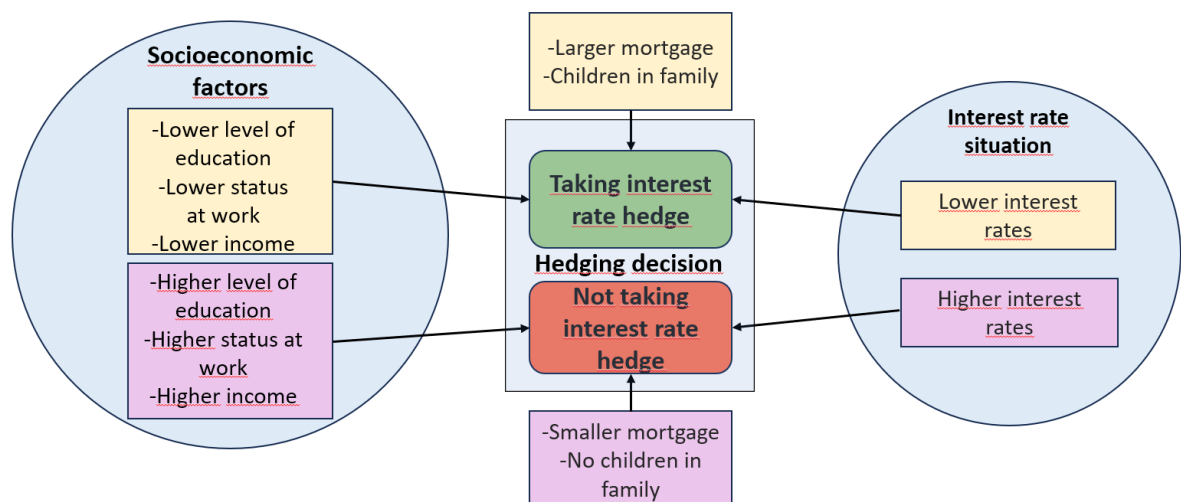


Figure 3. Hypotheses on the effects of socioeconomic and other variables on the choice of interest rate hedging

3 Research material and methods

In this chapter, the data collection process and descriptive analysis of the responses to the online survey are examined. The statistical methods used in the research are also reviewed.

3.1 Data collection

People who have taken out a mortgage in 2020-2023 or plan to take out a mortgage in 2023-2024 were selected as the research setting for this study. This time frame for mortgages was chosen for review because it is a period in which interest rates have been rising after a long period of zero interest rates. In this way, information could be obtained from the research about decisions related to interest hedging during the changing interest rate situation. The target group of the study was both those buying an apartment for their own use and apartment investors.

Data collection for the study was carried out using an online questionnaire in October 2023. The link to the questionnaire was shared in Facebook discussion groups. These discussion groups were related to the purchase and construction of apartments and real estate, letting, investing, and financial matters. People were motivated to answer the questionnaire by offering respondents the opportunity to participate in a gift card draw. The survey was open for two weeks and 393 responses were received. The questionnaire questions can be found in Appendix 1.

The survey initially asked for basic information about the respondents, such as age group, area of residence in Finland, marital status, and number of children in the household. Socio-economic factors such as education level, professional group and net household income per month were asked to determine the socio-economic status of the respondents. After the questions about the respondents' background information, the survey was divided into two parts. The first part was for those who had already taken out a mortgage and the second part was for those who were planning to take out a mortgage. These questions asked about the size of the mortgage, the reference interest rate, and whether those who took the mortgage took interest rate protection or how likely future borrowers intended to take it. Finally, the

survey asked which thing the respondents felt had the most influence on the interest hedging decision or which they feel will have the most influence on it in the future.

3.2 Research material

393 responses were received to the survey. Of the respondents, 82 % (n=322) had taken out a mortgage between 2020 and 2023, and 18 % (n=71) planned to take it out between 2023 and 2024. Most of the respondents, 65 % (n=257), were women. The rest of the respondents were men, and there were no people who chose the “other” option. The largest age group was 31-40 years old, which was 42 % (n=163) of the respondents, and the second largest was 18-30 years old, which was 36 % (n=140). Up to 81.7 % of the respondents were highly educated, i.e., university or university of applied sciences graduates, as can be seen in Table 1. In 2022, about 1.6 million of Finland’s population over 15 years of age had a higher education, which is about 28 % of Finland’s entire population (Statistics Finland, 2023c). Buying an own apartment seems, at least in recent years, to have been very strongly concentrated on higher educated people. However, it may be that the survey was mostly answered by people with higher education, because the survey was distributed in discussion groups, where most of them are probably with higher socioeconomic status.

The largest occupational group in this study was employees (127 responses, 32 % of responses) and a clear majority, 83 % (n=325) were in full-time work. The high employment figures were expected, as regular income is naturally required to obtain a mortgage. Household net income per month ranged from less than 500 euros to more than 10,000 euros. The highest peak of the distribution was between 5,000 and 7,499 euros. Responses were received very evenly across Finland, with the Helsinki-Uusimaa region having the largest number of responses (38 %, n=147). Table 1 presents the presence of independent variables in the study population. Most respondents (71 %, n=277) were married or cohabiting, but only 41.7 % had children. It is possible that those who take out a mortgage are just planning to have children and first want to buy an owner-occupied home for their future family. On the other hand, the birth rate in Finland in general is also in a big decline, and many people no longer want children at all (Statistics Finland, 2023d).

		Freq.	Percent	Cum.
gender	man	136	34.61	34.61
	woman	257	65.39	100.00
age group	18-30	140	35.62	35.62
	31-40	163	41.48	77.10
	41-50	62	15.78	92.88
	51-64	26	6.62	99.50
	65+	1	0.25	99.75
	missing	1	0.25	100.00
education	comprehensive school	6	1.53	1.53
	vocational school	44	11.20	12.73
	high school	22	5.60	18.33
	uni. of applied sciences	129	32.82	51.15
	uni. bachelor's degree	45	11.45	62.60
	uni. master's degree	134	34.10	96.69
	licentiate or Ph.D	13	3.31	100.00
occupational group	leading position	20	5.09	5.09
	senior official	115	29.26	34.35
	lower official	75	19.08	53.43
	worker	127	32.32	85.75
	entrepreneur	34	8.65	94.40
	student	10	2.54	96.94
	pensioner	3	0.76	97.70
	stay-at-home mom/dad	4	1.02	98.72
	unemployed	2	0.51	99.24
other	3	0.76	100.00	
work situation	full-time work	325	82.70	82.70
	part-time 15-34 h/week	21	5.34	88.04
	part-time <15 h/week	1	0.25	88.29
	unemployed	7	1.78	90.07
	student	15	3.82	93.89
	retired	4	1.02	94.91
	on parental leave	20	5.09	100.00
household net income/month	< 500 euros	2	0.51	0.51
	500-999 euros	2	0.51	1.02
	1000-1499 euros	4	1.02	2.04
	1500-1999 euros	8	2.04	4.08
	2000-2499 euros	30	7.63	11.71
	2500-2999 euros	33	8.40	20.11
	3000-4999 euros	132	33.59	53.70
	5000-7499 euros	136	34.61	88.31
	7500-10 000 euros	34	8.65	96.95
	> 10 000 euros	12	3.05	100.00

		Freq.	Percent	Cum.
marital status	unmarried	90	22.90	22.90
	married or cohabiting	277	70.48	93.38
	divorced	25	6.36	99.75
	widow	1	0.25	100.00
number of children	no children	229	58.27	58.27
	1	69	17.56	75.83
	2	68	17.30	93.13
	3 or more	27	6.87	100.00
region in Finland	Helsinki-Uusimaa	147	37.40	37.40
	Southern Finland	77	19.59	56.99
	Western Finland	95	24.17	81.16
	Northern/eastern Finland	72	18.32	99.49
	missing	2	0.51	100.00
mortgage situation	Took out a mortgage in 2020-2023	322	81.93	81.93
	Plans to take out a mortgage in 2023-2024	71	18.07	100.00
Total		393	100.00	

Table 1. Values and frequencies of independent variables in the research population

Of the respondents who had already taken out a mortgage, the majority had taken it during the period of low interest rates. In 2020, 27 % of the respondents had taken out a mortgage, and the same in 2021. In 2022-2023, when interest rates rose, fewer mortgages had been taken out. In 2022, 23 % of respondents had taken out a mortgage, and the same in 2023. Most respondents, 81 % (n=259), had bought the apartment for their own use and 19 % (n=62) for investment or other use. It had been most common to take out a mortgage with a partner or another person (59 % of respondents, n=188). The amount of mortgage varied between 0-50 000 to over 500 000 euros, with the largest peak in the distribution being for mortgages of 100 000 to 150 000 euros. Almost everyone (96 %, n=310) had chosen Euribor or another market rate as the reference rate. 2 % (n=5) had a fixed interest rate and 1 % (n=3) had a prime interest rate. The rest did not know the answer to the question. Borrowers' decisions regarding their mortgages can be viewed in Table 2.

		Freq.	Percent	Cum.
time frame	in 2020	86	26.71	26.71
	in 2021	89	27.64	54.35
	1/2022-6/2022	31	9.63	63.98
	7/2022-12/2022	43	13.35	77.33
	in 2023	73	22.67	100.00
usage	in own use	259	80.69	80.69
	investment	61	19.00	99.69
	other	1	0.31	100.00
alone or with someone	alone	128	40.13	40.13
	with someone	188	58.93	99.06
	in the name of a company	3	0.94	100.00
mortgage size	0-50 000	25	7.76	7.76
	51 000-100 000	59	18.32	26.08
	101 000-150 000	67	20.81	46.89
	151 000-200 000	61	18.94	65.83
	201 000-250 000	42	13.04	78.87
	251 000-300 000	26	8.07	86.96
	301 000-400 000	30	9.32	96.28
	401 000-500 000	5	1.55	97.83
	over 500 000	7	2.17	100.00
reference rate	Euribor or other market interest rate	310	96.27	96.27
	prime interest rate	3	0.93	97.20
	fixed interest rate	5	1.55	98.76
	missing	4	1.24	100.00
	Total	322	100.00	

Table 2. Data on the mortgages of people who took out a mortgage in 2020-2023

Of the respondents who took out a mortgage in 2020-2023, about 30 % had taken out some kind of interest rate protection for their mortgage. Figure 4 shows that the most common type of interest rate hedging was the interest rate cap, which 17 % of the respondents had chosen for their mortgages. Interest rate collar had been taken by 7 % of the respondents. Less than 2 % of the respondents had a fixed interest rate. Many respondents who chose the "other" option said in the open answer field that they took an ASP mortgage that includes a free interest rate cap. ASP is a system by which the Finnish government helps citizens purchase their first home. ASP mortgages are granted with lower interest rates than regular mortgages. It is possible to get a government interest subsidy and a free government

guarantee for an ASP mortgage. The interest subsidy is granted for 10 years. If the ASP mortgage's interest rate exceeds 3.8 % during the interest subsidy period, the State Treasury pays 70 % of the interest rate exceeding this level. (State Treasury, 2023)

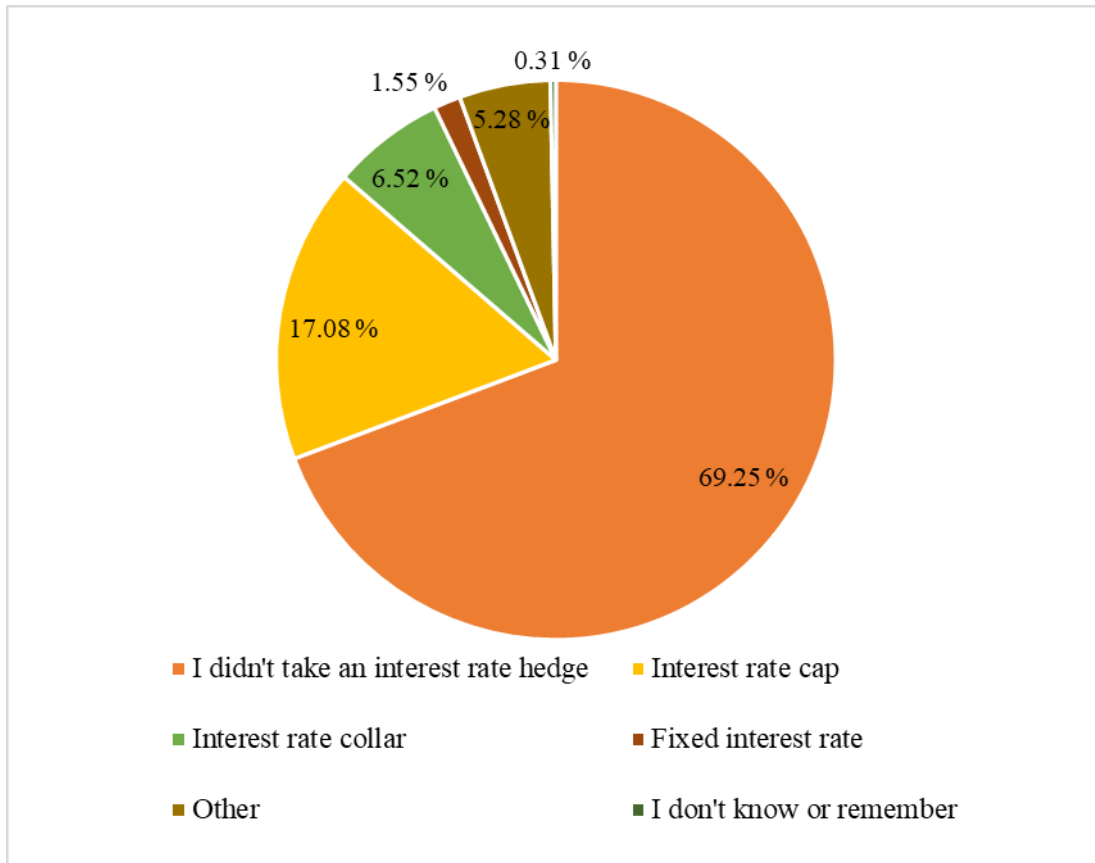


Figure 4. Interest rate hedging choices for mortgages taken out in 2020-2023

The results regarding the choice of interest hedging are in line with how many mortgage borrowers have previously been reported to have taken interest rate hedging on their mortgages. According to a separate bank survey by the Bank of Finland (2023c), 25 % of mortgages had a separate interest rate hedging product and in addition 2.5 % of the mortgages had a fixed interest rate.

Among those planning to take out a mortgage, the choices related to mortgages were very similar to those who had previously taken one. The planned sizes of mortgages were distributed slightly differently and had two peaks: at 51 000-100 000 euros and at 151 000-200 000 euros. In this group, there were slightly more people planning to buy an apartment

for investment use. About 30 % (n=21) could not yet say which reference rate they intend to take on their mortgage. These results can be seen in Table 3.

		Freq.	Percent	Cum.
usage	in own use	54	76.06	76.06
	investment	16	22.54	98.59
	other	1	1.41	100.00
alone or with someone	alone	29	41.43	41.43
	with someone	40	57.14	98.57
	in the name of a company	1	1.43	100.00
mortgage size	not sure yet	3	4.29	4.29
	0-50 000	3	4.29	8.58
	51 000-100 000	14	20.00	28.58
	101 000-150 000	9	12.86	41.44
	151 000-200 000	12	17.14	58.58
	201 000-250 000	9	12.86	71.44
	251 000-300 000	8	11.43	82.87
	301 000-400 000	7	10.00	92.87
	401 000-500 000	3	4.29	97.14
over 500 000	2	2.86	100.00	
reference rate	Euribor or other market interest rate	46	64.79	64.79
	prime interest rate	1	1.41	66.20
	fixed interest rate	3	4.23	70.42
	not sure yet	21	29.58	100.00
	Total	71	100.00	

Table 3. Data on the mortgages of people who are planning to take out a mortgage in 2023-2024

Among mortgage planners, there was quite little interest in interest hedging. Willingness to take interest rate hedge on a mortgage was asked on a scale from 0 to 10, where 0 meant that there was no interest at all and 10 meant that the person would definitely take out a hedge. Even 28 % (n=20) of the respondents answered their interest as 0. Other options were chosen quite evenly, but the distribution was clearly biased towards those who were not interested. The distribution can be viewed in Figure 5.

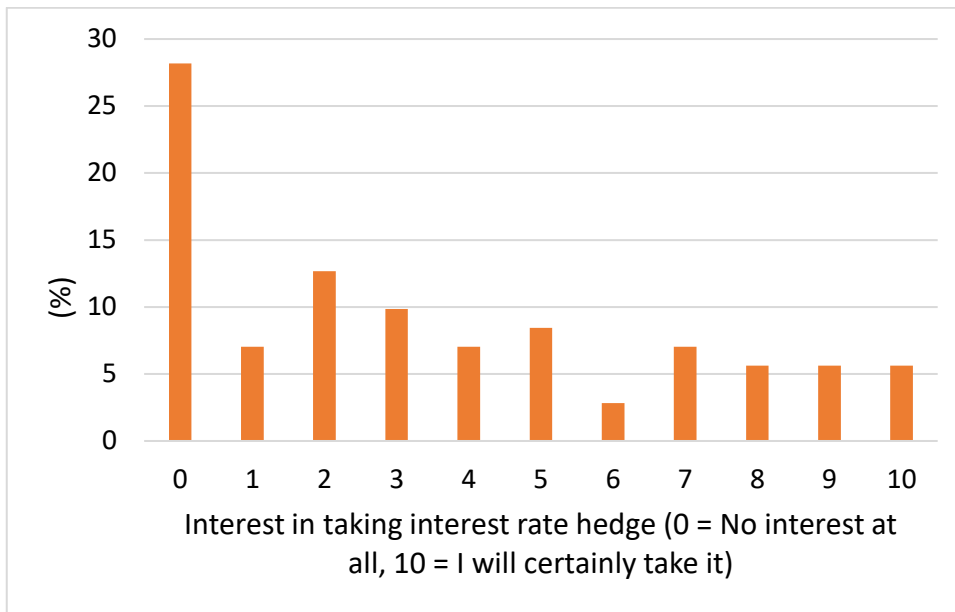


Figure 5. Mortgage planners' interest in interest rate hedging

The high level of market interest rates prevailing at the time of implementation of the survey probably reduced respondents' interest in interest hedging. The 6-month Euribor was around 4,1 % when the survey was carried out (Bank of Finland, 2023a). This result is in line with previous studies. In the past, it has been observed that a high interest rate at the time of borrowing reduces the willingness of households to take a product that locks in the interest rate, such as FRM. (Devine, McCarthy & O'Toole, 2023; Phillips & VanderHoff, 1991)

The data analysis started by looking at the distributions of the variables, making the necessary variable transformations and examining the correlations between the different variables. Almost all variables were nominal or ordinal, which affected the available analysis methods. In addition, the distributions between the categories of many variables were uneven. The distributions can be seen in bar plots in Appendix 2. The distributions were made more even by combining the smallest categories. All variable transformations can be seen in Appendix 2. The dependent variables related to the choice of interest hedging were also transformed into binary for performing logistic regression analysis. This binary variable was also used in Spearman rank correlation tests. The results were analyzed so that those who have already taken a mortgage and those planning to take it were analyzed separately. This was due to slightly different questionnaire questions for different groups of respondents (Appendix 1, questionnaire). In addition to socio-economic factors, the size of the mortgage

and the prevailing interest rate at the time of taking out the mortgage were thought to influence whether the borrower takes out interest rate hedge. Therefore, the connections between the size of the mortgages and the year of borrowing on borrowers' decisions were also included for examination.

The first to be examined were those who had already taken out a mortgage. The dependent variable was whether the borrower took interest rate protection. The number 0 was coded as "no interest rate hedge" and the number 1 "interest rate hedge". The independent variables used were age group, education level, professional status, household net income per month, number of children in the household, time frame of borrowing and size of the mortgage. Correlations between independent variables and the dependent variable were examined and they found to be quite low. As can be seen from the correlation matrix (Table 4), the strongest correlations between independent variables were between the number of children and age group (0.4042*) and between the mortgage size and household net income (0.3448*). There was also a statistically significant positive correlation between educational level and professional status (0.3069*). However, even these correlation coefficients remained quite weak in strength.

	hedging or not	age group	education	profess. status	househ. income	n of children	time frame	mortgage size
hedging or not	1							
age group	-0.0761	1						
education	-0.0187	0.1213**	1					
professional status	0.0339	0.1467***	0.3069***	1				
househ. income	-0.0521	0.2283***	0.2218***	0.2792***	1			
n of children	0.0591	0.4042***	-0.0208	0.025	0.1855***	1		
time frame	-0.1567***	-0.0195	0.0489	0.0622	0.0434	0.0489	1	
mortgage size	0.0874	-0.0596	0.1730***	0.1945***	0.3448***	0.0839	-0.0456	1

Table 4. Spearman rank correlation test for taken out mortgages. Results at 10 %, 5 % and 1 % confidence level denoted with *, ** and *** respectively.

A statistically significant negative correlation (-0.1567*) was observed between the time frame of borrowing and the dependent variable, choice of interest hedging. Taking interest rate hedge therefore decreased from 2020 to 2023 at 5 % risk level.

To compare the results, the same correlation test was also performed for the planned mortgages. The independent variable "borrowing time" was left out. In addition, the independent variable "mortgage size" was only the survey respondents' estimates of the size of their future mortgages. In order to obtain comparable results, the 11-point scale on the

level of interest of mortgage planners was also coded as binary. Values 0-4 were coded "no interest rate protection", values 6-10 "interest rate protection" and value 5 "missing". The results were very similar to those who had already taken out a mortgage. There was hardly any correlation to be found between the explanatory variables and the choice of interest hedging. The correlation coefficients remained low and were not statistically significant. The correlation coefficients can be seen in Table 5.

	hedging or not	age group	education	profess. status	househ. income	n of children	mortgage size
hedging or not	1						
age group	0.1515	1					
education	-0.1242	0.1213**	1				
professional status	-0.1554	0.1467***	0.3069***	1			
househ. income	0.0065	0.2283***	0.2218***	0.2792***	1		
n of children	0.0221	0.4042***	-0.0208	0.0250	0.1855***	1	
mortgage size	0.0834	-0.2484**	0.0172	-0.0150	0.4398***	-0.0767	1

Table 5. Spearman rank correlation test for planned mortgages. Results at 10 %, 5 % and 1 % confidence level denoted with *, ** and *** respectively.

The survey also asked which issue the respondents felt or feel had/has the most influence on their mortgage interest rate protection decision. Most respondents felt that the interest rate at the time of borrowing or their own idea of the future interest rate was the most important factor, as can be seen in Figure 6 and Figure 7. In addition to these factors, the idea of the sense of security brought by the interest rate hedge was perceived as an important factor affecting the decision.

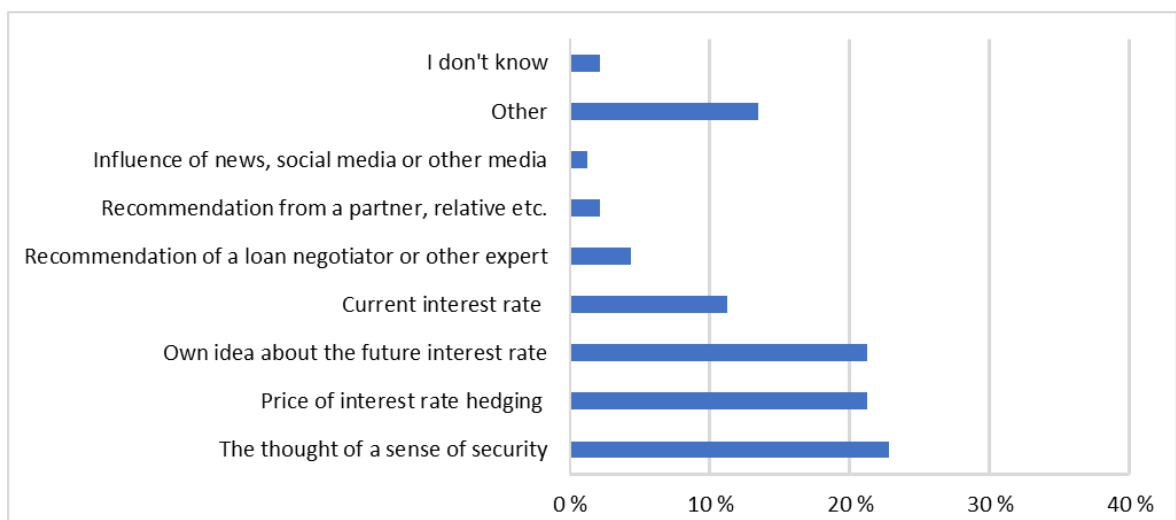


Figure 6. Mortgage borrowers' thoughts on what most influenced their interest rate hedging decision

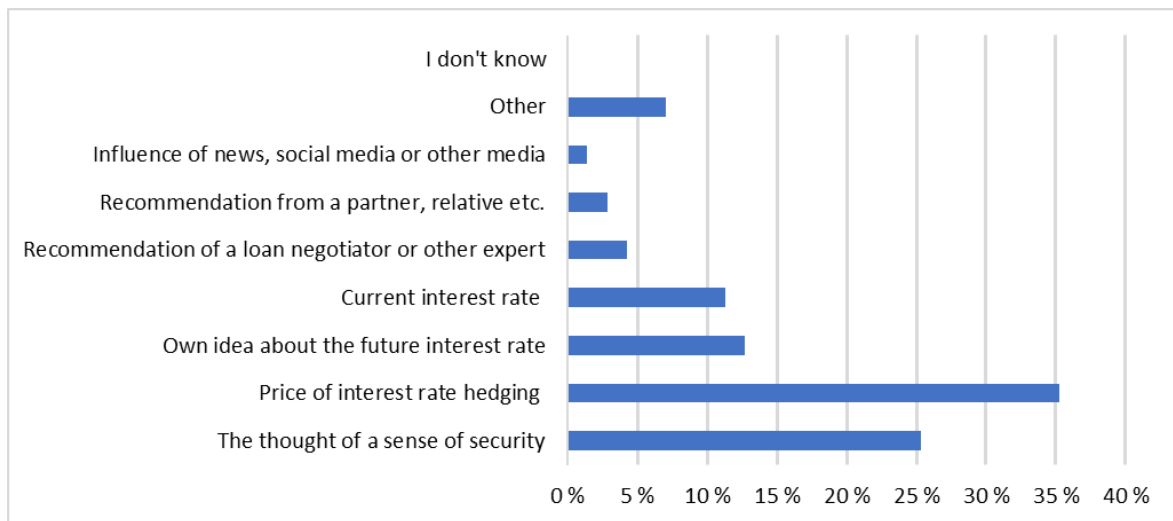


Figure 7. Thoughts from those planning to take out a mortgage on what most influences their interest rate hedging decision

Among those who were planning to take out a mortgage, the price of interest rate protection seemed to be a slightly greater influencing factor than among those who had already taken out their own. This may be related to the fact that interest rate hedges were cheaper in the past when interest rates were lower.

3.3 Methodology

This chapter presents the methods used in the research. The first section presents analysis of variance. One form of analysis of variance, the Kruskal-Wallis test, was used to examine whether there is a difference in the distributions of certain variables in terms of how many people take out interest rate protection on their mortgage. In the second section, logistic regression analysis is presented. It was used to study the connection of certain socio-economic and other variables to the interest rate hedging decision.

3.3.1 Analysis of variance

Analysis of variance, also called ANOVA, is used to investigate whether the mean values of two or more groups differ statistically significantly from each other. One type of it, Kruskal-

Wallis test by ranks, is non-parametric, so it can be used even if the variables used in the study were not normally distributed. The test compares average values between several different samples so the dependent variable must be such that an average can be calculated. In this study, the Kruskal-Wallis test by ranks was used to investigate whether the levels of interest in interest rate hedging differ from each other in groups among people with different educational levels and different professional positions. In addition to these two independent variables, the relationship between the size of the mortgage and, in the case of already taken mortgages, the relationship between the time of borrowing and the hedging decision was also investigated. These two factors were assumed to influence the decision in addition to educational level and professional status. (University of Tampere, 2023)

3.3.2 Logistic regression analysis

Regression analysis is used to estimate the relationships between a dependent variable and one or more independent variables. Logistic model is used to model the probability of an event when the independent variables take certain values. This study aims to predict the probability of the event "a person takes interest rate protection" when an independent variable concerning a person's socio-economic status gets a certain value. In this study, the dependency relationship between variable was studied by using binary logistic regression. In binary logistic regression there is a binary dependent variable, which can only take on two different values, 0 or 1. In this study, the binary dependent variable was whether or not the mortgage borrower took out interest rate hedge. The number 0 was therefore coded for the value of the dependent variable "the person did not take interest rate hedge" and the number 1 for the value "the person took interest rate hedge". All socioeconomic status-related variables asked in the survey were used as independent variables. (Kaakinen & Ellonen, 2023)

In logistic model, the essential concept is "odds", which is obtained by dividing the probability of an event by the probability of a complementary event. For example, in this study, if the probability of an individual with higher education to take an interest rate hedge was 20 %, and therefore the probability of not taking an interest rate hedge was 80 %, the odds would be $0.2/0.8=0.25$. If, on the other hand, a low-educated person took interest rate protection with a 40 % probability, the odds would be $0.4/0.6=0.67$. After calculating the

odds, the odds ratio will be calculated. It means the ratio between two different odds. The odds ratio tells how the odds of the predictable event (here, taking an interest rate hedge) changes as the values of the independent variables change. In this case, the odds ratio is obtained by dividing the odds of the highly educated by the odds of the low educated ($0.25/0.67=0.37$). This would mean that in the case of the highly educated, the odds of taking an interest rate hedge is 0.37 times that of the low educated. If the odds ratio is 1, it means that there is no difference in the bet. Large odds ratios mean that the odds of the modelled event increases if the independent variable increases. Correspondingly, smaller odds ratios mean that as the independent variable increases, the odds decreases. In the logistic model, the dependent variable is the logarithm of the bet of the predicted event. (Kaakinen & Ellonen, 2023)

Logistic regression model can be expressed by the formula as follows:

$$\ln \left[\frac{P(Y=1)}{1-P(Y=1)} \right] = a + bx, \quad (1)$$

where $P(Y=1)$ is the probability that the dependent variable gets the value 1, a is the constant factor, b is the regression coefficient and x is the value of the independent variable. (Kaakinen & Ellonen, 2023)

4 Results

In this chapter, the results of used analysing methods are viewed and analysed. The research results were produced using the Stata/SE statistical program. At first, analysis of variance was performed to compare the distributions of interest rate hedging choices among people with different educational levels and professional positions. Distributions of hedging choices were also investigated among mortgage borrowers from various years and with various sizes of mortgages. The logistic regression analysis was then performed to answer the first main research question: “How do different socioeconomic factors affect the willingness of mortgage borrowers to take interest rate protection on their mortgage?”. In this analysis, the independent variables were the socioeconomic variables asked in the survey and the dependent variable was if the borrowers took an interest rate hedge or not.

4.1 Analysis of variance

To compare the interest rate hedging choices among differently educated people, analysis of variance was performed by using Kruskal-Wallis test by ranks. Both decisions of people who were taken out a mortgage and mortgage planners were investigated. The null hypotheses of these tests were that the samples came from similar populations, so people with different levels of education would not differ in whether they take an interest rate hedge. With the probability of 0.94 for taken out mortgages and 0.40 for planned mortgages, the null hypotheses remained valid, i.e. there were no statistically significant differences in the interest hedging willingness of those with different educational levels. Table 6 shows the results of the tests.

Kruskal–Wallis equality-of-populations rank test			
Taken out mortgages			
	Education	Obs	Rank sum
	No higher education	57	9273.00
	Lower university degree	145	23462.50
	Master's or doctorate degree	119	18945.50
	chi2(2) with ties = 0.117		
	Prob = 0.9433		
Future mortgages			
	Education	Obs	Rank sum
	No higher education	13	435.50
	Lower university degree	27	959.50
	Master's or doctorate degree	25	750.00
	chi2(2) with ties = 1.812		
	Prob = 0.4042		

Table 6. Kruskal-Wallis test on the distribution of interest hedging decisions by educational level

Kruskal-Wallis test was also done for hedging decisions of people with different professional positions. H₀ was that people with different professional statuses would not differ in whether they take an interest rate hedge. With the probabilities of 0.40 and 0.43, these null hypotheses were also remained valid, so there were no differences were found in the distributions of interest rate hedging willingness between different professional positions. These results can be seen in Table 7.

Kruskal–Wallis equality-of-populations rank test			
Taken out mortgages			
	Professional status	Obs	Rank sum
	Outside of work	18	2265.00
	Worker or lower official	168	24790.00
	Higher position	106	15723.00
	chi2(2) with ties = 1.805		
	Prob = 0.4056		
Future mortgages			
	Professional status	Obs	Rank sum
	Outside of work	4	149.00
	Worker or lower official	30	965.00
	Higher position	27	777.00
	chi2(2) with ties = 1.680		
	Prob = 0.4318		

Table 7. Kruskal-Wallis test on the distribution of interest hedging decisions by professional status

Since the size of the mortgage and the prevailing interest rate were also thought to be connected to the interest rate hedging decision, the distributions of hedging decisions between different sizes of mortgages and different borrowing times were also examined using the Kruskal-Wallis test. H0 of the test of hedging decisions by mortgage sizes was that the hedging decision would not differ in people with different sizes of mortgages. With the probabilities of 0.38 (taken out mortgages) and 0.48 (planned mortgages), the null hypotheses remained valid and no different distributions of hedging decisions seemed to be found between mortgages of different size categories (Table 8).

	Kruskal–Wallis equality-of-populations rank test		
Taken out mortgages			
	Mortgage size	Obs	Rank sum
	0 - 50 000	25	3281.00
	51 000 - 100 000	58	9064.00
	101 000 - 150 000	67	11356.00
	151 000 - 200 000	61	9881.00
	201 000 - 250 000	42	6469.00
	251 000 - 300 000	26	4196.00
	301 000 - 400 000	30	5286.00
	401 000 or more	12	2146.00
	chi2(2) with ties = 7.500		
	Prob = 0.3787		
Planned mortgages			
	Mortgage size	Obs	Rank sum
	0 - 50 000	3	69.00
	51 000 - 100 000	12	337.00
	101 000 - 150 000	7	222.00
	151 000 - 200 000	10	321.00
	201 000 - 250 000	9	359.00
	251 000 - 300 000	8	214.00
	301 000 - 400 000	7	222.00
	401 000 or more	5	145.00
	chi2(2) with ties = 6.518		
	Prob = 0.4807		

Table 8. Kruskal-Wallis test on the distribution of interest hedging decisions by mortgage size

However, statistically significant differences in the distributions of hedging decisions were found between mortgages taken out at different times. Borrowing dates could only be examined for mortgages already taken out. H0 of the test was that the distribution of hedging decision would not differ in mortgages taken out in different years. With the probability of 0.04, the null hypothesis was rejected. The test results can be found in Table 9.

Kruskal–Wallis equality-of-populations rank test		
Time frame	Obs	Rank sum
2020	86	14928.50
2021	88	14831.00
2022	74	11498.00
2023	73	10423.00
chi2(2) with ties = 8.247		
Prob = 0.0412		

Table 9. Kruskal-Wallis test on the distribution of interest rate hedging decisions by time of taking out a mortgage

At 5 % risk level, statistically significant differences were found in the distributions of willingness to hedge mortgage interest rates in different years. It means that in some years, interest rate hedging was more popular. As stated earlier, interest rate hedges were taken more in earlier years than in later years.

4.2 Logistic regression analysis

To deepen the knowledge about the connections of different factors to the mortgage interest rate protection decision, a logistic regression analysis was performed. A prerequisite for performing a logistic regression analysis is a sufficient sample size, which was achieved in this study with 322 answers from those who had already taken out a mortgage and 71 answers from those who were planning to take it. The logistic regression model must also include all relevant variables. If variables that greatly explain the phenomenon under study are removed, it will weaken the significance of the model. An effort was made to include independent variables in the study in a sufficiently comprehensive manner, although personality traits and willingness to take risks were not investigated in this study. Furthermore, there must not be complete multicollinearity between the explanatory variables and the observations must be independent of each other. The correlations between the variables remained quite low, so multicollinearity was not considered to be a problem. (Kaakinen & Ellonen, 2023)

At first, the logistic regression was performed with all the independent variables asked in the survey: gender, age group, education level, professional status, work situation, marital status, region, number of children, household monthly net income, the time frame of taking out the mortgage, the usage of the apartment, mortgage size and whether the respondent took out the mortgage alone or with someone. The statistical significance of the model remained very low, with $\text{prob} > \chi^2$ remaining at 0.4843. The coefficient determination of this model was 0.1010 so despite the large number of independent variables, the model was unusable. The next step was to implement the model according to the hypotheses that had been set regarding which socio-economic and other factors could influence the interest hedging decision. These factors were education level, professional status, household monthly net income, mortgage size, number of children and the time frame. The statistical significance of the model remained at 0.2939 and the coefficient determination decreased to 0.0725. The weakness of the model could have been influenced by the uneven distribution of the categories of the variables. There were no normally distributed variables in the independent ones. In addition, multicollinearity could be a problem. The model was slightly improved by removing the variable "educational level" from it, which was somewhat correlated with the variable "professional status". This was how the best possible model was produced, which had a statistical significance of 0.2178 and coefficient determination of 0.0713. The models used and the values describing their goodness can be seen in Table 10. The results of the best logistic model can be seen in Table 11. All other logistic models used can be found in Appendix 3.

Dependent variable: Hedging or not			
	Model 1	Model 2	Model 3
Independent variables	gender, age group, level of education, professional status, work situation, marital status, region, number of children, household income, time frame, usage of the apartment, mortgage size, mortgage alone or with someone	level of education, professional status, household income, mortgage size, number of children, time frame	professional status, household income, mortgage size, number of children, time frame
Statistical significance of the model (Prob > chi2)	0.4843	0.2939	0.2178
Coefficient determination (Pseudo R2)	0.1010	0.0725	0.0713

Table 10. Used logistic regression models

							Number of obs = 292
							LR chi2(21) = 25.71
							Prob > chi2 = 0.2178
							Pseudo R2 = 0.0713
hedging or not	Odds ratio	Std. err.	z	P> z	[95% conf. interval]		
professional status							
worker/lower offic.	2.443502	1.737311	1.26	0.209	0.6064779	9.844877	
higher position	2.875388	2.08232	1.46	0.145	0.6954514	11.88847	
household income							
2000-2499	1.134709	1.002492	0.14	0.886	0.2008473	6.410668	
2500-2499	1.408044	1.21176	0.4	0.691	0.2606597	7.606041	
3000-4999	0.9383977	0.7343625	-0.08	0.935	0.2024238	4.35023	
5000-7499	0.8455079	0.6719879	-0.21	0.833	0.1780757	4.014493	
7500-10 000	0.352994	0.3418546	-1.08	0.282	0.0528965	2.355633	
over 10 000	0.2667326	0.3721817	-0.95	0.344	0.0173127	4.109496	
mortgage size							
51 000-100 000	2.202603	1.575469	1.1	0.27	0.5421162	8.949117	
101 000-150 000	2.554671	1.774747	1.35	0.177	0.6546358	9.969428	
151 000-200 000	2.595878	1.830344	1.35	0.176	0.6517863	10.33864	
201 000-250 000	2.126837	1.581285	1.01	0.31	0.4953057	9.132613	
251 000-300 000	2.247584	1.836684	0.99	0.322	0.4530328	11.1507	
301 000-400 000	4.025189	3.171634	1.77	0.077	0.8591812	18.85766	
401 000 or more	5.95702	5.713326	1.86	0.063	0.9091783	39.03094	
children							
1	0.8324635	0.3139375	-0.49	0.627	0.3975221	1.743288	
2	1.69714	0.5929189	1.51	0.13	0.855734	3.365863	
3 or more	1.144263	0.6997874	0.22	0.826	0.3451146	3.79392	
time frame							
2021	0.8945285	0.3100387	-0.32	0.748	0.4534948	1.764477	
2022	0.5091122	0.1980552	-1.74	0.083	0.2375081	1.091311	
2023	0.3829678	0.1561396	-2.35	0.019	0.1722342	0.85154	
_cons	0.1131157	0.1236868	-1.99	0.046	0.013267	0.964433	

Table 11. Logistic regression results for taken out mortgages

The statistical significance of the model remained low, with chi square remaining at 0.22 and the coefficient of determination at 0.07. However, when Hosmer & Lemeshow test was carried out to check the fit of the model to the data. In this test, the null hypothesis is that the model is compatible with the data. With a P-value of 0.81, the null hypothesis remained valid, which means that the model was compatible with the data. The results can be seen in Table 11.

Goodness-of-fit test after logistic model

Variable: hedging_or_not

Number of observations	=	292
Number of groups	=	10
Hosmer-Lemeshow chi2(8)	=	4.51
Prob > chi 2	=	0.8087

Table 12. Hosmer & Lemeshow test for the logistic regression of taken out mortgages

When examining the logistic regression analysis results at a 5 % risk level, none of the socioeconomic factors were statistically significant predictors of whether the borrower took interest rate protection. It can be observed that only the time of taking out a mortgage predicted the choice. If a mortgage was taken out in 2023, interest rate protection was taken out significantly less often than in the comparison year 2020, with an odds ratio of 0.38. When examining the results in Table 10, it should be noted that the comparison categories for each variable are missing from the table, and the odds ratio of these comparison categories would have the value 1.

If the results are considered at a 10 % risk level, it can be noticed that the size of the mortgage also had a statistically significant effect on taking interest rate protection. Those who took out a mortgage of more than 300 000 euros were significantly more likely to take out interest rate protection than the comparison category, those who took out a mortgage of less than 50 000. For a mortgage of 301,000 to 400,000 euros, the odds ratio was 4.03, and for a mortgage of at least 401,000 euros, the odds ratio was 5.96.

To compare the results, logistic regression analysis was also performed for future mortgage interest rate hedging decisions. In the question on the questionnaire, the interest in interest rate protection of those planning to take out a mortgage was asked on a scale from 0 (I will

not take interest rate protection) to 10 (I will definitely take interest rate protection). This variable was made binary so that the numbers 0-4 meant that interest rate protection was not taken and 6-10 meant that it was taken. The number 5 was coded as a missing value. The same variables were used as in the reported model of taken out mortgages in Table 10. However, the model seemed to predict future mortgage interest rate hedging decisions even worse than previously taken ones. The chi square remained at 0.43 so the model was not statistically significant. Moreover, none of the classes of the independent variables got p-values under 0.05. This regression model can be seen in Appendix 3.

5 Discussion & Conclusions

The main research questions of this study were:

“How do different socioeconomic factors affect the willingness of mortgage borrowers to take interest rate hedge on their mortgage?”, and

“How does socio-economic status affect interest rate hedging decisions in different interest rate situations?”

The sub-questions of this study were:

- 1. How much do the mortgage borrowers' age, education level, annual household income and family size affect whether they take out interest rate hedge for a mortgage?*
- 2. Does the prevailing interest rate affect the choice of interest rate hedging for mortgage?*
- 3. Which interest rate hedging methods are preferred by people of different socioeconomic statuses?*

Based on this study, socio-economic factors had no effect on the mortgage interest rate hedging decision. The general level of interest rates seemed to influence the decision to hedge interest rates so that during low interest rates more interest rate hedges were taken. The most popular form of interest rate hedging was an interest rate cap, which was taken by about 17 % of those who answered the survey and had already taken out a mortgage.

Based on the results of the logistic regression analysis, almost all the hypotheses that were set at the beginning of the research process had to be rejected. However, the hypothesis about the effect of the time of borrowing was correct. The earlier the mortgage was taken out between 2020 and 2023, the more likely it was to choose interest rate hedging. The hypothesis about the effect of the size of the mortgage was also partly true: for the largest mortgages, over 300,000 euros, the size of the mortgage predicted the taking of an interest rate hedge statistically significantly.

It was a surprising research result that socio-economic factors had no effect on the decision, because in previous studies connections between them and the type of mortgage (FRM or ARM) have been found (Coulibaly & Li, 2009; Worthington, 2009). In the logistic

regression in this study, the significance of the model remained very low. It is possible that all the relevant independent variables were not included in the model. Complete multicollinearity did not occur as the correlations between the variables remained low. Since the highest correlation was between education level and professional status, education level was omitted from the final model. Still, the prediction accuracy of the model was not much improved. Therefore, the reliability of the research results remained quite low.

The interest rate situation in Finland was very exceptional in the period 2020-2023, which could have affected the results. Based on this study, the year of borrowing had an impact on the decision, and it probably had an effect specifically through the interest rate situation. In the early years of the 2020s, interest rates were low until they started to rise sharply in 2022 (Bank of Finland, 2023a). It is possible that with interest rates rising rapidly, the interest rate situation influenced mortgage-related decisions more than usual. It may be that the research results would have been different if the interest rates had been more stable, and the impact of socio-economic factors then could have been visible. Therefore, repeating the research in a different interest rate situation could be meaningful.

In addition to the time, the size of the mortgage was found to influence the hedging decision to some extent. The effect was visible in the cases of the largest mortgage amounts. This is a very logical and expected result, because when interest rates rise, the monthly instalments of a large mortgage could easily increase by several thousand euros. This would certainly cause difficulties for many people, even if the income is high, so interest rate hedging is justified. The geographical distribution of the respondents could also have influenced the results. In Finland, apartment prices are the highest in the Helsinki-Uusimaa area, which can increase the willingness to hedge interest rates. In addition, the Helsinki-Uusimaa region has a more educated population, which may also affect the results. By removing the influence of some of these factors, different research results could be obtained.

The subject of further research could be, for example, the effects of personality traits and willingness to take risk on interest rate hedging decisions. The effects of these on the choice between FRM and ARM have already been studied before (Coulibaly & Li, 2009; Devine, McCarthy & O'Toole, 2023; Posey & Yavas, 2001), but there is a lack of data related to interest rate hedging.

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Appendices

Appendix 1. The cover letter and the questionnaire

Cover letter

Dear members of the xxx group. I am a student of LUT School of Business and I am doing my bachelor's thesis related to decisions regarding taking out a mortgage. I am looking for respondents to my survey who have taken out a mortgage between 2020 and 2023 or plan to take out a mortgage between 2023 and 2024. My purpose is to investigate the effects of various socio-economic factors on whether a mortgage borrower takes out interest rate protection on their loan.

Answers are given anonymously via the Webropol form, and it takes about 3–5 minutes to answer. A 20-euro S Group gift card will be drawn among willing respondents, so you can leave your contact information for the draw if you wish. Contact information is not combined with the answers to the questionnaire. The material received is stored and processed confidentially and securely. You can read the data protection notice on the survey's front page.

The research will be completed in early 2024 and my bachelor's thesis will be published in LUTPub at that time. Every answer is important! Thank you in advance for your reply.

Conductor of the study:

Milla Ylönen

milla.ylonen (a) student.lut.fi

Link to survey:

<https://link.webpolsurveys.com/S/D4177E8B6F5A4BC6>

Questionnaire

1. Are you..?

- a man
- a woman
- other

2. What age group do you belong to?

- 18–30
- 31–40
- 41–50
- 51–64
- 65+ years

3. What is your level of education? Select the highest level of education you have completed.

- Less than primary school or equivalent
- Elementary school, public school or middle school
- Vocational school or course
- High school or high school student
- College-level professional education
- University of applied sciences
- University, lower level degree
- University, higher degree
- Licentiate or doctoral degree

4. Which professional group do you consider yourself to belong to?

- In a leading position in the service of another
- Senior official
- Lower official
- Employee
- Entrepreneur or private practitioner
- Agricultural entrepreneur
- A student
- Retired
- Stay-at-home mom or dad
- Unemployed
- Other

5. Which of the following best describes your work situation?

- In full-time work (more than 35 hours a week)
- Part-time work (15–34 hours per week)
- In part-time work (less than 15 hours a week)
- Unemployed
- Student
- Retired
- In conscript or civilian service
- On parental leave

6. How much is your household's net income per month on average? (Net income means income from which taxes have been deducted. Net income includes all household income, such as wages, capital gains, business income, pensions, unemployment benefits and other social benefits such as child benefits.)

- Less than 500 euros
- 500–999 euros
- 1000–1499 euros
- 1500–1999 euros
- 2000–2499 euros
- 2500–2999 euros
- 3000–4999 euros
- 5000–7499 euros
- 7,500–10,000 euros
- More than 10,000 euros

7. Are you currently..?

- Unmarried
- In a marriage or cohabitation
- Divorced
- Widowed
- Other

8. How many children live in your household?

- 0
- 1
- 2
- 3 or more

9. In which region of Finland do you live?

- Helsinki-Uusimaa region
- Southern Finland
- Western Finland
- Northern or Eastern Finland
- Åland

10. Which of the following describes your situation when it comes to taking out a mortgage?

- I have taken out a mortgage between 2020 and 2023
- I plan to take out a mortgage between 2023 and 2024

Questions for those who have taken out a mortgage between 2020 and 2023:**11. In what period did you take out your mortgage?**

- In 2020
- In 2021
- January - June 2022
- July - December 2022
- In 2023

12. Is the apartment..?

- in own use
- an investment apartment
- other

13. Did you take out a mortgage..?

- alone
- with another person, e.g. a partner
- in the name of the company

14. How much did you take out a mortgage for? If you took it out with someone, answer according to how much you took out in total.

- 0–50,000 e
- 51,000–100,000 e
- 101,000–150,000 e
- 151,000–200,000 e
- 201,000–250,000 e
- 251,000–300,000 e
- 301,000–400,000 e
- 401,000–500,000 e
- more than 500,000 e

15. What reference interest rate did you take on your mortgage?

- Euribor interest rate (e.g. Euribor 6-month or 12-month) or other market interest rate
- Prime interest rate (the bank's own reference interest rate)
- Fixed interest rate (interest rate that remains the same throughout the loan period)
- I don't know or remember

16. Did you take out an interest rate hedge for your mortgage? If you did, what?

- I did not take an interest rate hedge
- Interest rate cap
- Interest pipe
- Fixed rate
- Else, what? _____
- I don't know or remember

17. Which of the following do you feel had the most influence on your decision to take or not take an interest rate hedge?

- The price of interest hedging
- The current interest rate
- My own idea about the future development of interest rates
- The idea of a sense of security or how one's own finances can withstand changes in interest rates
- Recommendation from a partner, relative or other acquaintance
- Recommendation of a loan negotiator or other expert in the field
- Impact of news, social media or other media
- Else, what? _____
- I don't know

Questions for those who plan to take out a mortgage in 2023-2024:

11. Are you going to buy an apartment..?

- For my own use
- As an investment apartment
- Other

12. Do you take out a mortgage..?

- alone
- with another person, e.g. a partner
- in the name of the company

13. How much do you plan to take out a mortgage for?

- I do not know yet
- 0–50,000 e
- 51,000–100,000 e
- 101,000–150,000 e
- 151,000–200,000 e
- 201,000–250,000 e

- 251,000–300,000 e
- 301,000–400,000 e
- 401,000–500,000 e
- more than 500,000 e

14. What reference rate are you going to take on your mortgage?

- Euribor interest rate (e.g. Euribor 6-month or 12-month) or other market interest rate
- Prime interest rate (the bank's own reference interest rate)
- Fixed interest rate (interest rate that remains the same throughout the loan term)
- I do not know yet

15. On a scale of 0-10, how interested are you in taking interest rate hedging on your future mortgage at the moment? 0 = I'm not interested at all, 10 = I'm definitely going to take it

0 1 2 3 4 5 6 7 8 9 10

16. Which of the following would you most likely choose as a form of interest hedging?

- Interest rate cap
- Interest pipe
- Fixed rate
- None of these
- Else, what? _____
- I can not say

17. Which of the following do you suspect has the greatest influence on your decision to take or not to take interest rate protection?

- The price of interest hedging
- Interest rate at the time of borrowing
- My own idea about the future development of interest rates
- The idea of a sense of security or how one's own finances can withstand changes in interest rates
- Recommendation from a partner, relative or other acquaintance

- Recommendation of a loan negotiator or other expert in the field
- Impact of news, social media or other media
- Else, what? _____
- I can not say

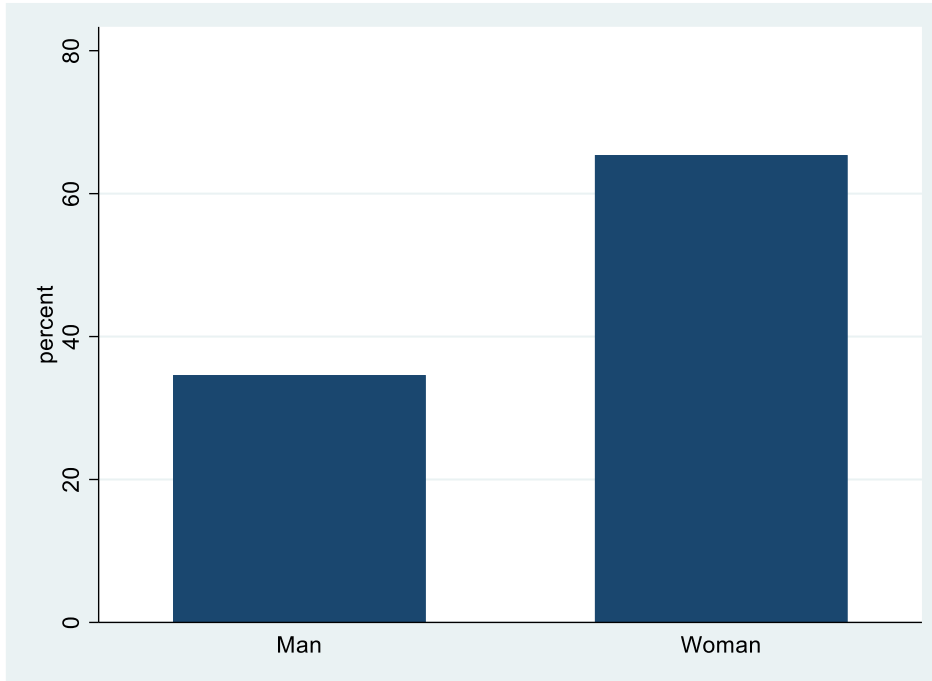
For all the respondents:

18. Thank you for your answers. If you want to take part in the draw, please leave your contact information here.

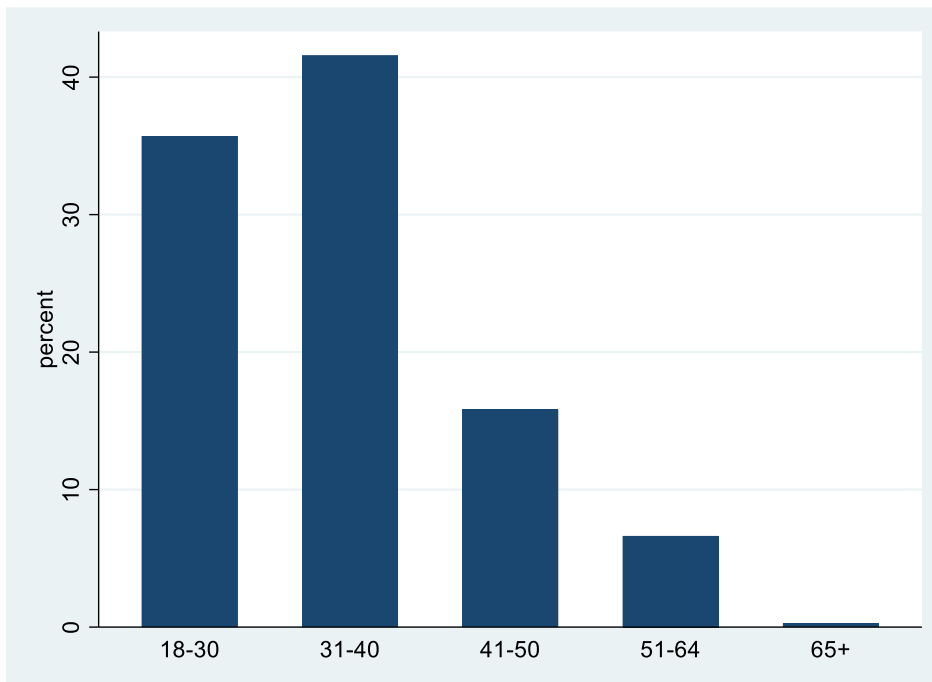
- Name
- Phone number
- Email address

Appendix 2. Distributions of the variable values and the modified variables

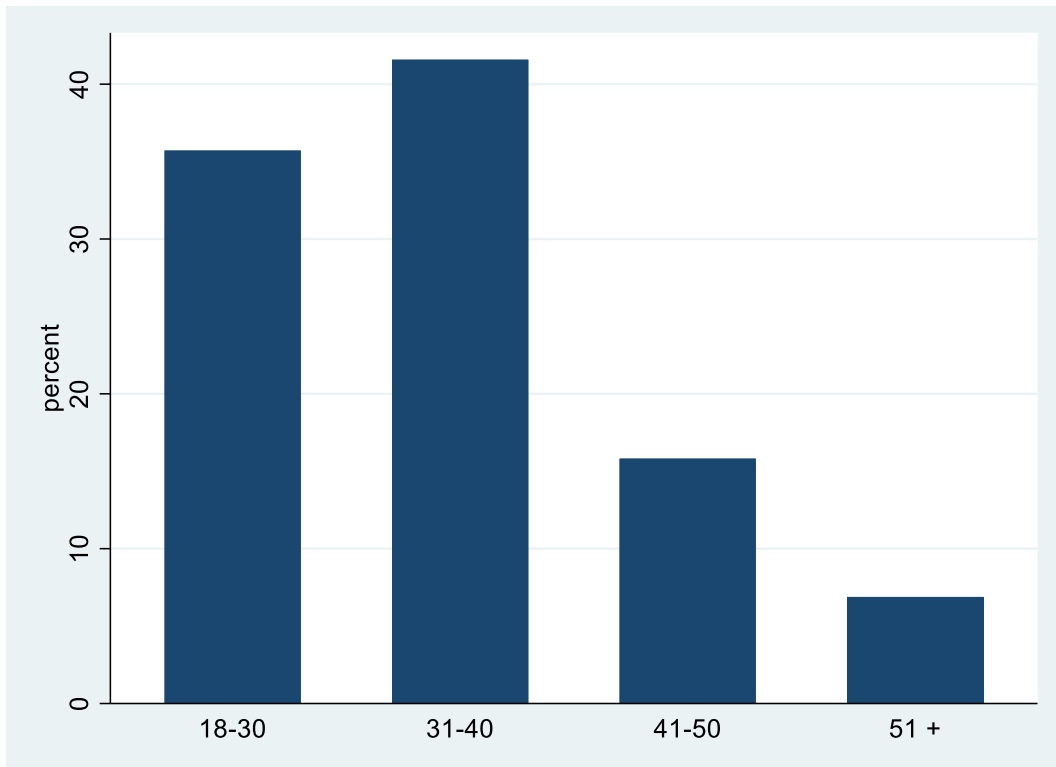
Gender:



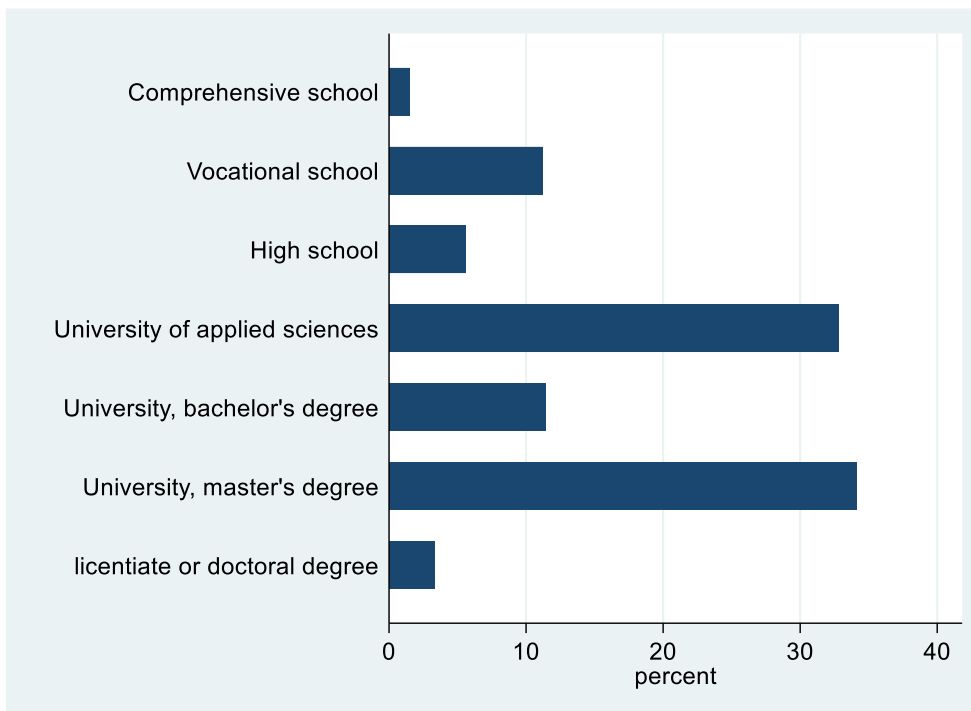
Age group:



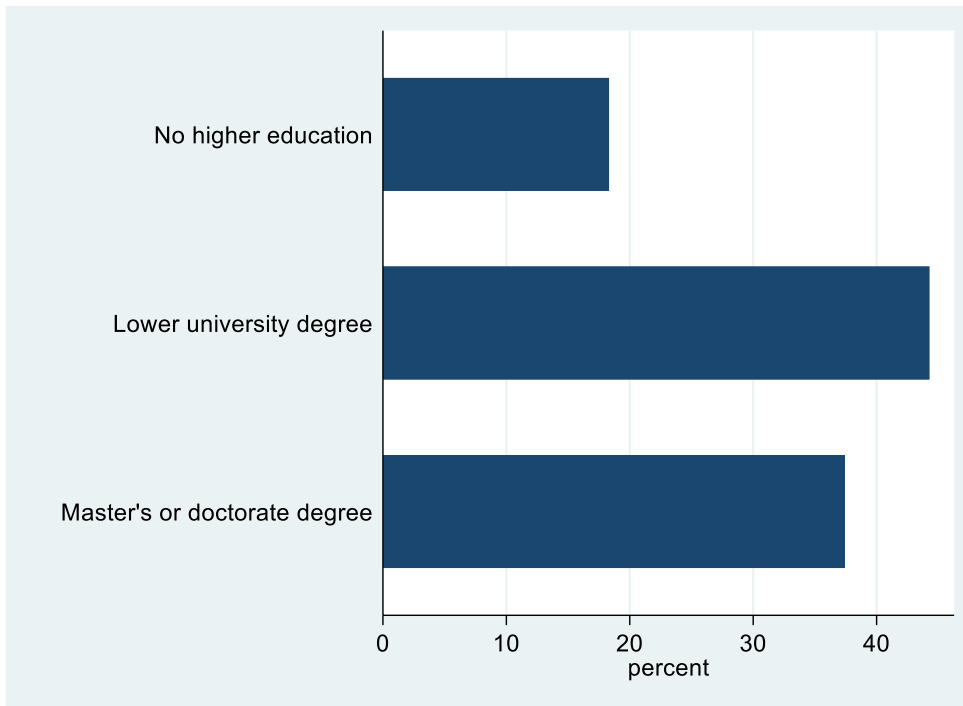
Modified variable: Age group



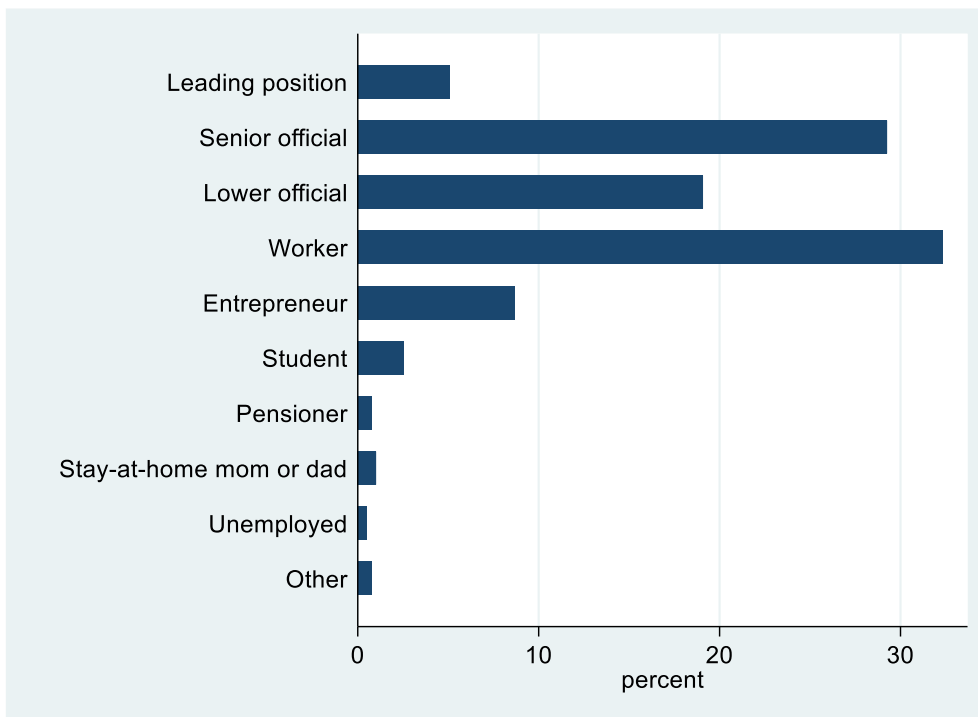
Education:



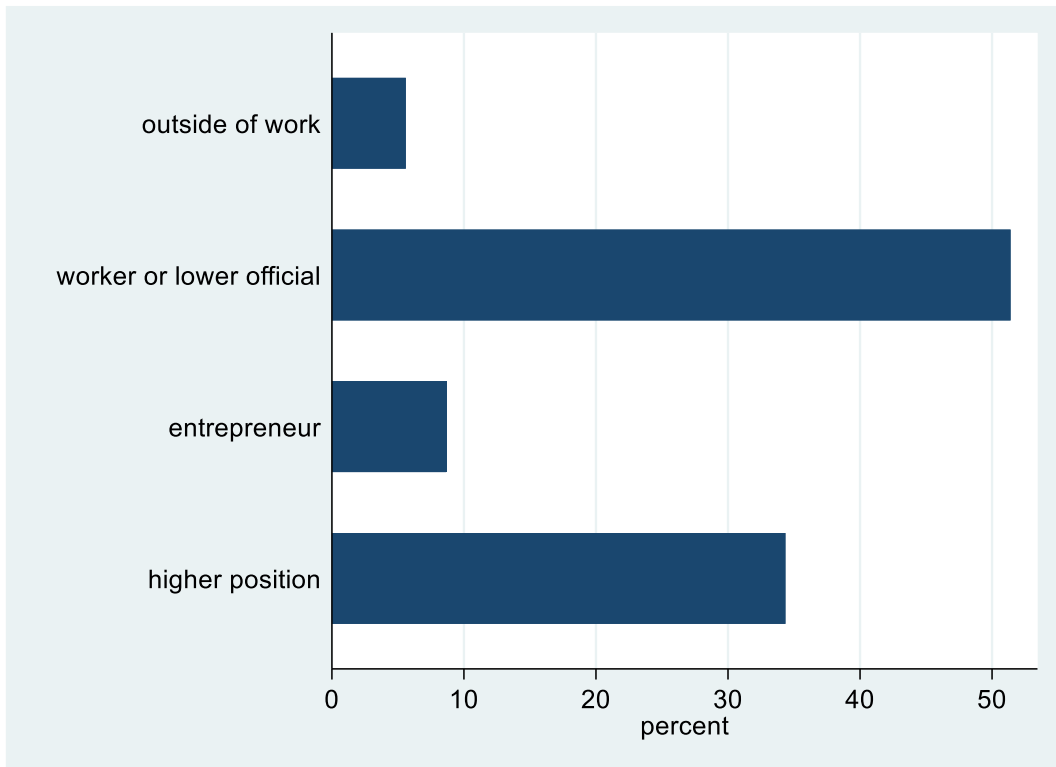
Modified variable: Education



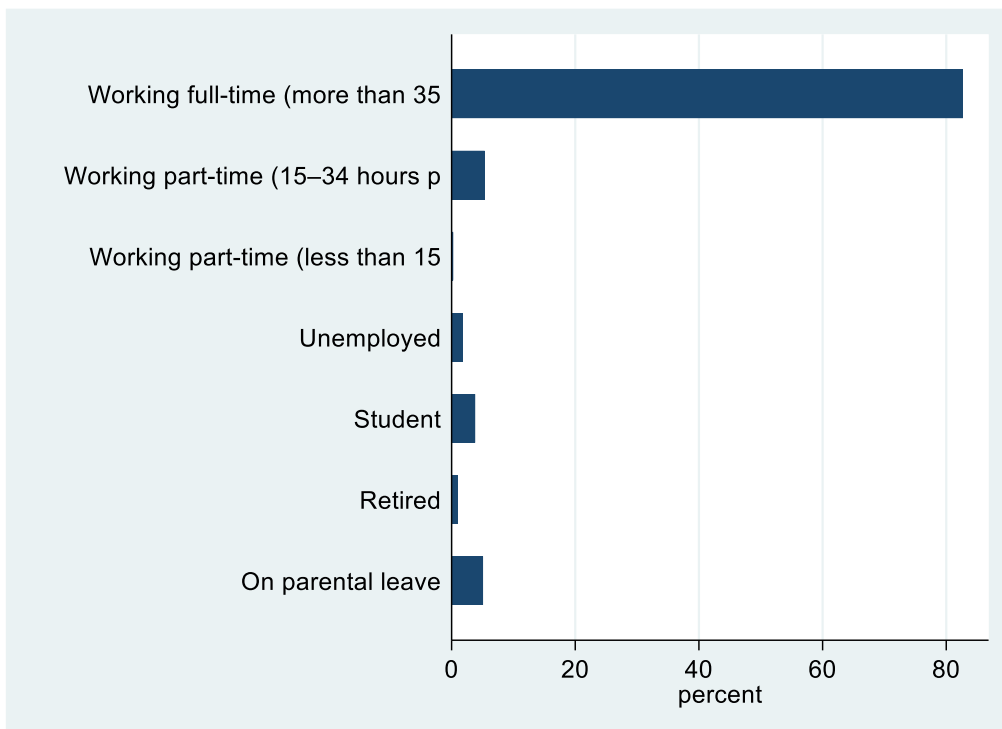
Professional status:



Modified variable: Professional status

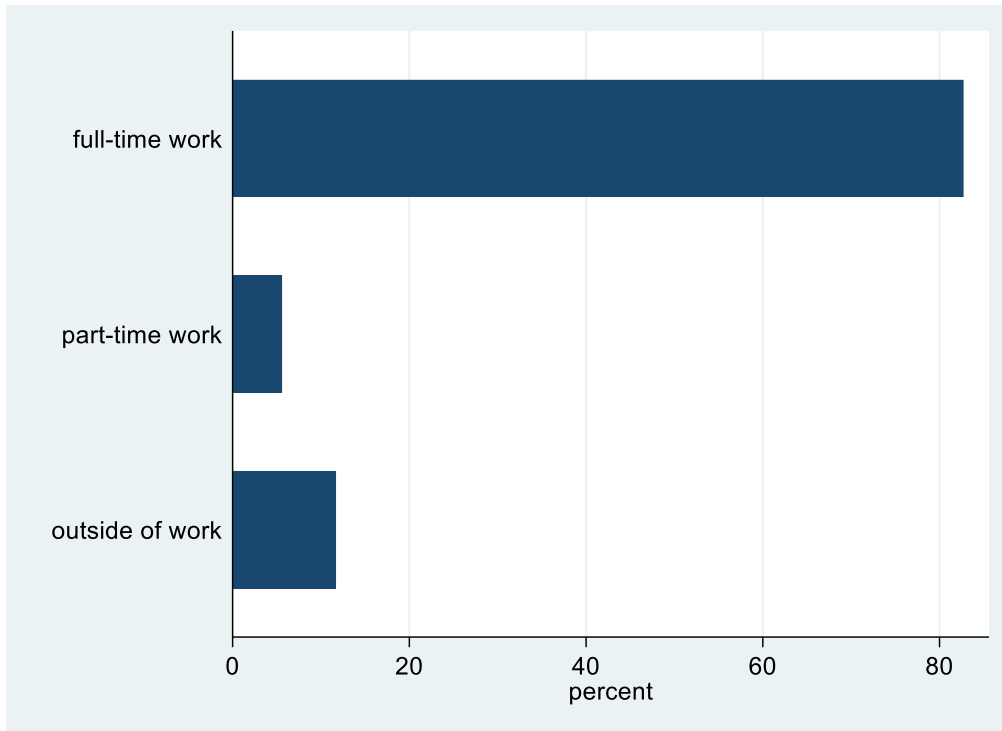


Work situation:

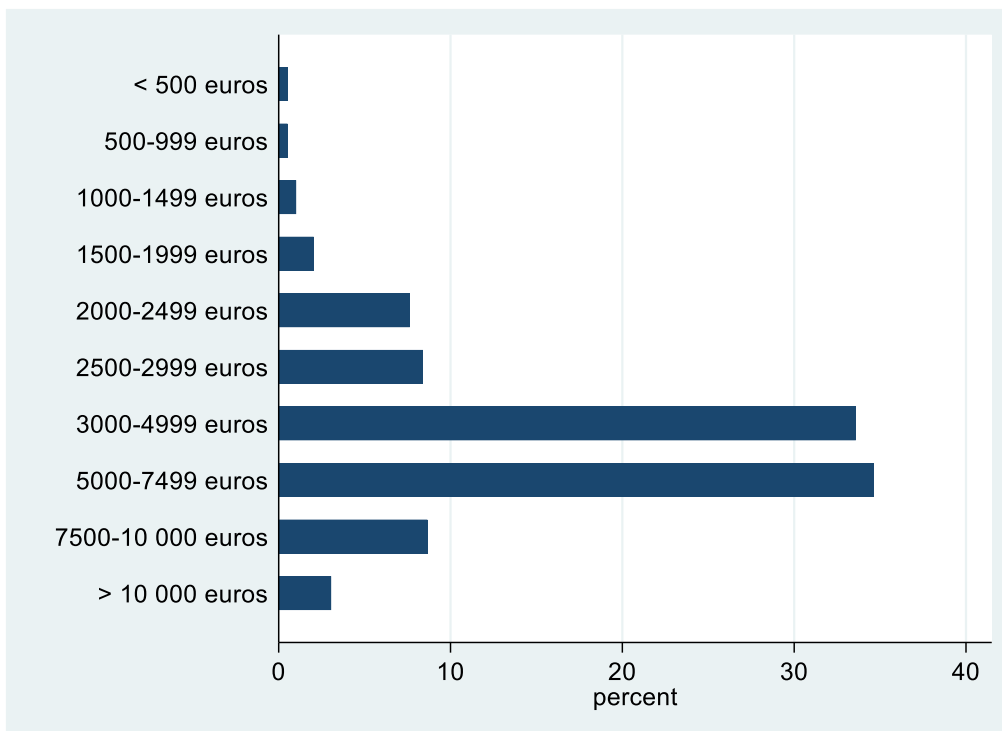




Modified variable: Work situation

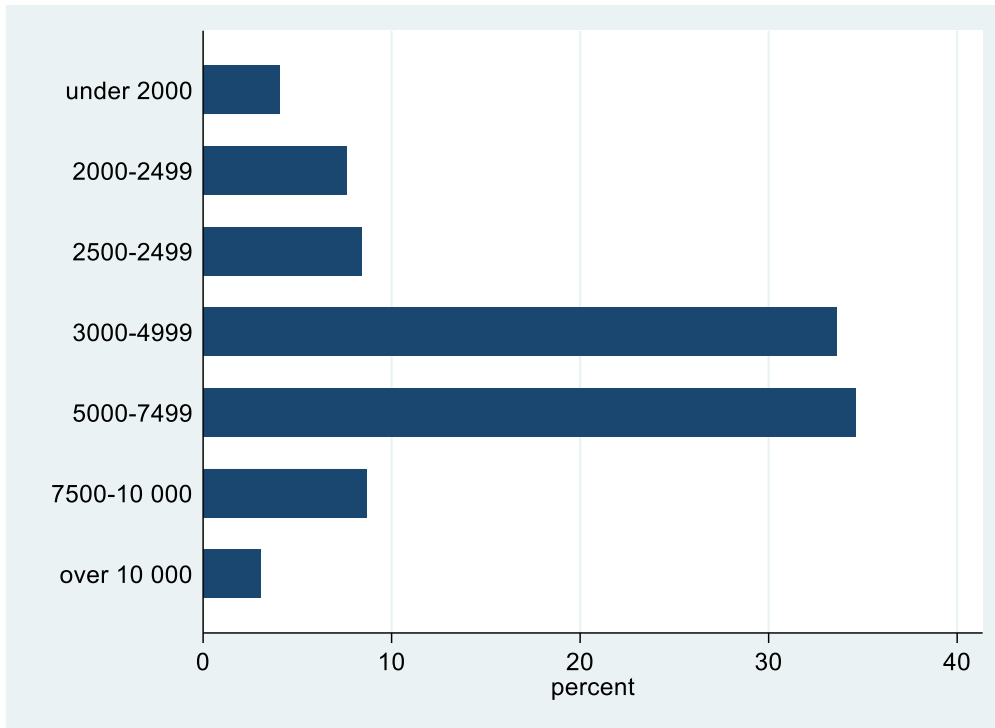


Household net income per month:

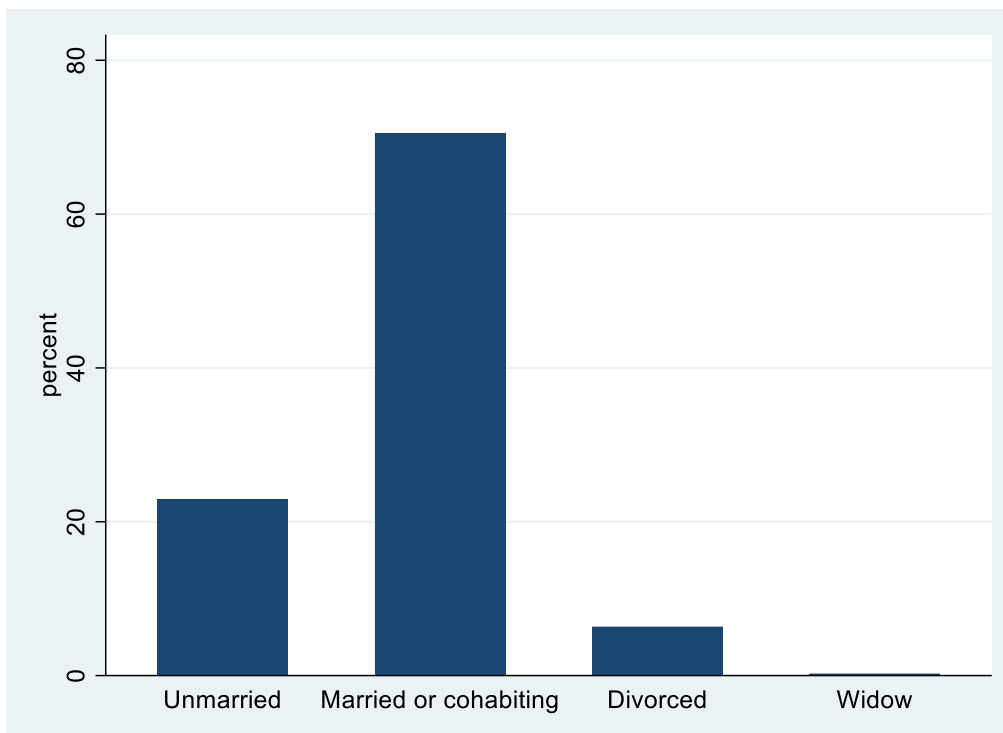




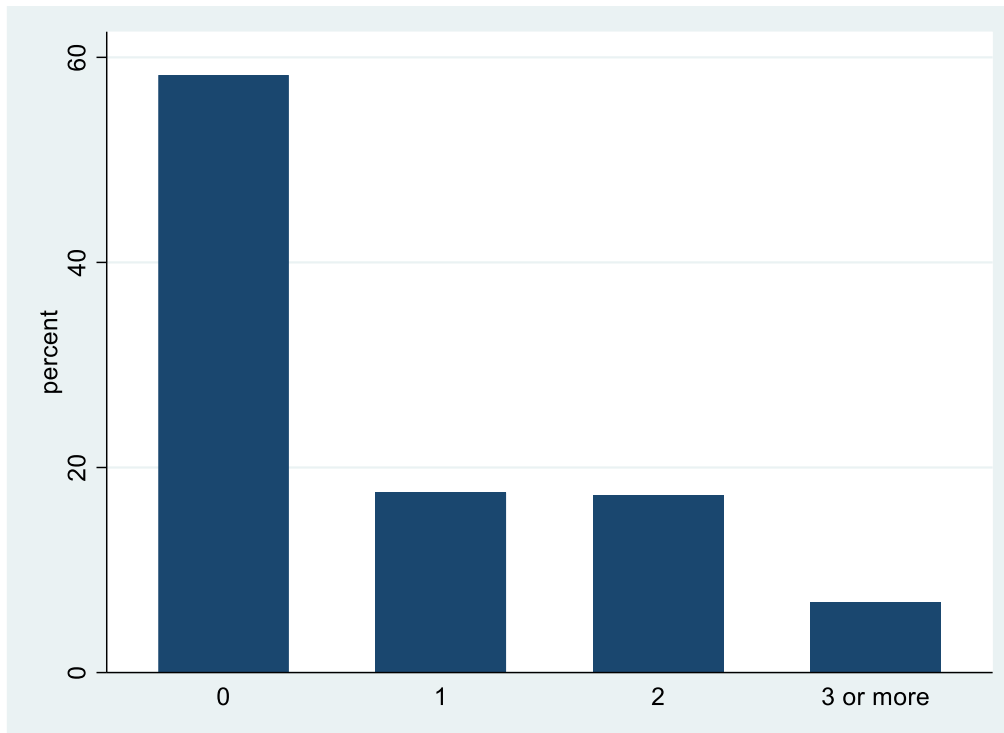
Modified variable: Household net income per month



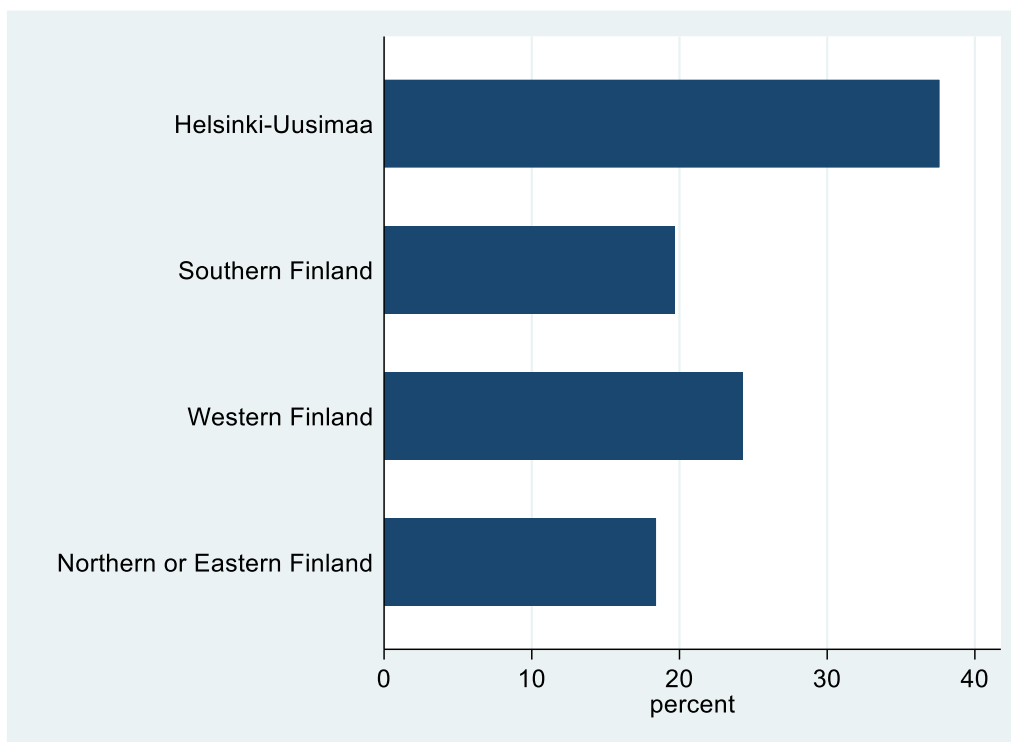
Marital status:



Number of children:

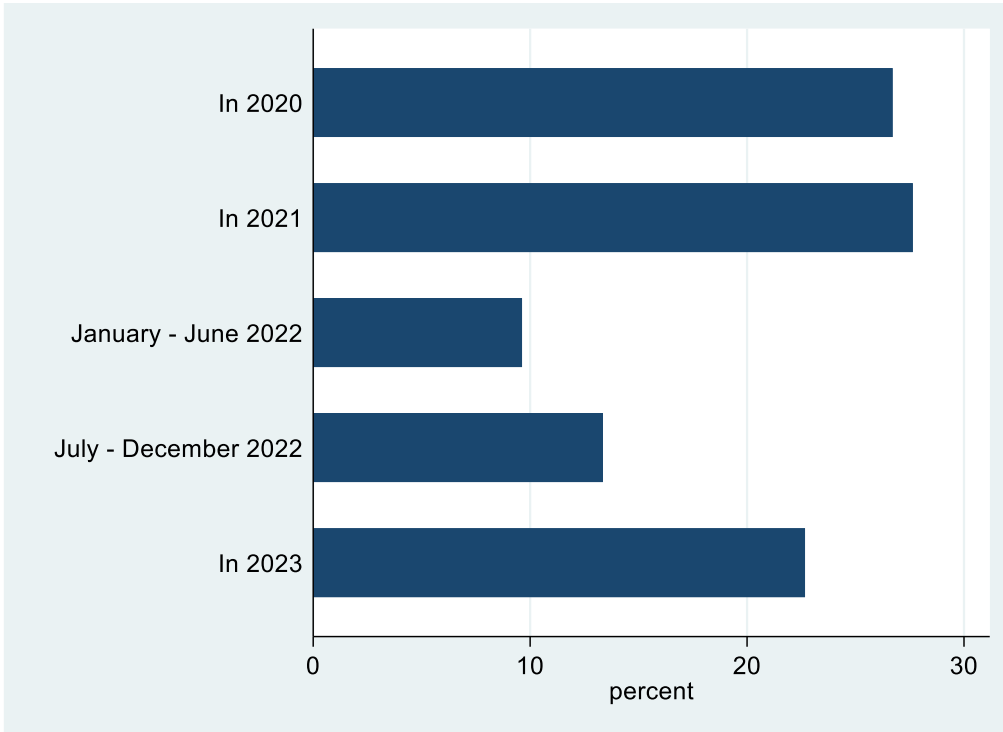


Region:

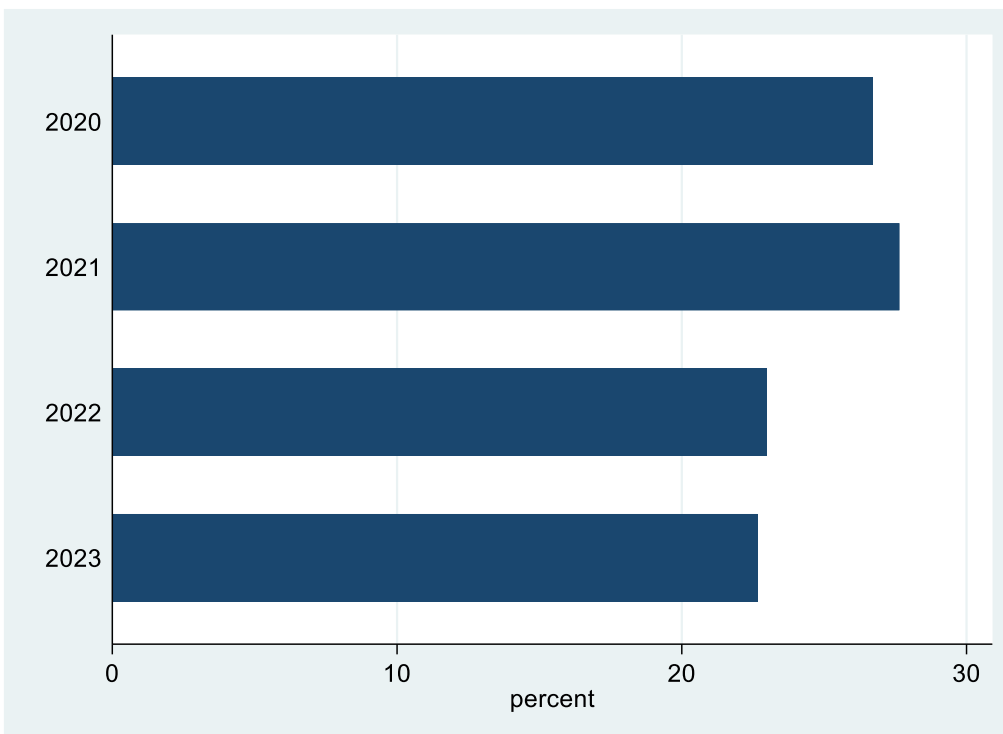


Taken out mortgages:

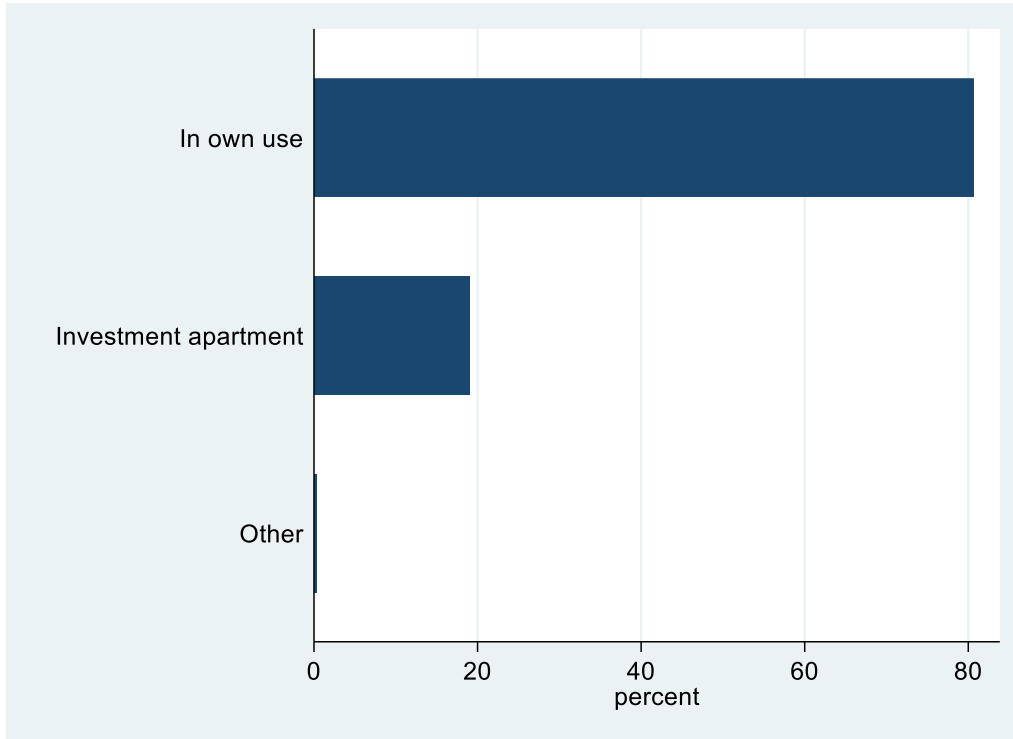
Time frame:



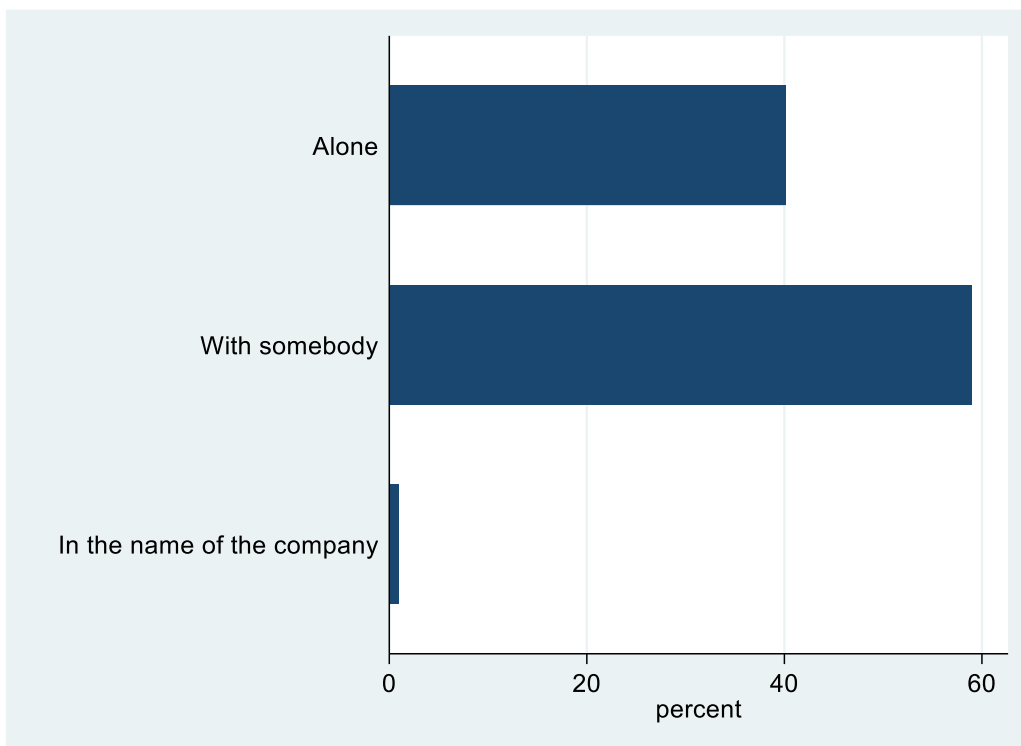
Modified variable: Time frame



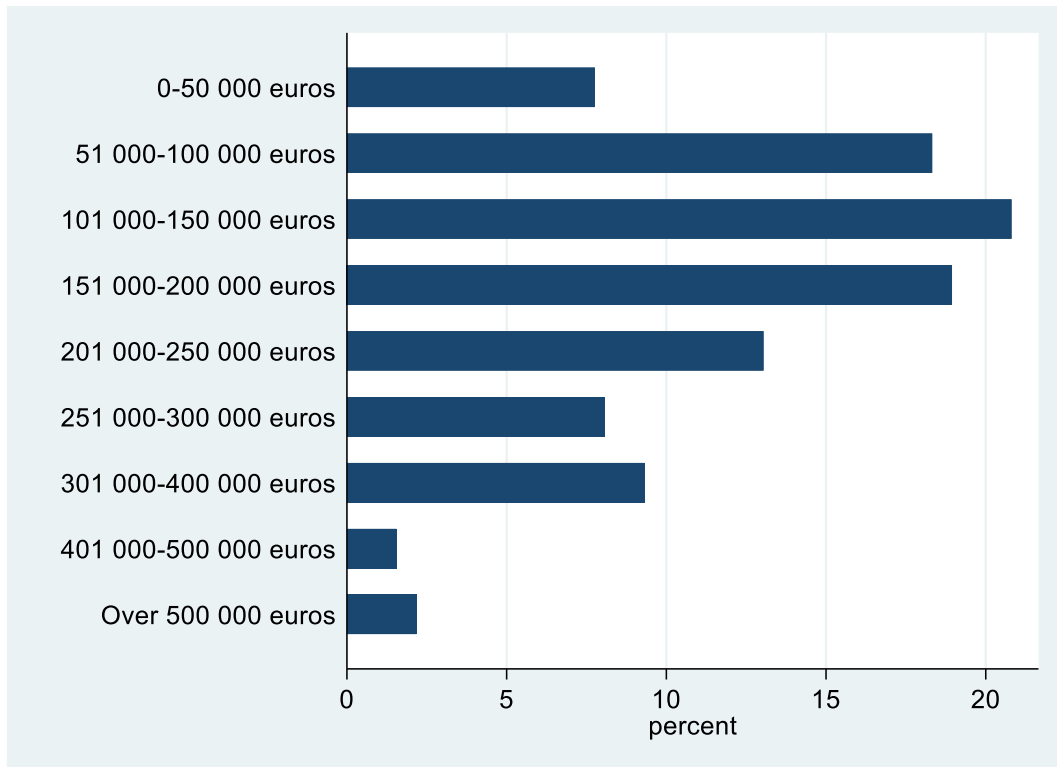
Usage:



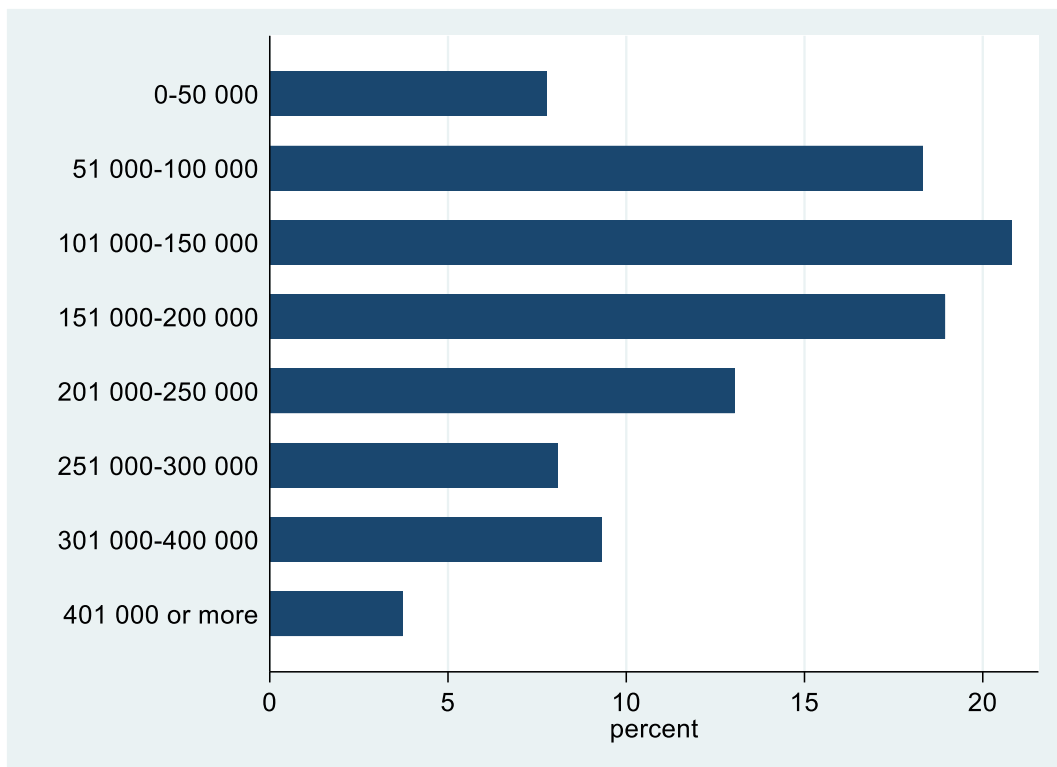
With whom:



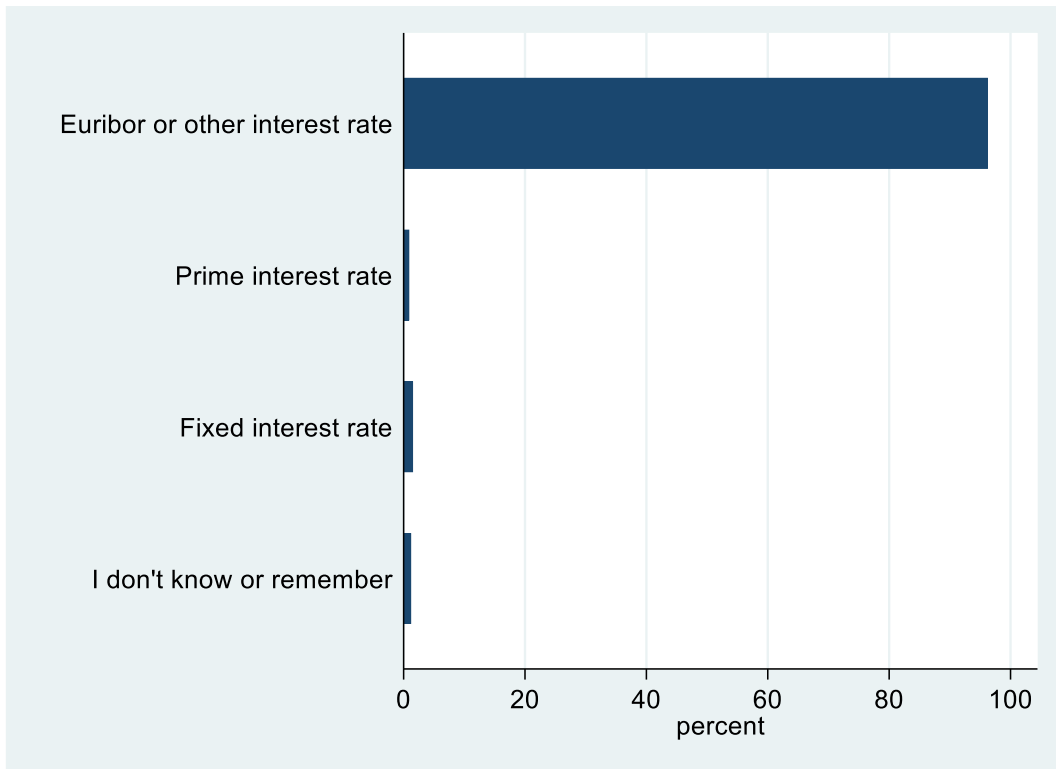
Mortgage size:



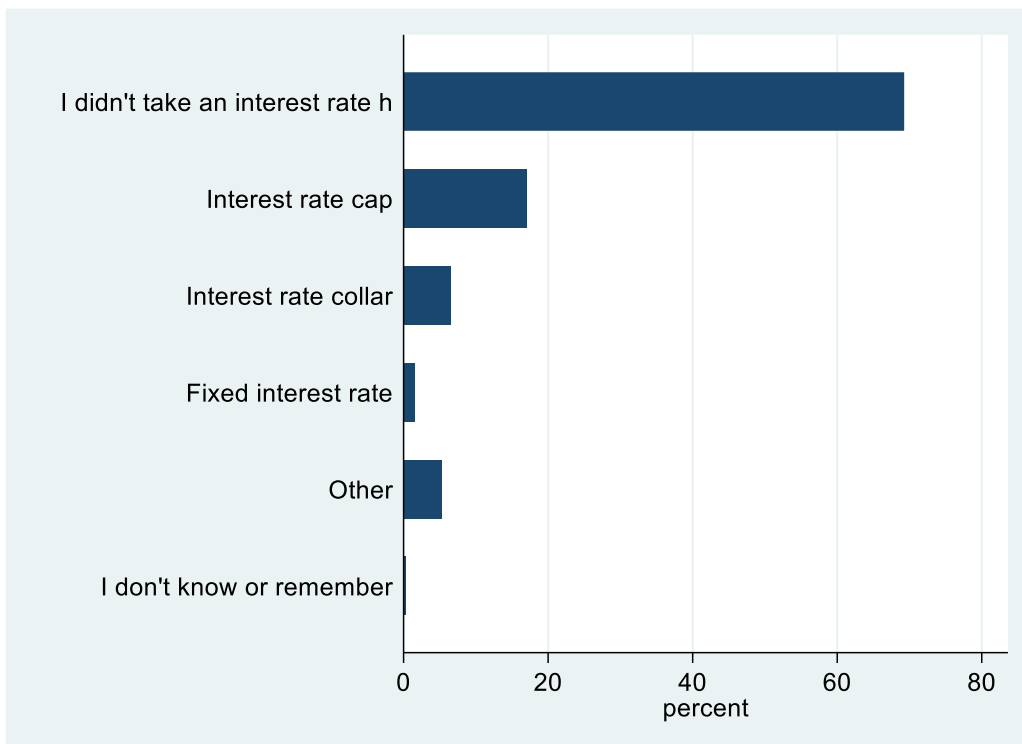
Modified variable: Mortgage size



Reference rate:

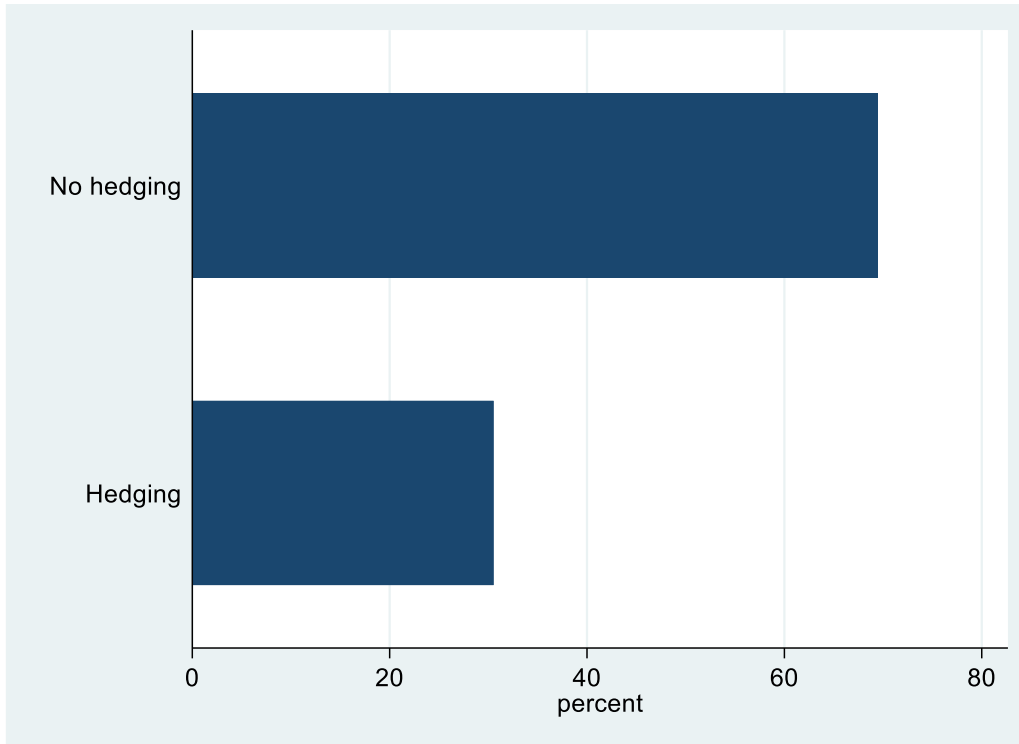


Hedging method:

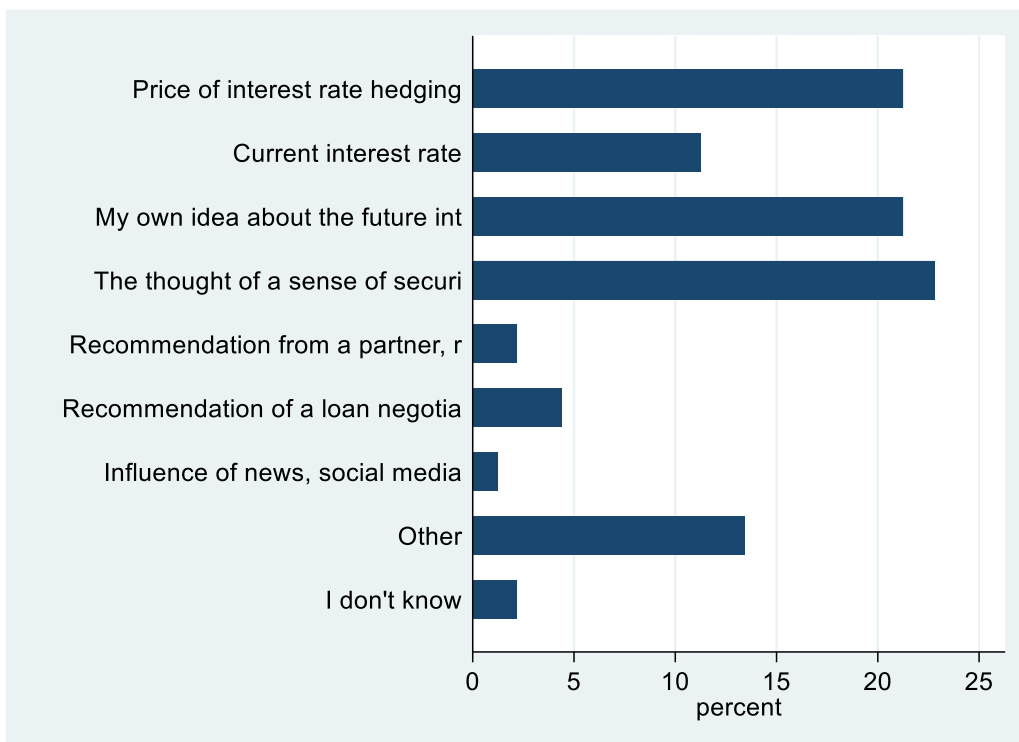




Modified variable: Hedging or not

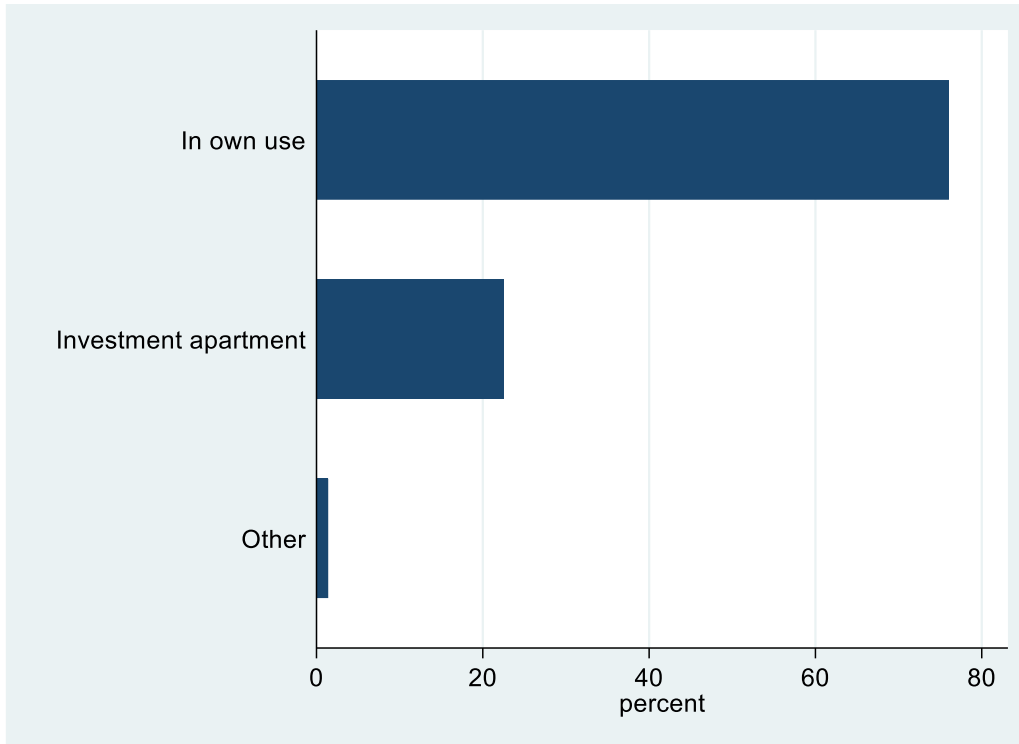


Influenced factor:

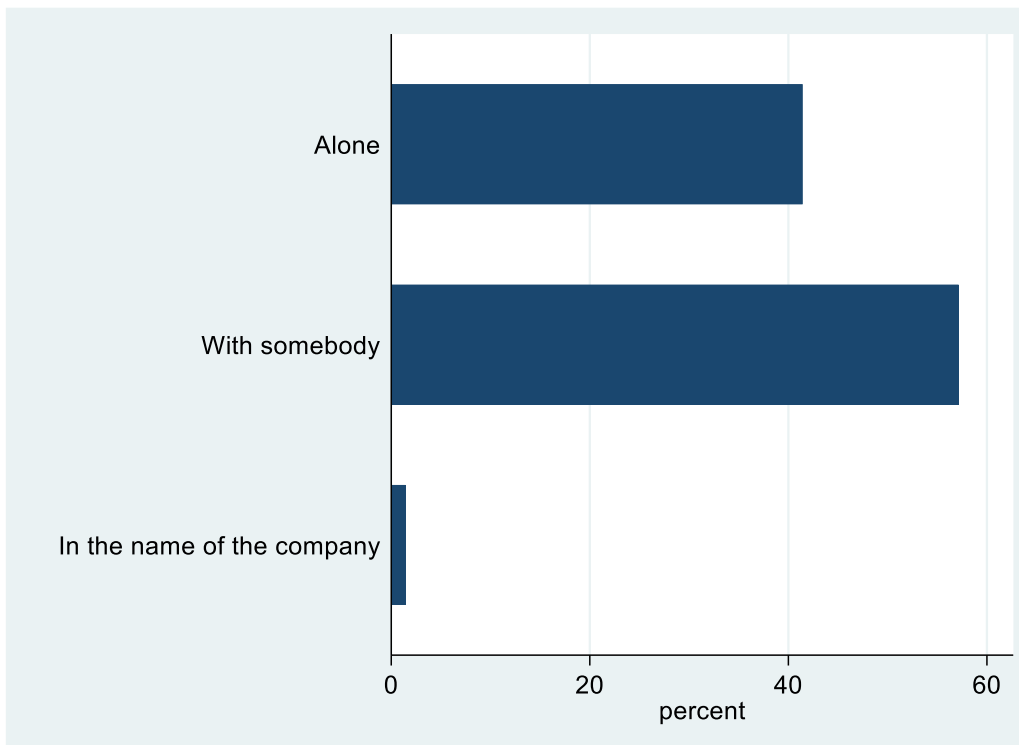


Planned mortgages:

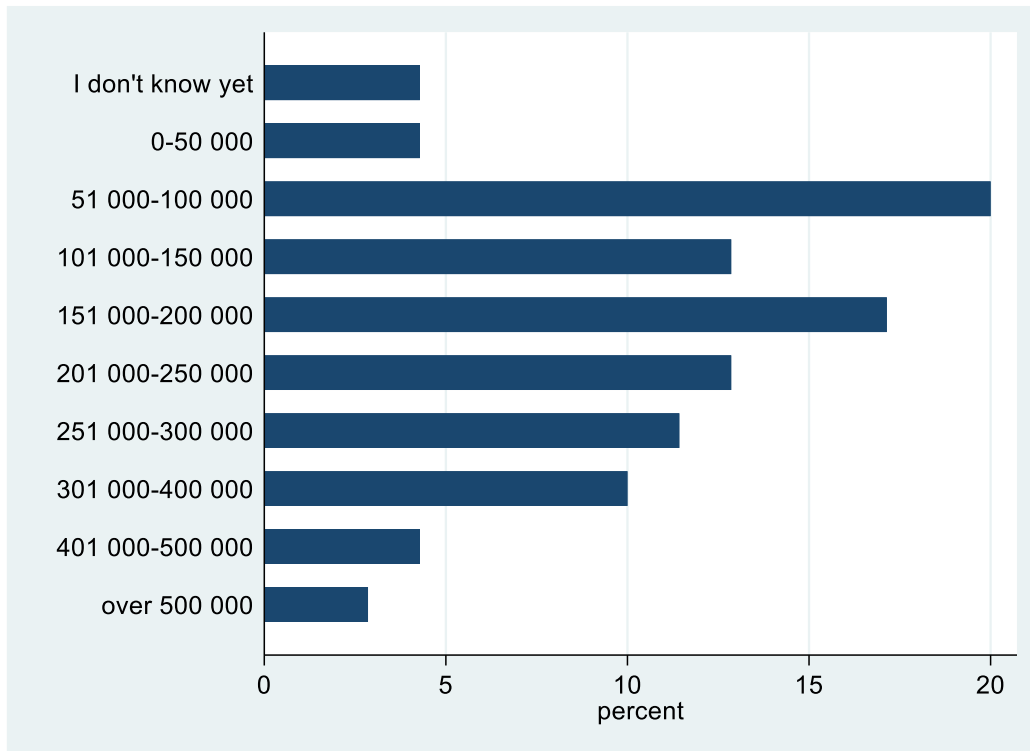
Usage:



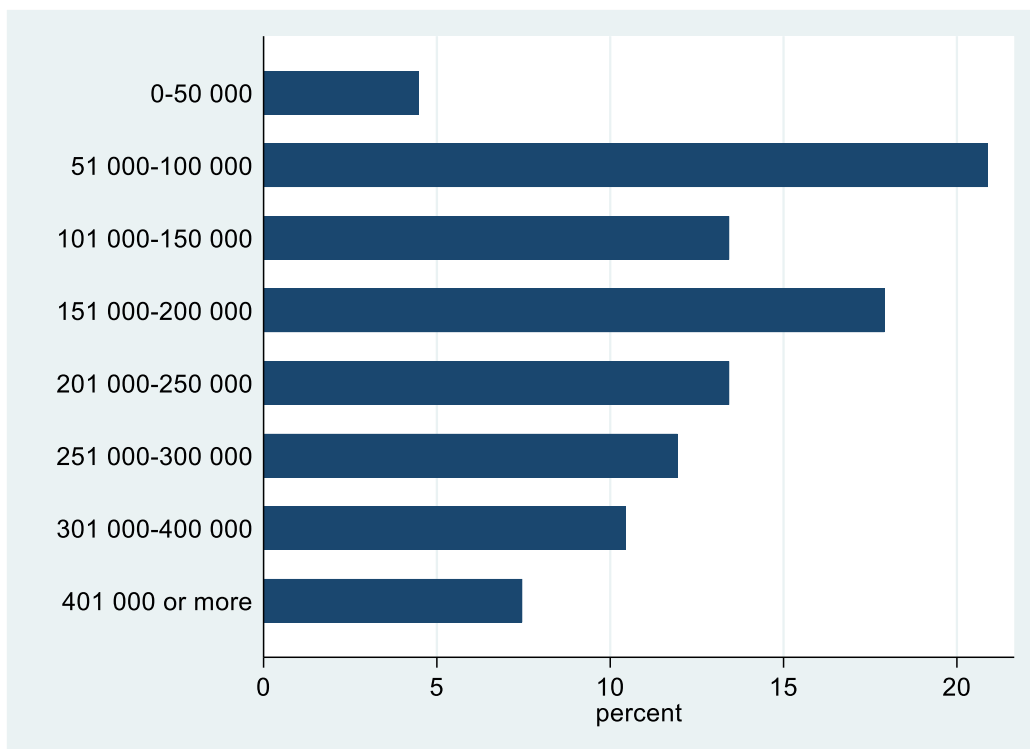
With whom:



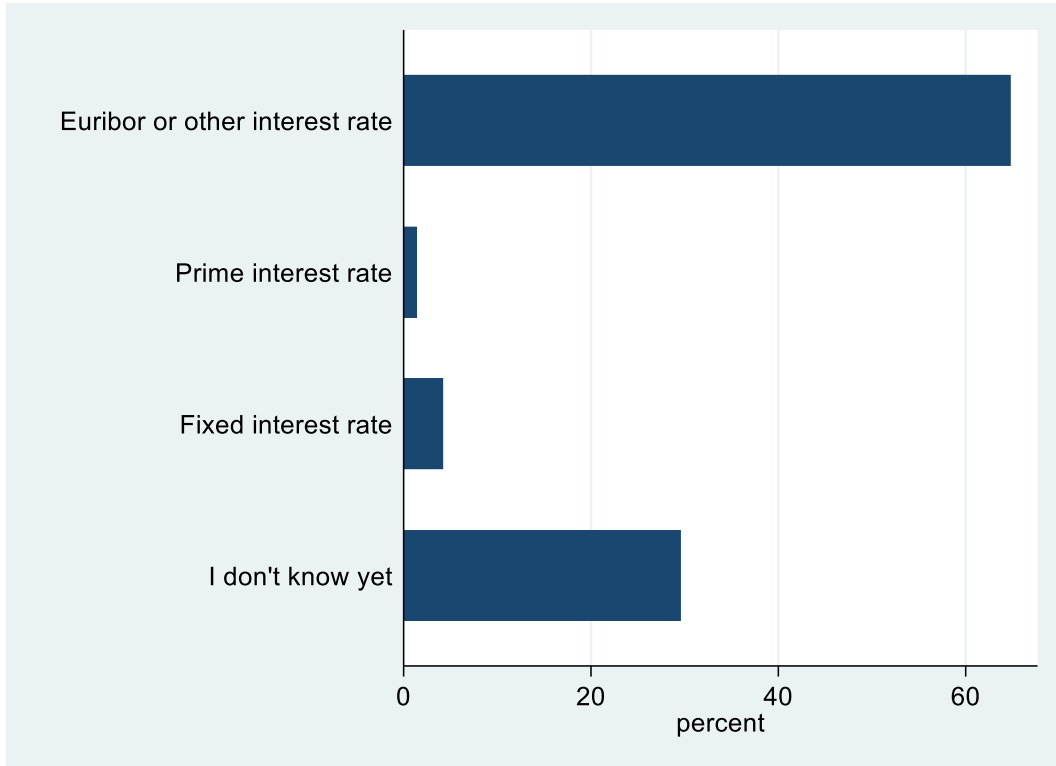
Mortgage size:



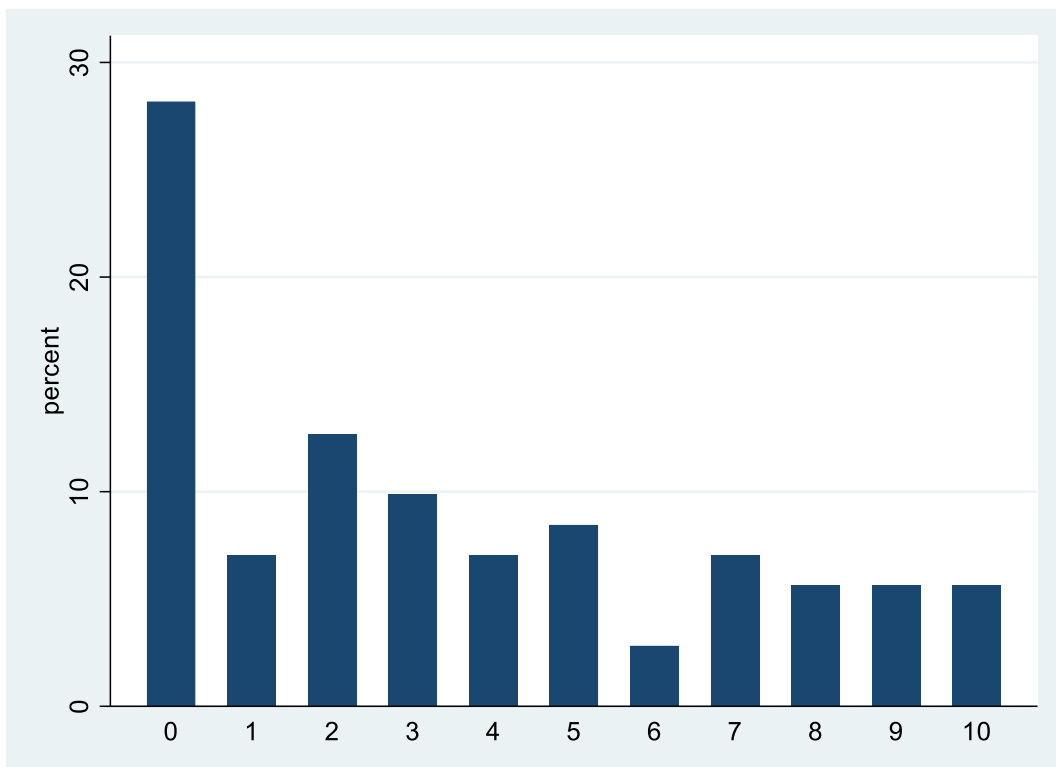
Modified variable: Mortgage size



Reference rate:

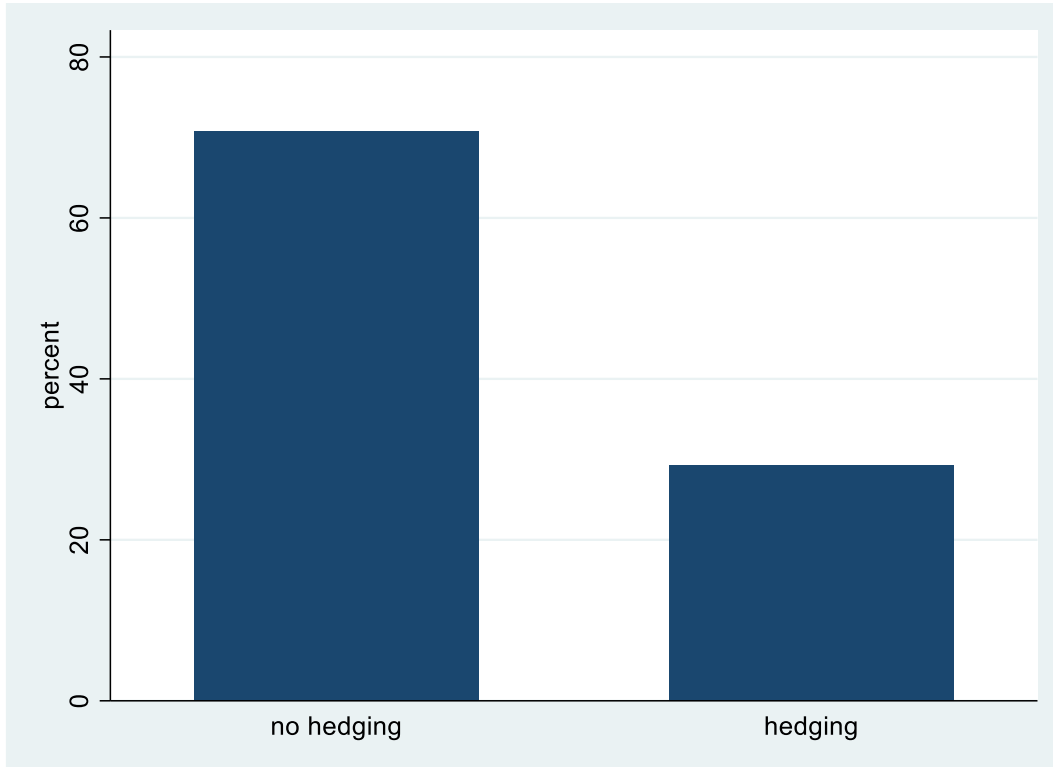


Hedging interest:

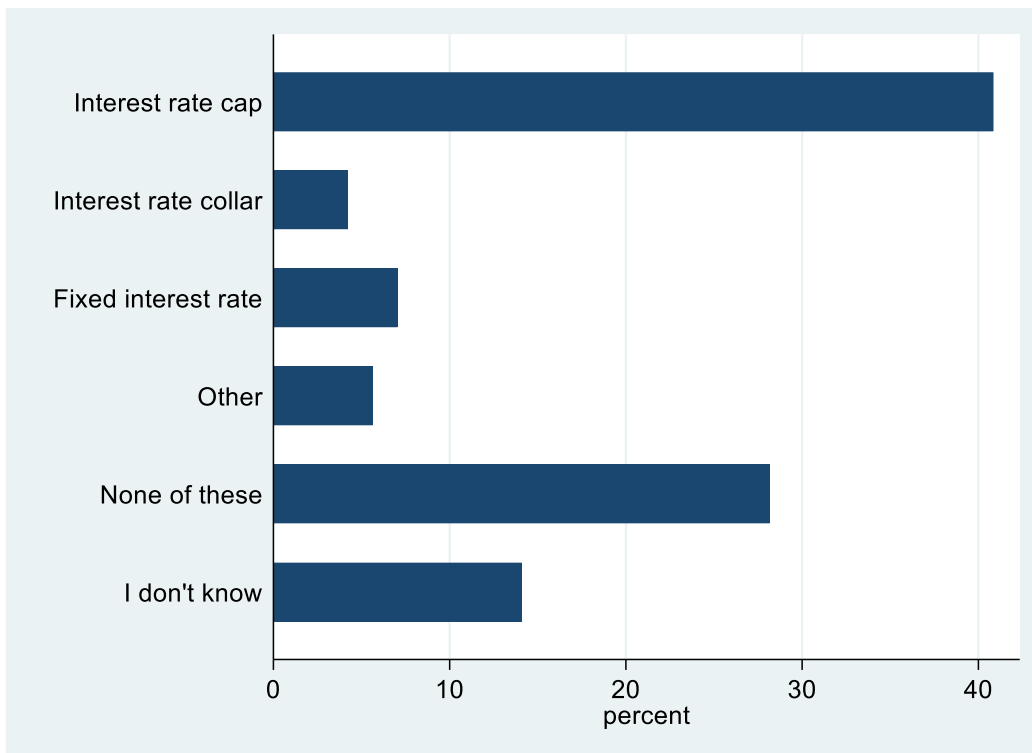




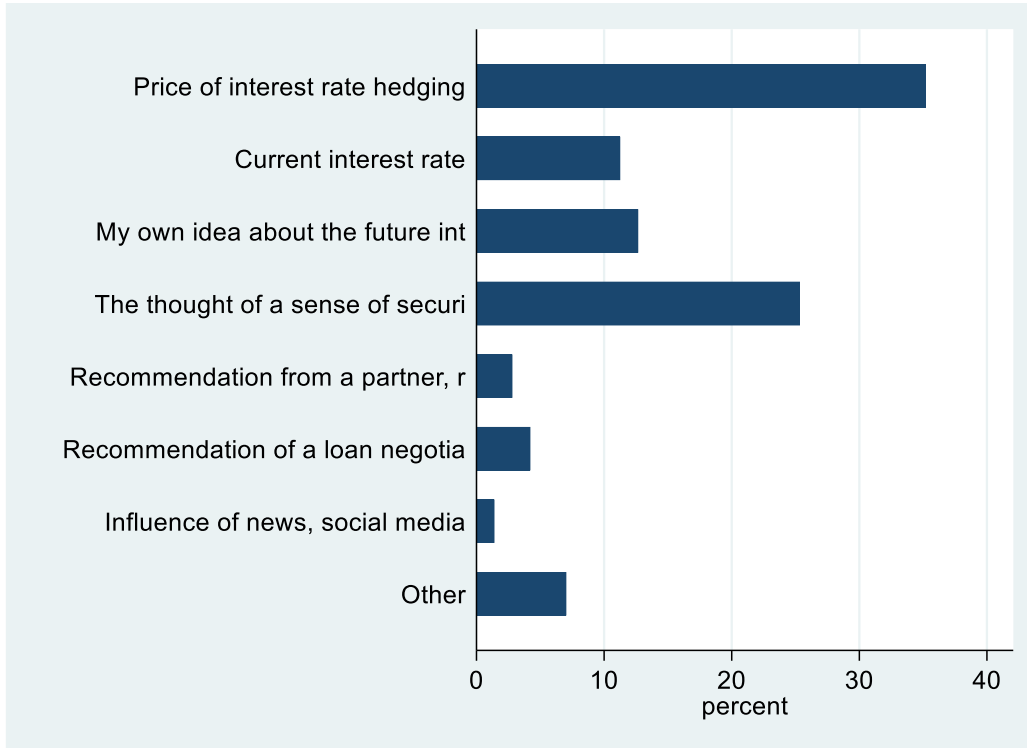
Modified variable: Hedging in the future or not



Hedging method:



Influencing factor:



Appendix 3. All logistic regression models used

The first logistic regression model with all the independent variables: Model 1

Logistic regression Number of obs = 286
 LR chi2(36) = 35.67
 Prob > chi2 = 0.4843
 Log likelihood = -158.69814 Pseudo R2 = 0.1010

hedging_or_not	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
gender						
Woman	1.004385	.3224727	0.01	0.989	.535315	1.884478
age_group2						
31-40	.7357587	.265078	-0.85	0.394	.3631331	1.49075
41-50	.4641601	.2604848	-1.37	0.171	.1545172	1.394308
51 +	.3658973	.2912362	-1.26	0.207	.0768856	1.7413
education2						
Lower university degree	1.134835	.4757131	0.30	0.763	.4990184	2.580769
Master's or doctorate degree	1.073961	.4888823	0.16	0.875	.4400577	2.621003
occupation4						
worker or lower official	1.944783	1.735312	0.75	0.456	.338339	11.17868
higher position	2.530544	2.308153	1.02	0.309	.4234655	15.12202
work_situation2						
part-time work	.4706046	.4093563	-0.87	0.386	.0855533	2.588663
outside of work	.6739226	.4081647	-0.65	0.515	.2056248	2.20874
marital2						
in relationship	1.813547	.9039501	1.19	0.232	.6827364	4.817308
region						
Southern Finland	.9954796	.4300291	-0.01	0.992	.4269026	2.321325
Western Finland	1.287319	.5006014	0.65	0.516	.6007286	2.758634
Northern or Eastern Finland	.6401247	.3097972	-0.92	0.357	.2479213	1.652781
children						
1	.989187	.4304682	-0.02	0.980	.4215585	2.321127
2	2.156951	.9056634	1.83	0.067	.9471894	4.911836
3 or more	1.240812	.910634	0.29	0.769	.2944473	5.228827
househ_net_income2						
2000-2499	.8664991	.8424733	-0.15	0.883	.1288749	5.825967
2500-2499	1.057971	1.017886	0.06	0.953	.1605175	6.973082
3000-4999	.5710869	.5313881	-0.60	0.547	.0921874	3.537798
5000-7499	.49472	.4900454	-0.71	0.477	.0709906	3.447609
7500-10 000	.2144542	.2487742	-1.33	0.184	.0220755	2.083328
over 10 000	.0994968	.2101618	-1.09	0.275	.0015844	6.248227
time_frame2						
2021	.8249766	.3026718	-0.52	0.600	.401928	1.693304
2022	.4751218	.1932365	-1.83	0.067	.2140984	1.054379
2023	.2864751	.1270942	-2.82	0.005	.120075	.6834723
usage2						
investment apartment	1.031564	.5228262	0.06	0.951	.382017	2.785541
with_whom						
With somebody	.8290485	.3595467	-0.43	0.666	.3543446	1.939698
In the name of the company	12.50846	25.76429	1.23	0.220	.2207711	708.7049
mortgage_size2						
51 000-100 000	2.183294	1.671893	1.02	0.308	.4867332	9.793402
101 000-150 000	2.158031	1.644408	1.01	0.313	.4846704	9.608791
151 000-200 000	2.110107	1.671341	0.94	0.346	.4467844	9.965775
201 000-250 000	2.063383	1.7538	0.85	0.394	.3900225	10.91616
251 000-300 000	1.820357	1.708446	0.64	0.523	.2892576	11.45588
301 000-400 000	3.552006	3.219462	1.40	0.162	.6011225	20.98865
401 000 or more	3.871562	4.28571	1.22	0.221	.4422115	33.89552
cons	.2288178	.3070389	-1.10	0.272	.0164932	3.174488

The second logistic regression model with hypothesized variables: Model 2

Logistic regression

Number of obs = 292

LR chi2(23) = 26.15

Prob > chi2 = 0.2939

Pseudo R2 = 0.0725

Log likelihood = -167.28522

hedging_or_not	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
education2						
Lower university degree	1.225431	.487453	0.51	0.609	.5619491	2.672271
Master's or doctorate degree	1.022807	.4476309	0.05	0.959	.433776	2.41169
occupation4						
worker or lower official	2.473559	1.767978	1.27	0.205	.6094322	10.03967
higher position	3.036909	2.226434	1.52	0.130	.7217626	12.77818
househ_net_income2						
2000-2499	1.117446	.995998	0.12	0.901	.1947764	6.410864
2500-2499	1.425443	1.233556	0.41	0.682	.2614168	7.772596
3000-4999	.9106887	.7240372	-0.12	0.906	.1917024	4.326257
5000-7499	.8276056	.671036	-0.23	0.815	.1689101	4.055005
7500-10 000	.3456954	.3412516	-1.08	0.282	.0499383	2.393058
over 10 000	.2704641	.3845878	-0.92	0.358	.0166625	4.390158
mortgage_size2						
51 000-100 000	2.142627	1.535763	1.06	0.288	.5258161	8.730908
101 000-150 000	2.514059	1.751061	1.32	0.186	.6419587	9.845635
151 000-200 000	2.519794	1.780989	1.31	0.191	.6305743	10.06917
201 000-250 000	2.101881	1.566795	1.00	0.319	.4876419	9.059729
251 000-300 000	2.255277	1.848563	0.99	0.321	.45238	11.24337
301 000-400 000	4.054108	3.191066	1.78	0.075	.8667588	18.96236
401 000 or more	6.357368	6.148374	1.91	0.056	.9551214	42.31518
children						
1	.8349313	.315322	-0.48	0.633	.398276	1.75032
2	1.678229	.5877903	1.48	0.139	.8447391	3.334109
3 or more	1.126812	.690936	0.19	0.846	.3387766	3.747911
time_frame2						
2021	.8824524	.3086566	-0.36	0.721	.4445958	1.751528
2022	.5031554	.1961832	-1.76	0.078	.2343224	1.080415
2023	.3702792	.1534125	-2.40	0.016	.1643854	.8340565
_cons	.104024	.1147647	-2.05	0.040	.0119686	.9041149

The third logistic regression model with hypothesized variables, excluding education level:
Model 3

Logistic regression

Number of obs = 292

LR chi2(21) = 25.71

Prob > chi2 = 0.2178

Log likelihood = -167.50516

Pseudo R2 = 0.0713

hedging_or_not	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
occupation4						
worker or lower official	2.443502	1.737311	1.26	0.209	.6064779	9.844877
higher position	2.875388	2.08232	1.46	0.145	.6954514	11.88847
househ_net_income2						
2000-2499	1.134709	1.002492	0.14	0.886	.2008473	6.410668
2500-2499	1.408044	1.21176	0.40	0.691	.2606597	7.606041
3000-4999	.9383977	.7343625	-0.08	0.935	.1780757	4.35023
5000-7499	.8455079	.6719879	-0.21	0.833	.1780757	4.014493
7500-10 000	.352994	.3418546	-1.08	0.282	.0528965	2.355633
over 10 000	.2667326	.3721817	-0.95	0.344	.0173127	4.109496
mortgage_size2						
51 000-100 000	2.202603	1.575469	1.10	0.270	.5421162	8.949117
101 000-150 000	2.554671	1.774747	1.35	0.177	.6546358	9.969428
151 000-200 000	2.595878	1.830344	1.35	0.176	.6517863	10.33864
201 000-250 000	2.126837	1.581285	1.01	0.310	.4953057	9.132613
251 000-300 000	2.247584	1.836684	0.99	0.322	.4530328	11.1507
301 000-400 000	4.025189	3.171634	1.77	0.077	.8591812	18.85766
401 000 or more	5.95702	5.713326	1.86	0.063	.9091783	39.03094
children						
1	.8324635	.3139375	-0.49	0.627	.3975221	1.743288
2	1.69714	.5929189	1.51	0.130	.855734	3.365863
3 or more	1.144263	.6997874	0.22	0.826	.3451146	3.79392
time_frame2						
2021	.8945285	.3100387	-0.32	0.748	.4534948	1.764477
2022	.5091122	.1980552	-1.74	0.083	.2375081	1.091311
2023	.3829678	.1561396	-2.35	0.019	.1722342	.8515401
_cons	.1131157	.1236868	-1.99	0.046	.013267	.9644334

The logistic regression model for planned mortgages with hypothesized variables, excluding education level and time frame:

Logistic regression

Number of obs = 48

LR chi2(15) = 15.26

Prob > chi2 = 0.4328

Pseudo R2 = 0.2559

Log likelihood = -22.181868

future_hedging_or_not	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
occupation4						
worker or lower official	3.458752	6.162854	0.70	0.486	.1052534	113.6587
higher position	1.511713	2.788524	0.22	0.823	.0406755	56.18314
househ_net_income2						
2000-2499	1	(empty)				
2500-2499	.0564369	.1285418	-1.26	0.207	.0006499	4.900912
3000-4999	.4391158	.8771881	-0.41	0.680	.0087538	22.02721
5000-7499	.4213724	.8718238	-0.42	0.676	.0073033	24.31144
7500-10 000	3.39e+08	1.39e+12	0.00	0.996	0	.
over 10 000	.2537402	.6331708	-0.55	0.583	.001907	33.76255
future_mort_size						
0-50 000	1	(empty)				
51 000-100 000	4.978659	10.31184	0.77	0.438	.0859204	288.4886
101 000-150 000	9.328312	21.84406	0.95	0.340	.0947433	918.4546
151 000-200 000	7.802558	16.90685	0.95	0.343	.1116411	545.3178
201 000-250 000	22.20217	44.71278	1.54	0.124	.4287134	1149.804
251 000-300 000	1.24769	2.710008	0.10	0.919	.0176717	88.09145
301 000-400 000	.7693893	1.482748	-0.14	0.892	.0176089	33.6171
401 000 or more	1	(omitted)				
children						
1	1	(empty)				
2	6.3148	7.965896	1.46	0.144	.5328428	74.83765
3 or more	6.12e-08	.0002504	-0.00	0.997	0	.
_cons	.068907	.1951968	-0.94	0.345	.0002673	17.7627