

**ERASMUS UNIVERSITY ROTTERDAM  
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## **Investigating the financial effects of the coronavirus pandemic on the self-employed in the Netherlands**

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## **PREFACE AND ACKNOWLEDGEMENTS**

This research paper came into existence as there was no research yet on the broad financial impact of self-employed when looking at the COVID-19 pandemic. The paper tries to explain the effect of the coronavirus pandemic years on the self-employed when comparing them to regular employees. This was done by first looking at the proportions of self-employed. Furthermore, I looked at their savings, financial assets, and net wealth. I would like to express gratitude towards my thesis supervisor Roy Kouwenberg, for his guidance these past few months. Finally, I want to express gratitude towards my family and friends for their support throughout this thesis.

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

## **ABSTRACT**

This research paper investigates the impact of COVID-19 on the savings and financial wealth of the self-employed in the Netherlands. Contrary to initial expectations, the self-employed did not experience substantial negative impacts. The proportion of self-employed stayed stable comparing pre-pandemic to pandemic years. The financial outcomes of the self-employed were not worse than those of regular employees, and even showed non-significant results towards greater financial improvement with an increase in savings and wealth. Great variability within both groups suggests multiple influencing factors.

Regression analysis shows gross income as the most crucial factor for explaining changes in the financial situation. Marital status also played a significant role in half of the tests. The self-employment status had a significant positive effect of 17034 euro on net wealth only when holding socio-demographic variables constant. Other socio-demographic variables, like age, gender and education level were not significant in affecting the financial situation. Overall, during the Covid-19 pandemic the average Dutch employees' financial situation improved as savings and wealth went up. The self-employed were not worse off than other employees on average, which shows the limited impact of COVID-19 on the financial situation of self-employed.

**Keywords:** COVID-19, Self-employment, Financial impact

**JEL Classification:** D14, J21, J23, J24

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## **CHAPTER 1 Introduction**

The Coronavirus Disease of 2019 pandemic or COVID-19 pandemic has had big effects on the entire world and its economies. These effects are there for regular employees, but for the self-employed as well. In this paper we will look at the effect of the COVID-19 pandemic on the self-employed with various hypotheses. We will look at data from the Netherlands as in the Netherlands self-employment is something which is quite common, and data is available via a yearly extensive survey. This paper aims to investigate multiple facets of the impact of the COVID-19 pandemic on the self-employed.

First, we will investigate if the COVID-19 pandemic led to a decrease in self-employment. In this way we try to understand how the crisis impacted individuals' employment decisions.

Furthermore, this paper investigates if the self-employed are saving more than regular employees in a crisis like the COVID-19 pandemic. Despite the importance of savings to use in case of tough times, we see that due to higher risk appetite normally the self-employed do not save more than regular employees. This research paper aims to see whether these turbulent coronavirus pandemic times changed the self-employed saving patterns.

Lastly, we will look at the overall wealth of self-employed compared to regular employees in the COVID-19 pandemic. With this information we can look at the difference in impact of a crisis like the COVID-19 pandemic on two distinct categories of employment.

### **Research Question**

The central research question guiding this study is:

"How did the coronavirus pandemic impact the self-employed and their savings in the Netherlands?"

## **CHAPTER 2 Theoretical Framework**

### **2.1 COVID-19**

The main research period of this paper is the coronavirus pandemic and the years preceding it. The coronavirus pandemic started at the end of 2019 in the city of Wuhan in the People's Republic of China. The severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 quickly spread across the world. The symptoms of the Corona virus that were most common were cold symptoms, coughing, shortness of breath and elevation or fever (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023). Another common symptom was the sudden loss of taste and/or smell. Less common complaints included symptoms like headaches, muscle pain, fatigue, or dizziness for instance (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023).

At the start of 2020, the coronavirus pandemic also reached the Netherlands and soon many people were infected. To combat the virus, the Dutch government started with an intelligent lockdown and testing for the virus. This intelligent lockdown meant that a lot of venues were closed. Examples would be schools or offices, but this also meant that bars and other parts of the hospitality industry closed. Furthermore, The Dutch government made testing for the SARS-CoV-2 virus available. If someone tested positive, they should self-quarantine for multiple days to restrict the virus from spreading even further.

In 2021 a new set of restrictions to combat the spread of the SARS-CoV-2 virus was announced (Ministerie van Algemene Zaken, 2024). At the start of 2021, the Dutch government started to vaccinate the entire population with, of course, the weak and risky groups first. Furthermore, a curfew was introduced. This meant not being able to be on the street between 21:00 at night and 04:30 in the morning.

At the end of 2021 and the start of 2022, the Netherlands slowly opened back up again after the harsh and long lockdowns. First with Corona entrance tickets, which meant testing for Corona before entering hospitality establishments like restaurants or cinemas. In this way normal life could start again. 2023 marked the end of economic effect of the coronavirus pandemic

(Sarker et al., 2023). For this reason, the years 2020-2022 were taken as coronavirus pandemic years in the empirical study.

## ***2.2 Financial decision-making in COVID-19***

In all the countries around the world countermeasures for the coronavirus pandemic were implemented by governments leading to people getting increasingly restricted in their daily lives. Curfews and intelligent lockdowns were imposed on the entire world. These restrictions of course also influenced the economy and the whole outlook of the population on the economy in its respective country. It changed people's outlook on the economy as they lost confidence in it when COVID-19 hit. Adding to this increasingly reduced confidence was the reduced labour supply from companies to employees (Von Gaudecker et al., 2020). The reduction of confidence in the economy led to people becoming more risk averse leading to less investments (Yue et al., 2020). Furthermore, having someone, like a family member, friend, or acquaintance, in the same village or community infected with the COVID-19 disease caused a decrease in the total investment amount of around 9% due to a reduced confidence in the economy (Yue et al., 2020).

More people becoming risk-averse and consuming less leads to saving more. years of the coronavirus pandemic we see that the entire population, on average, (Jin et al., 2021). COVID-19 years people saved more of which a big part was involuntary (Neuteboom & Economisch Bureau, 2021). This makes sense as due to the pandemic a lot of restrictions were imposed. An example would be the 'going out' restrictions like closed restaurants, entertainment venues (cinemas, etc.), and nightlife.

Although not all the savings were voluntary, the fact that, on average, the people in the Netherlands could be deemed useful as around 60% of households in the COVID-19 period in the Netherlands had a financially unhealthy or vulnerable position (Deloitte, 2023). A part of this financially unhealthy or vulnerable financial position stems from the fact that people with median wealth on average have a small consumption gap, the gap between actual and available spending, of only 8% (Browning et al., 2016). With a crisis this consumption gap is at risk of becoming even smaller leading to more financial distress when the available spending falls below the actual spending. 'Cash is king' is a standard expression when looking at bankers in a crisis

(Van Dalen & Henkens, 2020). As a countermeasure to this possibility of increased financial distress people and firms should look at building up more financial and human buffers for these kind of crisis (Van Dalen & Henkens, 2020).

### **2.3 Self-employed**

The main research sample of this paper is the population, and more specifically the working population, in the Netherlands. In the Netherlands, the unemployment rates are low, even just after the coronavirus pandemic in 2024, at 3.7% of the working population (Centraal Bureau voor de Statistiek, n.d.). The Dutch government uses the life expectancy to calculate the retirement age (Centraal Bureau voor de Statistiek, 2023). As this life expectancy is increasing, except for the COVID-19 period (Centraal Bureau voor de Statistiek, 2023), the retirement age is increasing as well. Combined with the low unemployment rates of 3.7%, this means that the working population is a large part of the whole Dutch population. The working population refers to all the people in the Netherlands between the age of 15 and 75 that are capable of working (Centraal Bureau voor de Statistiek, n.d.-b). Out of the 9.8 million paid employees (Centraal Bureau voor de Statistiek, n.d.-b) the large majority is normally employed, which means they work for a boss and are not self-employed. However, the last 20 years a new type of employee is on the rise, namely the self-employed without personnel or ZZP'er in Dutch (Centraal Bureau voor de Statistiek, n.d.-a). When adding the self-employed without personnel to the self-employed with personnel, it brings the total amount of self-employed in the Netherlands to around 1.5 million which is approximately 15% of the paid employees (Centraal Bureau voor de Statistiek, n.d.-a).

Some research has been done on why people become self-employed. One of the strong reasons to become self-employed is the employment status of the father. If the father of a child is self-employed, they are significantly more likely to become self-employed themselves as well (De Wit & Van Winden, 1989). Furthermore, self-employed are often overly optimistic, which can be seen in their expectations of their business (Cassar, 2009). For instance, they overestimate how many employees they will have in the first year and how much they will sell in the first year as well (Cassar, 2009). Additionally, risk tolerance is higher for the self-employed as the decision to become and stay self-employed tends to involve higher risk and uncertainty compared to

regular employment (Caliendo et al., 2013). What is also interesting is that employee earnings are more responsive to typical human capital like education and experience than the earnings of self-employed people (De Wit & Van Winden, 1989).

When studying literature about the savings of self-employed we can see interesting findings. There is no significant difference in the financial knowledge between self-employed and employed individuals (Rostamkalei et al., 2019). Furthermore, the self-employed individuals have similar levels of confidence in their retirement wealth compared to regular employees (Rostamkalei et al., 2019). However, self-employed save on average less than regular employees for retirement (Knoef et al., 2017). Although the self-employed do find it important to save for retirement they, on average, do not save significantly more than the rest of the working population in normal circumstances (Mastrogiacomo & Alessie, 2015). They save less in the first and second pillar and end up with a lower net pension (Goudswaard et al., 2017). Consequently, this means that the income replacement rate in retirement for self-employed is also lower on average for regular employees (Knoef et al., 2017). Partly by these arguments the Netherlands desires to help improve the pensions for the self-employed (Goudswaard et al., 2017). This can be seen in the new law which was accepted in 2023. This law improves the yearly tax-free pension savings limit and increases the speed at which self-employed can catch up their unused pension allowance for the previous years (Simaela, 2024).

#### ***2.4 Self-employed in COVID-19***

The purpose of this research is to investigate the impact of the coronavirus pandemic on the Dutch self-employed. Damman & Kraaykamp found that 25% of the Dutch self-employed without personnel saved less because of the coronavirus pandemic. The self-employed tend to face greater risks as well as they have less access to social safety nets. For instance, they do not get paid when sick and they must construct their retirement portfolio themselves. Another example would be that they see increased likelihood of income losses in a crisis in Germany (Graeber et al., 2021) and in the United States of America as well (Kalenkoski & Pabilonia, 2021). In the Netherlands the government provided some support which helped to protect the income (Zimpelmann et al., 2021), but self-employed were still more financially vulnerable (Van Ophem,

2020). In the Netherlands 25% of the self-employed do not even have retirement savings, which implies that they have an elevated risk appetite (Centraal Bureau voor de Statistiek, 2017). Self-employed also hold riskier portfolios as they are known to have not so well-diversified portfolios (Hubbard and Gentry, 2004). Furthermore, risk tolerance is higher for the self-employed as the decision to become and stay self-employed is influenced by it (Caliendo et al., 2013). What happens with the savings and financial wealth of the self-employed in a crisis like the COVID-19 pandemic will be examined in this paper.

The coronavirus pandemic started in 2020 and ended in 2022 in the Netherlands (Ministerie van Algemene Zaken, 2024). To compare these years to a regular period, we look at 3 years before the coronavirus crisis as well, so from 2017 to 2019. We will compare the change in self-employment from 2020 to 2022 compared to years before the coronavirus crisis, 2017 to 2019, to see what the effect was of the coronavirus pandemic on the self-employment rates in the Netherlands. In this way this paper will add to the growing literature on self-employment. It is expected that the self-employed returned more to regular employment to reduce their risk exposure during the coronavirus pandemic.

Furthermore, while self-employed do find it important to save for retirement, research finds that they do not save significantly more than the rest of the working population (Mastrogiacomo & Alessie, 2015) in normal circumstances. They save less in the first and second pillar and end up with a lower net pension (Goudswaard et al., 2017). This again shows their elevated risk appetite, as their job is riskier compared to regular employees. Furthermore, when self-employed are in a crisis they experience more financial distress (Wolfe & Patel, 2021) and self-employed are also more affected by a crisis (Von Gaudecker et al., 2020). This would logically mean that to compensate for that riskiness that self-employed will save more in a crisis like the COVID-19 pandemic. When looking at the coronavirus pandemic we can see that for the whole population everyone increased their savings (Jin et al., 2021), but more than half of the self-employed in the Netherlands did not save more in the Covid-19 pandemic according to Damman & Kraaykamp (2022). As the self-employed are more risk seeking, I expect to find that they do not save more than regular employees in times of a crisis like the COVID-19 pandemic. As this comparison between self-employed and regular employees has not been investigated yet,

Damman en Kraaykamp (2022) only look at self-employed, this is another contribution to the growing literature on self-employment. Furthermore, as the data of the DNB Household Survey is more complete than the data of Damman en Kraaykamp (2022), this paper is also able to look not only at liquid savings, but also at other financial assets. This is another contribution which will be investigated with a sub hypothesis in this paper.

Lastly, in a crisis the wealth of a household usually goes down (Banks et al., 2013). However, ABN AMRO found that during the coronavirus pandemic people saved more of which a big part was involuntary (Neuteboom & Economisch Bureau, 2021). This is logical as a lot of restrictions were imposed due to the pandemic. An example would be the 'going out' restrictions like closed restaurants, entertainment venues (cinemas, etc.), and nightlife. However, for more than half of the self-employed there was no change in the savings amount (Damman & Kraaykamp, 2022). As self-employment is riskier than working for a company, it is expected that the income of the self-employed was hit harder, especially with the pandemic restrictions in place (P & Conen, 2021). Graeber et al. (2021) do find these effects in the Covid-19 pandemic in Germany and Kalenkoski & Pabilonia (2021) find these effects in the Covid-19 pandemic in the United States of America. However, in the Netherlands the government support seemed have helped to reduce these effects (Zimpelmann et al., 2021). Still when looking at the literature, it is expected that overall wealth of self-employed went down in the pandemic more than the overall wealth of regular employees in the Netherlands. The DNB Household Survey gives the opportunity to look at financial assets instead of only looking at savings, like the research by Damman & Kraaykamp (2022). We will contribute to the literature by making this comparison between the amount of wealth from the self-employed and the regular employees in the COVID-19 pandemic.

Furthermore, the research of Damman en Kraaykamp (2022) shows low-educated self-employed were hit harder in their savings by the COVID-19 pandemic than high-educated self-employed, as their income was affected more negatively by the pandemic restrictions. The research of Von Gaudecker et al. (2020) adds to this as they find that self-employed and low-educated employees are more affected by a crisis. Contrary to the findings in these two papers is the research of De Wit & Van Winden (1989), they find that employee earnings are more

responsive to typical human capital like education and experience than the earnings of self-employed people. As the dataset that we use for this thesis research is more complete and allows for wealth calculations, we will add to the literature by looking if the level of education of a self-employed person matters for the reduction in wealth during the COVID-19 pandemic.

Finally, socio-demographic variables, like gender or marital status, will also be examined as they play a role in the analysis (Graeber et al., 2021; Kalenkoski & Pabilonia, 2021).

## **CHAPTER 3 Data**

### ***3.1 Dataset***

The dataset that will be used for this study is the DNB Household Survey (DHS). The DNB Household Survey has a purpose to study the economic and psychological determinants of the saving behaviour of households. It is a Dutch survey which has been collected since 1993 from the Centerpanel which is a panel of 7500 respondents of 5000 different households (Centerdata, 2022). The survey is collected at the start of year  $x$  reporting on year  $x-1$ , which means that the data collected in 2023 is the data of 2022. From this DHS survey there are multiple variables that will be used like age or gender for example. There will also be multiple variables created with the help of the data of each individual question in the DHS survey. Some variables in the data showed some severe outliers. To get a distribution of the variable closer to the normal distribution while keeping the observations in the dataset some variables were winsorized at 2.5% and 97.5%. This limits all the values of the variables of beneath 2.5% or above 97.5% to the value at 2.5% and 97.5%, respectively. This was done with all the dependent variables used for testing the hypotheses and sub hypotheses, namely the savings difference, financial asset difference, and the wealth difference.

### ***3.2 Socio-demographic and dummy variables***

Basic socio-demographic variables will be used in the research. The demographic variables that are used consist of the variables age, gender (female = 0 and male = 1), education, income, and marital status (not married = 0 and married = 1). These variables will be used to control for in the regressions that are used to test the hypotheses of the paper.

To these socio-demographic variables a dummy was added to be able to answer hypothesis 3.1. This dummy shows high education between the education levels of the respondents. High education will equal 1 if the education of the respondent consists of vocational college (HBO) or university (WO) level studies (Centraal Bureau voor de Statistiek, 2019).

Furthermore, I define a dummy variable for the coronavirus pandemic years to be able to

show those years. The coronavirus pandemic years are the years from 2020 to 2022. Non-coronavirus pandemic years are represented by the years 2017 to 2019.

### ***3.3 Important created variables***

The first important variable is the proportion of employees that are self-employed. The survey contains a question about the primary occupation of the respondent, with the following answer options:

- Employed on contractual basis
- Works in own business
- Free profession, freelance, self-employed
- Looking for work after having lost job
- Looking for first-time work
- Student
- Works in own household
- Retired (pre-retired, AOW, VUT)
- (Partly) disabled
- Unpaid work, keeping benefit payments
- Works as a volunteer
- Other occupation
- Too young, has no occupation yet

With this information we can calculate the proportion of self-employed by dividing the number of self-employed by the total number of employees. The self-employed will consist of summing up the 'Works in own business' and the 'Free profession, freelance, self-employed'. For the regular employees we will add 'Employed on contractual basis' to the sum amount. For these categories of self-employed and all regular employees two dummy variables are created, one for the self-employed and one for all the regular employees.

Another important variable is the savings amount of the respondents. The savings amount consists of the checking accounts (b1b), the employer-sponsored savings plans (b2b), the savings arrangements linked to a Postbank account (b3b), the deposit books (b4b), the saving certificates

(b6b) and the total amount checking accounts with positive/negative deficit balance (x1b). With this information the change in savings amount (or percentage) can be calculated from two subsequent years by subtracting year x-1 from year x.

A third important variable is the amount of financial wealth of the respondents. This financial wealth amount is the sum of the savings and the financial assets of a respondent. The financial assets of respondents consist of the cash value of insurance, bonds, mutual funds, stocks, options, and other financial assets. The cash value of insurance is the sum of the single-premium annuity insurance policies (b7b), the savings or endowment insurance policies (b8b), the cash value of life insurance on mortgage real estate not being used as own accommodation (not 1<sup>st</sup> or 2<sup>nd</sup> residence) (b19vzb), the cash value of life insurance of mortgage on 1<sup>st</sup> residence (b26vzb) and the cash value of life insurance of mortgage on 2<sup>nd</sup> residence (b27vzb). The bonds amount consists of bonds and/or mortgage bonds (b13b). The mutual funds amount is the amount of mutual fund accounts (b12b). The stocks amount represents the stocks, public (excluding private businesses) (b14b). The option amount consists of the put-options bought (b15b), the put-options written (b16b), the call-options bought (b17b) and the call-options written (b18b). The amount of other financial assets equals the sum of money lent out to family or friends (1=yes, 0=no) (b24b) and the savings or investments not mentioned before (b25b).

The final important variable is the overall level of wealth or the total amount of wealth of a respondent. This can be calculated by summing up all the assets of a respondent, like the savings, the financial assets, and the real assets, and subtracting the debt of a respondent. The real assets consist of the real assets (non-housing), the real assets (housing) and the value of the private business. The real assets (non-housing) are the sum of the cars (b20b), the motorbikes (b21b), the boats (b22b) and the caravans/trailers (b23b). The real assets (housing) represent the sum of the value of the real estate not being used as own accommodation (not 1<sup>st</sup> or 2<sup>nd</sup> residence) (b19ogb), the value of the 1<sup>st</sup> residence (b26ogb) and the value of the 2<sup>nd</sup> residence (b27ogb). The private business amount is the sum of stocks from the substantial holding (b28b), the business equity (professions) (b29b) and the business equity self-employed (b30b). Afterwards we subtract all the liabilities, which is the sum of unsecured debt and mortgage debt. The unsecured debt consists of non-mortgage debt (s1b, s2b, s3b, s4b, s5b, s6b, s7b, s8b and

x1b). The mortgage debt is the sum of mortgage on real estate not being used as own accommodation (not 1<sup>st</sup> or 2<sup>nd</sup> residence) (b19hyb), the mortgage on the 1<sup>st</sup> residence (b26hyb) and the mortgage on the 2<sup>nd</sup> residence (b27hyb). The change in wealth over the years can be calculated by subtracting the amount of wealth in two subsequent years by subtracting year x-1 from year x.

### ***3.4 Summary Statistics***

This section offers some more insight into the dataset with summary statistics of the key variables in the dataset. The winsorizing of the three variables was done before the summary statistics. These statistics include the number of observations (N), the mean, the standard deviation (SD), the minimum (Min), the 25th percentile, the median, the 75th percentile and the maximum (Max) values for all listed variables. These summary statistics can be found in Table 1.

Table 1 – Summary Statistics

	N	Mean	SD	Min	25th Percentile	Median	75th Percentile	Max
<b>Respondent Characteristics</b>								
Age	14866	54.310	17.263	15	41	56	68	97
Male	14868	0.517	0.500	0	0	1	1	1
Married	14868	0.680	0.467	0	0	1	1	1
Employed	14868	0.503	0.500	0	0	1	1	1
Self-Employed	14868	0.052	0.223	0	0	0	0	1
High-Education	14868	0.378	0.485	0	0	0	1	1
Gross Income	12004	32673	27461	0	12000	30000	46000	231458
Net Income	9718	26615	21601	-4200	13779	24760	34834	250248
Net Wealth	14377	178314	268008	-241164	7500	66525	270423	2642250
Total Assets	14377	238623	311685	0	10900	136746	373215	3037000
Financial Assets	14377	49998	99815	0	2591	16272	51025	1109797
Savings	14378	28053	55923	0	1750	10234	30100	722856
Equity	14415	8028	41149	0	0	0	0	675889
Stocks	14415	2122	14357	0	0	0	0	248757
Mutual Funds	14415	5712	33886	0	0	0	0	582069
Insurance	14414	10764	39671	0	0	0	0	525000
Bonds	14415	593	7250	0	0	0	0	150000
Options	14415	13	319	0	0	0	0	8750
Other Financial Assets	14415	1856	14184	0	0	0	0	225000
Other Real Assets	14415	7820	13188	0	0	3400	10000	134000
Real Assets Housing	14415	175398	244687	0	0	0	300000	2100000
Private Business	14415	4230	36305	0	0	0	0	750000
Total Debt	14378	60104	110115	0	0	0	87007	885009
Unsecured Debt	14378	3074	13158	0	0	0	0	200000
Housing Debt	14415	56893	108884	0	0	0	83000	876250
Savings Difference	10437	1435	14115	-43450	-269	0	2850	50001
Financial Asset Difference	10436	2811	27080	-78996	-570	0	5118	99062
Net Wealth Difference	10436	18334	87326	-231000	-1993	1726	33591	306489

When looking at the summary statistics we can see that the sample provides a complete dataset with big differences in financial situations and socio-demographic factors. The observations or N are around 14000 per variable, collected for 3982 respondents over 6 years. The mean of net wealth is 178314, which is in line with the data of the Centraal Bureau voor de Statistiek (2023a). There is also great variability which can for example be seen in the huge standard deviations with regards to, for instance, savings, financial assets, or net wealth. In America, the negative wealth percentage is around 10% (Shaikh, 2023). This percentage is the same in the Netherlands (CBS, 2022) and it is reflected in this dataset as well.

## CHAPTER 4 Methodology

### *4.1 Hypotheses*

The first hypothesis this paper will examine is the relationship between the corona pandemic and the number of self-employed people. Given the fact that when self-employed are in a crisis they experience more financial distress (Wolfe & Patel, 2021), it will lead them to become more risk averse and, navigating more to normal employment. For this reason, it is expected that the coronavirus pandemic decreases the number of self-employed people in the Netherlands. The coronavirus pandemic years from 2020 to 2022 (Ministerie van Algemene Zaken, 2024) will be compared to years before the coronavirus crisis, so from 2017 to 2019.

Hypothesis 1: The proportion of self-employed people in the Netherlands decreased during the COVID-19 pandemic in the years from 2020 to 2022.

The second hypothesis will look at the relationship between the coronavirus pandemic and the retirement savings of the self-employed in comparison to regular employees. As most people are expected to be risk averse, which can be seen from the expected utility theory framework, they should reduce risk through strategies such as diversification like we have seen in modern portfolio theory, and through pre-cautionary savings to have a back-up in times of hardship. However, the self-employed are known to be more risk seeking, which is also shown in the fact that they do not save more for retirement compared to the regular employees (Mastrogiacomo & Alessie, 2015). Because of this reason, it is expected that the self-employed will not save significantly more even in such a crisis like COVID-19 compared to regular employees.

Hypothesis 2: The self-employed will save less in the COVID-19 pandemic in the years from 2020 to 2022 compared to regular employees.

For this hypothesis we will look at a sub hypothesis to see if the same is true not only for savings, but also for the whole amount of financial assets, including investments such as mutual funds, stocks, and bonds. It is expected that the self-employed will have more negative change in their financial assets in a crisis like COVID-19 compared to regular employees.

Hypothesis 2.1: The self-employed will have more negative change in their financial assets in the COVID-19 pandemic in the years from 2020 to 2022 compared to regular employees.

The third hypothesis will explore the impact of the coronavirus pandemic on the wealth of the self-employed in the Netherlands compared to regular employees. In a crisis wealth usually decreases for households in general (Banks et al., 2013). However, ABN AMRO, which is a large Dutch bank in the Netherlands, found that during the coronavirus pandemic people saved more of which a big part was involuntary (Neuteboom & Economisch Bureau, 2021). This makes sense as due to the pandemic a lot of restrictions were imposed like travel or 'going out' restrictions like closed restaurants or cinemas. To be self-employed is riskier than working for a company, so the income of the self-employed was likely hit harder as well especially with the pandemic restrictions (P & Conen, 2021). For these reasons, it is expected that overall wealth of self-employed went down in the coronavirus pandemic more than regular employees in the Netherlands.

Hypothesis 3: The wealth of the self-employed decreased more in the COVID-19 pandemic in the years from 2020 to 2022 compared to regular employees.

For this hypothesis we will look at a sub hypothesis involving level of education as a variable. Low-educated self-employed felt more negative implications in the COVID-19 pandemic relating to their savings (Damman & Kraaykamp, 2022). It is expected that the wealth of low-educated self-employed decreased even more in the coronavirus pandemic compared to the wealth of high-educated self-employed.

Hypothesis 3.1: The wealth of low-educated self-employed decreased more in the COVID-19 pandemic in the years from 2020 to 2022 compared to high-educated self-employed.

#### ***4.2 Research Design***

With data on the employment status, we can look at the first hypothesis to see how many people switch from self-employment to regular employment. We first look if it dropped in the coronavirus pandemic years, so from 2020 to 2022 with a paired samples test. In this way, the first hypothesis can be tested as we can look at the change in proportion of self-employed with a paired samples test for the proportion. In this way, we compare the coronavirus pandemic years 2020 to 2022 with the non-coronavirus pandemic years, 2017 to 2019, and see if we find a significant difference.

The second hypothesis can be tested by looking at the average change in the savings amount of the self-employed and comparing that to the average change in the savings amount of the regular employees. If we make sure that we have a column which shows the change in average saving amounts this can be compared with an independent-samples non-equal variances t-test to see if the self-employed indeed do not save significantly more than the regular employees. In addition, to control for socio-demographic variables like age, gender, education, income, and marital status, we also test this hypothesis one more time with a regression model with a dummy variable for self-employment at the beginning of the Covid-19 pandemic period as the main independent variable.

For the sub hypothesis we will also use an independent-samples non-equal variances t-test, but now to see if the decrease in financial assets is bigger for self-employed compared to regular employees in the coronavirus pandemic years 2020 to 2022. Further, to control for variables like age, gender, education, income, and marital status, we also test the hypothesis one more time with a regression model.

The third hypothesis can be tested by calculating the overall or total wealth of self-employed and regular employees. Again, this will be translated to a change in wealth which can be compared with an independent-samples non-equal variances t-test to see if the self-employed

indeed do not save significantly more than the regular employees. We, furthermore, can look at the summary statistics to see if variables like age, gender, education, income, and marital status vary between self-employed or regular employees. Afterwards we estimate a regression model for the change in wealth that include the control variables age, gender, education, income, and marital status to account for this, as well as a dummy variable for self-employment at the beginning of the Covid-19 pandemic period (the main independent variable).

For the sub hypothesis we will use an independent-samples non-equal variances t-test to see if the low-educated self-employed indeed had a bigger negative impact of the coronavirus pandemic on their total wealth compared to high-educated self-employed. For this hypothesis we, again, control for variables like age, gender, income, and marital status.

### 4.3 Statistical tests

For hypothesis 1 we test if the proportion of self-employed went down in the coronavirus pandemic years. The two-sample test statistic for the proportion is the following:

$$z = \frac{p_{pre} - p_{during}}{\sqrt{p(1-p)\left(\frac{1}{n_{pre}} + \frac{1}{n_{during}}\right)}}$$

Where:

- $p_{pre}$  is the sample proportion of self-employed before the coronavirus pandemic years, so from 2017 to 2019
- $p_{during}$  is the sample proportion of self-employed during the coronavirus pandemic years, so from 2020 to 2022
- $p$  is the pooled proportion of self-employed before and during the coronavirus pandemic years, so from 2017 to 2022
- $n_{pre}$  is the sample size before the coronavirus pandemic years, so from 2017 to 2019
- $n_{during}$  is the sample size during the coronavirus pandemic years, so from 2020 to 2022

For the two-sample test of proportions the null and alternative hypotheses are:

$$H_0 : \pi_{pre} \leq \pi_{during}$$

$$H_1 : \pi_{pre} > \pi_{during}$$

Where:

- $\pi_{pre}$  is the population proportion of self-employed before the coronavirus pandemic years, so from 2017 to 2019
- $\pi_{during}$  is the population proportion of self-employed during the coronavirus pandemic years, so from 2020 to 2022

For hypothesis 2 we test if the self-employed will save more in the COVID-19 pandemic years from 2020 to 2022 compared to regular employees. The test statistic is the following:

$$t = \frac{\overline{DS}_{reg} - \overline{DS}_{self}}{S_p \sqrt{\frac{1}{n_{reg}} + \frac{1}{n_{self}}}}$$

Where:

- $\overline{DS}_{reg}$  is the average change in savings for the regular employees during the coronavirus pandemic years, so 2020 to 2022
- $\overline{DS}_{self}$  is the average change in savings for the self-employed during the coronavirus pandemic years, so 2020 to 2022
- $S_p$  is the pooled standard deviation
- $n_{reg}$  is the sample size of the regular employees during the coronavirus pandemic years, so from 2020 to 2022
- $n_{self}$  is the sample size of the self-employed during the coronavirus pandemic years, so from 2020 to 2022

For the independent-samples non-equal variances t-test the null and alternative hypotheses are:

$$H_0 : DS_{reg} \leq DS_{self}$$

$$H_1 : DS_{reg} > DS_{self}$$

Where:

- $DS_{reg}$  is the mean change in savings for the regular employees in the population during the coronavirus pandemic years, so 2020 to 2022
- $DS_{self}$  is the mean change in savings for the self-employed in the population during the coronavirus pandemic years, so 2020 to 2022

The equation of the regression model for the change in saving controlling for the sociodemographic variables is the following:

$$DS_i = \beta_0 + \beta_1 \text{Self-employed}_i + \beta_2 \text{Age}_i + \beta_3 \text{Male}_i + \beta_4 \text{Education}_i + \beta_5 \text{Income}_i + \beta_6 \text{Married}_i + \varepsilon_i$$

Where:

- $DS_i$  is the change in savings for respondent  $i$
- $\beta_0$  is the intercept term
- $\beta_1$  to  $\beta_6$  are the coefficients for the independent variables ('Self-employed', 'Age', 'Male', 'Education', 'Income' and 'Married')
- $\varepsilon$  is the error term

For hypothesis 2.1 we test if the self-employed have more negative change in their financial assets in the COVID-19 pandemic years from 2020 to 2022 compared to regular employees. The test statistic is the following:

$$t = \frac{\overline{DF\bar{A}}_{reg} - \overline{DF\bar{A}}_{self}}{S_p \sqrt{\frac{1}{n_{reg}} + \frac{1}{n_{self}}}}$$

Where:

- $\overline{DF\bar{A}}_{reg}$  is the average change in financial assets for the regular employees during the coronavirus pandemic years, so 2020 to 2022
- $\overline{DF\bar{A}}_{self}$  is the average change in financial assets for the self-employed during the coronavirus pandemic years, so 2020 to 2022
- $S_p$  is the pooled standard deviation
- $n_{reg}$  is the sample size of the regular employees during the coronavirus pandemic years, so from 2020 to 2022

- $n_{self}$  is the sample size of the self-employed during the coronavirus pandemic years, so from 2020 to 2022

For the independent-samples non-equal variances t-test the null and alternative hypotheses are:

$$H_0 : DFA_{reg} \leq DFA_{self}$$

$$H_1 : DFA_{reg} > DFA_{self}$$

Where:

- $DFA_{reg}$  is the mean change in financial assets for the regular employees in the population during the coronavirus pandemic years, so 2020 to 2022
- $DFA_{self}$  is the mean change in financial assets for the self-employed in the population during the coronavirus pandemic years, so 2020 to 2022

The equation of the regression model controlling for the sociodemographic variables is the following:

$$DFA_i = \beta_0 + \beta_1 Self - employed_i + \beta_2 Age_i + \beta_3 Male_i + \beta_4 Education_i + \beta_5 Income_i + \beta_6 Married_i + \varepsilon_i$$

Where:

- $DFA_i$  is the change in financial assets for respondent I
- $\beta_0$  is the intercept term
- $\beta_1$  to  $\beta_6$  are the coefficients for the independent variables ('Self-employed', 'Age', 'Male', 'Education', 'Income' and 'Married')
- $\varepsilon$  is the error term

For hypothesis 3 we test if the self-employed their net wealth decreased more in the COVID-19 pandemic years from 2020 to 2022 compared to regular employees. The test statistic is the following:

$$t = \frac{\overline{DNW}_{reg} - \overline{DNW}_{self}}{S_p \sqrt{\frac{1}{n_{reg}} + \frac{1}{n_{self}}}}$$

Where:

- $\overline{DNW}_{reg}$  is the average change in net wealth for the regular employees during the coronavirus pandemic years, so 2020 to 2022
- $\overline{DNW}_{self}$  is the average change in net wealth for the self-employed during the coronavirus pandemic years, so 2020 to 2022
- $S_p$  is the pooled standard deviation
- $n_{reg}$  is the sample size of the regular employees during the coronavirus pandemic years, so from 2020 to 2022
- $n_{self}$  is the sample size of the self-employed during the coronavirus pandemic years, so from 2020 to 2022

For the independent-samples non-equal variances t-test the null and alternative hypotheses are:

$$H_0 : DNW_{reg} \leq DNW_{self}$$

$$H_1 : DNW_{reg} > DNW_{self}$$

Where:

- $DNW_{reg}$  is the mean change in net wealth for the regular employees in the population during the coronavirus pandemic years, so 2020 to 2022
- $DNW_{self}$  is the mean change in net wealth for the self-employed in the population during the coronavirus pandemic years, so 2020 to 2022

The equation of the regression model controlling for the sociodemographic variables is the following:

$$DNW_i = \beta_0 + \beta_1 Self - employed_i + \beta_2 Age_i + \beta_3 Male_i + \beta_4 Education_i + \beta_5 Income_i + \beta_6 Married_i + \varepsilon_i$$

Where:

- $DNW_i$  is the change in net wealth for respondent  $i$
- $\beta_0$  is the intercept term
- $\beta_1$  to  $\beta_6$  are the coefficients for the independent variables ('Self-employed', 'Age', 'Male', 'Education', 'Income' and 'Married')
- $\varepsilon$  is the error term

For hypothesis 3.1 we test if the high-educated self-employed their net wealth decreased less in the COVID-19 pandemic years from 2020 to 2022 compared to low-educated self-employed. The test statistic is the following:

$$t = \frac{\overline{DNW}_{low} - \overline{DNW}_{high}}{S_p \sqrt{\frac{1}{n_{low}} + \frac{1}{n_{high}}}}$$

Where:

- $\overline{DNW}_{low}$  is the average change in net wealth for the low-educated self-employed during the coronavirus pandemic years, so 2020 to 2022
- $\overline{DNW}_{high}$  is the average change in net wealth for the high-educated self-employed during the coronavirus pandemic years, so 2020 to 2022
- $S_p$  is the pooled standard deviation
- $n_{low}$  is the sample size of the low-educated self-employed during the coronavirus pandemic years, so from 2020 to 2022

For the independent-samples non-equal variances t-test the null and alternative hypotheses are:

$$H_0 : DNW_{low} \geq DNW_{high}$$

$$H_1 : DNW_{low} < DNW_{high}$$

Where:

- $DNW_{low}$  is the mean change in net wealth for the low-educated self-employed in the population during the coronavirus pandemic years, so 2020 to 2022
- $DNW_{high}$  is the mean change in net wealth for the high-educated self-employed in the population during the coronavirus pandemic years, so 2020 to 2022

The equation of the regression model controlling for the sociodemographic variables is the following:

$$DNW_i = \beta_0 + \beta_1 Self - employed_i + \beta_2 High\_Education_i + \beta_3 High\_Education_i * Self - employed_i + \beta_4 Age_i + \beta_5 Male_i + \beta_6 Income_i + \beta_7 Married_i + \varepsilon_i$$

Where:

- $DNW_i$  is the change in net wealth for respondent I
- $\beta_0$  is the intercept term
- $\beta_1$  to  $\beta_2$  and  $\beta_4$  to  $\beta_7$  are the coefficients for the independent variables ('Self\_employed', 'High\_education', 'Age', 'Male', 'Income' and 'Married')
- $\beta_3$  is the interaction term between 'High\_education' and 'Self\_employed'
- $\varepsilon$  is the error term

## CHAPTER 5 Results

### 5.1 Hypothesis 1

The first hypothesis tests whether the proportion of the self-employed differed between the non-coronavirus pandemic years, 2017 to 2019, and the coronavirus pandemic years, 2020 to 2022. To test this a two-samples test was used. Group 0 is the pre-pandemic period with 3734 observations and group 1 is the pandemic period with 3750 observations. These results are presented in Table 2.

*Table 2 – Results Hypothesis 1*

Group	N	Mean	Std. err.	95% Confidence interval
Pre-pandemic	3734	0.1044	0.0050	[0.0946, 0.1143]
Pandemic	3750	0.1040	0.0049	[0.0942, 0.1138]
Diff		0.0004	0.0071	[-0.0134, 0.0143]

$\Pr(Z > z) = 0.475, z = 0.063$

The results show that the proportions of the self-employed are almost identical in both periods. In the non-coronavirus pandemic years from 2017 to 2019 it is 10.44%, while in the coronavirus pandemic years from 2020 to 2022 it is 10.40%. The difference in proportions of 0.04 percentage points is not statistically significant with  $z = 0.063$  and the p-value ( $\Pr(Z > z) = 0.475$ ). The 95% confidence interval for the difference lays between -0.0134 and 0.0143, indicating no significant difference between the periods before and during the pandemic.

## 5.2 Hypothesis 2

The second hypothesis tests if there is a significant difference in savings between self-employed and regular employees during the coronavirus pandemic years from 2020 to 2022. To test this a two-sample t-test with unequal variances was used. The analysis included 3200 observations, with 2861 regular employees and 339 self-employed. The results can be found in Table 3.

*Table 3 – Results Hypothesis 2*

Group	N	Mean	Std. err.	SD	95% Confidence interval
Regular Employees	2861	2097	259	13890	[1588, 2606]
Self-Employed	339	1919	939	17281	[73, 3765]
Combined	3200	2078	253	14285	[1583, 2573]
Diff		178	974		[-1737, 2092]
Pr(T > t) = 0.428, t = 0.182, df = 391					

The mean savings difference for regular employees is 2097 and for self-employed it is lower at 1919. The large standard deviations of 13890 and 17281 indicate a high variability between the two groups. The difference of the means of the two groups was 178 where the 95% confidence interval was between -1737 and 2092. There is no statistically significant difference in the mean change in savings as the p-value (Pr(T > t)) is equal to 0.428. Table 4 shows the robustness check, which is a 2-sample median test.

*Table 4 – Results Robustness Hypothesis 2*

Group	N	Median	Rank sum	Expected
Regular employees	2861	0	4614374	4579031
Self-Employed	339	0	507226	542570
Combined	3200	0	5121600	5121600
Prob >  z  = 0.026, z = 2.23				

The robustness check shows that the median savings difference for regular employees and self-employed is the same at 0. There is a statistically significant difference in the distribution of savings as the p-value (Prob > |z|) is 0.026. The Shapiro Wilk test shows the data is non-normal as W is 0.780, the z-value is 15.49 and the p-value (Prob > z) is 0.000.

To test the impact of self-employment and socio-demographic factors on changes in savings during the coronavirus pandemic years, a linear regression analysis was performed with robust standard errors. The regression model includes variables for self-employment status, age, gender, education level, gross income and marital status while restricting the test to employed individuals during these pandemic years from 2020 to 2022. The results of the regression analysis are presented in Table 5.

*Table 5 – Results Regression Hypothesis 2*

Savings Difference	Coefficient	Robust SD	t	p-value	95% Confidence interval
Self-Employed	-320	1116	-0.29	0.774	[-2508, 1867]
Age	8	24	0.32	0.750	[-40, 55]
Male	-788	580	-1.36	0.175	[-1926, 350]
High-Education	429	595	0.72	0.471	[-737, 1595]
Gross Income	0.038	0.014	2.74	0.006	[0.011, 0.066]
Married	981	550	1.62	0.105	[-188, 1970]
Constant	-35	1228	-0.03	0.978	[-2443, 2374]

N = 2773, F(6, 2766) = 2.48, p-value = 0.022, R<sup>2</sup> = 0.008, Root MSE = 14242

The results of the regression indicate that the overall model was statistically significant with the F-statistic of 2.48 and a corresponding p-value of 0.022. Combined with an R-squared of 0.008 these results suggest that the included variables did explain the variance in the change of savings for a small portion. When looking at the individual variables we can see that only gross income is significant with a coefficient of 0.038 and a p-value of 0.006. All the other variables were not

significant with  $p > 0.05$ . A robustness check was done with the ratio of change in savings divided by the income, but this did not change the results.

### 5.3 Hypothesis 2.1

With hypothesis 2.1 we test if there is a significant difference in financial assets between self-employed and regular employees during the coronavirus pandemic years from 2020 to 2022. To examine this a two-sample t-test with unequal variances was used. The analysis included 3200 observations, with 2861 regular employees and 339 self-employed. The results can be found in Table 6.

*Table 6 – Results Hypothesis 2.1*

Group	N	Mean	Median	Std. err.	SD	95% Confidence interval
Regular Employees	2861	4026	0	512	27375	[3023, 5030]
Self-Employed	339	5617	0	2036	37479	[1613, 9621]
Combined	3200	4195	0	506	28612	[3203, 5168]
Diff		-1591		2099		[-5718, 2536]
Pr(T > t) = 0.776, t = -0.758, df = 382						

The mean financial assets difference for regular employees is 4026 while the mean financial assets difference for self-employed is higher at 5617. The large standard deviations of 27375 and 37479 indicate a high variability between the two groups. The difference of the means of the two groups was -1591 where the 95% confidence interval was between -5718 and 2536. There is no statistically significant difference in savings as the p-value ( $\text{Pr}(T > t)$ ) is equal to 0.776. The robustness check, which is a 2-sample median test, shows that the median difference in financial assets for regular employees and self-employed is the same at 0. There is no statistically significant difference in financial assets as the p-value ( $\text{Prob} > |z|$ ) is 0.426.

To test the impact of self-employment and socio-demographic factors on changes in financial assets during the coronavirus pandemic years, a linear regression analysis was performed with robust standard errors. The regression model includes variables for self-employment status, age, gender, education level, gross income and marital status while restricting the test to employed individuals during these pandemic years from 2020 to 2022. The results of the regression analysis are presented in Table 7.

*Table 7 – Results Regression Hypothesis 2.1*

Financial Assets Difference	Coefficient	Robust SD	t	p-value	95% Confidence interval
Self-Employed	688	2417	0.28	0.776	[-4051, 5427]
Age	7	46	0.16	0.872	[-83, 97]
Male	-813	1105	-0.74	0.462	[-2980, 1354]
High-Education	74	1192	0.06	0.951	[-2263, 2410]
Gross Income	0.114	0.026	4.40	0.000	[0.063, 0.165]
Married	2203	1037	2.12	0.034	[168, 4237]
Constant	-1866	2379	-0.78	0.433	[-6532, 2799]

N = 2773, F(6, 2766) = 4.43, p-value = 0.000, R<sup>2</sup> = 0.015, Root MSE = 28561

The results of the regression indicate that the overall model was statistically significant with the F-statistic of 4.43 and a corresponding p-value of 0.000. Combined with an R-squared of 0.015 suggests that the included variables collectively did explain the variance in the change of financial assets for a small portion. When looking at the individual variables we can see that gross income is significant with a coefficient of 0.114 and a p-value of 0.000. Furthermore, marital status is significant as well with a coefficient of 2203 and a p-value of 0.034. All the other variables were not significant with  $p > 0.05$ .

### 5.4 Hypothesis 3

The third hypothesis tests if there is a significant difference in net wealth, so assets minus liabilities, between self-employed and regular employees during the coronavirus pandemic years from 2020 to 2022. To test this a two-sample t-test with unequal variances was used. The analysis included 3200 observations, with 2861 regular employees and 339 self-employed. The results can be found in Table 8.

*Table 8 – Results Hypothesis 3*

Group	N	Mean	Median	Std. err.	SD	95% Confidence interval
Regular Employees	2861	28715	7000	1760	94137	[25264, 32166]
Self-Employed	339	41007	8240	7050	129808	[27139, 54875]
Combined	3200	30017	7000	1743	98577	[26600, 33434]
Diff		-12293		7267		[-26580, 1995]
Pr(T > t) = 0.954, t = -1.692, df = 381						

The mean net wealth difference for regular employees is 28715 while the mean net wealth difference for self-employed is higher at 41007, which for both groups is a large increase in wealth. The large standard deviations of 94137 and 129808 indicate a high variability between the two groups. The difference of the means of the two groups was -12293 where the 95% confidence interval was between -26580 and 1995. There is no statistically significant difference in net wealth as the p-value ( $\Pr(T > t)$ ) is equal to 0.954. The robustness check, which is a 2-sample median test, shows that the median difference in net wealth for regular employees is 7000 and for self-employed it is 8240. There is no statistically significant difference in net wealth as the p-value ( $\text{Prob} > |z|$ ) is 0.822.

To test the impact of self-employment and socio-demographic factors on changes in net wealth during the coronavirus pandemic years, a linear regression analysis was performed with robust standard errors. The regression model includes variables for self-employment status, age, gender, education level, gross income and marital status while restricting the test to employed individuals during these pandemic years from 2020 to 2022. The results of the regression analysis are presented in Table 9.

*Table 9 – Results Regression Hypothesis 3*

Net Wealth Difference	Coefficient	Robust SD	T	p-value	95% Confidence interval
Self-Employed	17034	8183	2.08	0.037	[989, 33079]
Age	-29	152	-0.19	0.849	[-326, 268]
Male	3504	3862	0.91	0.364	[-4069, 11076]
High-Education	2034	4082	0.50	0.618	[-5970, 10038]
Gross Income	0.408	0.083	4.90	0.000	[0.245, 0.572]
Married	14736	3520	4.19	0.000	[7834, 21637]
Constant	1107	7948	0.14	0.889	[-14477, 16690]

N = 2773, F(6, 2766) = 10.64, p-value = 0.000, R<sup>2</sup> = 0.027, Root MSE = 95984

The results of the regression indicate that the overall model was statistically significant with the F-statistic of 10.64 and a corresponding p-value of 0.000. Because the R-squared of 0.027, the results suggest that the included variables did explain the variance in the change of net wealth moderately for a significant amount. When looking at the individual variables we can see that gross income is significant with a coefficient of 0.408 and a p-value of 0.000. Marital status is also significant with a coefficient of 14736 and a p-value of 0.000. Finally, self-employed is also significant with a positive coefficient of 17034 euro, contrary to the hypothesis, and a p-value of 0.037. All the other variables were not significant with  $p > 0.05$ .

### 5.5 Hypothesis 3.1

With hypothesis 3.1 we test if there is a significant difference in net wealth between low-educated self-employed and high-educated self-employed during the coronavirus pandemic years from 2020 to 2022. To examine this a two-sample t-test with unequal variances was used. The analysis included 339 observations, with 163 low-educated self-employed and 176 high-educated self-employed. The results can be found in Table 10.

*Table 10 – Results Hypothesis 3.1*

Group	N	Mean	Median	Std. err.	SD	95% Confidence interval
Low-Educated Self-Employed	163	33476	3750	9803	125156	[14118, 52834]
High-Educated Self-Employed	176	47983	10642	10097	133950	[28055, 67910]
Combined	339	41007	8240	7050	129808	[27140, 54875]
Diff		-14506		14073		[-42188, 13175]
Pr(T < t) = 0.152, t = -1.031, df = 337						

The mean net wealth difference for low-educated self-employed is 33476 while the mean financial assets difference for high-educated self-employed is higher at 47983. The large standard deviations of 125156 and 133950 indicate a high variability between the two groups. The difference of the means of the two groups was -14506 where the 95% confidence interval was between -42188 and 13175. There is no statistically significant difference in savings as the p-value (Pr(T < t)) is equal to 0.152. The robustness check, which is a 2-sample median test, shows that the median difference in net wealth for low-educated self-employed is 3750 and for high-educated self-employed it is 10642. There is no statistically significant difference in net wealth as the p-value (Prob > |z|) is 0.359.

To test the impact of the interaction, of self-employment and high-education, and socio-demographic factors on changes in net wealth during the coronavirus pandemic years, a linear regression analysis was performed with robust standard errors. The regression model includes variables for the interaction between self-employment and high-education, self-employment status, high-education, age, gender, gross income, and marital status while restricting the test to self-employed individuals during these pandemic years from 2020 to 2022. The results of the regression analysis are presented in Table 11.

*Table 11 – Results Regression Hypothesis 3.1*

Net Wealth Difference	Coefficient	Robust SD	t	p-value	95% Confidence interval
Self-Employed	18789	11518	1.63	0.103	[-3792, 41370]
High-Education	2257	2881	0.78	0.434	[-3392, 7905]
Interaction Self-Employed and High-Education	4438	16150	0.27	0.783	[-27222, 36099]
Age	-116	67	-1.74	0.083	[-248, 15]
Male	1252	2707	0.46	0.644	[-4056, 6560]
Gross Income	0.363	0.061	5.92	0.000	[0.243, 0.483]
Married	9431	2453	3.84	0.000	[4622, 14240]
Constant	8880	4292	2.07	0.039	[467, 17294]

N = 5256, F(7, 5248) = 11.49, p-value = 0.000, R<sup>2</sup> = 0.021, Root MSE = 91314

The results of the regression indicate that the overall model was statistically significant with the F-statistic of 11.49 and a corresponding p-value of 0.000. Because the R-squared of 0.021 was moderate, the results suggest that the included variables did explain the variance in the change of net wealth moderately for a significant amount. When looking at the individual variables we can see that only gross income and marital status are significant with gross income having a coefficient of 0.363 and a p-value of 0.000. Marital status has a coefficient of 9431 and a p-value of 0.000. All the other variables were not significant with  $p > 0.05$ .

## CHAPTER 6 Discussion

### *6.1 Discussion of the results*

The most important pattern across the hypotheses is the observation that self-employed, although not expected beforehand, were generally not impacted that negatively by the COVID-19 pandemic in the Netherlands.

Hypothesis 1 showed that there was almost no decrease in the proportion of self-employed between the pre-coronavirus pandemic years and the coronavirus pandemic years. The difference was 0.04456 percentage points and was not statistically significant. Therefore, we concluded that there was no significant change between the pre-coronavirus pandemic years and the coronavirus pandemic years.

Furthermore, the savings and financial assets in general were not impacted as bad as thought of beforehand. In fact, their savings went up on average, and the increase in the median was also positive. Hypothesis 2 examined whether the change in savings of self-employed and regular employees differed during the coronavirus pandemic years. The results show that the self-employed did not save more than the regular employees as the t-test results show no significant difference in the change in savings between self-employed and regular employees. However, the significant result in the 2-sample median test shows significant differences in the distributions of the difference in savings between regular employees and self-employed. As the medians of both groups were 0, it was likely due to differences in the variability in the 2 groups. The Shapiro Wilk test shows the data is non-normal and the 2-sample median test the best match for the data. The discrepancy suggests that although the average change in savings differs not that much, the distribution of savings changes is wider for the self-employed. This indicates that outliers or a skewed distribution is present.

Adding to the positive results for the self-employed financially is hypothesis 2.1. It tests if the financial assets of self-employed and regular employees were different during the COVID-19 pandemic. Although self-employed had again a bigger change of 1591 euro in financial assets, there was no significant difference between financial assets of self-employed and regular employees.

The pattern continued in the change in wealth. Hypothesis 3 examined if the difference in net wealth (assets – liabilities) between self-employed and regular employed was significant in the coronavirus pandemic years. The results show the self-employed having the bigger change in net wealth with a large average change of 41,000 euro, but in the t-test and the 2-sample median test it showed to be not significant. However, when controlling for other variables it showed to be significant in the regression.

Although previous research finds that education plays a role in change in net wealth, hypothesis 3.1 found there was no significant difference in the change in net wealth (assets – liabilities) between low-educated self-employed and high-educated self-employed in the COVID-19 pandemic. The difference in the change of net wealth showed that the high-educated self-employed have a slightly higher change in net wealth, but as noted before this was not a significant difference for the COVID-19 pandemic.

When looking at the regressions of hypotheses 2 to 3.1 we can see mainly 1 result. That result shows that gross income is the most crucial factor for increasing savings, financial assets, and net wealth with it being significant in all 4 the regressions that were done. The impact of gross income on savings was already found in earlier research (Dynan et al., 2004). Dynan et al. (2004) find that for households aged 30–59, higher-lifetime income households save a larger fraction of their income than lower-income households. Another variable that was a key factor in the regressions is the marital status, but only for increasing net wealth as the variable was significant in hypotheses 3 and 3.1. Self-employment was only significant when controlling for other variables in the regression testing for the difference in net wealth in hypothesis 3. All the other socio-demographic factors which consist of age, gender, and high-education, are not significant and thus also not important in explaining variation in the change in savings, financial assets, or net wealth between employees.

## **6.2 Limitations and further research**

One of the limitations of this research paper is that there is no data of the pensions of the regular employees in the dataset. As shown before self-employed save on average less than regular employees for retirement (Knoef et al., 2017). As regular employees automatically save up for retirement, via the company they work for, they save up a lot, which cannot be seen in this dataset. As self-employed save less in the first and second pillar and end up with a lower net pension (Goudswaard et al., 2017), it would be interesting to see if the results change if these amounts were added to the tests of the research hypotheses.

Furthermore, there are new upcoming digital currencies that pop out all over the world. There are currently around 10000 different cryptocurrencies worldwide and new ones are still being released as well (Statista, 2024). In the DHS survey cryptocurrencies are only added from 2022 onwards. Adding those from 2022 onwards to the financial assets in the dataset would mean creating lopsided sum values of financial assets. For this reason, cryptocurrency values were not considered for this research paper. At the end of 2021 around 300 million people owned cryptocurrency (Hon et al., 2022). This amounts to around 4% of the world population.

Another limitation to the study is the number of the self-employed in the sample. Especially in hypothesis 3.1 this is evident. In the sample for hypothesis 3.1 only 339 self-employed are included. Although the ideal sample size would only be marginally greater at an amount of 400 (Qualtrics, 2023), it is still something to take into consideration. For further research, a bigger sample could be useful to increase generalizability, statistical power and reduce bias for example.

When looking at the results we can spot some opportunities for future research. For starters, the group of self-employed is quite diverse when looking at the different sectors in which they work. The impact of the Covid-19 will likely differentiate between sectors. Some sectors like the hospitality sector will have been hit harder than the online retail sector. The hospitality sector was forced to close for a big part of the crisis while sectors like online retail thrived. Further research could look at the difference between sectors of self-employed to gain more insight in the impact of Covid-19 on the self-employed.

Furthermore, when looking specifically at the results of the change in savings we can see some more opportunities for further research. The results of the hypothesis tests are not significant when looking at the change in savings between self-employed and regular employees. A potential explanation could be that self-employed only saved more in this coronavirus pandemic years and that in normal years they save less than regular employees. Further research could look at the percentages saved in and before a crisis for self-employed to ensure this is not the case. This would give more insight into the savings of the self-employed in a crisis like the COVID-19 pandemic.

Finally, all survey-based research could have a sample which can be biased in at least two ways. Some respondents can skip questions about a part of their financials. If this is happening a lot for a specific subgroup of the population this would lead to a biased sample. Furthermore, respondents can make typos leading to mistakes in the estimate of their savings, financial assets, or net wealth. One way these typos were countered was by winsorizing the final 2.5% of the data on both sides as explained before.

## CHAPTER 7 Conclusion

This research study looked at the changes in savings and wealth for the Dutch self-employed in the coronavirus pandemic years. The findings show that the self-employed were not affected as negatively as anticipated beforehand, but rather the average increase in their savings and wealth was positive.

For starters, the proportion of self-employed remained almost constant at 10.4% when comparing the years before the COVID-19 pandemic with the years during the COVID-19 pandemic. Secondly, the change in savings of the self-employed of on average 1919 euro was not significantly different from the change in savings of the regular employees of on average 2097 euro. Furthermore, the self-employed were not hit significantly worse in their financials than the regular employees. They even showed, although not significant, a bigger positive change in their financial assets by 1591 euro on average (4026 euro for regular employees, and 5617 euro for the self-employed). Adding to it was the almost significant result of the bigger positive change in net wealth of on average 12293 euro (28715 euro for regular employees, and 41007 euro for the self-employed). Finally, when looking at the self-employed themselves we can see that, although not significant, education plays a role in having a bigger positive change in net wealth as on average high-educated self-employed have a bigger net positive change in net wealth of 14506 (33476 for low-educated self-employed and 47983 for high-educated self-employed).

What should be taken into consideration as well is the fact that the variability within each group is substantial, which could be attributed to a lot of factors. As the self-employed are quite diverse, some sectors could be hit harder with Covid-19 like the hospitality sector. Other sectors like IT or construction, could have benefited from Covid-19. Other examples of factors that could have contributed are financial literacy or access to financial resources. Finally, as government support measures were quite extensive in the Netherlands during Covid-19 these could have attributed to the variability as well.

When looking at the regressions and the variables we can see that gross income is the crucial factor for increasing savings, financial assets, and net wealth with it being significant in all four of the regression models. The impact of gross income on savings was already found in earlier research (Dynan et al., 2004). Dynan et al. (2004) find that for households aged 30–59, higher–

lifetime income households save a larger fraction of their income than lower-income households. Marital status is also a key factor, but only for increasing net wealth as the variable was only significant in half of the tests. Finally, self-employment was significant, only on net wealth, with an average positive change of 17034 euro. All the other socio-demographic factors, age, gender, and high-education, are not significant and thus also not important in increasing savings, financial assets, or net wealth.

In conclusion, the study highlights the, in general, limited financial impact of the Covid-19 pandemic on the self-employed in the Netherlands. In fact, the research shows that on average the Dutch employees' savings, which ABN AMRO already found (Neuteboom & Economisch Bureau, 2021), and wealth went up during the COVID-19 pandemic and the self-employed were not worse off than other employees on average. The findings show the need for further investigation into the diverse financial situation of the types of self-employed individuals, as the Covid-19 pandemic's effects likely varied across sectors.

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## APPENDIX

### A. Important Variables

Figure 1 – Histogram of Savings Difference

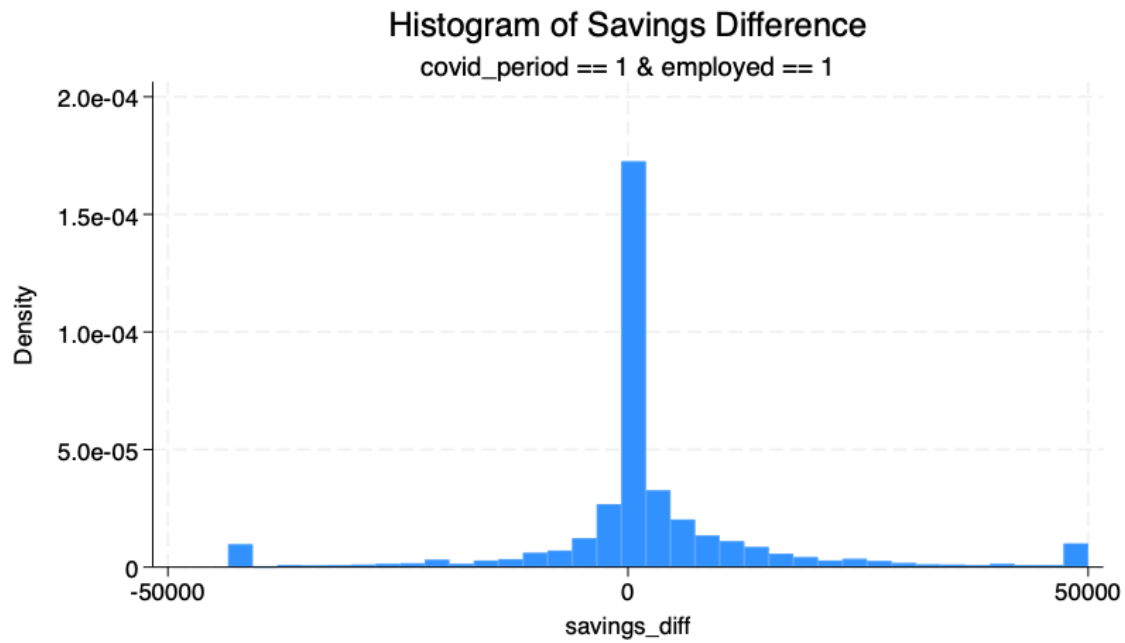


Figure 2 – Histogram of Financial Assets Difference

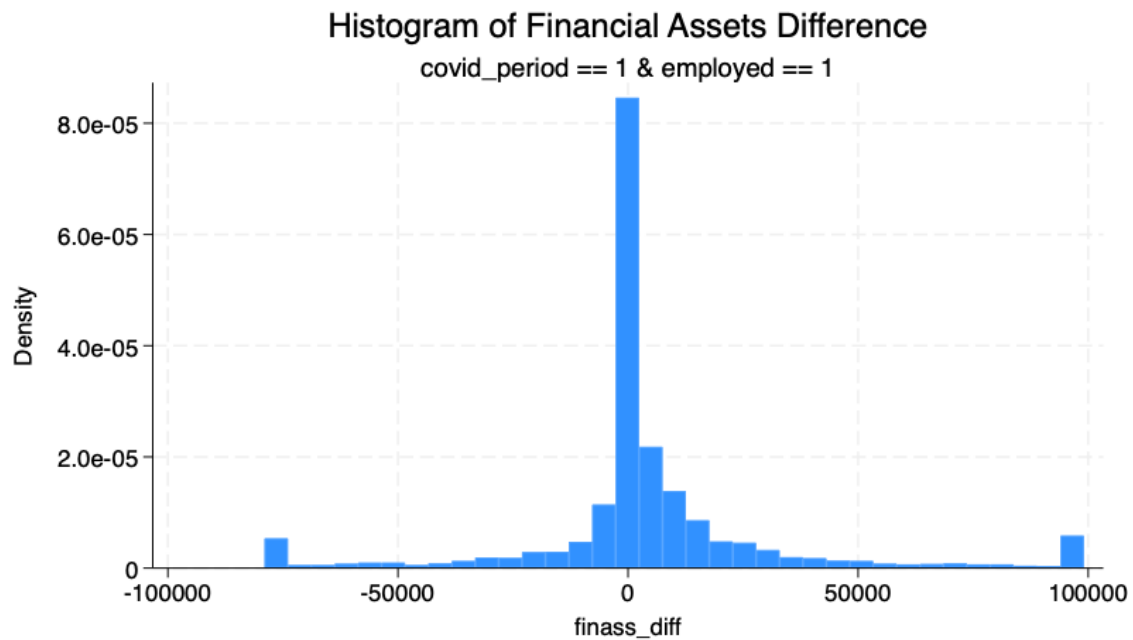


Figure 3 – Histogram of Net Wealth Difference

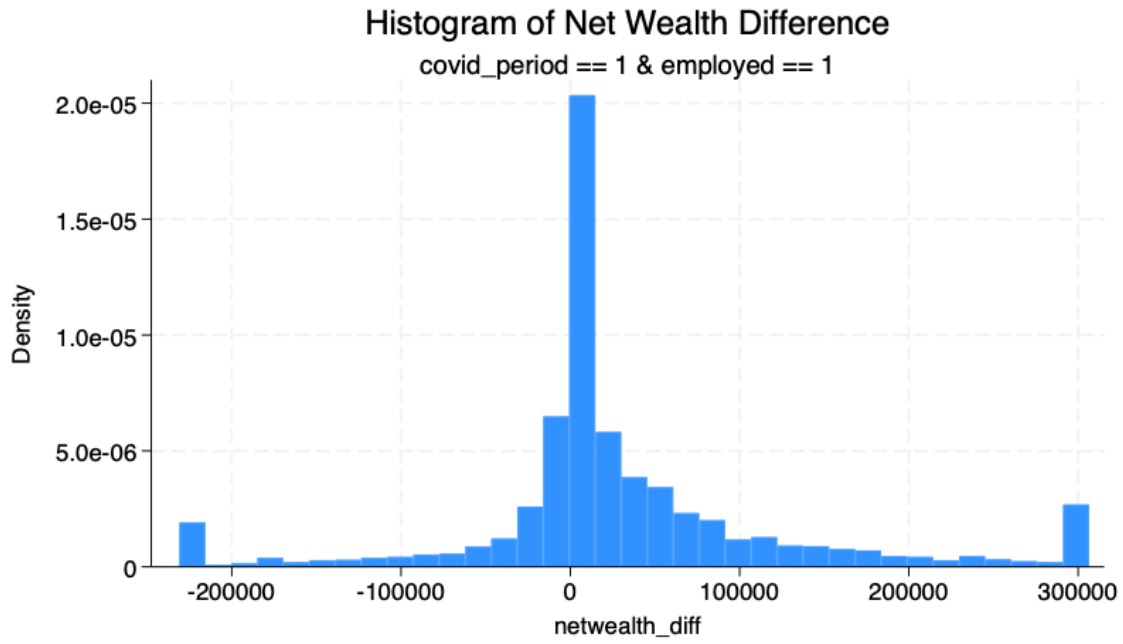


Figure 4 – Histogram of Net Wealth Difference (self-employed)

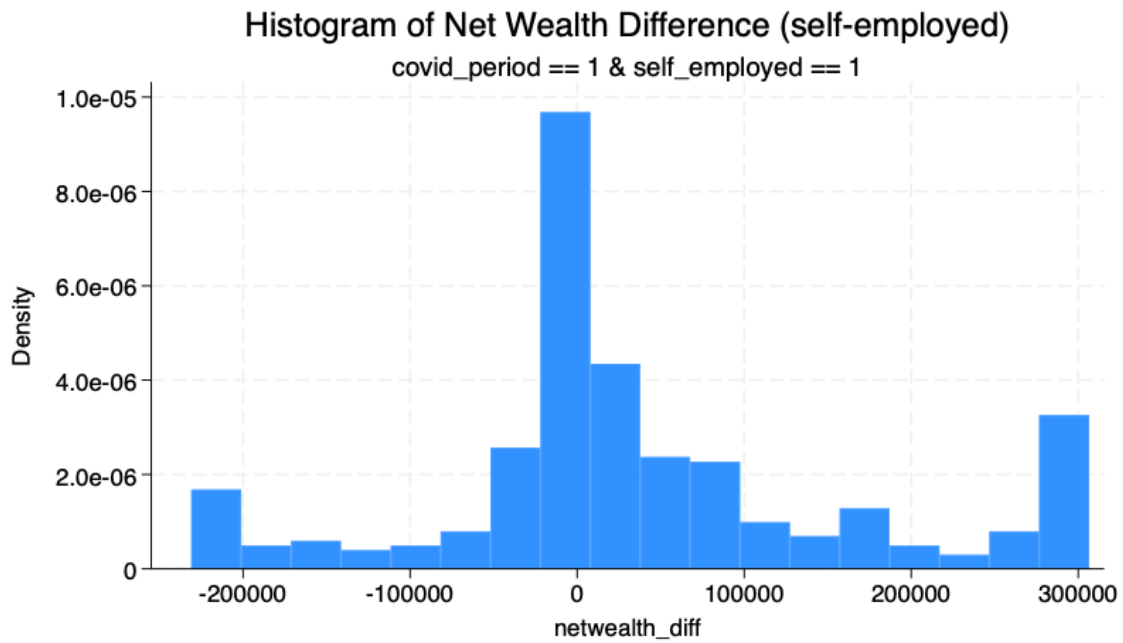
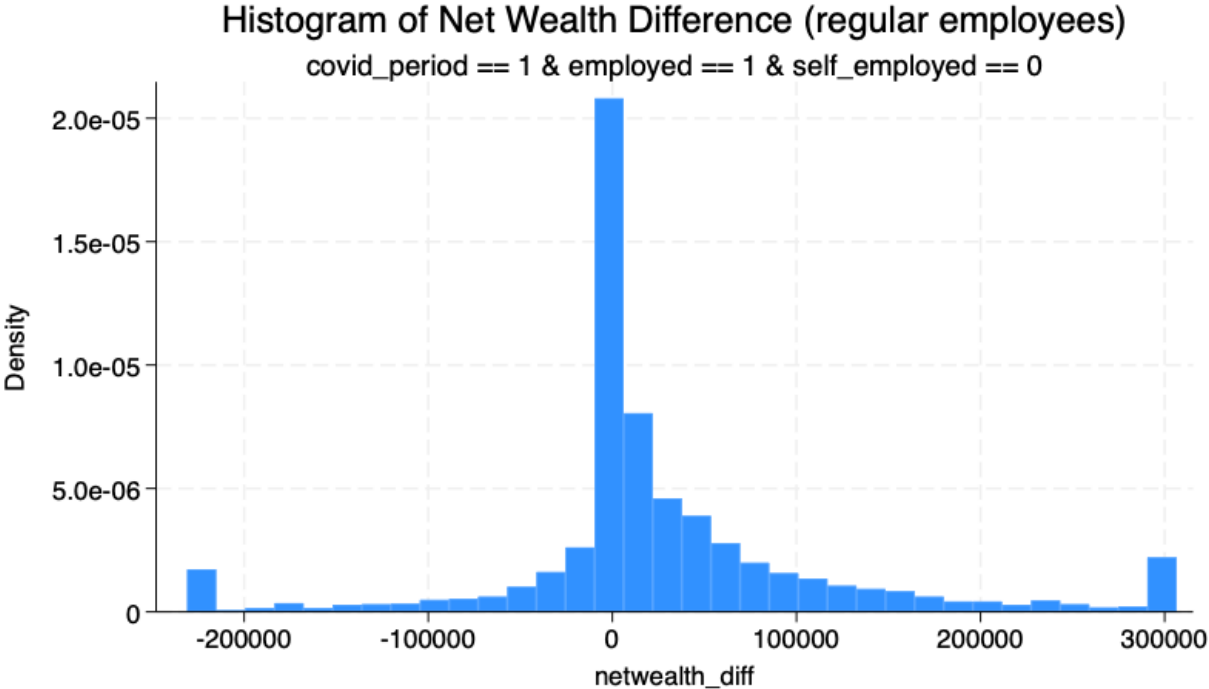


Figure 5 – Histogram of Net Wealth Difference (regular employees)



**B. Variables Summary Statistics**

Figure 6 – Histogram of Age

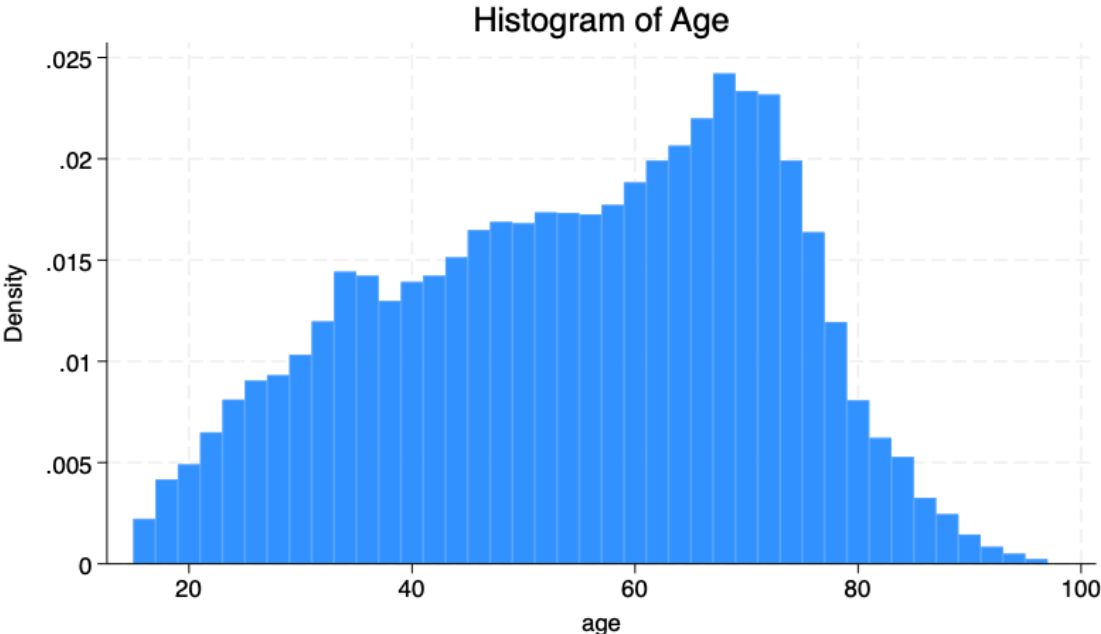


Figure 7 – Pie Chart of Gender

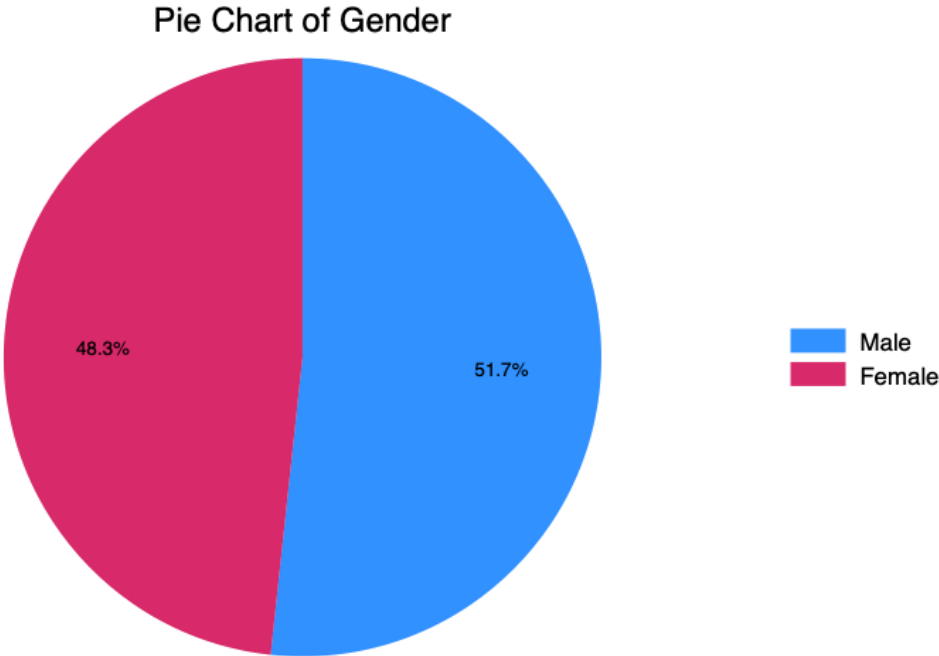


Figure 8 – Pie Chart of Marital Status

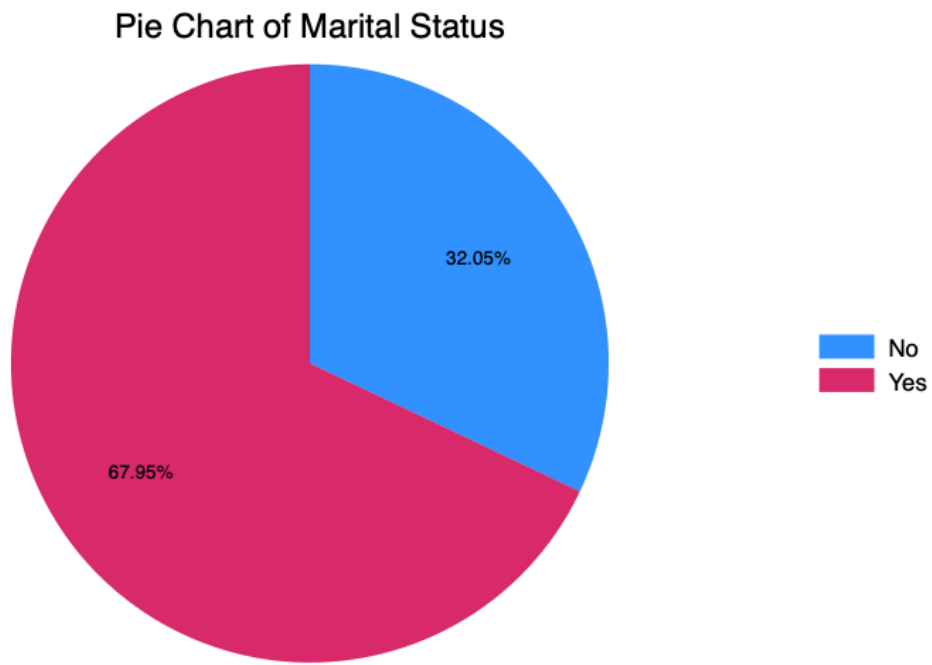


Figure 9 – Pie Chart of Employment Status

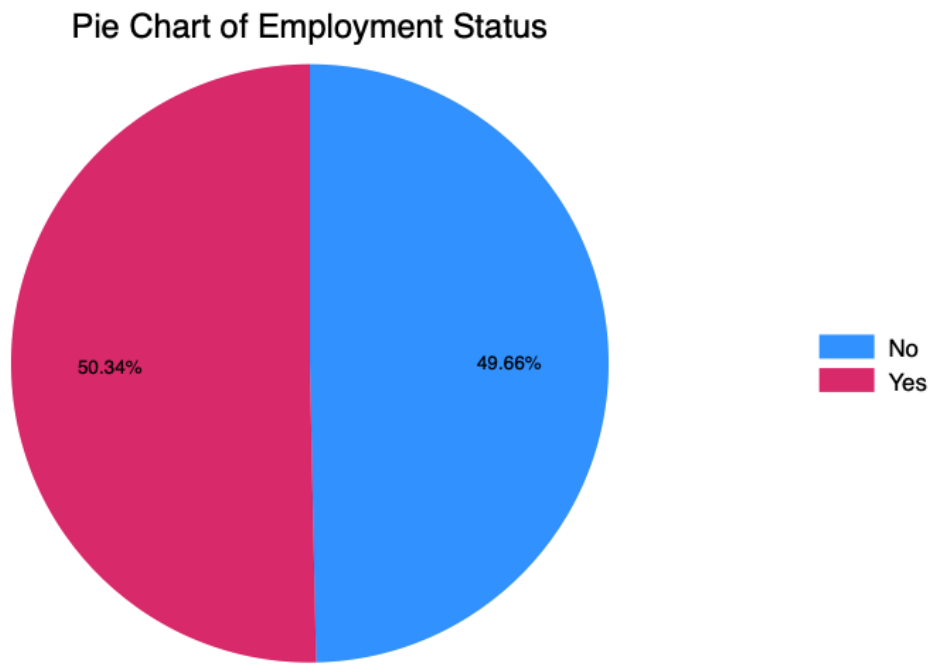


Figure 10 – Pie Chart of Self-Employment Status

Pie Chart of Self-Employment Status

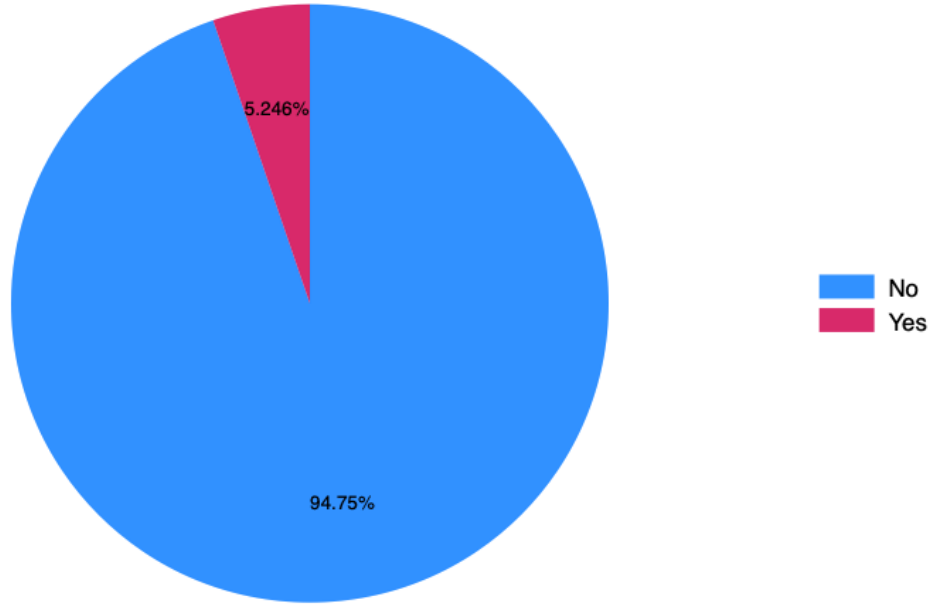


Figure 11 – Pie Chart of High-Education Status

Pie Chart of High-Education Status

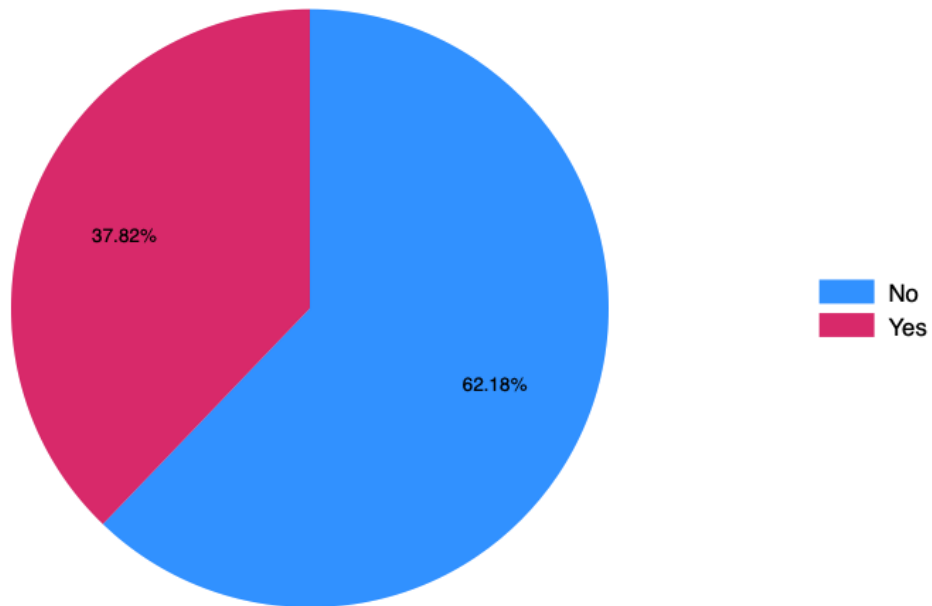


Figure 12 – Histogram of Gross Income

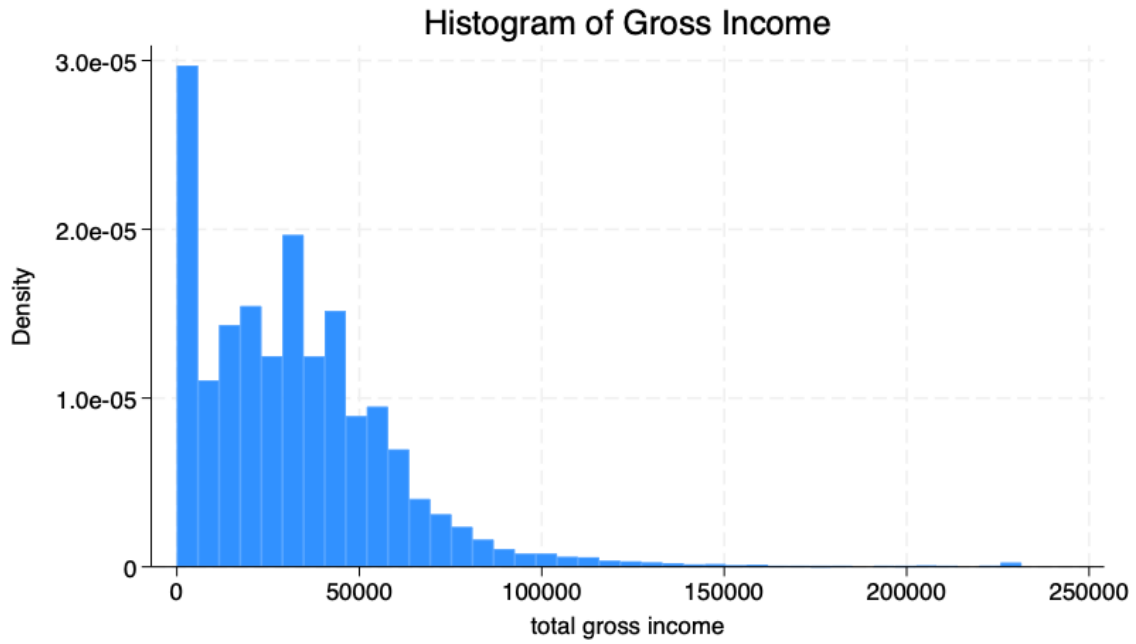


Figure 13 – Histogram of Net Income

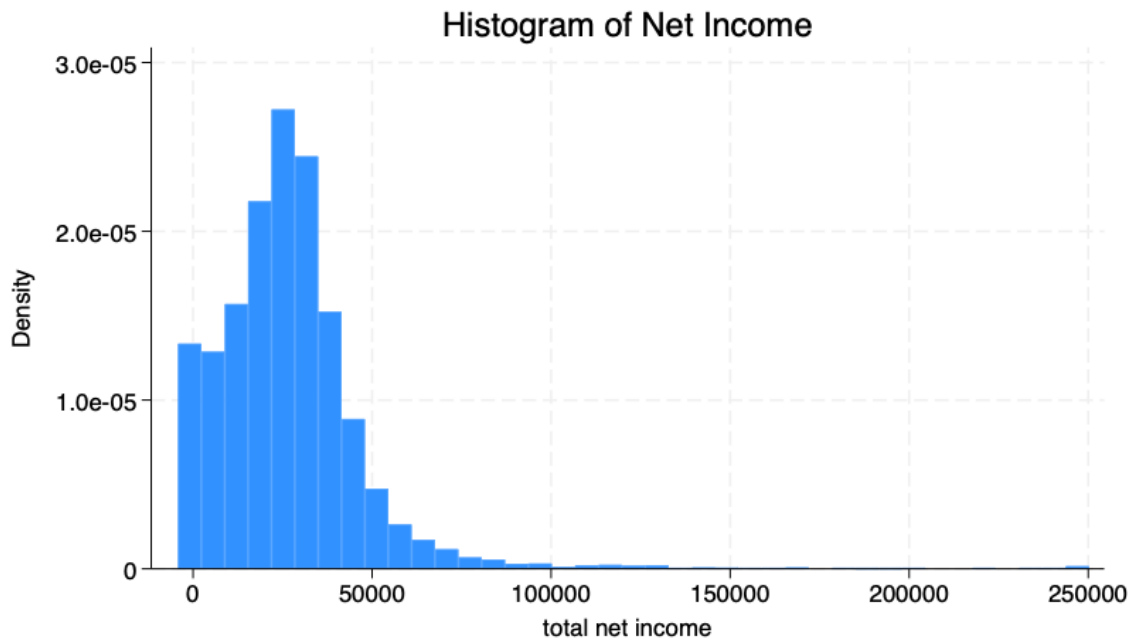


Figure 14 – Histogram of Net Wealth

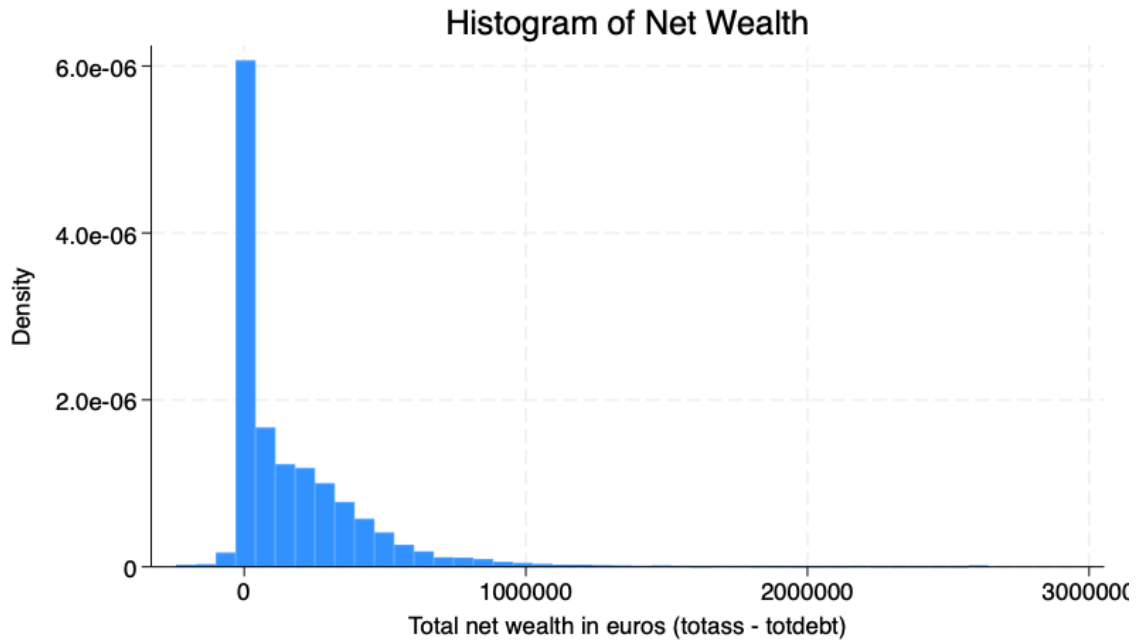


Figure 15 – Histogram of Total Assets

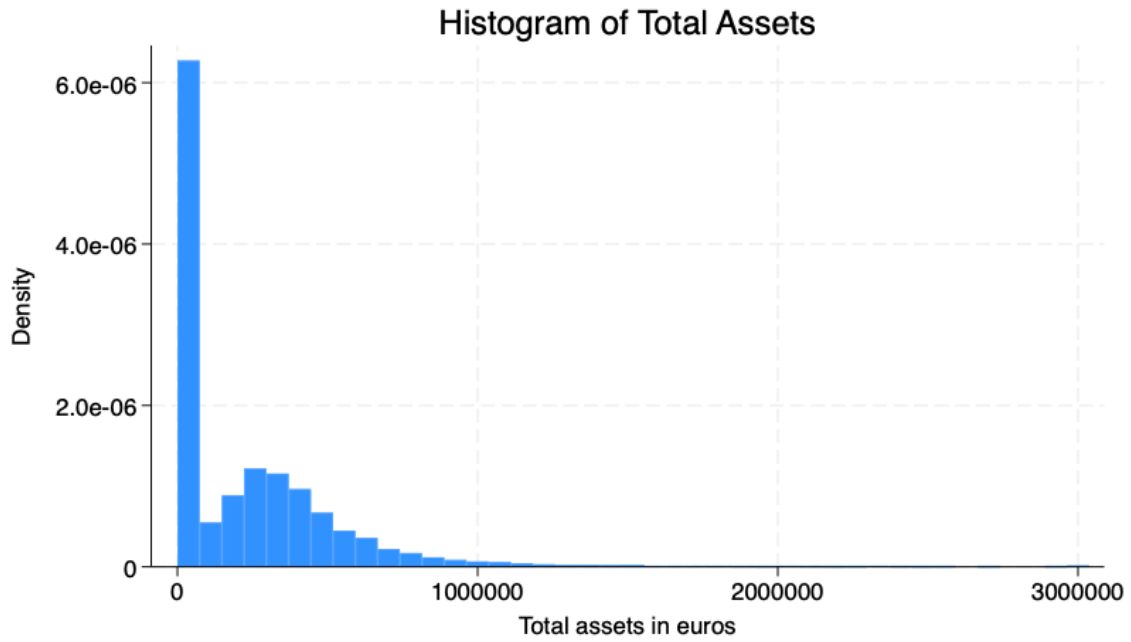


Figure 16 – Histogram of Financial Assets

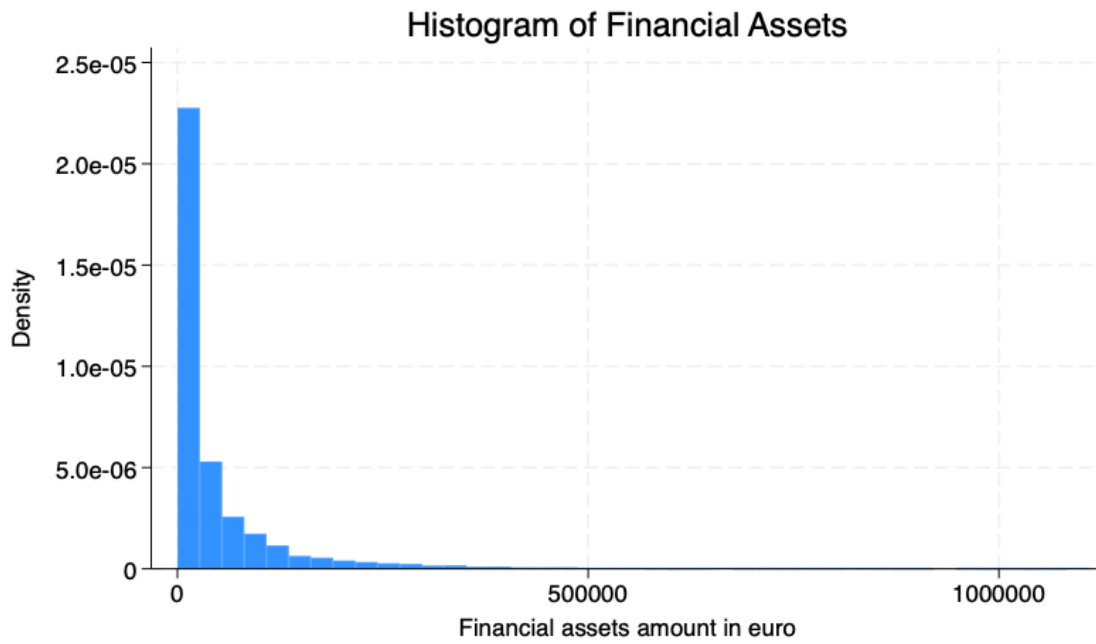


Figure 17 – Histogram of Savings

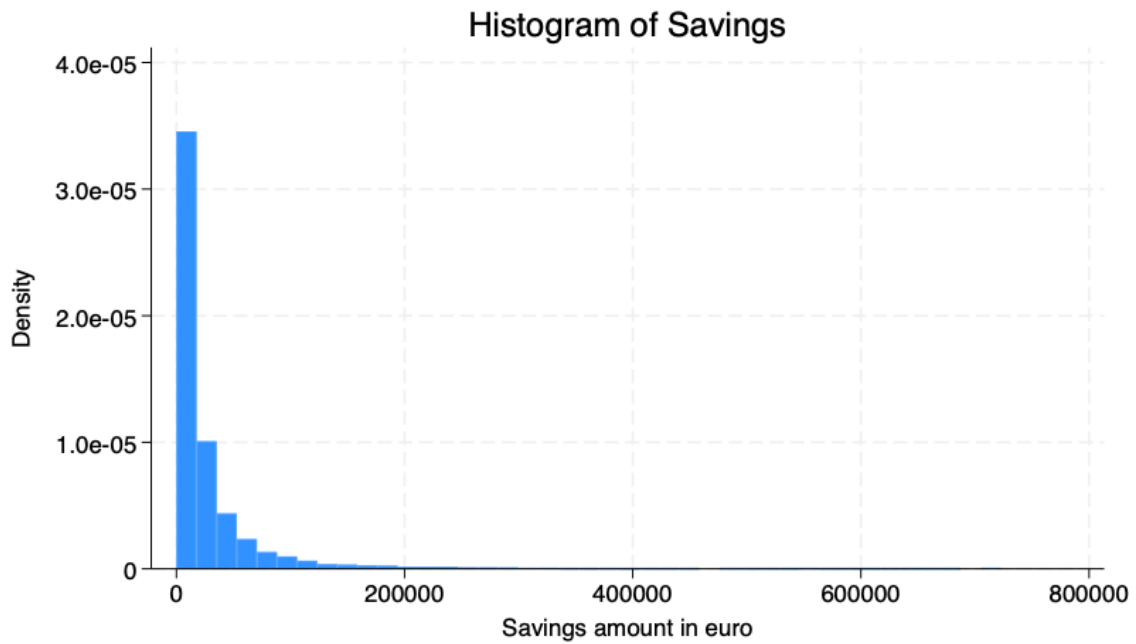


Figure 18 – Histogram of Equity

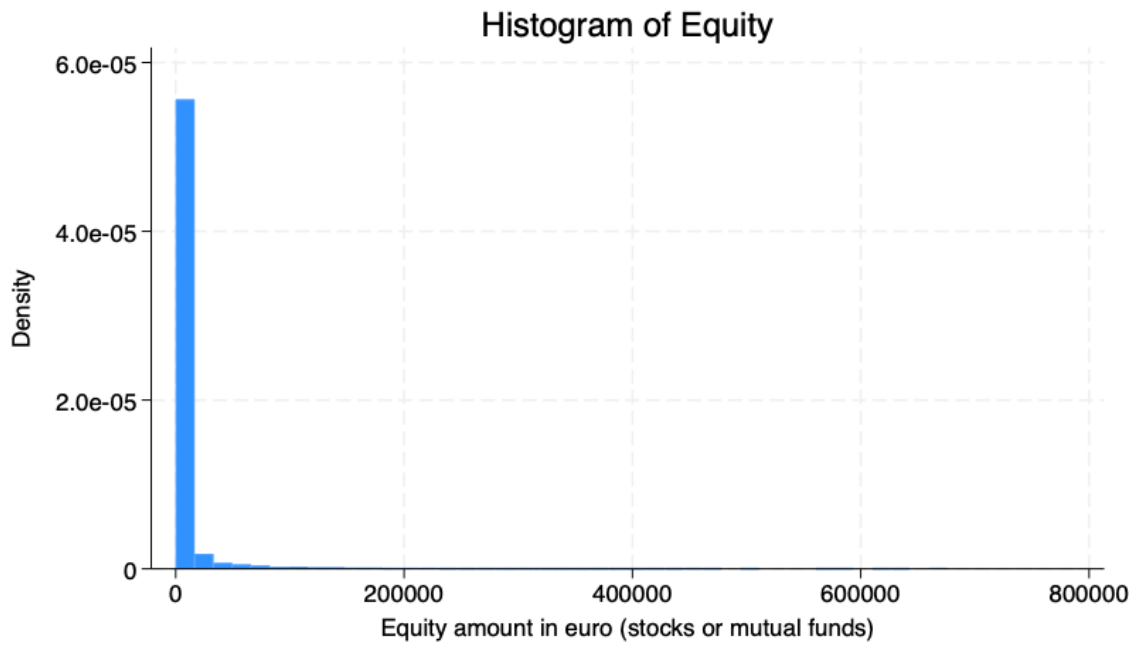


Figure 19 – Histogram of Stocks

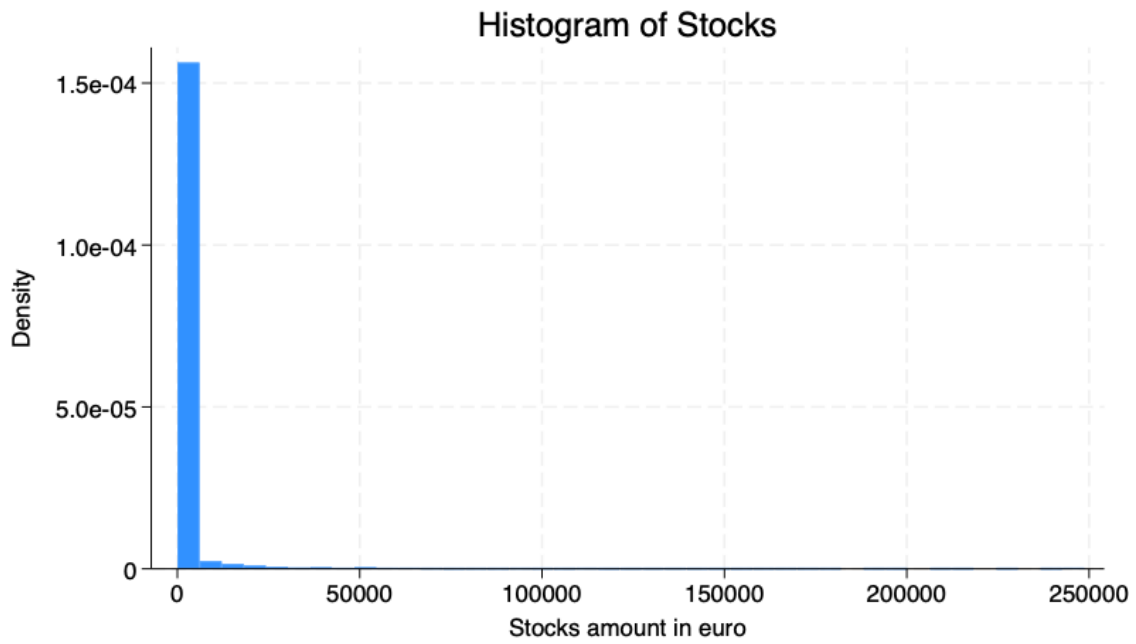


Figure 20 – Histogram of Mutual Funds

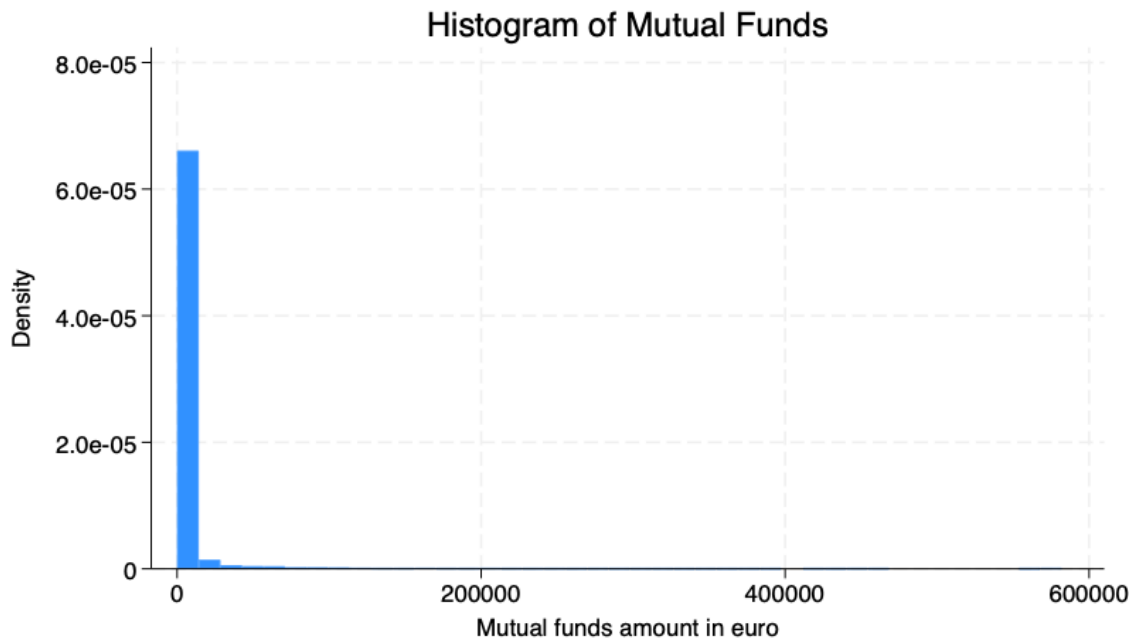


Figure 21 – Histogram of Insurance

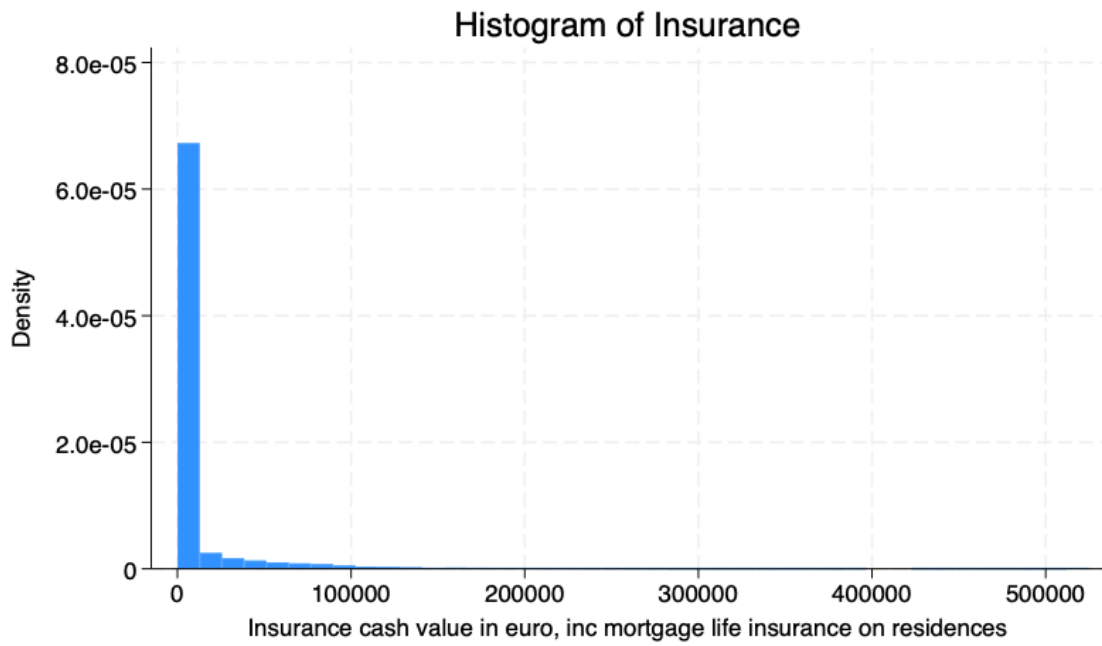


Figure 22 – Histogram of Bonds

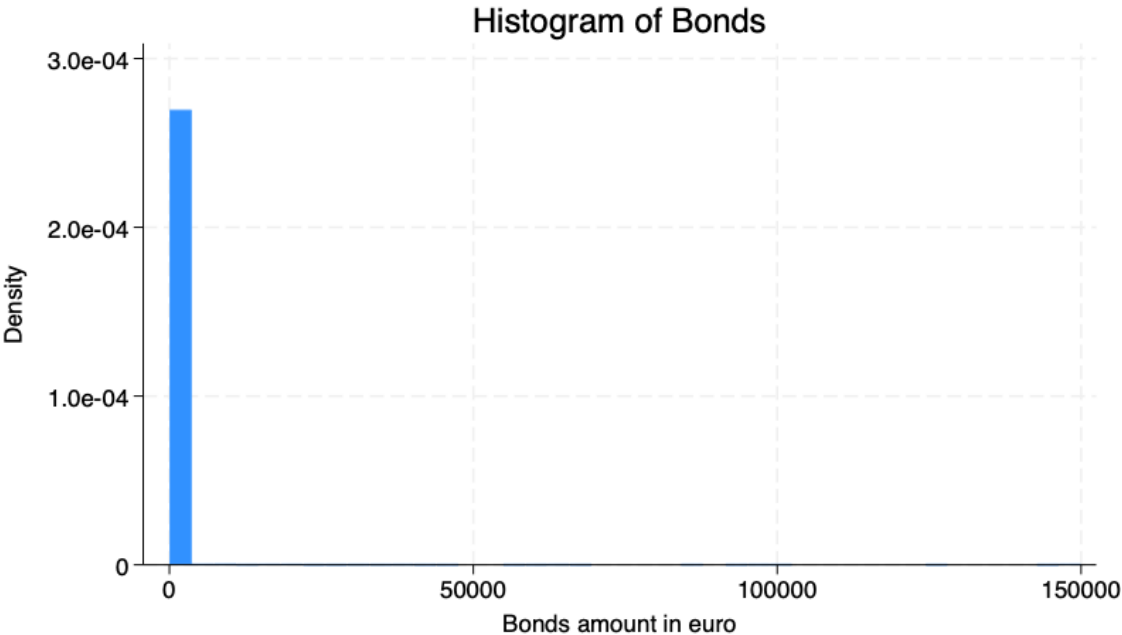


Figure 23 – Histogram of Options

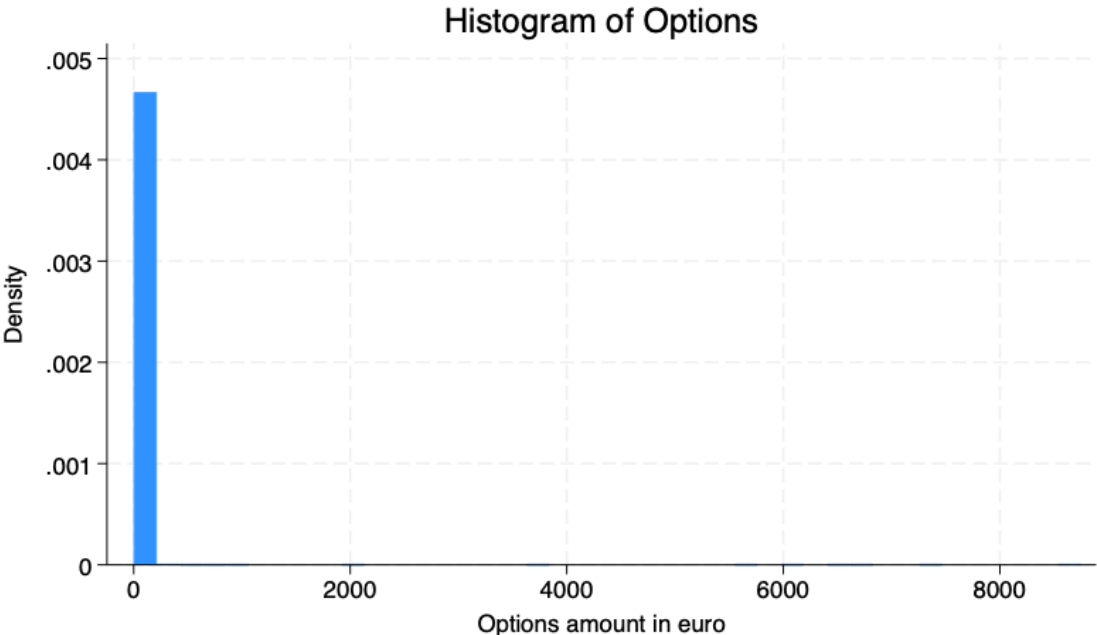


Figure 24 – Histogram of Other Financial Assets

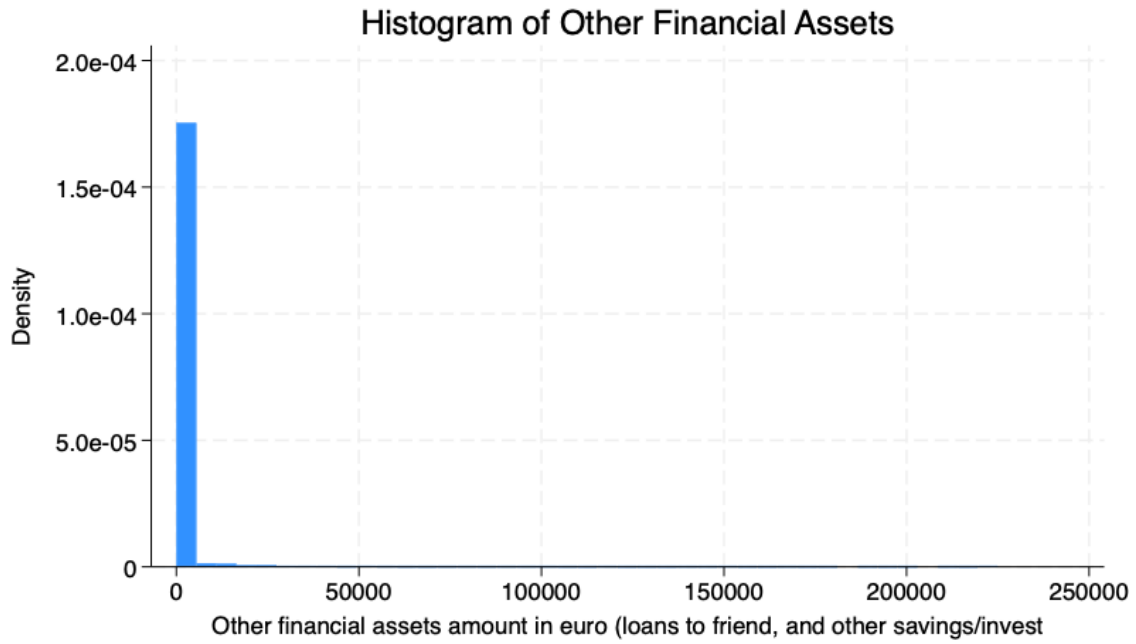


Figure 25 – Histogram of Other Real Assets

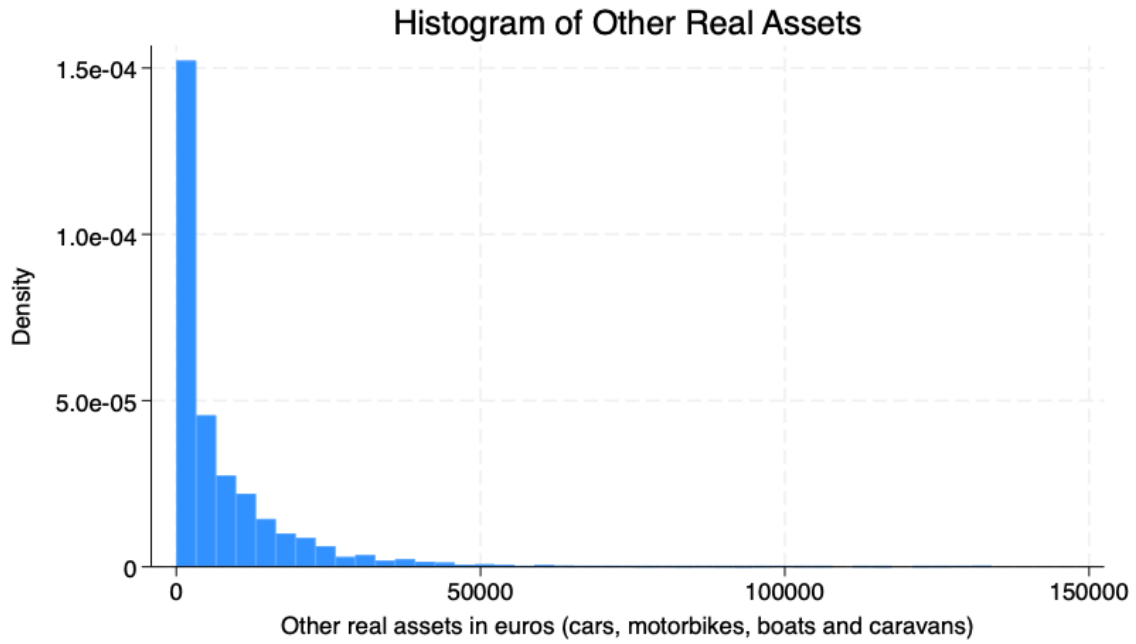


Figure 26 – Histogram of Real Assets Housing

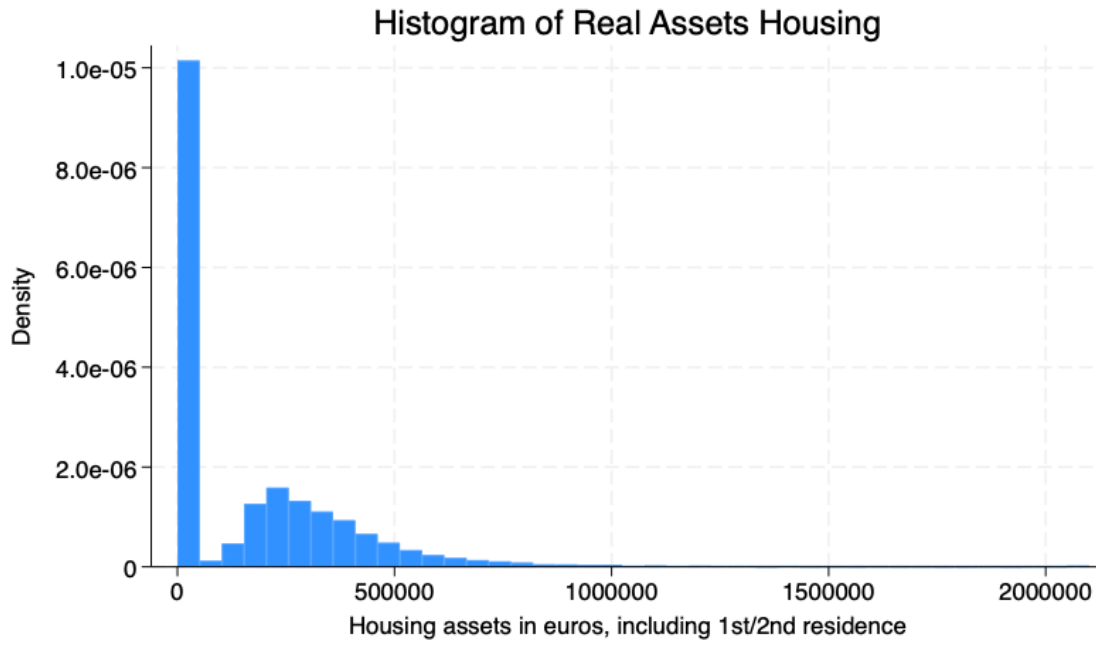


Figure 27 – Histogram of Private Business

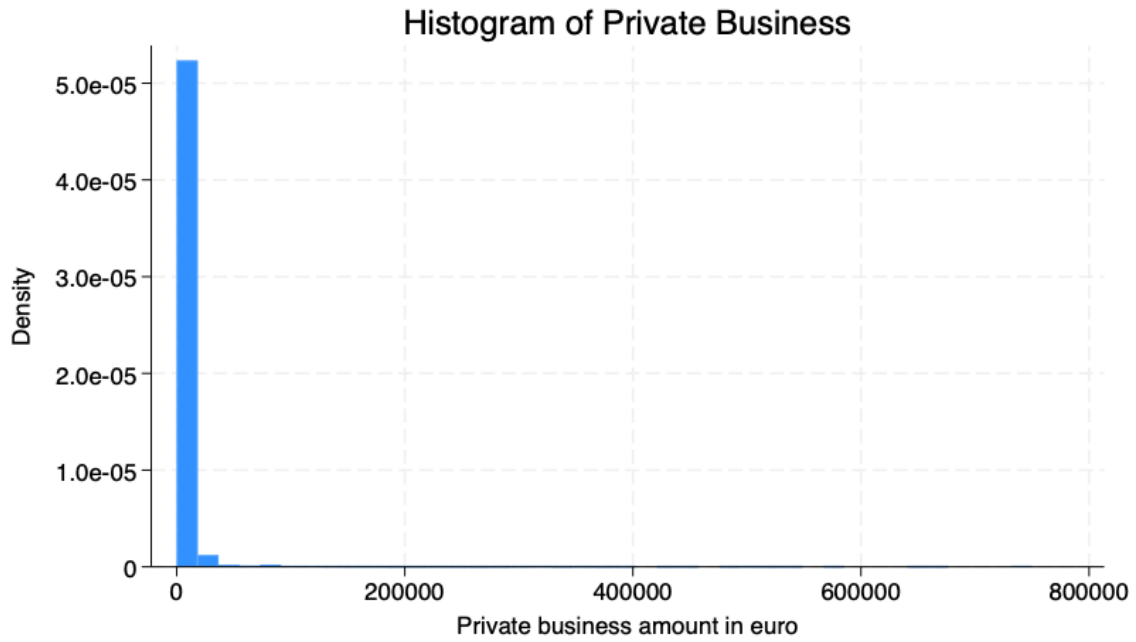


Figure 28 – Histogram of Total Debt

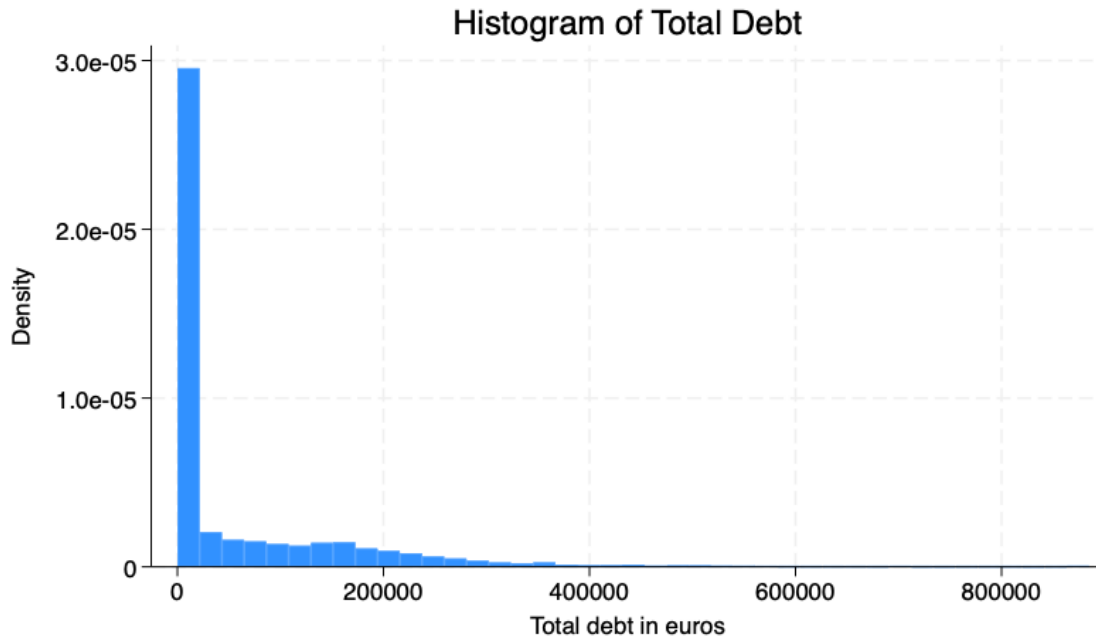


Figure 29 – Histogram of Unsecured Debt

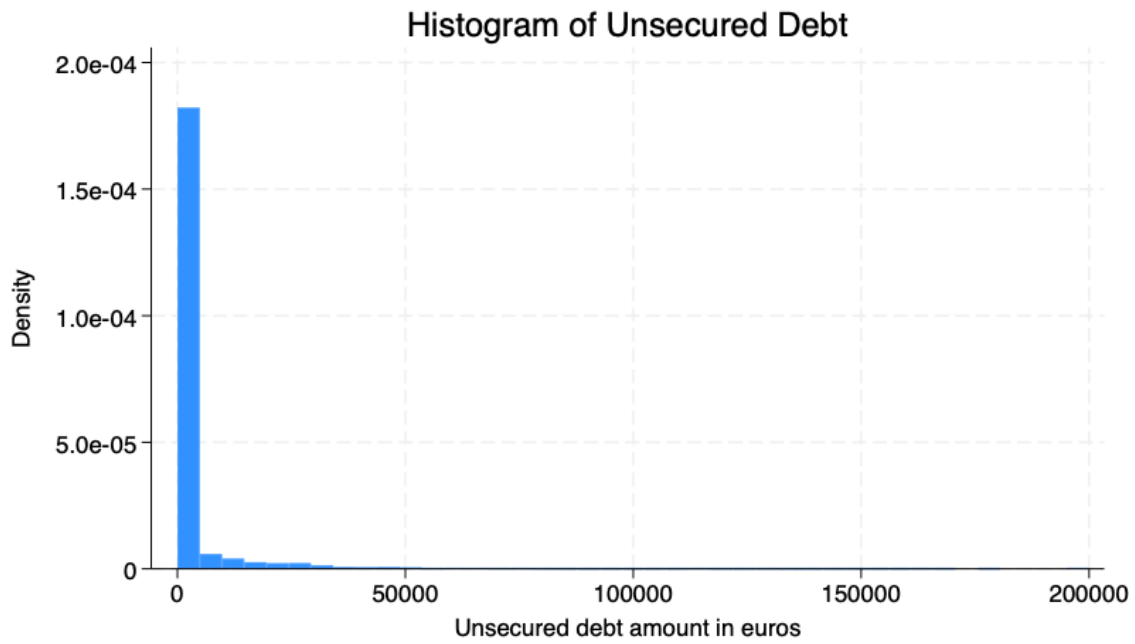


Figure 30 – Histogram of Housing Debt

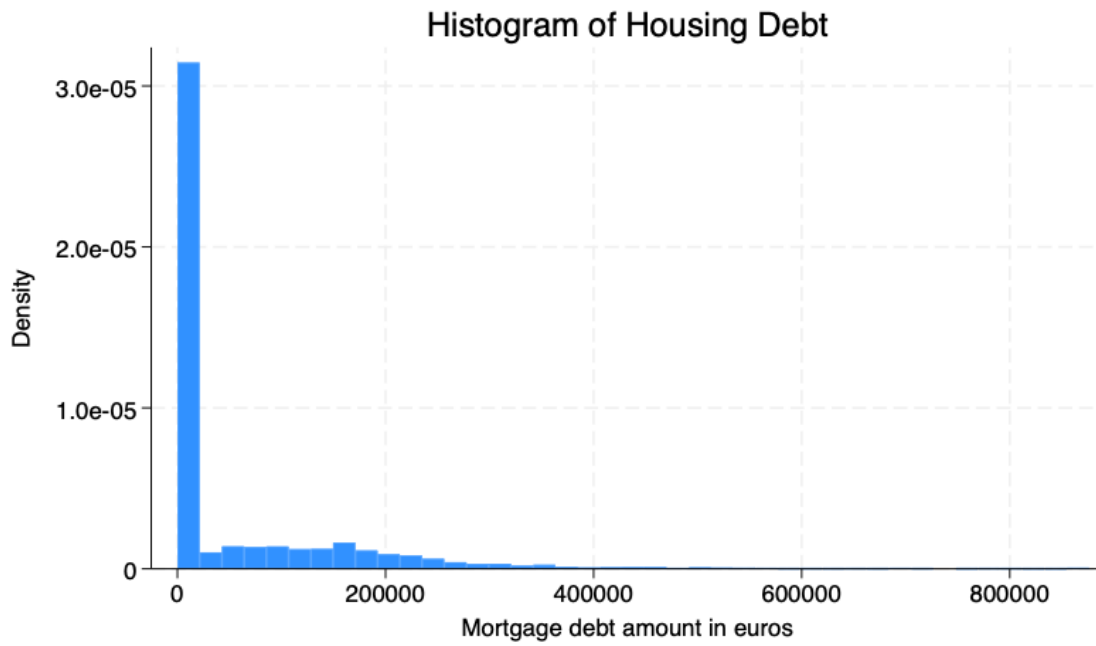


Figure 31 – Histogram of Savings Difference Complete

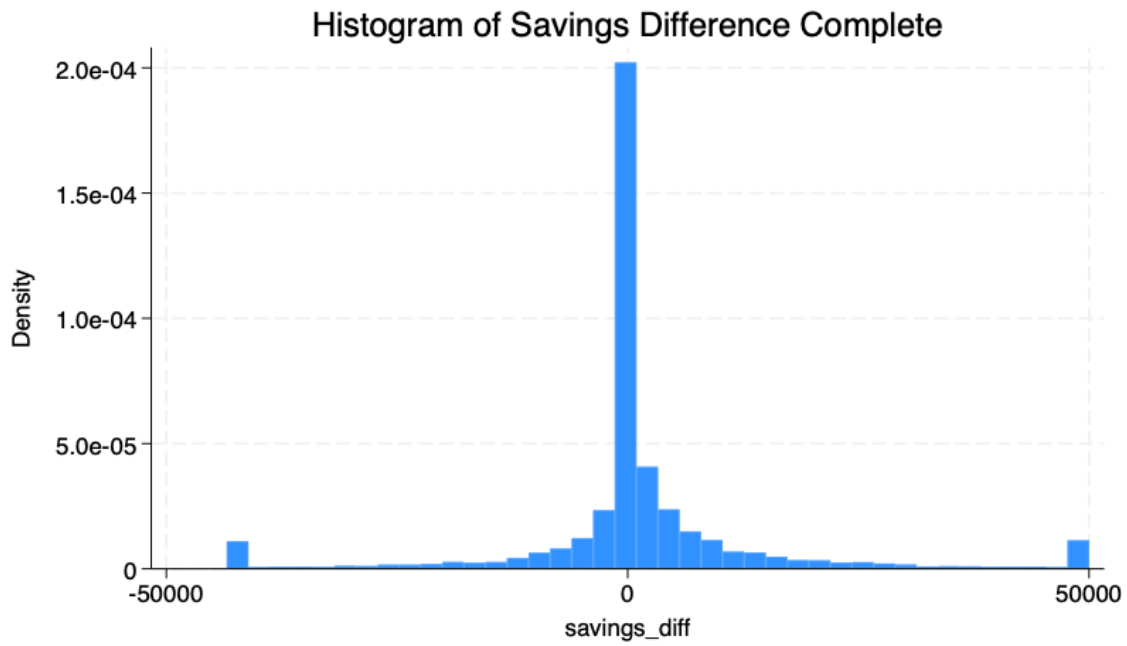


Figure 32 – Histogram of Financial Assets Difference Complete

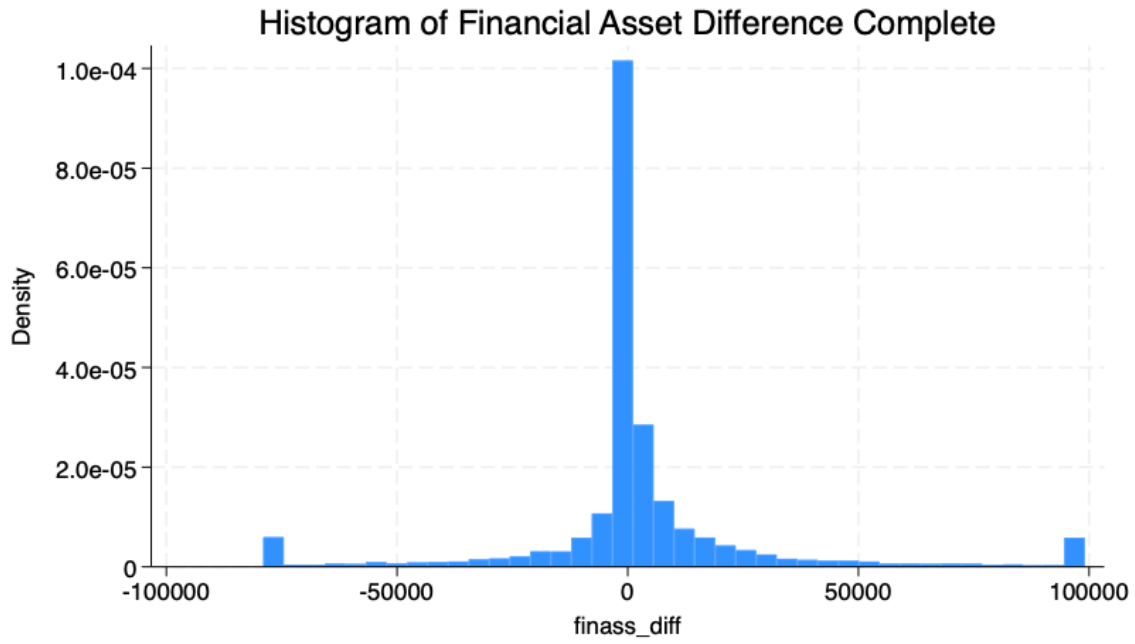


Figure 33 – Histogram of Net Wealth Difference Complete

