Wealth Inequality in the Netherlands: Developments and Causes

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For me, the last three years at Delft University of Technology, one year of which was pre-master's and two years of which were master's, have been a fruitful and insightful period. The speed at which you had to grasp knowledge was much higher than I was used to during my bachelor's. This not only made me more disciplined but also more confident. Beforehand, I thought that this journey was not feasible for me, but here I am.

In the second year of the Master Management of Technology, I took the Economics & Finance specialization, which eventually gave rise to the writing of this thesis. During this specialization, I was lectured frequently by my first supervisor Dr. Servaas Storm. In all the years that I studied, there were not many lectures that I genuinely enjoyed going to. But these lectures are among that select few. Knowledge was conveyed not only in an interactive way, but also with humor, which I think is very important to attract students to the lecture halls and keep them motivated.

I spent a long time searching for a suitable topic to write my thesis on, to the point of frustration. By combining wealth inequality, which came up during the specialization, with a title of a thesis I found in TU Delft's Repository, I found my topic. If I am truthful, it may not have been the most intriguing topic I chose. But I did learn a lot from it, both content-wise and methodically. In addition, it definitely made it easier that Dr. Servaas Storm was my first supervisor. I experienced the collaboration as very pleasant. He regularly put me at ease and when I had questions he was always accessible and responsive. For this I would like to express my sincere gratitude to him. I had slightly less contact with my second supervisor Dr. ir. Udo Pesch. However, the occasions when we discussed the progress of my thesis, the conversations were enjoyable and enlightening. He provided several points of improvement that undoubtedly enhanced the quality of my thesis. Therefore, I would also like to express my gratitude to him for his guidance.

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I hereby present my master's thesis. Hopefully you will gain something from it.

Wessel Griekspoor
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Executive Summary

Wealth inequality exists all over the world. This can be seen as a social problem because it violates accepted norms of egalitarian distribution. Moreover, wealth inequality can negatively affect a number of areas, including economic growth. However, wealth inequality also has advantages. For example, it provides incentives to engage in risky ventures that can lead to a more prosperous society. Thus, it would actually promote technological development and economic growth. The problem remains that wealth inequality above a certain point yields more negative than positive effects. Yet the most optimal point of wealth inequality is difficult to determine and depends on the context in which a country finds itself.

Wealth inequality is clearly a socioeconomic issue and has been increasingly studied internationally in recent years. For the Netherlands, however, it has only been examined in a handful of studies and often only one indicator has been used. The first objective of this thesis is therefore to investigate the development of wealth inequality in the Netherlands using various indicators. Moreover, these studies have done little or no research into the causes of the development of wealth inequality. As such, the second and main objective of this thesis is to examine the causes of this development in the Netherlands. During the Management of Technology (MOT) program at TU Delft, several major social issues related to technology or innovation were addressed. At the time of writing, wealth inequality is a contemporary socioeconomic issue in the Netherlands. It also affects technological development and innovation, making it relevant to the MOT program. Based on the main objective, we formulated the following main research question:

Main RQ: What factors have contributed to the development of wealth inequality in the Netherlands?

To answer this research question, we first conducted a literature review. Here, we addressed the definition of wealth, how wealth inequality can be measured, what had already been researched in the Netherlands, and the possible consequences of wealth inequality. But the most important finding from this literature review was a holistic view of the possible causes of wealth inequality. We did this primarily by analyzing studies that examined wealth inequality in countries similar to the Netherlands. We found that at least 10 macroeconomic and 8 household factors can potentially directly influence wealth inequality in a given country. We also identified indirect factors, but did not include them in this thesis.

After presenting a comprehensive overview of possible causes of wealth inequality, we developed hypotheses for these determinants. At the macroeconomic level, no hypotheses were eventually developed for the factors wealth tax, inheritance tax, and political stability. The latter was not considered relevant for the Netherlands. The other two remained constant over the years and were not meaningful to analyze. Ultimately, a total of 7 hypotheses were developed for the macroeconomic level. We omitted examining the effects of wealth inequality in this thesis, with the exception of the effect of wealth inequality on income inequality. These two factors would reinforce each other and this is better known as the snowballing-effect. Therefore, not 8 but 9 hypotheses were developed for the household level. Based on the formulated hypotheses, a conceptual model was created that served as the basis for the empirical analysis.

A descriptive analysis was then conducted. When collecting the data, the CBS database was

mainly used. Occasionally, data from DNB and the World Bank were used. First, the development of wealth inequality in the Netherlands was examined. Most of the data found on household wealth covered the period 2006-2021. This period was therefore retained for the entire empirical analysis. Three indicators were used to validate the development of wealth inequality. These indicators were found to be highly correlated with each other, allowing the development of wealth inequality in the Netherlands to be confirmed with certainty. From 2006 to 2008, there was a small decline, after which it rose to record levels in 2013. From then on it fell again, and by 2021 the level was about the same as in 2008. Whether this is a desirable level of wealth inequality, we cannot say and requires further research. Subsequently, we examined the development of the possible determinants for which hypotheses were developed. We have not validated the determinants and associated indicators as in the case of wealth inequality (with the exception of income inequality). As a result, the development of the determinants entails some uncertainty. Moreover, we could not find suitable indicators for all determinants. In the end, 6 macroeconomic and 7 household determinants remained for the regression analysis.

With the remaining macroeconomic and household determinants, we first ran a simple regression to filter out the factors with significant influence on wealth inequality. We found that at the macroeconomic level, 3 factors were significant and consistent with the formulated hypotheses: housing prices, generous welfare state, and globalization. At the household level, these were 2 factors: mortgage debts and financial assets ownership rate inequality. Thus, no evidence was found for the snowballing-effect in the Netherlands. Two multiple regression analyses were then conducted: at the macroeconomic level and at the household level. It was found that all macroeconomic determinants were again significant and explained 93.7% of the variance in wealth inequality. Housing prices contributed the most to this, followed by globalization and generous welfare state, respectively. The two household determinants were also found to be significant and explained 73.8% of the variance in wealth inequality. Financial assets ownership rate inequality contributed the most to this. Based on the descriptive and regression analyses, the final conceptual model was created. Due to the limitations of the study, we could not examine whether the two regression models are correlated. Apart from that, however, we can conclude that they both predict the development of wealth inequality quite well, thus answering the main research question.

This study has filled several knowledge gaps by (1) examining and validating the development of wealth inequality in the Netherlands using various indicators, (2) constructing a comprehensive overview of possible causes of wealth inequality, and (3) empirically identifying the causes of the development of wealth inequality in the Netherlands. Furthermore, we can provide a number of insights to policymakers based on our findings. First, policymakers could compare the development of wealth inequality with the policies they implemented during this period to learn from it. This in turn could also provide new insights into the possible causes of wealth inequality in the Netherlands (at the policy level). Moreover, the significantly identified causes offer direct guidance for policymakers to influence wealth inequality in the Netherlands. This is especially true for the determinants generous welfare state, globalization, and financial assets ownership rate inequality, as they can be directly influenced by public policy. Further research should focus on identifying the consequences of the development of wealth inequality in the Netherlands. This can contribute to a better understanding of the desired level of wealth inequality in the Netherlands so that policymakers can manage it more effectively.

Contents

1 Introduction

This chapter provides an introduction to the research that will be conducted. First, the background of the subject will be explained. Then the problem statement of the subject will be highlighted. This problem provides the impetus for the study whose objective and research questions will be addressed thereafter. Finally, there is the thesis outline.

1.1 Background

It is estimated that the bottom 50% of the world's population holds less than 2% of total wealth. In contrast, the top 10% of the world's population holds more than 70% of total wealth. This implies that wealth is very concentrated at the global level (Zucman, 2019). It must be noted that these estimates are not fully representative. However, this does not work in favor of wealth equality. For example, developing countries such as Africa lack appropriate measures to measure household (or private) wealth. As a result, the figures are likely to be higher because the concentration of wealth is even higher in these countries. Over the period from 1980 to 2019, there is evidence of a moderate increase in wealth inequality. The bottom 75% of the world's population remained stable at a share of approximately 10%, while the top 1% rose from 28% to 33% (Zucman, 2019).

Wealth inequality in the U.S. has often been examined in the literature. For example, Wolff (2017) has done this very extensively for the period 1962 to 2016. This study reveals that at 40% in 2016, the wealth share of the top 1% in the U.S. is even higher than at the global level (33% in 2019). Moreover, the top 20% owns almost 90%. In contrast, Zucman (2019) observed that wealth inequality in Europe is significantly lower than the rest of the world, and specifically, the U.S. (Piketty & Saez, 2014). A century ago, this picture looked very different. If we compare Europe to the United States, for example, wealth inequality in the U.S. was much smaller than in Europe (Piketty & Saez, 2014). Since about 1970, however, the roles have been reversed and wealth inequality in the U.S. has increased significantly. This is called "the great reversal of inequality." One of the reasons for this is that the European middle-class holds a relatively large wealth share, made possible by the policies implemented in the decades following World War II. Moreover, private pensions, whose assets have increasingly fallen into hands of the middle-class, have also made a positive contribution to the equalization of wealth distribution in Europe in recent decades (Zucman, 2019). However, Piketty and Saez (2014) said that this share has been declining recently in Europe as well as in the U.S. In addition, Blanchet and Martinez-Toledano (2022) found that the accumulation of wealth at top increased much faster in the U.S. than in Europe. However, this does not imply that wealth inequality is not a problem in Europe.

1.2 Problem Definition

Wealth inequality seems to be prevalent in many countries around the world. So what? According to Peterson (2017), two different perspectives support the claim that it is clearly a social problem. The first perspective has to do with the intrinsic value of inequality, that is, non-distributive justice. Economic inequality can be considered unjust because it violates accepted norms of egalitarian distribution. Saez (2017) also looks into this by arguing that people have a sense of fairness and have certain perceptions about whether the distribution of economic resources is fair. He believes that it is crucial to shed light on this topic by offering metrics of inequality that are transparent and easy for the general public to comprehend. The second per-

spective deals with the fact that reducing inequality has instrumental value. There are at least four areas that are potentially negatively affected by (rising) inequality: individual health and behavior, environmental and social conditions, democratically designed political systems, and economic growth (Peterson, 2017). Adding to these perspectives, Vermeulen (2018) argues that comprehending the distribution of wealth is a key factor in any consideration of tax and redistribution policies. He also emphasizes that measures of wealth held by the richest households are more significant indicators of wealth inequality because wealth tend to be highly concentrated at the top. Despite the evident relevance, measuring the wealth distribution accurately has proven challenging.

However, there are also arguments in favor of wealth inequality. For example, inequality would not matter because people are better off than before thanks to solid economic growth (Peterson, 2017). Others argue that equal opportunity is more important than equal outcomes. If everyone has equal opportunity, inequality of outcomes can be justified (Peterson, 2017). Another argument is that attempts to equalize the distribution of wealth, i.e., reduce inequality, will harm the economic apparatus. The incentives for the rich to engage in risky adventures that could potentially lead to prosperity for society will be adversely affected by these efforts. Inequality would actually promote innovation and economic growth, and therefore be beneficial (Peterson, 2017). Clearly, there are both proponents and opponents of wealth inequality. In any case, it is certain that there is a debate regarding this issue.

The optimal point at which wealth inequality is most beneficial is difficult or impossible to determine and depends on the context in which a country finds itself (e.g., regulations and institutions). The practical problem remains that wealth inequality above a certain point negatively affects a country's economic growth, political power, and society. In addition, wealth inequality may be a consequence of a deep-seated problem that needs to be addressed. According to Saez and Zucman (2016), the wealth distribution is negatively impacted by income inequality. It is claimed that income inequality has a snowballing-effect on the wealth distribution. Richer people tend to save more and consume less per unit of income. This causes wealth to be more concentrated at the top incomes. Higher wealth concentration, in turn, leads to higher capital-income concentration. After all, one receives interest on savings, or one can use savings to invest, for example, in stocks on which one receives dividends. Consequently, income inequality increases, and so does wealth inequality. Hence, this process is self-reinforcing. It has been found that over the past 30 years rising incomes at the top have significantly affected the wealth distribution in the U.S. through the snowballing-effect (Saez & Zucman, 2016). One factor that has contributed to the increase in income and wealth inequality in the U.S. is the 'financialization' of the U.S. economy (Davis & Kim, 2015). That is, the relative growth of the Financial, Insurance, and Real Estate (FIRE) sector in the economy.

1.3 Research Objective

It has become clear that wealth inequality is an issue and that the growth of wealth inequality in Europe is lower than in the rest of the world. But does this also apply to the Netherlands, one of the wealthiest countries in Europe? Multiple studies confirm that between 2006 and 2015 wealth inequality increased in the Netherlands (Balestra & Tonkin, 2018; Salverda, 2019; Van Bavel & Frankema, 2017). In the following years, wealth inequality seems to have decreased (Rijksoverheid, 2022; Toussaint et al., 2022). If we look at the papers and articles that have studied wealth inequality in the Netherlands, they have generally done so using only the Gini

coefficient and/or the top wealth shares. This study attempts to give a more complete picture by using more indicators of wealth inequality. The first aim of this study is to *investigate how wealth inequality in the Netherlands developed before and after 2015, according to various indicators*. In addition, the studies just mentioned have done little or no research on the causes of the development of wealth inequality. Therefore, the second and main objective of this study is *to examine the causes of this development or trend*. The literature on the causes of wealth inequality is quite fragmented. There are many studies that focus on one or a few causes of wealth inequality, but few, if any, that provide a holistic understanding of all possible causes. This study attempts to change that. We would also have liked to examine the effects of wealth inequality, but this was not feasible due to time constraints for this study.

1.4 Research Questions

Based on the main research objective established in the previous subsection, one main research question can be formulated:

Main RQ: What factors have contributed to the development of wealth inequality in the Netherlands?

To answer this question, we must first answer three sub-research questions. These should suffice as guidelines for this study and are as follows:

SRQ 1: What are possible causes of wealth inequality?

SRQ 2: How did wealth inequality develop in the Netherlands before and after 2015?

SRQ 3: How have the possible causes of wealth inequality developed over the years in the Netherlands?

The above-mentioned questions will be answered process-wise. Section 3 will conduct a literature review to analyze what has already been researched so far about wealth inequality in the Netherlands, and what are possible causes of wealth inequality. This literature review identifies the knowledge gap that this thesis seeks to fill and forms the basis of the entire study. From here, descriptive and regression analyses can be conducted. Each section forms a puzzle piece which can collectively answer the research questions.

1.5 Theoretical and Practical Contributions

This thesis also aims to contribute to the academic literature on wealth inequality studies. In particular, leading countries such as the U.S. and the U.K. have been widely studied, but there is very little literature that has examined the development of wealth inequality in the Netherlands. A possible reason for this could be that little data has been recorded and published for the Netherlands on this topic. When the Netherlands has been studied, different data and measurement tools have often been used. First, this thesis contributes to the literature on wealth inequality in the Netherlands by using different measurement instruments and checking the consistency between the instruments to validate the development. Second, it contributes to the literature examining the causes of wealth inequality. There are few, if any, studies that have done a comprehensive review of possible causes of wealth inequality. For the Netherlands, this would be the first study to test many different factors for causality. Moreover, this thesis aims

to provide additional guidance to policymakers. If the level of wealth inequality is deemed sub-optimal, it is now clearer which controls can be turned to change it.

1.6 Relevance to Management of Technology

Throughout the Management of Technology (MOT) program at TU Delft, several major societal issues were addressed, ranging from ethics to economics and finance. Almost all of these issues had an interface with technology or innovation. This thesis examines the development of wealth inequality in the Netherlands. At the time of writing, this is a very contemporary socioeconomic issue and widely discussed in the media and by politicians. Besides, it is also a societal issue outside the Netherlands. Furthermore, wealth inequality also affects technological development and innovation. A certain level of wealth inequality encourages wealthier people and entrepreneurs to innovate. If inequality is curtailed, the incentives for the wealthy to engage in these risky adventures are negatively affected. While this research does not focus on examining the effect of wealth inequality on innovation and economic growth, it does provide a basis for further research and thus interfaces with technology. Finally, this thesis applied both analytical and research skills acquired during the MOT program.

1.7 Thesis Outline

The thesis is structured as follows. In the first following section, Section 2, we discuss the research methodology, establishing the research strategies as well as how we will collect and analyze data. In Section 3, a literature review is conducted. This section defines the concept of wealth inequality, how it can be measured, and how it has developed in the Netherlands in recent years according to the literature. The causes and consequences of wealth inequality are also studied. Section 4 develops hypotheses and presents a conceptual model with the possible causes of wealth inequality, some of which will be tested for the Netherlands. Section 5 reports the results of descriptive and inferential statistics. First, the descriptive statistics concerning wealth inequality in the Netherlands and the possible causes of wealth inequality in the Netherlands are presented. Subsequently, the results of the regression analyses are reported and, lastly, the final conceptual model is presented. Section 6 discusses and interprets the results in detail. This section will also include theoretical contributions, practical implications, limitations, further research avenues, and reflections. Finally, Section 7 deals with the main conclusions of this thesis.

2 Research Methodology

The research objectives and research questions have already been addressed in Section 1. For convenience, we repeat the research objectives because this section is based on them. Moreover, there is no harm in restating them so that we can once again recall what this thesis is about. The two main objectives of this study are as follows:

1. *Find out how wealth inequality in the Netherlands developed before and after 2015.*
2. *Examine the causes of this development or trend.*

This section aims to establish the research design and methodology to achieve these goals. First, the research strategies that can be used to answer the research questions are discussed. Second, the data collection methods are discussed. Finally, it is explained how the data are analyzed.

2.1 Research Strategies

The research strategy depends on the research objective and the type of research questions. In general, there are three types of questions that research projects attempt to answer: exploratory, descriptive, and causal questions (Sekaran & Bougie, 2016). Exploratory questions are typically asked when (1) existing research findings have many limitations or are unclear; (2) not much is known about the topic; (3) the topic is very complex; or (4) not enough theory is available to develop a theoretical framework. In general, exploratory research uses a qualitative approach to collect data. Examples include interviews, case studies, and focus groups (Sekaran & Bougie, 2016). Descriptive questions are used, among other things, to describe certain characteristics of situations, events, or objects (e.g., organizations, products, or persons). Descriptive research can be qualitative or quantitative. Qualitative data collected may describe, for example, how people in a society are affected by a problem. Quantitative data involves collecting data on, for example, the demographics of a country. If a researcher is interested in relationships between variables, he can conduct a correlational study. Note that when a correlation is found between two variables, it does not imply that there is a causal relationship (Sekaran & Bougie, 2016). Causal (explanatory) questions are used to determine whether one variable causes a change in another variable. Suppose X is the independent variable and should cause a change in Y, the dependent variable. To show a causal relationship, four conditions must be met: (1) X and Y should correlate; (2) X should precede Y; (3) no factor other than X should cause a change in Y; and (4) a theory is needed to explain why X affects Y (Sekaran & Bougie, 2016). It is common within a project to try to answer different types of research questions. Usually, exploratory research lays the foundation for descriptive research, and in turn, descriptive research lays the foundation for causal research. Because different types of research questions were formulated in Subsection 1.4, different research strategies are required.

The first sub-research question (SRQ 1) can be seen as a descriptive research question because it describes the possible causes of wealth inequality. To answer this question, a literature review is most appropriate, which is a qualitative approach. The second and third sub-research questions (SRQ 2 and SRQ 3) can both also be seen as descriptive research questions, as it describes the development of wealth inequality and its possible causes. In either case, it is most appropriate to use database research, which is a quantitative approach. The main research question (Main RQ) can be seen as a causal research question, as we want to find out the factors (causes) that contributed to the development of wealth inequality (consequence). Again, this is a quantitative approach, and the answers to SRQ 2 and SRQ 3 allow us to answer this question.

2.2 Data Collection

As discussed in the previous subsection, a literature review is best suited to answer SRQ 1. In the literature review, we critically assess the work of others and summarize the main issues. To gather the necessary qualitative material as efficiently as possible, we created a literature review approach that can be found in Appendix A. An overview of the keywords, selection criteria, and search terms used during the literature review is provided here. On the other hand, database research is best suited to answer SRQ 2 and SRQ 3. The method of data collection during this study is as follows. First, for each factor and associated hypothesis formulated in Section 4, one or more indicators were determined to be representative. The indicators were mainly adopted from the literature. However, in some cases the indicator was constructed by logical reasoning. For example, when it was not clear from the literature which indicator had been used to measure a particular determinant. This will be clarified in Section 5 for each selected indicator. These indicators were then searched in various databases, but mainly in that of Statistics Netherlands (CBS), better known as StatLine (CBS, n.d.-b). This database offers many figures on Dutch society and economy and is accessible to everyone. Moreover, over the years it has collected a lot of data on the wealth of Dutch households. These data can be put to good use because households are usually the unit of analysis in studies that investigate wealth inequality. For most factors, therefore, the CBS with its data was able to provide a solution. In a few cases, another database was used. For each factor and associated indicator(s), the relevant datasets were downloaded and the data were processed and prepared in Microsoft Excel. Data related to wealth inequality in the Netherlands were available in most cases for the period 2006 through 2021. Therefore, this data collection period was also retained for all other factors so that data could be analyzed consistently over the same period. The datasets used did not indicate whether they were nominal (not inflation-adjusted) or real (inflation-adjusted) figures. Therefore, it is assumed that all data collected are presented in nominal figures. In some cases, the indicators themselves had to be calculated with the available data. If this was the case, this is also mentioned and an explanation is given.

2.3 Data Analysis

The first step in the data analysis is to examine the development of wealth inequality in the Netherlands. This will be done mainly with descriptive statistics. For example, various indicators of wealth inequality will be displayed in graphs. In this way, an attempt will be made to paint as holistic a picture as possible of the development of wealth inequality. The second step is practically the same as the first step, but now we will look at the development of possible causes in the Netherlands. The third step is to test the causality of the various factors that may influence the development of wealth inequality using the hypotheses developed following the literature review. This will be done for each factor and corresponding indicator using a simple regression analysis in Excel. This is used when a single independent variable is said to influence a single dependent variable (Sekaran & Bougie, 2016). For example, if we suppose that only housing prices affect wealth inequality. The α-value used to test significance is 0.05. If the p-value is less than α, it means that the alternative hypothesis (see Section 4) may be accepted. Put differently, in that case there is a significant relationship between the independent and dependent variable. If a factor is not significant, then it is considered not to contribute to wealth inequality and thus not a cause in the Netherlands. The remaining significant factors are used in a multiple regression analysis. The idea of this method is similar to that of simple regression analysis. Only in this case, multiple independent variables are used that can explain the variance in the dependent variable (Sekaran & Bougie, 2016). The factors with a p-value

smaller than α can be considered as the factors that significantly influence the development of wealth inequality in the Netherlands. However, this does not mean that non-significant factors in other countries could not have an impact.

Note (again) that there is an important difference between correlation and causation. If there is a correlation between two variables, a relationship exists between them. However, that does not mean that a change in one variable is the cause of a change in the other variable. When a causal relationship is established, it does mean that a change in one variable causes a change in another variable. Causal relationships can only be established through experiments (Sekaran & Bougie, 2016). As mentioned earlier in Subsection 2.1, four conditions must be met to establish causation:

1. X (independent variable) and Y (dependent variable) should correlate.
2. X should precede Y.
3. No factor other than X should cause a change in Y.
4. A theory is needed to explain why X affects Y.

Conditions (1) and (4) can be determined independently of an experiment, but conditions (2) and (3) can only be controlled during an experiment. Conducting an experiment is simply not possible for this macroeconomic issue. This is because we cannot test how, for example, housing prices affect wealth inequality while controlling for all other factors. In addition, we cannot manipulate housing prices. Thus, it is not possible to establish rock-solid causality for the possible causes of wealth inequality because we cannot satisfy conditions (2) and (3). However, we use regression analysis in this study because it is not much different from correlation analysis. If certain results are significant, although a rock-solid causal relationship cannot be established, at least a correlation can be established. With these kinds of issues, the conditions for causality are simply always problematic.

3 Literature Review

This literature review examines the degree of wealth inequality in the Netherlands, how it has changed in the past decades, its causes and consequences. The purpose of this literature review is to find potential knowledge gaps. The research question is as follows: *How has wealth inequality in the Netherlands changed in the past decades and what are its causes and consequences?* The structure of this literature review is as follows. Subsection 3.1 discusses the difference between wealth and income and the definition of wealth. Subsection 3.2 analyzes how wealth inequality can be measured, along with the difficulties and limitations. Subsection 3.3 looks at how the wealth distribution in the Netherlands has changed in recent decades and whether inequality has increased. Subsection 3.4 and Subsection 3.5 discuss the causes and consequences of wealth inequality, respectively. Finally, Subsection 3.6 summarizes the main findings and identifies the knowledge gaps. The approach to the literature review is provided in Appendix A.

3.1 Definition of Wealth

To avoid confusion, I first want to emphasize that there is a major difference between income and wealth. The main difference between the two is that income is a flow and corresponds to the amount of goods and services produced and distributed annually. On the contrary, wealth is a stock and corresponds to the total wealth one possesses at a certain point in time (Piketty & Saez, 2014). This stock is generated from wealth that was accumulated or gained in the past by means of, for example, savings or inheritances. When income is broken down, it can be divided into two categories: capital income (e.g., dividends, interest, capital gains) and labor income (e.g., wages, bonuses). Looking at the differences between income inequality and wealth inequality, the latter is always greater. This is because the bottom 50% of households, when looking at wealth, have practically nothing. This, in turn, also means that they have no capital income (Saez, 2017). It also follows that the income concentration is always smaller compared to the wealth concentration (Piketty & Saez, 2014). The wealth-to-income ratio is an insightful measure to see how much wealth there is in a society relative to income.

When defining wealth, the unit of analysis is very important. Usually, the household is taken as the unit of analysis, and therefore the definition is also commonly referred to as net household wealth or private wealth (Blanchet & Martinez-Toledano, 2022; Causa et al., 2019; Cowell & Van Kerm, 2015; Killewald et al., 2017; Piketty & Zucman, 2015; Saez & Zucman, 2016). Simply put, net household wealth is the difference between the current value of all assets minus the current value of all liabilities of households. However, Advani et al. (2021) do not take households as the unit of analysis, but individuals within households. One of the disadvantages of the household as the unit of analysis is that the analysis might under represent wealth inequalities. For example, women tend to own fewer wealth because they have lower pension assets due to lower wages. Balestra and Tonkin (2018) also show that it can be useful to take the individual as the unit of analysis. They examined the differences between average household wealth and average individual wealth in OECD countries. When the two are compared, with respect to the ranking of countries, there is especially more variation in the middle rankings.

The definition of net household wealth sounds quite intuitive, however, what exactly do assets and liabilities encompass? Most scholars use the definition of assets according to the System of National Accounts (SNA). The SNA is a statistical guideline that facilitates the integration of economic statistical systems to ensure that they are compatible with national accounts (United

Nations, 2010). According to Blanchet and Martinez-Toledano (2022), Piketty and Zucman (2015), and Saez and Zucman (2016), which follow the standards of the SNA, assets encompass all real (i.e., non-financial) and financial assets on which property rights can be asserted and which bring their owners monetary gain. In contrast, Causa et al. (2019) follow the OECD Guidelines for Micro Statistics on Household Wealth. However, this definition is practically the same as that of the SNA. Real assets include real estate (e.g., land and houses) and unincorporated businesses (e.g., family trusts, sole proprietorships, and partnerships) (Blanchet & Martinez-Toledano, 2022). Financial assets on the other hand include equities (e.g., stocks, bonds, and mutual funds), cash, deposits in current and savings accounts, life insurance and pensions. Finally, liabilities include mortgage debt and other types of loans, such as student loans. To further clarify the definition, certain assets are also excluded. The most important are durable goods (e.g., furniture and vehicles) and collectibles, as well as the value of future pensions (social security) and all other future government transfers. This is because of a lack of data availability and future pension payments and/or transfers that cannot be easily converted to present values (Maestri et al., 2014; Piketty & Zucman, 2015). However, it should be noted that this type of future income affects saving propensity, and thus wealth accumulation (Advani et al., 2021). In addition, this may actually cause wealth inequality to be overestimated (Maestri et al., 2014).

3.2 Measuring Wealth Inequality

There are several ways in which wealth inequality can be measured. The Gini coefficient is one of the most widely used measures (Peterson, 2017). This coefficient has a number between 0 and 1, where 0 means perfect equality (i.e., everyone has equal wealth) and 1 means perfect inequality (i.e., wealth is extremely dispersed). It should be noted that lower average levels of wealth may be associated with greater variance. Therefore, caution should be used when comparing across countries using the Gini coefficient (Maestri et al., 2014). However, using the Gini coefficient has more limitations. Wealth is more often negative than income. If the wealth of certain households is negative, then the upper bound of the coefficient is no longer 1. This must also be taken into account when comparing countries, because the results are not comparable if negative values are allowed in some calculations and not in others. Another observation is that when negative values are not included, inequality is underestimated (Maestri et al., 2014). Finally, the Gini coefficient gives weight mainly to households in the middle of the wealth distribution. Changes that occur over time at the top and/or bottom of the distribution are therefore not clearly visible (Rijksoverheid, 2022). For this reason, it is recommended that indicators that provide a broader picture of the distribution be used in addition to the Gini coefficient.

In addition, wealth inequality can be measured by estimating the top wealth shares (Peterson, 2017; Saez, 2017). That is, for example, the amount of wealth as a share of the total wealth which the top 1% or top 10% of a country's population is holding. This is a relatively trivial measure that is easily understood by the public. Common indicators used to measure income inequality are inter-quantile share ratios (e.g., S90/S10 or S80/S20). These indicators provide a broader picture of the income distribution. However, according to Balestra and Tonkin (2018), these indicators are not well suited to measure wealth inequality, as many households and individuals experience negative net wealth. Instead, alternative indicators, such as the ratio of mean to median net wealth, provide a more refined picture of wealth inequality. Because median wealth better reflects the 'wealth situation' of a typical household. When the differences

between median and average wealth are larger, so is wealth inequality. As mentioned in the previous subsection, the wealth-to-income ratio is an insightful measure to see how much wealth there is in a society relative to income. However, this ratio is also a good indicator to measure inequality because it can be used to capture both the importance of wealth in society and the capital intensity of production (Piketty & Saez, 2014).

Generally, it is very difficult to accurately measure the distribution of wealth at the top because of a lack of information, which might be due to non-response, under reporting, and parsimony (Balestra & Tonkin, 2018). Vermeulen (2018) supports this by arguing that surveys, widely used as a means of measuring inequality, almost always underestimate the tail of the distribution as a result of differential unit non-response. He also argues that the methods of measuring or estimating the wealth of the very rich, i.e., the top tail, can be divided into five categories: through (1) official wealth (tax) registrations (records); (2) inheritance tax registrations; (3) information regarding capital income (originating from tax registrations); (4) surveys regarding household wealth; and (5) wealthy individuals surveyed by the media. Many countries have huge inheritance tax exemptions, and few have welfare taxes. In addition, administrative registrations often do not exist or contain little information (Vermeulen, 2018). When these data would be available, the question from a confidentiality perspective is whether researchers would be allowed to use them. Surveys will thus remain important for estimating wealth distributions. As mentioned earlier, there is a scarcity of available data in terms of wealth (asset) composition, comparability across countries, and time coverage, which complicates the measurement of wealth inequality (Maestri et al., 2014). Therefore, more attention should be paid to the collection and availability of (tax) data.

3.3 Wealth Inequality in the Netherlands

Salverda (2019) examined the wealth distribution of households in the Netherlands between 2006 and 2014. The period studied is relatively short due to a lack of availability of microdata. Wealth data are available for the period between 1993 and 2000, however, these data do not match the microdata and were therefore not used. For the period 2000 and 2006, there are no data at all, which is very unfortunate. After all, this period saw not only the dotcom crisis, but also the abolition of the separate wealth tax in the Netherlands. Furthermore, wealth data prior to 1993 have major shortcoming in terms of detail, consistency with current data, and available years. However, this does not imply that this period (2006–2014) is not of interest, since the Great Financial Crisis (GFC) and the subsequent Eurozone crisis occurred during this period. The microdata used are based on samples (Salverda, 2019), which makes the study less reliable and representative. Since 2011, CBS has been publishing data on wealth of the entire population. However, these data were not used because they may not be comparable to the microdata prior to 2011. It should also be noted that all data are presented in nominal terms. That is, they have not been adjusted for inflation. Finally, wealth figures do not include future pension payments (i.e., retirement benefits), as does the definition of wealth described in Subsection 3.1. Before discussing the results of this study, I must say that no further explanation as to what exactly wealth (and the microdata) entails in this study was provided. As a result, I feel that this study lacks context.

But to get to the results, we can get straight to the point: wealth inequality in the Netherlands is very high and has increased substantially (Salverda, 2019). In the period from 2006 to 2014, the Gini coefficient grew by about 23% from 0.764 to 0.939. How can this increase in wealth

inequality be explained? It can be seen that the wealth share of the bottom 50% in total wealth in the Netherlands dropped from -1.5% to -4.8%. The same is true for the middle 40% (i.e., P50-P90), whose share fell from 43.8% to 38.0%. In other words, for the bottom 90% of the population, the wealth share declined. In contrast, the share of the richest 10% increased from 57.8% to 66.8% (Salverda, 2019). In addition to this overall view, information is also available on the composition of wealth, namely: financial wealth and self-owned housing wealth. According to Salverda (2019), financial wealth refers to all types of wealth other than housing wealth. Thus, this remains a superficial concept where it is not known whether it includes, for example, collectibles or consumer durables. Using the definition described in Subsection 3.1, it is assumed that 'self-owned housing' refers to real assets, and 'financial wealth' refers to financial assets. The entire distribution shows that housing wealth has declined as a result of falling house prices. Most of the housing wealth is owned by the middle 40%, and thus they bear the heaviest burden of this decline. Surprisingly, financial wealth has not declined across the entire distribution as a result of the GFC. On the contrary, only for the bottom 50% has it dropped from 2.2% to 1.3% of total financial wealth (Salverda, 2019). However, there is cause for concern. Total gross debt as a percentage of total gross wealth increased from 31.7% to 38.4%. Lower house prices in combination with mortgage debts are the main reasons for this.

Balestra and Tonkin (2018) support the claim by Salverda (2019) that wealth inequality in the Netherlands is very high. As mentioned in Subsection 3.2, they use the ratio of mean to median net wealth to measure wealth inequality. In 2015, the average ratio across all OECD countries was about 2.6, but the Netherlands had a ratio of more than 8. Furthermore, they show that in 2015, the top 10% owned 68.3% of total household wealth. Despite the data of Salverda (2019) being limited to 2014, the data of Balestra and Tonkin (2018) roughly match this. The percentage of the top 10% would have increased by 1.5 percentage points between 2014 and 2015. It should be noted, however, that different data were used. According to Bogliacino and Maestri (2016), which used data from the Global Wealth Databook, the Gini coefficient was about 0.65 in 2010 and 0.75 in 2015. This does not quite match the results of Salverda (2019). Van Bavel and Frankema (2017) also examined the development of wealth inequality in the Netherlands between 1991 and 2014 using CBS data. Again, it shows that wealth inequality increased from a Gini of about 0.81 to 0.89 between 2006 and 2014 (see Figure 3.1). However, the figures are quite different from those of Bogliacino and Maestri (2016) and Salverda (2019). Also, in 2012, the top 1% would own about 13% of all wealth (Van Bavel & Frankema, 2017), which is totally inconsistent with the finding of 22.7% by Salverda (2019).

However, even more recent studies have examined wealth distribution and wealth inequality in the Netherlands. For example, Toussaint et al. (2022) did so for the period from 1854 to 2019. After World War II, the share of financial assets in household portfolios decreased, while pensions became a more important part of the portfolio with a 40% share in 2019. This finding on pensions strongly contradicts what was discussed in Subsection 3.1 on the definition of wealth. Indeed, it has been stated here that net household wealth or private wealth is the difference between the present value of all assets minus household liabilities. This does not include certain assets such as social security and future government transfers. This is because these payments and transfers are difficult to convert into present values. However, Toussaint et al. (2022) do include the value of pension entitlements and call this 'semiprivate wealth'. Many scholars disagree that pensions are considered future income streams and therefore not included. It is argued that pensions have a significant substitution effect on savings and are of great importance for estimates of wealth inequality (Toussaint et al., 2022). It can be observed that the 1980s

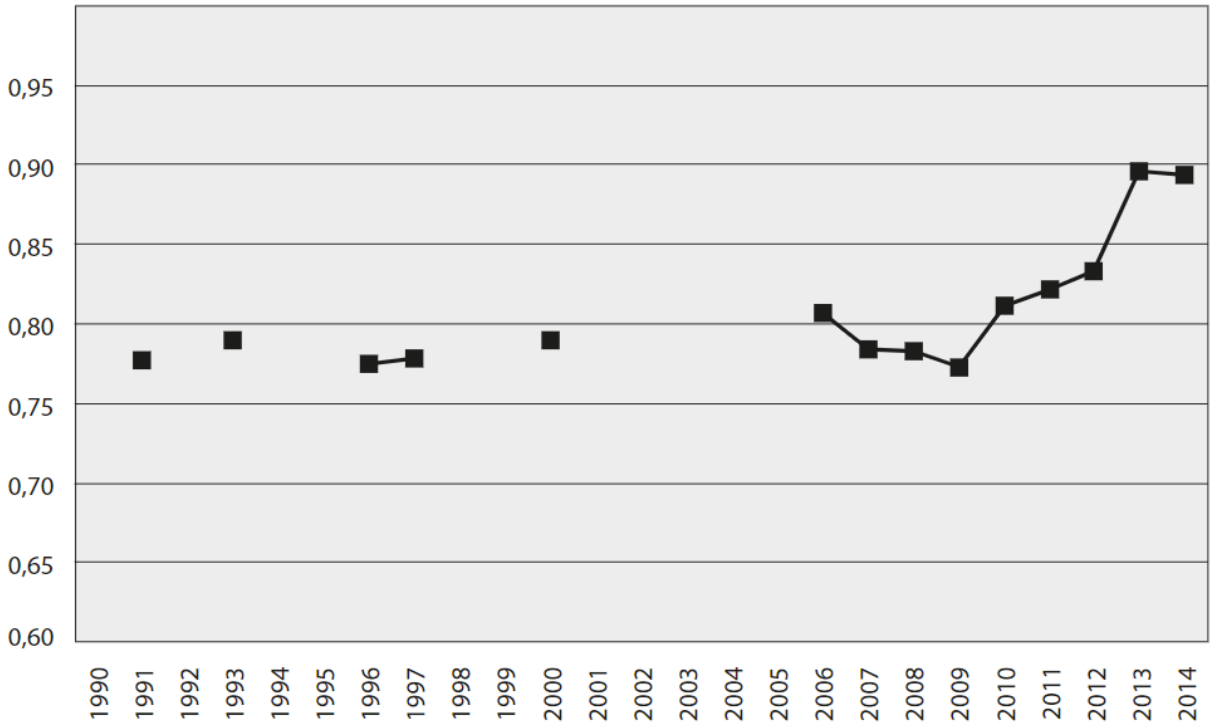

Figure 3.1: Gini Coefficients of Private Household Wealth Inequality in the Netherlands (1991–2014). *Adapted from Van Bavel and Frankema (2017).*

saw a turning point in the top's wealth share (which is defined without pension wealth). The wealth share of the top 1% peaked around 1900 at nearly 60% and fell to about 15% in the late 1970s. This share began to rise again in the late 1980s and peaked at about 35% in 2015. This is about 25% for 2012, which is roughly in line with the findings of Salverda (2019). Based on this study, it can also be concluded that wealth inequality has increased in the Netherlands since the 1980s. In addition to pensions, the share of housing in household portfolios has become increasingly important since the 1980s. However, these houses are financed by mortgages (debt), which has a moderating effect on real wealth growth (Toussaint et al., 2022).

Another recent study examining wealth inequality in the Netherlands is that of Rijksoverheid (2022). This study uses the common definition of net household wealth according to the SNA (United Nations, 2010), which excludes future pension entitlements, among others. However, pensions have been studies separately because they are certainly a relevant asset. Especially in the Netherlands, where households accumulate many pensions through collective employee schemes (Rijksoverheid, 2022). For the year 2020, wealth is divided into several categories, with the pension wealth and home owernship categories having the largest share. The total wealth of Dutch households in 2020 is €3325 billion, of which €1561 billion is pension wealth (47%) and €825 billion is home ownership (25%) (Rijksoverheid, 2022). The wealth of home ownership is expressed net, that is, the value of owner-occupied housing minus mortgage debts. It also shows that the top 10% richest households in the Netherlands owned 61% of total wealth in 2020. According to Balestra and Tonkin (2018) and Salverda (2019), this was 66.8% and 68.3% in 2014 and 2015, respectively. Another interesting fact is that the top 1% richest households in the Netherlands owned 26% of total wealth in 2020, compared to 27.5% and 27.8% in 2014 and 2015, respectively (Balestra & Tonkin, 2018; Salverda, 2019). This would imply that wealth inequality would have declined in the post-2015 period and that especially the p90 – p99

percentiles have suffered wealth losses. According to Rijksoverheid (2022), the Gini coefficient was 0.82 in 2013 and has declined to 0.76 in 2020. At first glance, this also confirms that wealth inequality in the Netherlands has declined. However, we must take into account the limitations of the Gini coefficient, as this indicator gives only a partial view and thus no firm conclusions can be drawn. It is argued that this decline is mainly related to home ownership, which accounts for a large of total wealth and is widely distributed in the Netherlands. Net home ownership (as just discussed) makes up more than half of total wealth from the 46th percentile onwards (the middle class). This share rises faster to 75% at the higher percentiles and is the result of rising house prices in recent years (Rijksoverheid, 2022). Even for the 10% richest households, home ownership still makes up a large share of wealth. However, this changes in the highest percentile (p100), where the share of substantial interest dominates at 60%.

One of the factors that contribute to wealth accumulation is income. The higher the income, the more room there is to save. Income can also be obtained through wealth (e.g., interest and/or dividends). Thus, wealth is accumulated through income, and wealth in turn has a reinforcing effect on income (Rijksoverheid, 2022). This is known as the snowballing-effect discussed earlier in the introduction (Subsection 1.2) (Saez & Zucman, 2016). In addition to income, gifts and inheritances are also important for wealth accumulation. No official figures are known, but it is estimated that 40% of wealth is obtained through these transfers (Rijksoverheid, 2022). Low interest rates also seem to be a cause of higher housing prices and other forms of investment (i.e., asset-price inflation). How interest rates could have been so low remains speculation, but most likely a combination of lower demand for capital, a higher propensity to save and low inflation are responsible. Finally, Dutch households do not need to hold as many buffers because of the large welfare state (Rijksoverheid, 2022). Moreover, access to public services, such as health care and education, is highly accessible. Research has shown that this collective public spending has a redistributive effect. However, there is also a downside to this 'generous welfare state'. The following subsections look more closely at the influences of income, transfers, interest rates and a generous welfare state.

3.4 Causes of Wealth Inequality

Salverda (2019) believes that (mortgage) debt and falling housing prices have (partly) led to an increase in wealth inequality in the Netherlands. Van Bavel and Frankema (2017) also argue that declining housing prices due to the GFC are the biggest cause of an increase in wealth inequality. Especially the middle class was hit hard, as they own the most homes (Causa et al., 2019). In the period from 2010 to 2015, house prices fell an average of 3.5% (Balestra & Tonkin, 2018). Causa et al. (2019) confirm that households in the Netherlands rely heavily on mortgage debt. Compared to the rest of the OECD countries, the Netherlands has the highest percentage of households with a mortgage (slightly higher than the U.S.), and the lowest percentage of households that are outright owners (along with Denmark). The asset that occupies the largest part of household portfolios is housing. As such, it is one of the main drivers of wealth accumulation (Causa et al., 2019). The reason why housing is a large part of the wealth composition is that it can be obtained with debt. It also follows that most liabilities in household portfolios consist of mortgage debt. There is a strong negative correlation between home ownership, in particular the extent to which households own homes outright (Balestra & Tonkin, 2018), and wealth inequality (Causa et al., 2019). Low (high) levels of home ownership are associated with high (low) levels of wealth inequality. Cowell et al. (2018) also confirm this for Sweden. Part of the reason why wealth is unevenly distributed and household wealth holdings are relatively low

is that home ownership is low. Another reason is due to the state providing education, health care, pensions, and income (i.e., social spending/security). Cowell et al. (2018) argue that there is both an indirect and a direct effect that a generous welfare state has on wealth inequality. The indirect effect is that social security crowds-out private savings especially at the lower end of the distribution, which in turn can lead to higher wealth inequality. The direct effect is that wealth inequality decreases because lower social costs leave people with more wealth. This is also discussed further below and referred to as a 'generous welfare state'. In addition, it is claimed that the higher property tax and the wealth tax that was recently abolished do not encourage home ownership (Cowell et al., 2018). Roberts and Lawrence (2017) identified the drivers of wealth inequality in the U.K. and also concluded that lower levels of home ownership reinforce wealth inequality. In the 1990s and early 2000s, home ownership grew across all income groups and regions. This contributed to a reduction in wealth inequality. From the mid-2000s, however, home ownership declined. This decline varied enormously across households, which has certain implications for the wealth distribution in the United Kingdom. In particular, the share of the lowest 50% fell, but the share of the richest rose moderately. As a result, wealth inequality has increased. This relationship of higher levels of home ownership associated with lower wealth inequality has also been confirmed by other scholars (Skopek et al., 2014).

However, the main cause of wealth inequality is the ownership of financial assets, which is typically owned by the 10% richest (Balestra & Tonkin, 2018; Van Bavel & Frankema, 2017). According to Salverda (2019), this group owned nearly 73% of all financial wealth in the Netherlands in 2014. During the period from 2010 to 2015, stock prices (i.e., part of financial assets) rose an average of 4.6% (Balestra & Tonkin, 2018). Ultimately, there is no single asset that explains wealth inequality within a country. In fact, it is due to the different portfolio structures across the distribution, and thus multiple assets (and liabilities). The wealth of the middle class is mostly in houses, while the wealth of the rich is mostly in financial assets (Lundberg & Waldenström, 2018). This brings us to the issue of the financialization of the economy, which is one of the causes of income inequality and the concentration of financial assets among the rich in the U.S. (Davis & Kim, 2015). In the early 1980s, the financial sector grew faster than the real economy. This was due to stagnant real wages and greater income inequality, which resulted in lower aggregate demand growth. This in turn caused low inflation and low interest rates. The poorest 90% began to borrow more as credit was cheap and at the same time the liquidity preferences of the richest and large corporations increased. Profits and returns on (financial) investments were not reinvested for productive purposes, but used to speculate which allowed financial markets to grow further. In other words, an orientation emerged that was more focused on creating shareholder value. This led to changing corporate structures and strategies that promoted outsourcing (contributing to declining worker power and thus stagnant real wages) and compensation at the top (Davis & Kim, 2015). Profit shares grew as the flipside of stagnant real wages, and the 10% richest benefited from this increase. This further increased income inequality and encouraged more saving and speculation in financial markets, which, in turn, increased wealth inequality. Muysken and Meijers (2022) show that the financial sector in the Netherlands grew substantially between 1995 and 2019. It is not known whether the factors that led to the financialization of the U.S. also apply to the Netherlands. Muysken and Meijers (2022) do mention causes, but these are consequences of causes. As such, they do not recognize the causes underlying Dutch financialization. In any case, the growth of the Dutch financial sector in recent decades is a possible clue as to why the richest 10% own a large share of financial wealth.

Maestri et al. (2014) argue that, in addition to the composition of household wealth (assets and liabilities) just discussed, five other factors may contribute to wealth inequality:

- Labor markets and inheritances: income consists largely of wages and is therefore an important factor influencing savings behavior and wealth distribution. Income distribution reflects labor market conditions, which thus inherently affect the distribution of wealth. In addition to labor market outcomes, inheritances are also a source of wealth inequality (more on this below). Furthermore, inheritances are a source of unequal opportunities.
- Demographic structures (e.g., age): in general, people build wealth as they age. As a country ages, this can affect the wealth distribution and thus wealth inequality.
- Billionaires: the rise of billionaires is another channel through which wealth inequality can be explained. The increasing concentration of income and wealth at the top of the distribution (i.e., the super-rich) increases disparities with the rest of the distribution, and thus wealth inequality.
- Taxes: there are several tax instruments by which wealth distribution can be influenced. These include inheritance tax, property tax, capital gains tax, capital income tax, and mortgage interest deduction (i.e., tax relief). These instruments have both behavioral and static effects. Three behavioral effects of the mortgage interest deduction, for example, are higher housing prices, higher debt and increased home ownership. The combined impact on wealth inequality is ambiguous. Static effects indicate the failure of redistribution and are typically assessed on the basis of income. Since higher incomes benefit more from the mortgage interest deduction, this can be seen as regressive (rather than progressive). The static effect of a reduction in the wealth tax is that it may cause wealth inequality to increase, because it allows wealth to accumulate more quickly among the rich.
- Institutions: higher social spending related to housing provides less incentives for the lower income class to accumulate wealth. They know that they will receive social housing and are therefore less likely to save to afford a house.

Regarding the last factor mentioned above, i.e., institutions, a positive relationship was found between wealth inequality and generous welfare state social security. A generous welfare state reduces the need for households to accumulate wealth for precautionary and life-cycle reasons (Maestri et al., 2014; Van Bavel & Frankema, 2017). Causa et al. (2019) also argue that, in terms of home ownership rates, differences between countries may be due to differences in institutions and policies, for example: taxes, provisioning regarding social housing, and mortgage market regulations. Finally, Van Bavel and Frankema (2017) argue that the combination of public welfare schemes and disproportionately high income taxes required to maintain them discourages lower incomes from accumulating wealth.

Trade unions can influence labor markets by negotiating conditions, including income. In Sweden, the power of these unions has declined in recent years, weakening the balance between capital and labor (Gao & Chen, 2022). This, in turn, has led to a certain increase in income and wealth inequality. Tippet et al. (2022) also found that workers' bargaining power, related to trade unions, is an important factor in the share of the wealthiest in the U.K., the U.S., and France. When workers' bargaining power increases, the wealth share of the richest decreases. Another study examined the evolution of wealth inequality in the U.S. and identified macroeconomic determinants (Berisha & Meszaros, 2020). Long-term wealth inequality depends on three factors: interest rates, inflation and income growth. This study found that higher income

growth and inflation contribute positively to the wealth holdings of the low and middle classes, and reduce wealth inequality. This is because higher income growth allows households to 1) save more and/or 2) pay down debt, increasing household net wealth. Since households that are less wealthy own most of the mortgage debt, they are better off with higher inflation. After all, this makes the debt worth less and the house worth more. Higher interest rates have been shown to have a negative relationship with wealth inequality, measured as the Gini coefficient. The reason is that lower interest rates increase stock prices, which tend to be owned by the wealthiest. However, this relationship does not hold for all indicators of wealth inequality, so the relationship remains somewhat ambiguous (Berisha & Meszaros, 2020).

After the GFC, major central banks eased monetary policy to support domestic prices and demand. A specific form of monetary policy that was advocated at the time is also known as quantitative easing (QE) and is basically an 'asset purchase program'. The European Central Bank (ECB) started this program in Europe in 2014. De Luigi et al. (2023) examined the effect of QE on the distribution of financial wealth in 9 European countries, including the Netherlands. They focused on asset prices and two main asset classes: housing wealth and risky financial assets. One-third of households in the sample were found to have neither risky financial assets nor housing wealth and therefore did not benefit from QE. This is particularly true in countries with low rates of home ownership. Wealth inequality was measured using indicators sensitive to changes at the tail of the distribution (e.g., S90/S10), among others. The effect of QE on the joint distribution of risky financial assets and housing wealth leads to an increase in wealth inequality in most countries according to these sensitive measures (De Luigi et al., 2023). When looking at the Gini coefficient, a less sensitive measure, the results vary by country. In the Netherlands, the effect of QE on wealth inequality is negative. QE increases the prices of risky financial assets, which has a negative effect on the wealth distribution. However, this is offset by rising housing prices. That being said, the Gini coefficient tends to camouflage changes in the upper tail of the distribution. Since the wealth distribution is characterized by extreme values in the upper deciles and is heavily skewed to the right, instruments to measure inequality, such as the 90th to 10th percentile, are more appropriate (De Luigi et al., 2023).

Nekoei and Seim (2023) argue that wealth inequality can be divided into two components. The first component is pre-inheritance wealth, that is, labor income, saving rate and return on savings. The second component is inequality in inherited wealth from previous generations passed down through inheritance. There are several studies that have examined the effect of inheritances on wealth inequality. Elinder et al. (2018) have done so for Sweden and argue that inheritances reduce relative wealth inequality in the short term, but increase absolute wealth dispersion. This is because wealthy heirs inherit larger amounts, but less wealthy heirs inherit a relatively large amount relative to their wealth before inheritance. However, it is claimed that in Sweden, the long-term effect of inheritance on wealth inequality is the reverse of this short-term effect (Nekoei & Seim, 2023). Unlike wealthier heirs, most heirs have exhausted their inherited wealth within ten years. This is due to the heterogeneous returns achieved on inherited wealth. However, Leitner (2016) claims the opposite regarding the short term effects of inheritances on wealth inequality. This study examined the causes of inequality in gross and net wealth in eight different euro countries. In fact, differences in inter vivos (while alive) transfers and inheritances obtained by households have an apparently stronger effect on wealth inequality than income differences. The share of (non-)financial assets inherited or gifted in wealth inequality is around 40% in Germany and Austria. However, this share is much lower for countries such as Belgium and Luxembourg. In addition, household characteristics (e.g.,

education, age, size, marital status, adults) also influence wealth distribution (Leitner, 2016). In the case of education, however, it must be taken into account that there is a strong relationship between the educational level of ancestors and that of their offspring. Thus, it can be concluded from this study that whether a person is born into a wealthy and intellectual family matters, and this affects wealth inequality.

Lusardi et al. (2017) add that having financial knowledge increases an individual's ability to allocate resources in a world of uncertainty. They showed that in a stochastic life-cycle model with endogenous financial knowledge accumulation, 30-40% of wealth inequality in the U.S. can be attributed to financial knowledge. And an individual can acquire financial knowledge by educating himself. Hasan et al. (2020) also hooks into the financial aspect by stating that 'finance' plays an important role in wealth inequality. However, this is not about financial knowledge, but rather factors such as financial markets, access to finance, and the efficiency of financial intermediaries. Large financial markets, represented by stock market capitalization (value of all stocks in a market), among others, have a positive correlation with wealth inequality. This is because generally the wealthy participate in these markets (Hasan et al., 2020). The potential return of these investment vehicles is generally greater than that of savings, but obviously with more risk. Less wealthy people are less likely to take this risk or do not have the capital. On the other hand, countries with more efficient financial intermediaries and better access to finance show less wealth inequality. Thus, it cannot be argued that greater wealth inequality is inherent in financial development. It is further argued that (1) better income distribution and education reduce wealth inequality (which is consistent with Berisha and Meszaros (2020), Gao and Chen (2022), Leitner (2016), Maestri et al. (2014), and Tippet et al. (2022)); (2) political stability affects wealth inequality; and (3) not technological development but globalization causes greater wealth inequality (Hasan et al., 2020).

Blanchet and Martinez-Toledano (2022) studied the wealth distribution and long-term dynamics of household wealth in the U.S. and Europe (using France as a benchmark). To determine how wealth distribution is constructed, they used an asset-specific decomposition. According to them, the three factors that shape wealth distribution are (1) labor income inequality, (2) saving rate inequality, and (3) capital gain inequality (similar to the pre-inheritance wealth component of Nekoei and Seim (2023)). The simulations show that since the mid-1980s, inequality in the saving rate has been the main factor contributing to the moderate increase in the wealth share of the top 1% in France (Blanchet & Martinez-Toledano, 2022). On the other hand, labor income inequality has actually reduced wealth concentration. Asset prices (capital gains) have played a role only since 2000 and, like labor income inequality, have pushed down wealth concentration. This can largely be explained by the fact that house prices rose more than financial assets, and because houses make up a significant part of the portfolios of low- and middle-class households. For the U.S., all three channels have contributed to the increasing concentration of wealth at the top since the mid-1980s (Blanchet & Martinez-Toledano, 2022). It can be concluded from this analysis that comparisons across regions (or countries) are important to understand the factors that influence the trajectory of wealth inequality. It is also clear that the various factors that push wealth concentration downward or upward vary from region to region and thus can be considered heterogeneous. In other words, the cause of wealth inequality in one country need not have the same effect in another.

Based on the literature, two overviews of the possible causes that (in)directly affect wealth inequality were created. One overview at the macroeconomic level (Table 3.1), and one overview

at the household level (Table 3.2). An example of a macroeconomic factor that indirectly affects wealth inequality is the interest rate. Suppose interest rates rise, then the demand for financial assets falls because the return on savings is higher and less risky. Falling prices of financial assets in turn have a negative effect on wealth inequality because most financial assets are owned by the richest 10%. Thus, a rise in interest rates has no direct effect on wealth inequality.

Table 3.1: Overview of the possible (in)direct causes of wealth inequality (WI) and their expected effect (+/-), categorized by macroeconomic level.

Cause[1]	**Sign (+/-)**	**Effect**[2]	**Source**
Housing prices	-	WI	Blanchet and Martinez-Toledano (2022), De Luigi et al. (2023), Salverda (2019), and Van Bavel and Frankema (2017)
Generous welfare state	-	WI	Cowell et al. (2018)
Generous welfare state	+	SRI	Cowell et al. (2018), Maestri et al. (2014), and Van Bavel and Frankema (2017)
Property tax	-	HOR	Cowell et al. (2018) and Maestri et al. (2014)
Wealth tax	-	WI	Maestri et al. (2014)
Labor market conditions	-	II	Gao and Chen (2022), Maestri et al. (2014), and Tippet et al. (2022)
Labor bargaining power	+	LMC	Gao and Chen (2022) and Tippet et al. (2022)
Inheritance tax	-	WI	Maestri et al. (2014)
Mortgage interest tax	-	HOR	Maestri et al. (2014)
Mortgage interest tax	-	HP	Maestri et al. (2014)
Mortgage interest tax	-	DT	Maestri et al. (2014)
Financial asset prices	+	WI	Berisha and Meszaros (2020), Blanchet and Martinez-Toledano (2022), and De Luigi et al. (2023)
Interest rate	-	FAP	Berisha and Meszaros (2020)
Inflation	-	DT	Berisha and Meszaros (2020)
Social housing	-	HOR	Causa et al. (2019) and Maestri et al. (2014)
Quantitative easing	+	HP	De Luigi et al. (2023)
Quantitative easing	+	FAP	De Luigi et al. (2023)
Size of financial markets	+	WI	Hasan et al. (2020)
Efficiency of financial intermediaries	-	WI	Hasan et al. (2020)
Access to finance	-	WI	Hasan et al. (2020)
Political stability	-	WI	Hasan et al. (2020)
Globalization	+	WI	Hasan et al. (2020)

[1] Note that in determining the effect, the underlying value of the cause is assumed to increase. For example, an increase in housing prices is expected to have a positive effect on WI.
[2] Definition of abbreviations: wealth inequality (WI), saving rate inequality (SRI), home ownership rate (HOR), income inequality (II), labor market conditions (LMC), housing prices (HP), debts (DT), financial asset prices (FAP).

Table 3.2: Overview of the possible (in)direct causes of wealth inequality (WI) and their expected effect (+/-), categorized by household level.

Cause[1]	**Sign (+/-)**	**Effect**[2]	**Source**
(Mortgage) debts	+	WI	Berisha and Meszaros (2020) and Salverda (2019)
Home ownership rate	-	WI	Balestra and Tonkin (2018), Causa et al. (2019), Cowell et al. (2018), Roberts and Lawrence (2017), and Skopek et al. (2014)
Saving rate inequality	+	WI	Berisha and Meszaros (2020), Cowell et al. (2018), and Maestri et al. (2014)
Financial assets ownership rate inequality	+	WI	Balestra and Tonkin (2018) and Van Bavel and Frankema (2017)
Income inequality	+	WI	Berisha and Meszaros (2020), Blanchet and Martinez-Toledano (2022), Gao and Chen (2022), Hasan et al. (2020), Maestri et al. (2014), and Tippet et al. (2022)
Inheritance inequality	+	WI	Elinder et al. (2018), Leitner (2016), Maestri et al. (2014), and Nekoei and Seim (2023)
Average household age	+	WI	Leitner (2016) and Maestri et al. (2014)
Education level	+	WI	Hasan et al. (2020) and Leitner (2016)
Income inequality	-	SRI	Berisha and Meszaros (2020) and Maestri et al. (2014)
Income inequality	-	DT	Berisha and Meszaros (2020)

[1] Note that in determining the effect, the underlying value of the cause is assumed to increase. For example, an increase in debt is expected to have a negative effect on WI.
[2] Definition of abbreviations: wealth inequality (WI), saving rate inequality (SRI), debts (DT).

3.5 Consequences of Wealth Inequality

First, I would like to highlight two arguments in favor of and against wealth inequality with respect to consequences mentioned in the introduction, both of which I believe are very strong. One of the arguments against wealth inequality is that reducing wealth inequality has instrumental value (Peterson, 2017). Note that this article reviews the consequences of economic inequality, which includes more than just wealth. The economic domain, and more specifically economic growth, is one of four areas that are potentially negatively affected by inequality (Peterson, 2017). Richer people tend to save more and consume less per unit of income. This means that when inequality increases, there will be relatively less consumption and investment. As a result, aggregate demand in the economy will stagnate. In turn, the output produced for the economy stagnates and so does economic growth. One of the arguments favoring wealth inequality is that it stimulates innovation because people are more willing to take on risky investments when they are more prosperous (Peterson, 2017). Innovation could spur labor productivity growth, which increases the profit share (if labor productivity growth exceeds real wage growth). This could have a positive effect on business investment and aggregate demand, which in turn increases economic growth. This is a self-reinforcing process and better known as the Kaldor-Verdoorn effect (Storm & Naastepad, 2012). In addition, Frid et al. (2016) examined the effects of wealth inequality on entrepreneurship, the engine of innovation. They find that

wealth constraints limit the ability for the middle and lower classes to actually start businesses. They conclude that entrepreneurship is a reinforcing factor regarding wealth inequality, but do not suggest that it should be curbed.

Besides the economic domain, there are three other areas that can be negatively affected by inequality, namely: political systems, individual health and behavior, and environmental and social conditions (Peterson, 2017). First, we will look at political systems that are negatively affected by inequality. The definition of rent-seeking is the attempt to gain economic advantage through politics at the expense of society. This is different from profit-seeking because, unlike rent-seeking, it does make a positive contribution to society. The practice of rent-seeking is an example of how inequality can affect the economy, albeit indirectly. Wealthy individuals can more easily influence public policy in their own interests, which adversely affects lower income groups by negatively affecting efficiency and economic growth (Peterson, 2017). In the area of individual health and behavior, it is argued that inequality can cause a 'discouragement effect' that reduces workers' efforts, which in turn reduces economic growth. It is also claimed that people compare themselves to others and determine their place in society on that basis. Those who think they have status behave differently than those who think they are lower in the social hierarchy (Peterson, 2017). Low-status people are more likely to adopt the behavior of 'live fast, die young'. An example of this behavior is that women in lower income groups are more likely to have a child at a young age compared to the somewhat more affluent. A person of low status also experiences more stress, which can have a negative effect on their health. The latter, however, is debatable in my opinion. Indeed, it could also be argued that people with a sense of high status, presumably politicians and CEOs of large corporations, are under high pressure and thus experience high levels of stress. According to Peterson (2017), however, opinions are divided on the effect of inequality on health. In particular, the direction of causality is a problem. After all, poor health could lead to increased inequality, but also vice versa. In the last area, environmental and social conditions, links have been found between inequality and a wide range of social problems, including teenage pregnancy, obesity, poor health, social mobility and crime. But again, these links have not been found in all studies. Nevertheless, it is reasonable to assume that inequality may contribute to these social problems (Peterson, 2017). Furthermore, economic inequality is associated with environmental problems. For example, more affluent individuals regularly benefit from polluting activities and have the capability to prevent regulation of these activities. A major drawback of Peterson's article is that it studies the effects of economic inequality. This definition includes other aspects besides wealth, such as income and well-being. Nor can it be clearly deduced from this article exactly what effects this form of inequality has. Many studies argue to the contrary. However, there does seem to be some consensus that it affects economic performance.

There are studies that have specifically examined the effects of wealth (inequality), rather than economic inequality. For example, there are positive effects of parental wealth on labor market outcomes, educational and cognitive performance, and the transition to home ownership, among others (Killewald et al., 2017). Put differently, it affects the context and environment in which children grow up. And, as one might imagine, as parental wealth inequality increases, it could potentially (further) divide society. There is also compelling evidence that large differences in income (which is a component of wealth) has both harmful social and health effects (Pickett & Wilkinson, 2015). Reducing income inequality (and thus wealth inequality) would improve the well-being and health of society. This is also confirmed by Killewald et al. (2017) who state that among the elderly, wealth has a positive correlation with staying healthy, and a negative

correlation with mortality. However, there are scholars who argue that this is impossible or difficult to prove because health is the result of influences from years ago. Wealth can affect the aforementioned outcomes in several ways. For example, negative economic shocks can be absorbed by financial assets. In retirement age, wealth also plays an important role when part of labor income is lost. Furthermore, wealth can also provide a certain cultural status and political power (Killewald et al., 2017), which is consistent with Peterson (2017).

Another study specifically examined whether wealth inequality does indeed matter for the growth of the economy (Bagchi & Svejnar, 2015). They did this using Forbes magazine, which each year surveys the wealthiest individuals from around the world. During this study, three metrics were used to measure wealth inequality: the sum of the wealth of all billionaires in a given country divided by (1) physical capital, (2) GDP, and (3) population. Wealth inequality has been found to have a negative effect on economic growth. It has also been shown that the effect of poverty on economic growth is negligible and that income inequality has no or a very small positive effect on economic growth (Bagchi & Svejnar, 2015). It further examined the effect of billionaires who accumulated their wealth in a 'legal' (politically unconnected) manner, or did so through cronyism (politically connected), that is, when jobs are given to friends rather than to people who are actually qualified. It can be concluded that politically connected wealth inequality has a negative impact on economic growth. The effect of politically unconnected wealth inequality has no significant effect (Bagchi & Svejnar, 2015). Islam and McGillivray (2020) also examined the relationship between wealth inequality and economic growth. They did this by using a panel (longitudinal) dataset over the period from 2000 to 2012, looking at 45 different countries. Several metrics were used to measure wealth inequality: the top 1%, the top 10%, and the wealth of billionaires described in Forbes magazine divided by GDP. This study also shows that wealth inequality has a negative effect on economic growth. According to Knight et al. (2017), there is also a relationship between wealth inequality and carbon emissions in high-income countries, including the Netherlands. This is in line with theories that argue that the concentration of wealth combined with the concentration of economic and political power affects environmental degradation.

In Sweden, the effect of family wealth on children's educational achievement was studied (Hällsten & Pfeffer, 2017). To draw a reliable conclusion about the effect of wealth on long-term inequality of opportunity, two generations, grandparents and grandchildren, were examined. Even in Sweden, considered a fairly egalitarian country, grandparents' wealth appears to have a positive effect on grandchildren's educational achievement, as also found by Killewald et al. (2017). In other words, wealth inequality between families leads to unequal opportunities. As has become clear, wealth consists of several components that can be divided into non-financial and financial assets. Hällsten and Pfeffer (2017) show that in Sweden financial wealth contributes more to educational achievement than housing wealth. Thus, it can be argued that within wealth, wealth components have different effects.

We have just examined several consequences of wealth inequality. At the beginning of this literature review, it became clear that income and wealth are two completely different concepts, yet they are closely related. The snowballing-effect has already been mentioned a few times. This effect has affected wealth distribution in the U.S. over the past 30 years (Saez & Zucman, 2016). Wealthier people tend to save more and consume less per unit of income. This further concentrates wealth at the tail of the distribution. Higher wealth concentration, in turn, causes higher capital-income concentration. When income inequality increases, wealth inequality will

also increase, and this process reinforces itself. Some members of the IMF's Strategy, Policy and Review Department have written a discussion note describing some of the macroeconomic implications of income inequality (Dabla-Norris et al., 2015). Since these are to some extent related to wealth inequality, I want to mention them anyway. Especially since they largely match previously mentioned consequences of wealth inequality. Again, the debate between having equal outcomes and equal opportunities is discussed, just as was raised by Peterson (2017). Inequality of outcomes is the result of individuals' difference in talent, work ethic and opportunities. However, it is argued that in an inter-generational context, it is not straightforward to consider work ethic and opportunity separately (Dabla-Norris et al., 2015). For example, the outcome of work ethic is closely linked to an individual's income, and thus to the opportunities of offspring. Opportunities and outcomes are equally informative and relevant for understanding the nature of inequality. It is also argued that some degree of inequality is desirable as long as people are encouraged to invest, save, and perform in order to advance up the ladder. Moreover, it can contribute to economic growth because it encourages people to be entrepreneurial and innovate (Dabla-Norris et al., 2015). However, increasing and high levels of inequality is not desirable. For example, profound inequality of outcomes can undermine individuals' educational and professional choices. In addition, it can also create undesirable incentives based on personal gain. For example, consider incentives that lead to nepotism (similar to cronyism, see Bagchi and Svejnar (2015)) creating preferential treatment that can have negative consequences for the economy and society. (Part of) society may lose patience and trust in politics as a result. Previous IMF research also shows that the shape of the income distribution can affect economic growth. If the income share of the top 20% grows by 1%, increasing income inequality, this has a negative effect on economic growth of 0.08%. However, if the share of the bottom 20% grows by 1%, this has a positive effect on economic growth of 0.38%. This positive effect also applies to the second and third quintiles (Dabla-Norris et al., 2015). How can this be explained? As income inequality widens, lower income groups are less able to accumulate human and physical capital and stay healthy, which affects growth. For example, lower income groups cannot afford as good an education for their children, which can reduce labor productivity. Moreover, increasing concentration leads to lower aggregate demand in the economy, as the rich save more and spend less per unit of income, as mentioned earlier. Furthermore, there is growing evidence that rising income inequality and the influence of the rich may be causing crises (Dabla-Norris et al., 2015). Between the relaxation of mortgage lending standards, excessive credit extension, and lobbyists hammering for financial deregulation in developed countries with high inequality, a relationship can be established with the GFC. Finally, greater inequality is associated with more conflict and is less able to combat poverty (Dabla-Norris et al., 2015).

Based on the literature, an overview of the possible consequences of wealth inequality was created (see Table 3.3). As mentioned earlier, it can be stated almost with certainty that increasing wealth inequality has a negative effect on economic growth.

Table 3.3: Overview of the possible (in)direct consequences of wealth inequality and their assumed effect (+/-), not categorized.

Cause[1]	**Sign (+/-)**	**Effect**[2]	**Source**
Wealth inequality	-	EG	Bagchi and Svejnar (2015), Islam and McGillivray (2020), and Peterson (2017)
Wealth inequality	+	IN	Peterson (2017)
Innovation	+	EG	Peterson (2017)
Wealth inequality	-	PS	Peterson (2017)
Wealth inequality	-	IHB	Killewald et al. (2017), Peterson (2017), and Pickett and Wilkinson (2015)
Wealth inequality	-	ESC	Knight et al. (2017) and Peterson (2017)
Wealth inequality	+	LMOI	Killewald et al. (2017)
Wealth inequality	+	ELI	Hällsten and Pfeffer (2017) and Killewald et al. (2017)
Wealth inequality	+	THOI	Killewald et al. (2017)
Wealth inequality	+	MI	Killewald et al. (2017)
Wealth inequality	+	II	Saez and Zucman (2016)

[1] Note that in determining the effect, the underlying value of the cause is assumed to increase. For example, an increase in wealth inequality is expected to have a negative effect on EG.
[2] Definition of abbreviations: economic growth (EG), innovation (IN), political systems (PS), individual health and behavior (IHB), environmental and social conditions (ESC), labor market outcome inequality (LMOI), educational level inequality (ELI), transition to home ownership inequality (THOI), mortality inequality (MI), income inequality (II).

3.6 Conclusion

Global wealth inequality is high and is a social problem. This literature review aimed to find out whether this also applies to the Netherlands. Therefore, the main research question was: *How has wealth inequality in the Netherlands changed in the past decades and what are its causes and consequences?*.

To answer this question, the definition of wealth was first established. In the literature, households are most commonly used as the unit of analysis. Consequently, the term is also defined as net household wealth or private wealth. It is the difference between the current value of all assets minus the current value of all liabilities of households. Here it is important to distinguish between those assets and liabilities that are and those that are not included in the definition. Next, it was examined how wealth inequality can be measured. There are several ways to do this, but the main indicators are the Gini coefficient, the top wealth shares, and the ratio of mean to median net wealth. Thereafter, it was examined how the wealth distribution in the Netherlands has developed over the past decades. A number of things can be concluded.

First, only a handful of studies have examined wealth inequality in the Netherlands. What each study lacks is a clear picture of all causes and consequences of wealth inequality. Often a few are mentioned, but these are certainly not the only ones that contribute to inequality. Second, the way wealth inequality has been measured, and with what data, varies enormously among the studies that are available. Third, there is some consistency between the results of the different

studies when it comes to the development of wealth inequality in the Netherlands. It increased significantly between 2006 and 2015. There is also reason to believe that wealth inequality decreased in the post-2015 period. Several reasons exist for the increase in wealth inequality over the period studied. For the Netherlands, this is at least partly due to lower housing prices, mortgage debts and the share of the wealthiest in financial assets. Other contributing factors have not yet been empirically established for the Netherlands. The main consequences of wealth inequality are that it affects economic growth and can create a two-tier society. Again, however, this has not yet been empirically established for the Netherlands.

Several knowledge gaps can be identified. The most important is how wealth inequality in the Netherlands continued to develop after 2015. There is some information on wealth inequality in the Netherlands in 2020, but not about the years before and after. Especially in light of recent years (e.g., Covid-19) and the current situation (rising inflation), it is relevant to investigate this. From a practical point of view, it is important to see whether the policies of recent years have been effective in combating wealth inequality in the Netherlands and whether new policies should be developed. From a theoretical point of view, it is insightful what effects Covid-19 and the war between Ukraine and Russia have on wealth inequality in the Netherlands. Besides the aforementioned knowledge gap, it is not entirely known what the causes of wealth inequality in the Netherlands are and to what extent they contribute to it. The same is true for the consequences of wealth inequality in the Netherlands.

4 Hypotheses Development

During the literature review in Section 3, the (in)direct causes of wealth inequality were identified, among other things. This chapter will develop hypotheses for the direct causes that will be tested for the Netherlands. This will not be done for the effects of wealth inequality because this is not feasible to investigate due to the time limit of the project. Each hypothesis will be briefly substantiated with theory as to why it might be a possible cause and why the expected relationship is positive or negative. Based on the hypotheses, a conceptual model was developed that represents the causes of wealth inequality to be tested.

4.1 Hypotheses

In Table 3.1 and Table 3.2, the causes are divided into macroeconomic level and household level causes to maintain an overview. The hypotheses will also be classified this way.

4.1.1 Macroeconomic Level

Housing prices According to Causa et al. (2019) and Salverda (2019), the majority of housing wealth in the Netherlands is owned by the middle class. Moreover, housing wealth from the 46th percentile onwards comprises more than half of total wealth (Rijksoverheid, 2022). Between 2006 and 2015, wealth inequality in the Netherlands increased. Salverda (2019) and Van Bavel and Frankema (2017) believe that falling housing prices are partly to blame for this rising wealth inequality. De Luigi et al. (2023) argue that quantitative easing (QE) increases the prices of both financial assets and houses. Rising housing prices, unlike financial assets, have a positive effect on the wealth distribution. Put differently, rising housing prices have a negative effect on wealth inequality. This is also confirmed by Blanchet and Martinez-Toledano (2022), who argue that in France asset prices have pushed down wealth concentration. This is due to the fact that housing prices have risen faster than financial assets and because housing wealth makes up a large part of the portfolios of the low and middle classes. This resulted in the following hypothesis:

H1.1: Higher housing prices reduce wealth inequality in the Netherlands.

Generous welfare state In the Netherlands, education, health care and public services are easily accessible. The Netherlands also has a large welfare state, which means that Dutch households do not have to maintain large buffers to absorb economic shocks, for example (Rijksoverheid, 2022). A generous welfare state is referred to if the government has a large budget with respect to collective or social public spending. The effect on wealth inequality of a generous welfare state is twofold. On the one hand, there is an indirect effect that social security crowds out private savings primarily at the bottom of the distribution, which in turn can lead to greater wealth inequality (Cowell et al., 2018). On the other hand, there is a direct reducing effect on wealth inequality in that the bottom of the distribution has lower social costs and thus can accumulate more wealth. Maestri et al. (2014) and Van Bavel and Frankema (2017) also found a positive relationship between a generous welfare state and wealth inequality. They also confirmed that a generous welfare state reduces households' propensity to save. The introduction to this chapter indicated that only hypotheses for the direct causes of wealth inequality are developed. However, an exception is made here because, according to the literature, a generous welfare state has both an indirect and a direct effect on wealth inequality. For convenience, both effects are taken together with the expectation that the indirect effect is dominant over the direct effect. This resulted in the following hypothesis:

H1.2: A more generous welfare increases wealth inequality in the Netherlands.

Wealth tax Similar to a generous welfare state, wealth taxes also have a direct and indirect effect on wealth inequality. The indirect effect is that a combination of a higher property tax with a lower wealth tax has a negative effect on the home ownership rate (Cowell et al., 2018). People are less likely to invest in housing and more likely to invest in financial assets. In turn, lower home ownership rates and higher financial asset ownership rates (which tend to be concentrated among the wealthy) increase wealth inequality. However, this effect is not included in Table 3.1 because it is both an indirect effect and a combination of two factors. The direct effect, which does appear in Table 3.1, is that a wealth tax cut may increase wealth inequality because wealth may accumulate more rapidly among the rich (Maestri et al., 2014). This can also be reasoned quite rationally, because wealth tends to concentrate among the rich. If this wealth is taxed more, then wealth inequality will decrease. As of January 1, 2001, the wealth tax in the Netherlands was merged into the income tax, also known as the '2001 Income Tax Act' or 'Wet inkomstenbelasting 2001' (Overheid.nl, 2023b). This law considers taxable income from savings and investments as a category of income. From 2001 to 2016, people had to pay 30% income tax on a notional (i.e., fictional) 4% return on assets (Belastingdienst, 2023a). As of 2017, this system of notional returns has changed. Capital is divided into three tranches that have different notional returns. One still had to pay 30% income tax on these different notional returns. In 2021, the income tax payable on the notional return was increased to 31% and from 2023 it will be 32% (Belastingdienst, 2023a). Since the income tax rate has remained fairly constant over the years, it makes no sense to formulate a hypothesis because it will have no effect on wealth inequality.

Inheritance tax Like wealth taxes, inheritance taxes may also explain wealth inequality. In absolute terms, wealthy people can usually transfer more to their offspring than less wealthy ones (Maestri et al., 2014). If inheritance taxes increase, one might expect wealth inequality to decrease. In 1956, the inheritance tax was introduced in the Netherlands, better known as the 'Successiewet 1956' (Overheid.nl, 2023a). A change was made in 2010 whereby there is no longer a separate rate for siblings. They have since fallen under the 'other beneficiaries' rate. In addition to this category, there are two other categories: 'children and partner', and 'grandchildren'. Since 2010, the rates for each inheritance tax category have remained constant, as with the income tax rate on savings and investments (Belastingdienst, 2023b). Therefore, no hypothesis will be formulated for the inheritance tax either.

Financial asset prices QE increases both housing prices and the prices of financial assets (De Luigi et al., 2023). The latter has a positive relationship with wealth inequality because most financial assets are owned by the very rich (Berisha & Meszaros, 2020). Blanchet and Martinez-Toledano (2022) also argue that rising prices of financial assets drive up wealth concentration. This resulted in the following hypothesis:

H1.3: Higher financial asset prices increase wealth inequality in the Netherlands.

Size of financial markets Finance also plays a role in wealth inequality (Hasan et al., 2020). Of course, this is a broad concept and consists of several factors, including the size of financial markets. This can be represented by stock market capitalization, or the value of all stocks in a market. Large financial markets have been shown to have a positive relationship with wealth inequality (Hasan et al., 2020). It is generally the rich who participate in these markets. Less

wealthy are less likely to participate in these markets because the risks are too high and they don't have the money for it. Therefore, greater stock market capitalization goes hand in hand with greater wealth inequality. This resulted in the following hypothesis:

H1.4: Larger financial markets increase wealth inequality in the Netherlands.

Efficiency of financial intermediaries Another factor mentioned by Hasan et al. (2020) that affects wealth inequality is the efficiency of financial intermediaries. The more efficient a country's financial markets are, the less wealth inequality. A limitation of this article is that no further explanation or theory is provided. There are scholars who have studied the efficiency of financial markets, including Haldane (2012), but they make no connection to wealth inequality. It was thought that the cost of financial intermediation would decrease as banks grew and became more concentrated. In reality, however, there are diseconomies of scale (Haldane, 2012). Increasing market concentration in the financial sector is linked to lower efficiency of banks in terms of costs. When banks become 'Too Big Too Fail' (TBTF), people know that these banks will be bailed out by the state if necessary. This gives them an implicit subsidy in the form of higher credit ratings because the perception is that they have a lower risk of default. These higher credit ratings allow these banks to get financing at lower interest rates, thus lower costs, making it easier for them to make a profit (Haldane, 2012). When these implicit subsidies are taken into account, the costs for these banks increase. Figure 4.1 shows that larger banks exhibit diseconomies of scale when adjusted for implicit subsidy. TBTF banks become 'Too Big To Manage' and less efficient when they become larger.

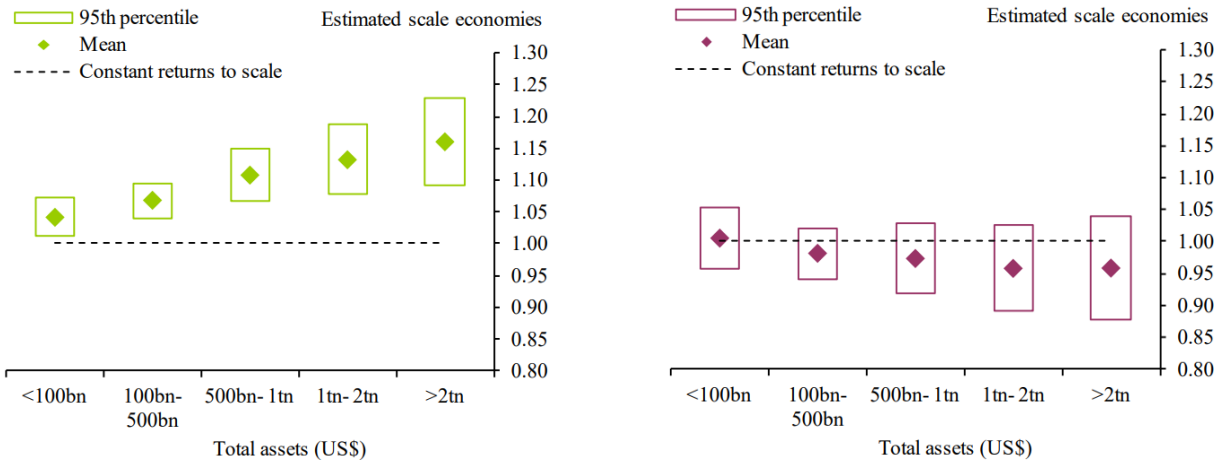

Figure 4.1: (Dis)economies of scale for banks. Assuming no implicit subsidy (left) and adjusted for implicit subsidy (right). *Adapted from Haldane (2012).*

Bankers who work for large banks and benefit from this implicit subsidy can reap excessive salaries, bonuses, and profits through various mechanisms, such as fraudulent activities, anti-competitive practices and the marketing of risky products (Storm & Naastepad, 2021a). Moreover, if the state has to bail out the bank, for example during the GFC, it is the taxpayer who will pay for these costs. Thus, this will fall mainly on the shoulders of the middle class, which may also increase wealth inequality. Therefore, the hypothesis is as follows:

H1.5: Higher efficiency of financial intermediaries reduces wealth inequality in the Netherlands.

Access to finance According to Hasan et al. (2020), better access to finance also leads to lower wealth inequality. As with the efficiency of financial intermediaries, no explanation or theory is given here as to why this is so. The indicators used to measure access to finance are: bank branches per 100,000 adults, and ATMs per 100,000 adults. These indicators are taken from Svirydzenka (2016), which also describes indicators for the size of financial markets and the efficiency of financial intermediaries used by Hasan et al. (2020). These indicators can be found in the Global Financial Development Database (GFDD). Regarding the definition of access to finance, we adopt the definition of Claessens and Perotti (2007). They distinguish between the use of financial services and access to financial services. The latter refers to the availability of financial services at a reasonable cost. If only the wealthy can use financial services, this can lead to wealth inequality. Less affluent people cannot afford these services and thus will be less inclined to undertake, reducing their ability to grow and increasing inequality. The hypothesis is as follows:

H1.6: Better access to finance reduces wealth inequality in the Netherlands.

Political stability In addition to the three factors just described, namely 'size of financial markets', 'efficiency of financial intermediaries', and 'access to finance', Hasan et al. (2020) identified two other factors that can affect wealth inequality. One is political stability and is defined as the number of wars or conflicts. The more wars or conflicts a country would have, the less political stability and the more wealth inequality there would be (Hasan et al., 2020). The Netherlands has not had any wars or conflicts in recent years, so it is not relevant to include this factor in this study. Therefore, no hypothesis will be formulated.

Globalization The other factor mentioned besides political stability is globalization. This factor, according to Hasan et al. (2020), is expressed as trade openness, without specifying exactly what it means and how it is measured. Arribas et al. (2009) argue that the degree of trade openness is a common indicator of globalization and can be measured as imports plus exports divided by GDP. A greater degree of globalization would lead to a greater degree of wealth inequality (Hasan et al., 2020). Indeed, globalization would stimulate the growth of an economy, and in the process some people would benefit more than others. Therefore, the hypothesis is as follows:

H1.7: Globalization increases wealth inequality in the Netherlands.

4.1.2 Household Level

(Mortgage) debts Salverda (2019) studied wealth inequality in the Netherlands from 2006 to 2014 and argue that debt, and in particular mortgage debt, partially led to the rising wealth inequality seen between 2006 and 2014. According to Causa et al. (2019), the Netherlands has the highest percentage of households with mortgages relative to the rest of the OECD countries. When looking at the composition of liabilities in household portfolios, it is also apparent that mortgages are the largest component (Causa et al., 2019). Berisha and Meszaros (2020) also argue that the less wealthy have the most mortgage debt, contributing to wealth inequality. This resulted in the following hypothesis:

H2.1: Higher mortgage debts increase wealth inequality in the Netherlands.

Home ownership rate The literature clearly agrees that low levels of home ownership are associated with high levels of wealth inequality (Causa et al., 2019; Roberts & Lawrence, 2017; Skopek et al., 2014). The relationship is particularly clear when the degree of outright home ownership is considered (Balestra & Tonkin, 2018). That is, when households have no outstanding mortgage debt for their homes. In Sweden, they have also examined the causes of wealth inequality and concluded that this is partly due to low home ownership (Cowell et al., 2018). As mentioned, housing is an important part of the portfolio of middle-class households and crucial to a more equal distribution of wealth (Causa et al., 2019; Salverda, 2019). Therefore, the hypothesis is as follows:

H2.2: A higher home ownership rate reduces wealth inequality in the Netherlands.

Saving rate inequality The saving rate is an important component for accumulating wealth. But without income, you can neither save nor accumulate wealth (Berisha & Meszaros, 2020; Maestri et al., 2014). Rich people save relatively more compared to the rest of the wealth distribution and therefore accumulate wealth more quickly. It is important that the bottom of the distribution also saves, otherwise the gap between rich and poor will continue to widen (Cowell et al., 2018). Thus, it is also crucial that incomes at the bottom of the distribution continue to grow, as this is the key source of savings and reduces savings inequality. The focus here, however, is not on income growth but on saving rate inequality. The hypothesis is as follows:

H2.3: Higher saving rate inequality increases wealth inequality in the Netherlands.

Financial assets ownership rate inequality According to Balestra and Tonkin (2018) and Van Bavel and Frankema (2017), ownership of financial assets is the main driver of wealth inequality. Indeed, financial assets are generally owned by the 10% richest. In 2014, this group owned almost 73% of all financial wealth in the Netherlands (Salverda, 2019). Stock prices rose by an average of 4.6% between 2010 and 2015 and could explain much of the rising inequality during that period (Balestra & Tonkin, 2018). Lundberg and Waldenström (2018) also emphasize that the wealth of the rich is primarily in financial assets. This resulted in the following hypothesis:

H2.4: Higher financial assets ownership rate inequality increases wealth inequality in the Netherlands.

Income inequality Income is part of wealth in the form of cash or deposits. There is agreement in the literature that when incomes are unequally distributed, this has a negative effect on the wealth distribution (Berisha & Meszaros, 2020; Blanchet & Martinez-Toledano, 2022; Gao & Chen, 2022; Hasan et al., 2020; Maestri et al., 2014; Tippet et al., 2022). Wealth can thus be accumulated through income, but income, in turn, can also be acquired through wealth. Both factors have a reinforcing effect on each other, i.e., the snowballing-effect (Saez & Zucman, 2016). It was stated at the beginning of this section that we would focus only on the causes of wealth inequality and not on the effects, as this would take too much time. However, we make an exception for the snowballing-effect because this is a rather special case. Therefore, the following two hypotheses were developed:

H2.5: Higher income inequality increases wealth inequality in the Netherlands.

H2.6: Higher wealth inequality increases income inequality in the Netherlands.

Inheritance inequality In addition to inheritance taxes, inheritances themselves are also a cause of wealth inequality according to Elinder et al. (2018), Leitner (2016), Maestri et al. (2014), and Nekoei and Seim (2023). Elinder et al. (2018) argue that inheritances reduce relative wealth inequality in the short run because less wealthy people inherit a relatively large amount compared to their wealth before inheritance. Nekoei and Seim (2023) agree, but do argue that these inheritances increase long-term wealth inequality. The less wealthy typically exhaust their inheritance within 10 years, unlike the rich. This is partly due to heterogeneous returns, but also because the rich inherit more in absolute values. Leitner (2016) argues that there is no difference between the short and long term, and that differences in inheritance increase wealth inequality anyway. This resulted in the following hypothesis:

H2.7: Higher inheritance inequality increases wealth inequality in the Netherlands.

Average household age In general, people accumulate more wealth as they age (Maestri et al., 2014). When a country ages, it can affect the wealth distribution. According to Leitner (2016), differences in average household age can contribute as much as 19% to wealth inequality. Therefore, the hypothesis is as follows:

H2.8: A higher average household age increases wealth inequality in the Netherlands.

Education level More education would reduce wealth inequality (Hasan et al., 2020). Again, this study provides little context as to why this effect exists. But presumably it is because education increases employment opportunities and one can better manage financial resources if one is more educated. Leitner (2016) also found a positive relationship between average household education levels and the amount of accumulated wealth. As with differences in average household age, education also contributes as much as 19% to wealth inequality. This resulted in the following hypothesis:

H2.9: Higher education levels reduce wealth inequality in the Netherlands.

4.2 Conceptual Model

Based on the hypotheses developed in the previous subsection, a conceptual model was constructed. The model is shown in Figure 4.2 and consists of two parts: the macroeconomic level (top) and the household level (bottom). The macroeconomic level counts a total of 7 hypotheses. The household level counts a total of 9 hypotheses. The relationship between income inequality and wealth inequality has two arrows and indicates the snowballing-effect (Saez & Zucman, 2016). This model serves as the basis for the descriptive and regression analyses. The next section presents the results of these analyses, followed by a discussion.

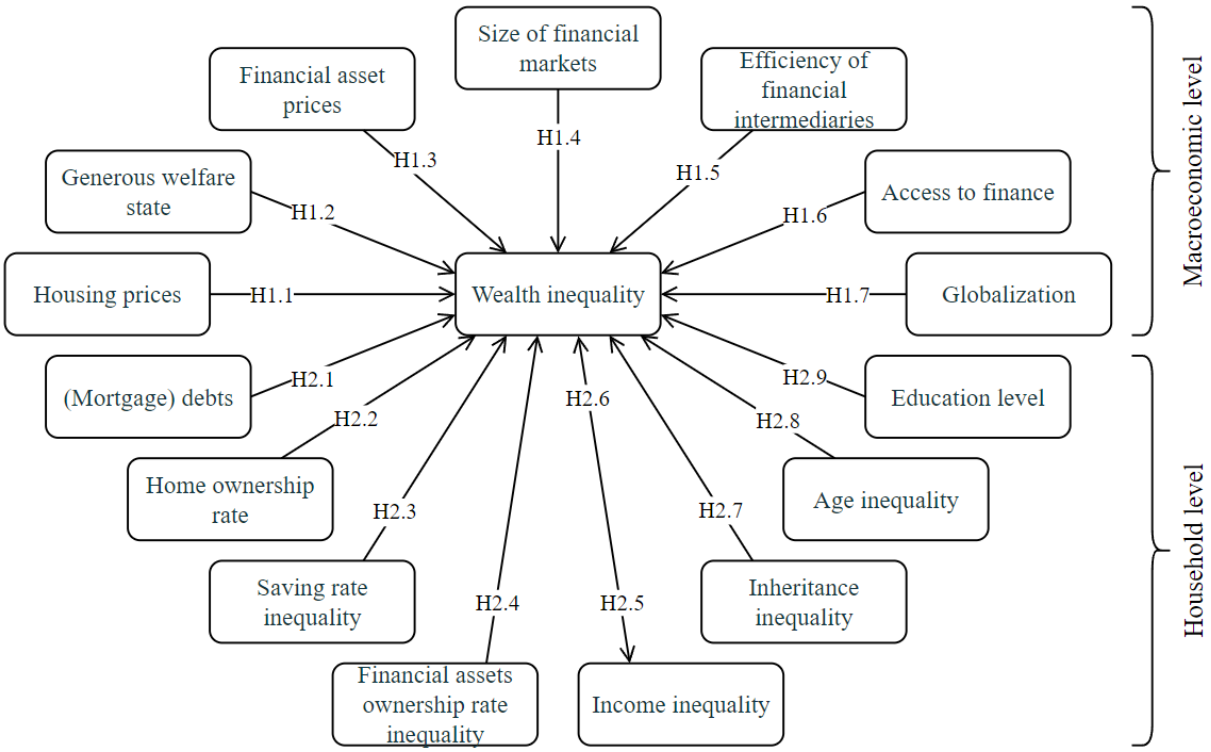

Figure 4.2: Conceptual model of the causes of wealth inequality in the Netherlands.

5 Results

This section presents and briefly explains the results for the period 2006-2021. We will first describe how wealth inequality in the Netherlands has developed over the years. The same will be done for the factors that are likely to influence this wealth inequality. Next, a simple regression analysis will be performed for all factors for which suitable indicators were found. Thereafter, a multiple regression analysis will be conducted with the remaining statistically significant factors. At the end, the final conceptual model will be presented. All data are reported in nominal figures.

5.1 Descriptive Analysis

5.1.1 Wealth Inequality

When defining wealth, the unit of analysis is important. In this case, households are the unit of analysis, referring to household net wealth (or private wealth), as Piketty and Zucman (2015), among others, do. This is the difference between the current value of all assets minus the current value of all household liabilities. This definition is used to determine (the causes of) wealth inequality in the Netherlands and is also used by the CBS. One of the most commonly used indicators to measure wealth inequality is the Gini coefficient (Peterson, 2017). This indicator has a number between 0 and 1, where 0 means perfect equality and 1 means perfect inequality. The CBS database has data on the Gini coefficient of income and wealth for the period 2011 through 2021. Most household wealth data available in the database run at least from 2006 through 2021. This is also the case for data in which the wealth distribution of households is divided into deciles, i.e., 10 groups of 10%. Therefore, an attempt was made to calculate the Gini coefficient of wealth based on these deciles for the period 2006-2021. In doing so, the total wealth of each decile in billions of euros was used. However, a problem arises here because one or more of the lower deciles often possess negative wealth. The moment these negative values are included then the upper bound of the Gini coefficient is no longer 1 and the normalization principle is violated (Raffinetti et al., 2015). There are ways to solve this. The simplest way is to set the wealth of the lowest decile (i.e., the 1st 10% group) to zero. The number that causes the wealth of the lowest decile to be zero must then also be added to all the other deciles. However, this is not an obvious method because the data is manipulated. There are other methods, but they are mathematically more complicated (Chen et al., 1982; Raffinetti et al., 2015). Because this requires a great deal of time and research for a single indicator, it has been further disregarded. We chose to calculate the Gini coefficient using the negative values, despite the limitations associated with this. Figure 5.1 shows, by way of illustration, a graph that helps to calculate the Gini coefficient. Two areas are shown: Area A and Area B. When these areas are known, the Gini coefficient can be calculated as follows:

$$\text{Gini coefficient} = \frac{\text{Area } A}{(\text{Area } A + \text{Area } B)} \tag{5.1}$$

To calculate Area B, we must first determine the wealth share of each decile in total wealth ($S_{D,n}$). For example, in 2020, the wealth held by the ninth decile (p81-p90) was 309.7 billion euros. The total wealth of all deciles combined in that year amounted to 1888.1 billion euros. Thus, the share of the 9th decile ($S_{D,9}$) in total wealth in 2020 was: $\frac{309.7}{1888.1} = 16.4\%$. Next, we have to calculate the cumulative of these wealth shares for each decile ($C_{D,n}$). The cumulative

of the first 10% households ($C_{D,1}$) is the wealth share of the first decile; the cumulative of the first 20% households ($C_{D,2}$) is the wealth share of the first decile plus the second decile; and so on. In formulaic form:

$$C_{D,n} = \sum_{k=1}^{n} S_{D,k} \tag{5.2}$$

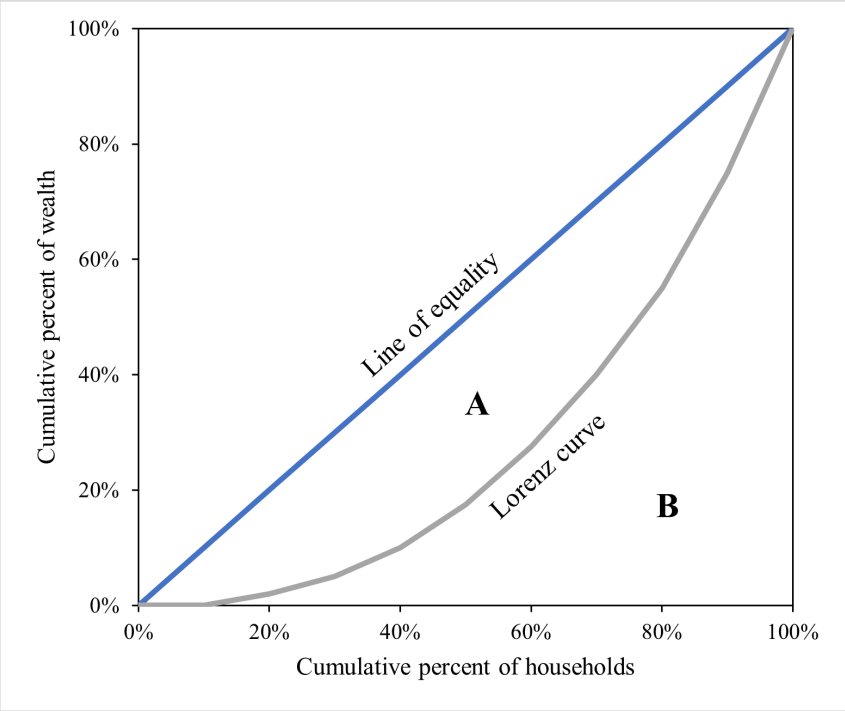

Figure 5.1: The Gini coefficient and the Lorenz curve. *Source: Author's own work.*

We approximate the area of each decile ($A_{D,n}$) by thinking of the area as a triangle. Therefore, looking at Figure 5.1, we multiply the width of each decile ($W_{D,n}$) by the corresponding decile's cumulative wealth share ($C_{D,n}$), divided by 2 (Equation 5.3). Finally, to calculate Area B, we have to add up the areas of each decile as done in Equation 5.4.

$$A_{D,n} = \frac{W_{D,n} \cdot C_{D,n}}{2} \tag{5.3}$$

$$\text{Area } B = \sum_{k=1}^{n} A_{D,k} \tag{5.4}$$

To calculate Area A, we need to subtract Area B from the area of the large triangle (consisting of Area A and Area B), which is equal to 0.5. Now that we have both areas, we can calculate the Gini coefficient. As an example, we will do this for the year 2020. The sum of the areas of each decile ($\sum_{k=1}^{n} A_{D,k}$), or Area B, is equal to 0.1181. It follows that Area A is equal to

$0.5 - 0.1181 = 0.3819$. Thus, the Gini coefficient of 2020 is $\frac{0.3819}{0.5} = 0.7638$. Figure 5.2 shows both the CBS-calculated Gini coefficient for the years 2011-2021 and the self-calculated Gini coefficient for the years 2006-2021 based on decile data. The complete formula and derivation for calculating the Gini coefficient is provided in Equation 5.5.

$$\begin{aligned}
\text{Gini coefficient} &= \frac{\text{Area } A}{(\text{Area } A + \text{Area } B)} = \frac{\text{Area } A}{0.5} \\
&= \frac{0.5 - \text{Area } B}{0.5} = \frac{0.5 - \sum_{k=1}^{n} A_{D,k}}{0.5} \\
&= \frac{0.5 - \sum_{k=1}^{n} \frac{W_{D,k} \cdot C_{D,k}}{2}}{0.5} = \frac{0.5 - \sum_{k=1}^{n} \frac{W_{D,k} \cdot \sum_{k=1}^{n} S_{D,k}}{2}}{0.5} \\
&= 1 - \sum_{k=1}^{n} (W_{D,k} \cdot \sum_{k=1}^{n} S_{D,k})
\end{aligned} \tag{5.5}$$

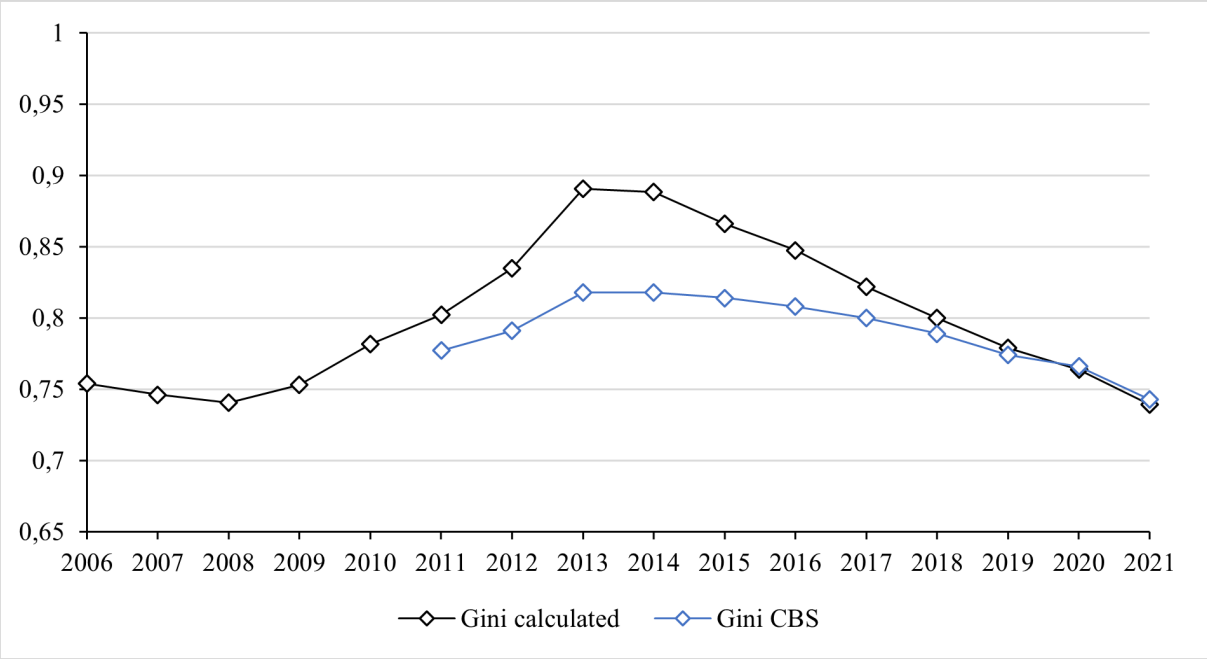

Figure 5.2: Wealth inequality measured as the Gini coefficient in the Netherlands. Presented are the Gini coefficients calculated by the CBS and the Gini coefficients according to our own calculations based on decile data from the CBS. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

It can be seen that the calculated Gini coefficients and that of the CBS in the middle of the figure above are quite different. There are two possible explanations for this. Presumably, the CBS used microdata to calculate the Gini coefficient. These data are probably arranged in percentiles or more accurate and are not openly available. We calculated the Gini coefficient from decile data and these are much less accurate. A second possible explanation is that the CBS treated the negative values of the lower percentiles differently. They provided a brief explanation of how they dealt with this, but it cannot be deduced from that exactly how they did it. For the best

possible estimate of the Gini coefficient from 2006 to 2021, we combined the self-calculated Gini coefficients and those from the CBS. From 2006 to 2009 we used the self-calculated Gini coefficient, and from 2011 to 2021 we used the CBS Gini coefficient. Figure 5.2 shows that the 2010 self-calculated Gini coefficient is higher than the 2011 CBS Gini coefficient. To best align the Gini coefficients, the average of the 2009 self-calculated Gini coefficient and the 2011 CBS Gini coefficient was taken for the year 2010. Figure 5.3 shows the combined Gini coefficients.

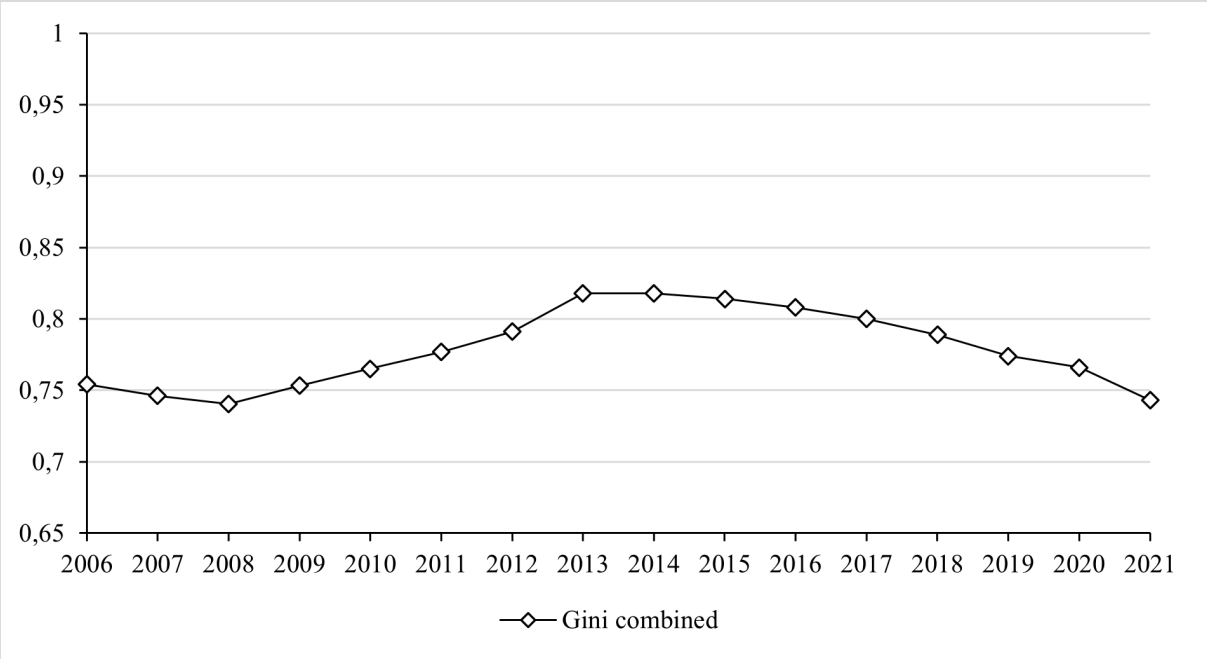

Figure 5.3: Wealth inequality measured as the Gini coefficient calculated by the CBS (2011-2021) and according to our own calculation based on decile data from the CBS (2006-2010) in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

The following can be deduced from the figure above. From 2006 to 2008, wealth inequality in the Netherlands, measured as the Gini coefficient, decreased slightly. In the subsequent period through 2013, wealth inequality increased sharply from 0.74 to 0.82. Since then, wealth inequality has weakened again to 0.74 in 2021. Thus, the Netherlands seems to have returned to the levels seen during the GFC. Importantly, the Gini coefficient gives much weight to households in the middle of the distribution. This can give a distorted picture if changes over time have occurred mostly at the bottom and/or top of the distribution (Rijksoverheid, 2022). Moreover, we cannot rely solely on the combined Gini coefficient because different data and calculations have been applied. Therefore, we want to identify other indicators of wealth inequality in the Netherlands in addition to the Gini coefficient. This allows us to examine whether the pattern of the Gini coefficient holds for other indicators of wealth inequality as well. We will do this for (1) the net household wealth shares at the top and bottom of the distribution, and (2) the ratio of mean to median net household wealth. We will also present what household portfolios consist of with respect to wealth.

According to Balestra and Tonkin (2018), inter-quantile share ratios such as the S80/S20 are common indicators of income inequality that provide a good illustration of the income distribution. However, they suggest that these indicators are not suitable for wealth inequality because

many households experience negative net wealth. Indeed, this is also true for the Netherlands. CBS data show that the 1st 10% group always has negative net wealth in the period 2006-2021. The same is true for the 2nd 10% group for the period 2011-2020, and some years for the 3rd 10% group. Therefore, it is not possible to use the S80/S20 indicator for wealth inequality. In fact, it is not even possible to plot the top wealth shares against the bottom 50%. Aggregating the wealth of the bottom 50% still produces a negative figure for certain years. To illustrate this, Figure 5.4 shows net household wealth shares for the period 2006-2021. Data for the shares of the top 1% and top 0.1% are only available since 2011.

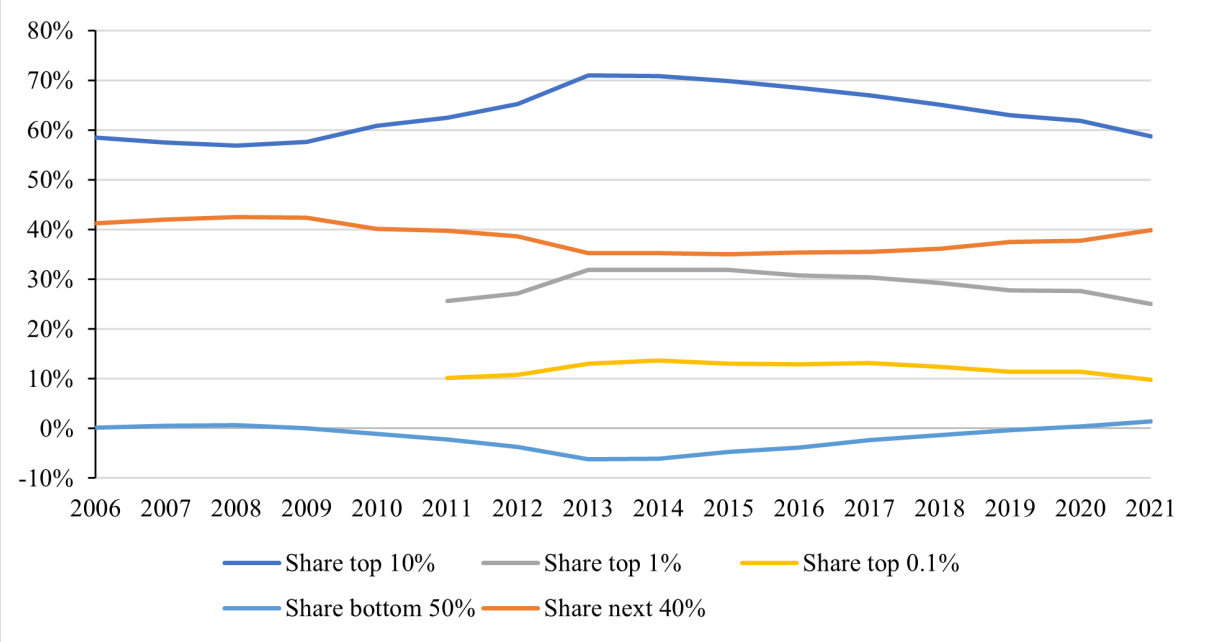

Figure 5.4: Net household wealth shares in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

It can be seen that the top 10% of households in the Netherlands held more than 70% of total wealth in 2013. The share of wealth of the bottom 50% in total wealth among households hovers around 0% and, as mentioned above, has been negative for several years. Therefore, we chose to plot the share of the top 10% relative to the bottom 90% as an indicator of wealth inequality. The bottom 90% is the total of the bottom 50% (i.e., p0-p50) and the next 40% (i.e., p50-p90). This ratio of top 10% to bottom 90% is shown in Figure 5.5. Looking at the ratio of the top 10% to bottom 90%, we see a similar pattern to the Gini coefficient. From 2006 to 2008, there is a slight decline in the ratio, meaning that the richest have had to cut into the share of total wealth. However, since 2008 through 2013, this ratio increased significantly from 1.32 to 2.44. From 2013 through 2021, the ratio fell to 1.42. This suggests that, like the Gini coefficient, wealth inequality was highest in 2013 and has only declined since then.

The final indicator of wealth inequality considered here is the ratio of mean to median net household wealth. According to Balestra and Tonkin (2018), this indicator provides a more refined picture of wealth inequality compared to share ratios. The rationale is that median wealth better reflects the 'wealth situation' of a typical household. If the ratio of mean to median is high, it follows that the richest households own a relatively large proportion of total net wealth. Otherwise, the value of mean net wealth would not be so high. The ratio during the

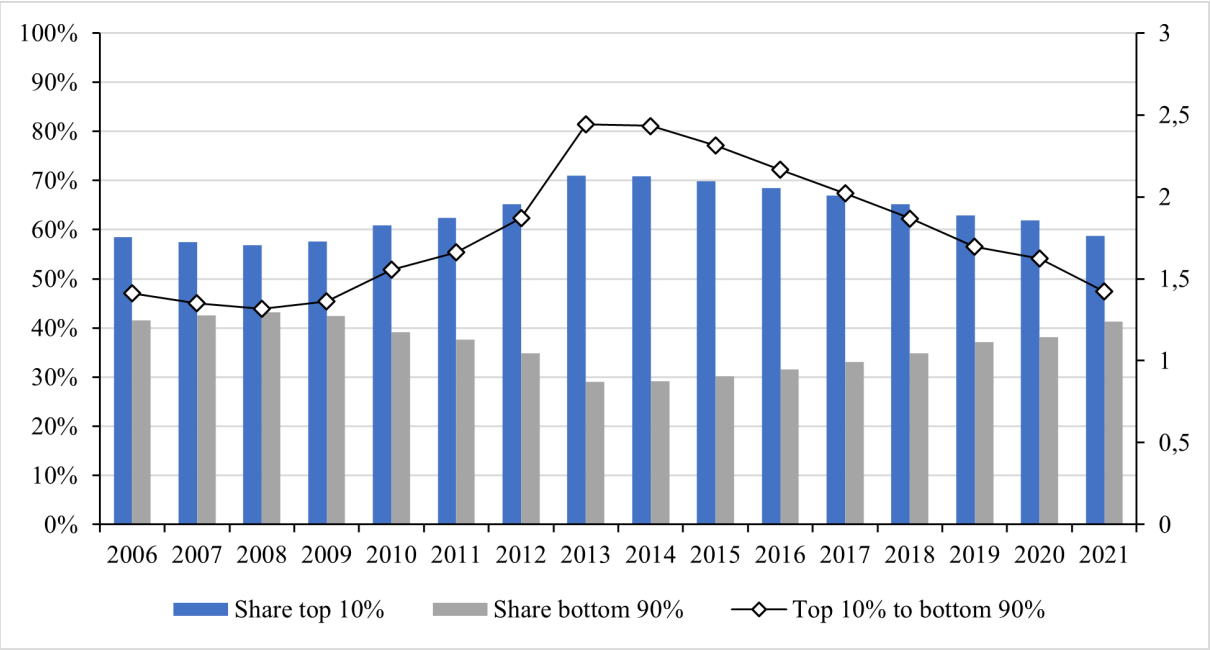

Figure 5.5: Top 10% to bottom 90% net household wealth shares in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

2006-2021 period is shown in Figure 5.6. Again, a similar pattern can be observed in the mean to median ratio compared to the Gini coefficient and the ratio of the top 10% to the bottom 90%. From 2006 to 2008, there is a slight decrease from 4.93 to 4.11. Next, this decline turns into a sharp increase, peaking in 2013 with a ratio of 8.74. Thereafter, the ratio drops to 2.99 in 2021, its lowest point in the 2006-2021 period. Interestingly, when the ratio of mean to median falls, the value of mean net wealth rises, and vice versa.

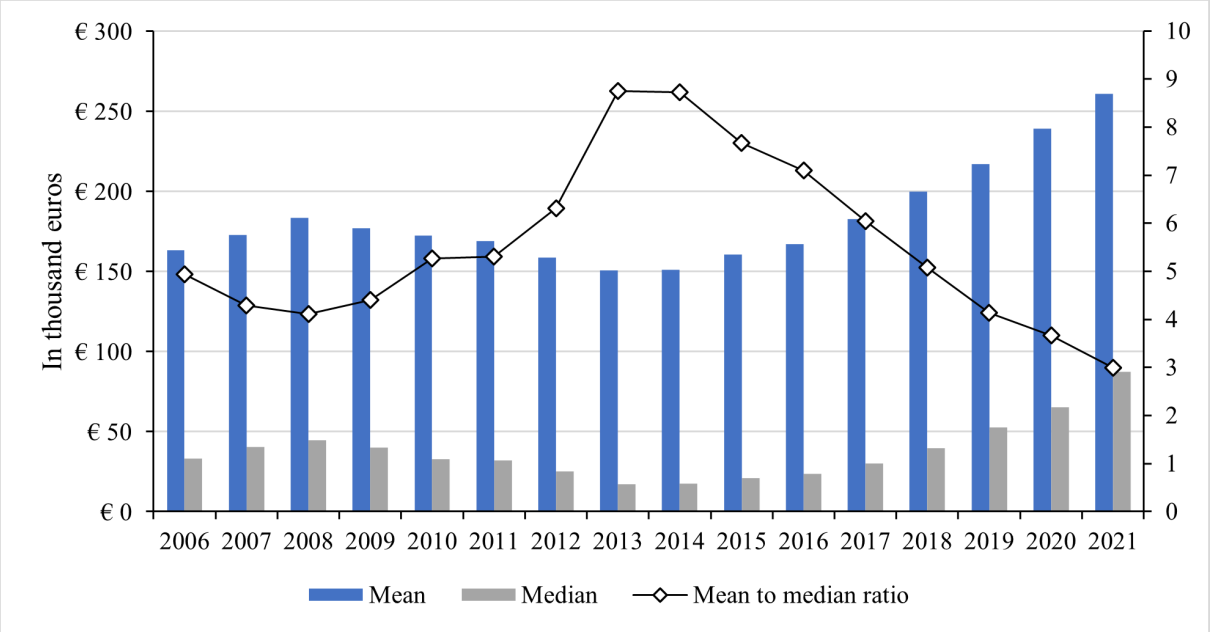

Figure 5.6: Mean to median net household wealth in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

Household wealth portfolios are not robust indicators of wealth inequality. However, it does provide insight into how household wealth is composed. Based on this insight, it is possible to reason logically what would happen to wealth inequality if certain assets or liabilities depreciate or increase in value. Since we previously dealt with the net household wealth shares of the top 10% and the bottom 90%, we will now do the same for the wealth portfolios of the top 10% and the bottom 90%. Appendix B shows the wealth portfolios of the bottom 50% and the next 40%, which are the portfolios of the bottom 90%, but disaggregated. For the sake of space and continuity, these portfolios are not discussed here. The portfolios were calculated by adding the total wealth of the various assets and liabilities of the respective group (i.e., bottom 90% and top 10%). The assets consist of:

- Financial assets: the sum of bank- and savings deposits, and securities. Securities consist of shares and bonds. Shares in particular refer to the market value of shares, options, mutual funds, and other investment funds.
- Real estate: the sum of the value of principal residences (i.e., property owned and used as main residence) and other real estate (e.g., second homes, vacation homes).
- Enterprise capital: balance of business assets and liabilities of the self-employed.
- Substantial interest: substantial shares in equity in incorporated businesses. One is a substantial interest holder if he or she owns at least 5% of the equity of a company.
- Other assets: includes cash, movable property leased or used as investment, trust assets, and more.

The liabilities consist of:

- Mortgage debts: refers to the amount of debts on which interest is due.
- Educational debts: debts under the 'Student Finance Act' or 'Wet studiefinanciering', excluding provisional debts convertible into gifts.
- Other debts: includes consumption debts, equity and second home financing, negative bank balances, health care debts, and tax- and benefit debts.

The portfolios of the bottom 90% and the top 10%, consisting of the assets and liabilities just mentioned, are shown in Figure 5.7 and Figure 5.8, respectively. Looking at the portfolio of the bottom 90%, two wealth components stand out. The assets of this group of households consist mainly of real estate. As mentioned above, real estate consists of two components: principal residences and other real estate. CBS data show that value of real estate of the bottom 90% consists chiefly of principal residences rather than other real estate. One can imagine that the moment housing prices fall, the total net wealth of this group will decrease. It can also be seen that the liabilities of this group consist mainly of mortgage debt, the flip side of home ownership. The average total net wealth during the period 2006-2021 is €506 billion. The average of real estate and mortgage debts added together during this period is €346 billion, to show the importance of these wealth components in the total of this group. Looking at the portfolio of the top 10%, more assets play an important role than just real estate, and mortgage debt is less important in total liabilities. Interestingly, substantial interest plays a much larger role in total assets. Financial assets are also slightly more important. When liabilities are considered, their total value is much lower than in the portfolio of the bottom 90%, while the total value of assets is similar.

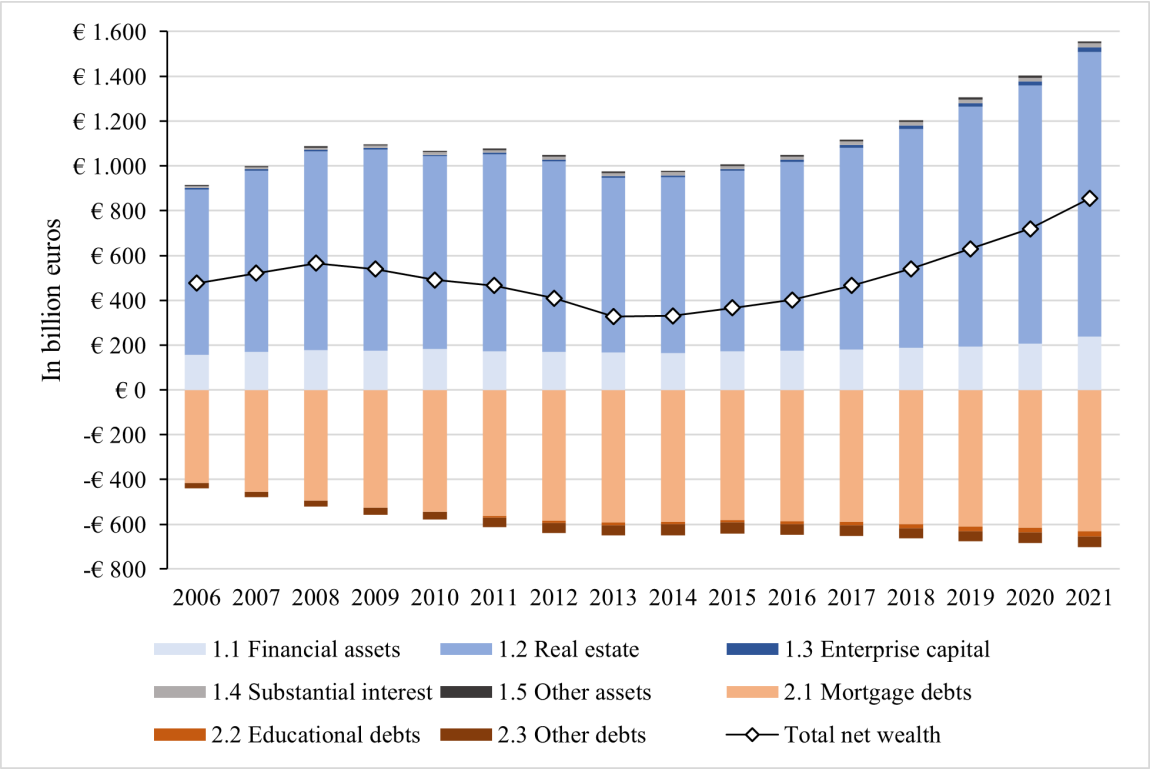

Figure 5.7: Household wealth portfolio of the bottom 90% in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine.*

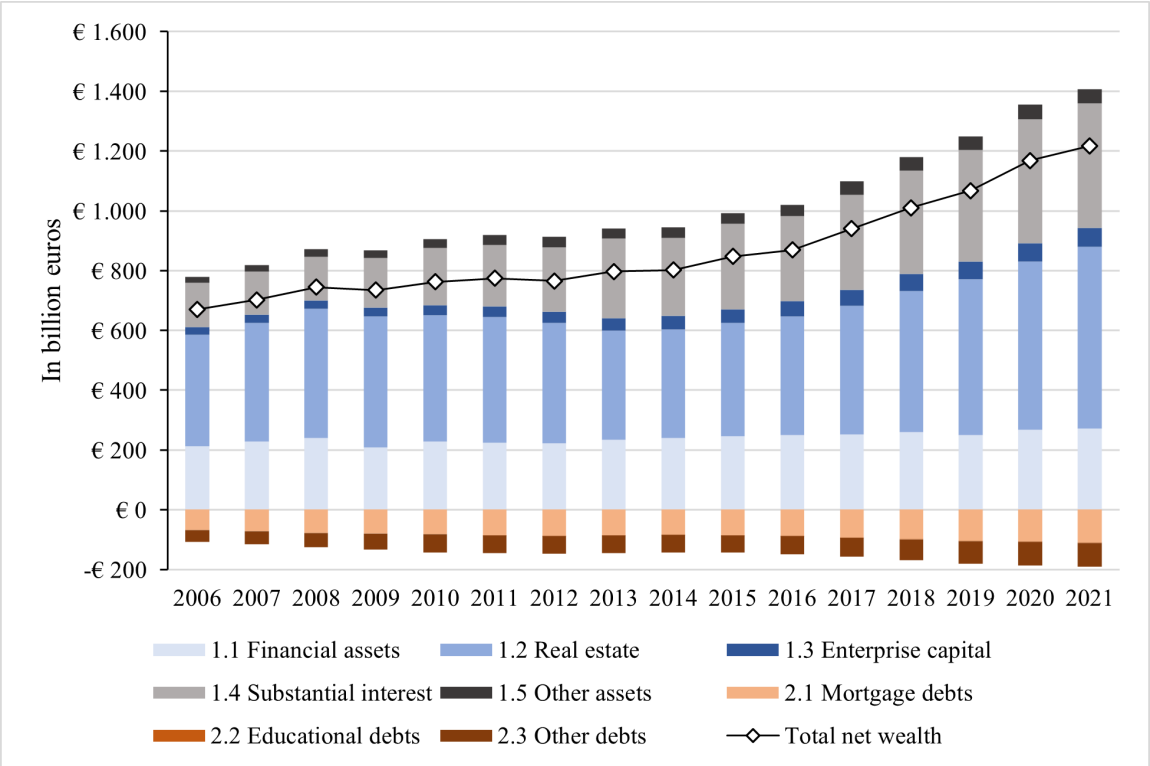

Figure 5.8: Household wealth portfolio of the top 10% in the Netherlands. Data for 2021 are preliminary figures. *Source: CBS StatLine.*

We want to conclude this subsection by presenting the correlations between the different indicators of wealth inequality that have been discussed. In this way, it can be established whether different indicators measure the same 'quantity', namely: wealth inequality. If there are significant correlations between the different indicators, we can say almost with certainty that they measured the same 'quantity'. Table 5.1 shows the Pearson correlation coefficients (r) obtained using the '*=PEARSON()*' function in Excel. To determine whether the coefficients are significant, the t-values were first calculated. This was done according to the formula of Zar (1972), see Equation 5.6. Note that n is the number of observations (2006-2021 has 16 observations).

$$\text{t-value} = \frac{r\sqrt{(n-2)}}{\sqrt{1-r^2}} \tag{5.6}$$

Thereafter, the p-value was calculated using the function '*=T.DIST.2T()*' in Excel. Note that the α-value used to test significance is 0.05. All three indicators have a significant correlation with each other and thus it can be said that they measure (almost) the same thing. Moreover, it can be confirmed that wealth inequality in the Netherlands has followed the trend illustrated by these indicators. From 2006 to 2008 there was a slight decrease after which wealth inequality increased sharply until 2013. From 2013 to 2021, wealth inequality decreased to about the 2008 level.

Table 5.1: Overview of the correlation coefficients and associated significance of the indicators of wealth inequality.

Indicators	**Pearson's r**	**t-value**	**p-value**
Gini combined – Top 10% to bottom 90%	0.9825	19.7246	1.3E-11*
Gini combined – Mean to median ratio	0.9056	7.9905	1.39E-06*
Top 10% to bottom 90% – Mean to median ratio	0.9146	8.4623	7.08E-07*

* Correlation is significant (p-value < α-value).

5.1.2 Macroeconomic Level

Subsubsection 4.1.1 established the hypotheses of the factors categorized at the macroeconomic level. Each of these factors and the corresponding indicator will be examined one by one. In the descriptive analysis of wealth inequality, the period from 2006 to 2021 was analyzed and this period will also be maintained here.

Housing prices First, we zoom in on the development of housing prices in the Netherlands. For this we use data from the CBS. For the period just mentioned, only data on the price index of purchase prices of existing owner-occupied homes (i.e., existing own homes) is available. Data on the price index of purchase prices of new and existing owner-occupied housing combined is only available for the period 2015-2022. The CBS also has data available on the average purchase price of existing own homes. However, they state that these figures do not reflect the price development of all existing own homes. They point out that the price index figures do. Figure 5.9 shows the development of the price index of existing own homes. 2015 is taken as the base period and thus equals 100. From 2006 to 2008, housing prices rose slightly from 112 to 120 index points. From that point, prices fell to 96 index points in 2013. Then prices rose again to 163 index points in 2021, the highest level during that period. The graph appears to show a similar but inverse pattern with respect to indicators of wealth inequality.

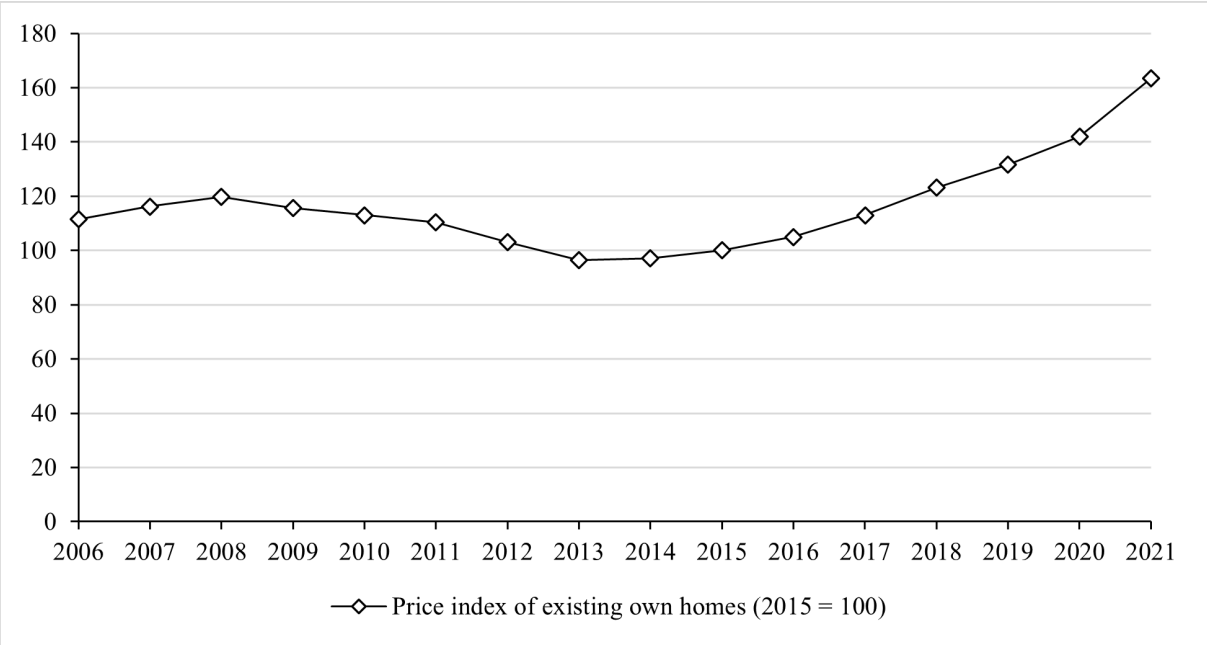

Figure 5.9: Price index of purchase prices of existing own homes (2015 = 100). Data for 2021 are preliminary figures. *Source: CBS StatLine*.

Generous welfare state The indicator of a generous welfare state is less obvious than an indicator of housing prices as discussed above. Earlier we mentioned that a generous welfare state exists when the government has a large budget for collective or social public spending. Caminada et al. (2010) studied the convergence of social protection in EU countries using several indicators, including social spending as a percentage of GDP, unemployment replacement rates, and poverty indicators. Giustozzi and Gangl (2021) also identify the net income replacement rate as an indicator to measure the generosity of the welfare state. This is the income a person receives during unemployment. Adema et al. (2011) argue that international comparisons of generous welfare states are measured by comparing the ratio of social spending to GDP. Following these studies, we tried to find data on both replacement rates of unemployment and social spending as a percentage of GDP. During this search, we could not find suitable data on replacement rates in various databases. However, stand-alone data were available on social protection spending and GDP in the Netherlands. According to the CBS, social protection expenditure includes all measures taken by public or private institutions to alleviate households and individuals of the burden of a defined set of risks and needs, provided that there is no simultaneous reciprocal or individual agreement. Gross Domestic Product (GDP) is a measure of the size of an economy. These data, obtained from the CBS, were combined so that the ratio of social protection expenditure to GDP could be calculated. Figure 5.10 presents this ratio for the period 2006-2021. The ratio is fairly constant between 2006 and 2008. Then it rises significantly, from 0.247 in 2008 to 0.291 in 2013. This should indicate that the welfare state has become more generous. From 2013 through 2019, the ratio falls to a level of 0.269, then rises in 2020 and falls again in 2021 to a value of 0.284. The pattern of the ratio of social protection expenditure to GDP is similar to that of the wealth inequality indicators, except for the years 2020 and 2021. Overall, based on this figure, it can be concluded that the Netherlands has increased its social protection budget over the years and thus has become more generous.

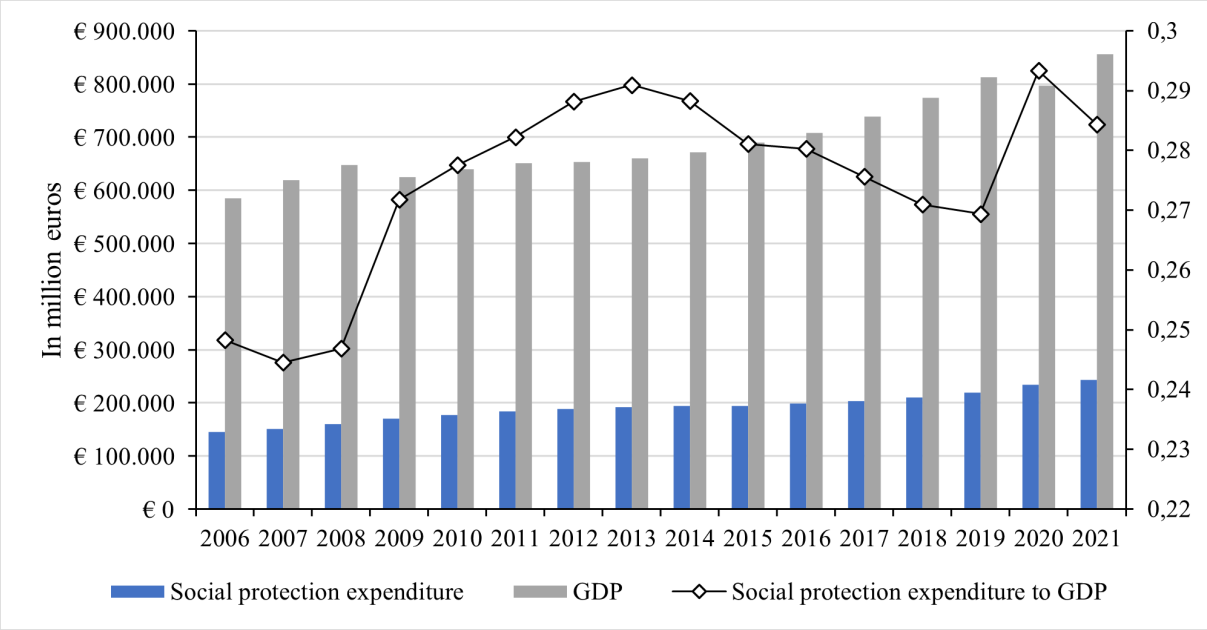

Figure 5.10: Social protection expenditure to GDP in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

However, we should note a caveat about all indicators using GDP. After all, the Netherlands experienced a number of recessions during the period 2006-2021. A recession occurs when economic growth is negative for two or more consecutive quarters and is measured by quarter-on-quarter figures for real GDP (after seasonal adjustment) (Storm & Naastepad, 2021b). We have used annual nominal values for GDP in this case, making recessions more difficult to observe. For example, the years 2008-2009 and 2020 had two clear recessions, the years 2011 and 2012 had two mild recessions. Assume that during a recession social protection expenditure remains the same. Consequently, the ratio of social protection expenditure to GDP will increase. However, this does not imply that the welfare state has become more 'generous'. Using GDP as part of an indicator therefore involves a limitation. It is important to take this into account when drawing conclusions.

Financial asset prices Subsubsection 5.1.1 discussed the portfolios of the top 10% and bottom 90% households. It was explained here what wealth components make up these portfolios. Financial assets was one of these components. According to the CBS, this is the sum of bank- and savings deposits, and securities. In which securities consist of stocks and bonds. The Amsterdam Exchange Index (AEX-index) is the most important stock market index of the Netherlands. The AEX-index is based on the price of the shares of 25 companies with the largest market capitalization in the Netherlands. Out of the weighted average of the prices of these shares, the level of the AEX is calculated (CBS, n.d.-a). Since the AEX-index is the main indicator for the Dutch stock market, we have chosen to use it as an indicator for the development of financial assets in the Netherlands. Figure 5.11 shows this development for the period 2006-2021. From this figure it is easy to observe when the GFC took place. From 2007 to 2009, the AEX-index fell from 523 points to 273 points, a historic low. Since then, the index has been on an upward trend again, with the exception of the years 2011, 2012, and 2016 in which the average of the index fell slightly compared to the previous year. Furthermore, the year 2021 had a major outlier in which the average rose by a whopping 31.6%.

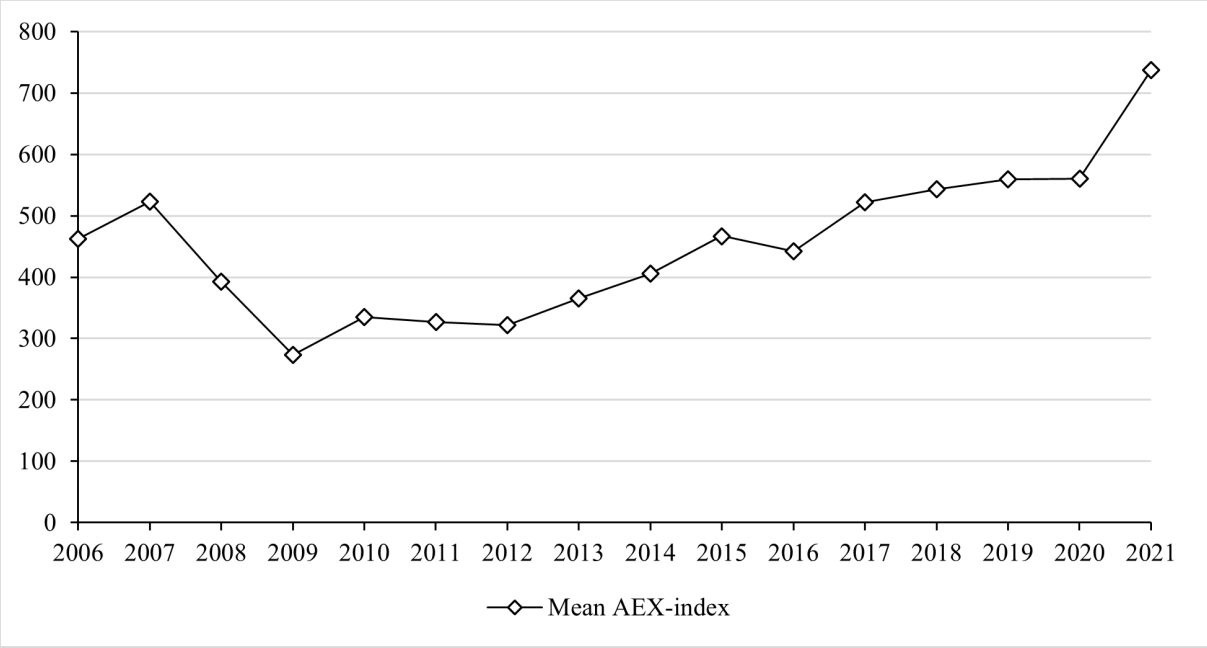

Figure 5.11: Mean of the Amsterdam Exchange Index (AEX-index). *Source: DNB*.

Size of financial markets According to Hasan et al. (2020), finance also affects wealth inequality. In the study they conducted, they focused on the effect of financial development on the wealth distribution within the economy. In doing so, they used the indicators made available by the World Bank in the Global Financial Development Database (GFDD) (Čihák et al., 2012). These indicators are divided into four dimensions:

- Financial depth: size of financial markets and institutions.
- Efficiency: efficiency of financial markets and institutions in providing financial services.
- Stability: stability of financial markets and institutions.
- Access: degree to which individuals can and do use financial services.

The independent variables in hypotheses H1.4 (size of financial markets), H1.5 (efficiency of financial intermediaries) and H1.6 (access to finance) are all based on the dimensions just mentioned. One indicator proposed by Čihák et al. (2012) to measure the size of financial markets is the ratio of stock market capitalization to GDP. Stock market capitalization, or simply market capitalization, can be calculated by multiplying the price of a share by the total number of shares outstanding. DNB has published monthly figures on the market capitalization of the total economy in the Netherlands. The total economy in this case includes the market capitalization of all Dutch companies, including those listed abroad. The market capitalization of the total economy in the Netherlands per year is calculated by taking the average of 12 months. Market capitalization to GDP was calculated by dividing this average by the GDP for the year in question. This ratio is shown in Figure 5.12. It can be observed that from 2007 to 2009, the ratio dropped sharply from 1.17 to 0.53. From then on, the ratio increased for years until it reached 1.45 in 2017. The next three years experienced a very small decline, followed by a sharp increase in 2021 with a ratio of 1.75, the highest level in the 2006-2021 period. Compared to 2009, the size of financial markets in the Netherlands more than tripled. This ratio follows a similar pattern to the average of the AEX-index over the years. Again, it is important to keep in mind the limitation of using GDP as part of an indicator when drawing conclusions.

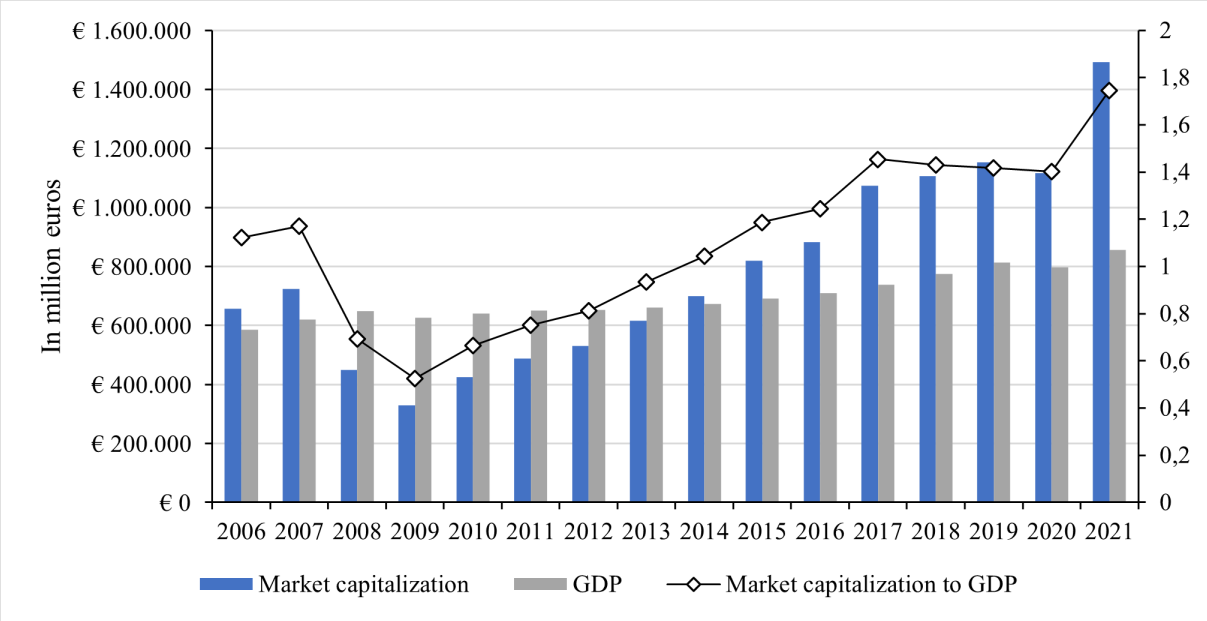

Figure 5.12: Market capitalization to GDP in the Netherlands. *Source: Author's calculations, DNB.*

Efficiency of financial intermediaries This is another dimension as defined by Čihák et al. (2012). In Subsubsection 4.1.1, we pointed out that the article by Hasan et al. (2020) provides virtually no explanation or theory as to why this factor affects wealth inequality. Therefore, we determined our own possible theory related to the implicit subsidies TBTF banks receive (Haldane, 2012). Bankers working for these TBTF banks can pocket excessive salaries and bonuses through various mechanisms. Moreover, it is the taxpayer who pays when the state has to bail out TBTF banks. Higher market concentration in the financial sector would lead to lower efficiency of banks in terms of costs (Haldane, 2012). In other words, lower market concentration should reduce wealth inequality. According to Rhoades (1993), the Herfindahl-Hirschman index (HHI) is a statistical measurement tool that can be used to measure concentration in various contexts, including the market concentration of banks. The HHI measures the size of firms relative to the industry in which they operate, and thus the degree of competition in that industry. Since 2008, DNB has kept quarterly data on 5 concentration indicators of the Dutch banking system, including the HHI. Like the Gini coefficient, the HHI is expressed by DNB as a score between 0 and 1. The score 0 is achieved if many different banks have an equal market share. The score 1 is achieved if there is only one reporting bank that covers 100% of the banking market. A limitation of the DNB data is that there is no data for 2006 and 2007.

As mentioned earlier, the World Bank has also made indicators available in the GFDD for the efficiency dimension (Čihák et al., 2012). These are 10 different indicators, 8 of which cover the period 2006-2021. Čihák et al. (2012) argue that the efficiency of financial intermediaries is measured by intermediation fees. They state that efficient financial intermediaries are often more profitable, but that this relationship is not very close. For example, a financial intermediary can be very profitable in boom times but still be inefficient, and vice versa. Therefore, Čihák et al. (2012) argue that these measures of efficiency are not very accurate. That is why we will not use this data from the GFDD. Although DNB data are limited, we chose to use the HHI as an indicator. Figure 5.13 shows the development of this indicator for the period 2008-2021. For each year, the quarterly figures were averaged. It can be seen that from 2008 to 2010,

the HHI decreases from its highest point (0.217) to its lowest point (0.201). In other words, concentration in the banking sector decreased and this should have improved the efficiency of banks because there would be more competition. Furthermore, it can be observed that the HHI shows an upward trend from 2010 and reaches the value of 0.216 in 2021. This means that concentration in the banking sector has almost returned to the old level of 2008.

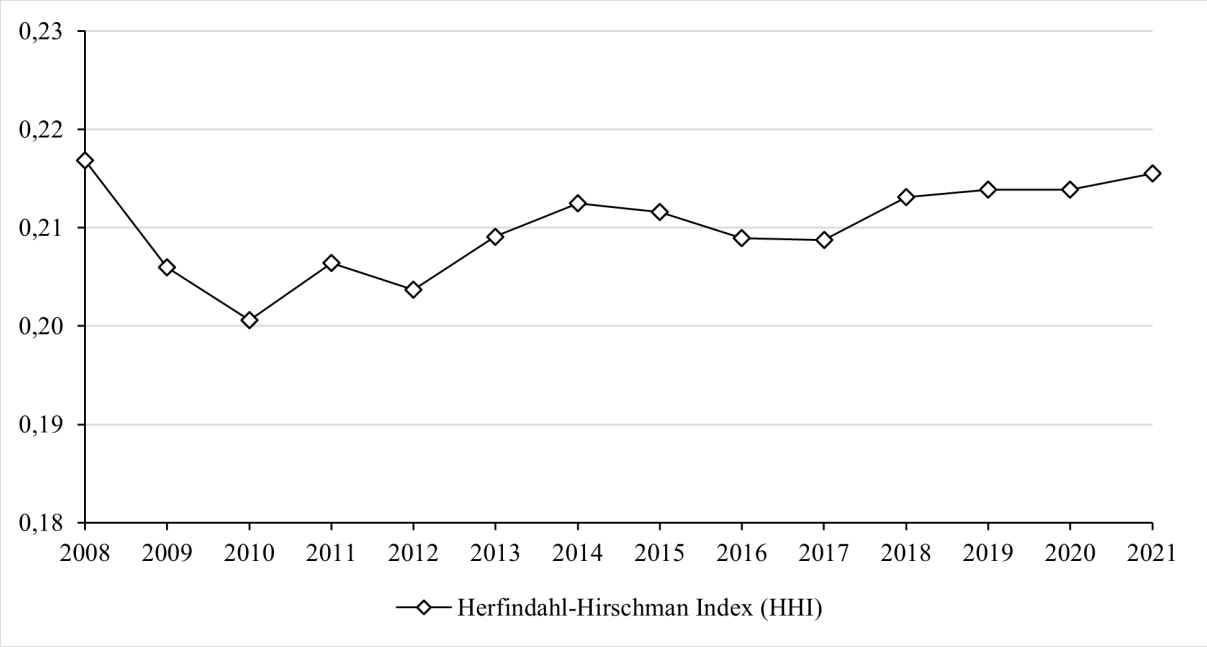

Figure 5.13: The Herfindahl-Hirschman Index (HHI) of the banking system in the Netherlands. *Source: Author's calculations, DNB*.

Access to finance The final 'finance' factor that Hasan et al. (2020) say affects wealth inequality is access to finance. Two indicators by which this could be measured according to Čihák et al. (2012) are bank branches per 100,000 adults, and ATMS per 100,000 adults. There are 34 other indicators by which access to finance could be measured. For the Netherlands, however, data are only available in the GFDD for the two indicators mentioned above. Bank branches per 100,000 adults and ATMs per 100,000 adults have a significant correlation with each other ($r = 0.971$). Figure 5.14 shows the trend of these indicators. A downward trend can be seen since the GFC. The peak number of ATMs was 64 per 100,000 adults in 2007 and 2008. By 2021, there were only 33. The same is true for the number of bank branches. In 2007, there were still 29 per 100,000 adults. By 2021, there were only 5.

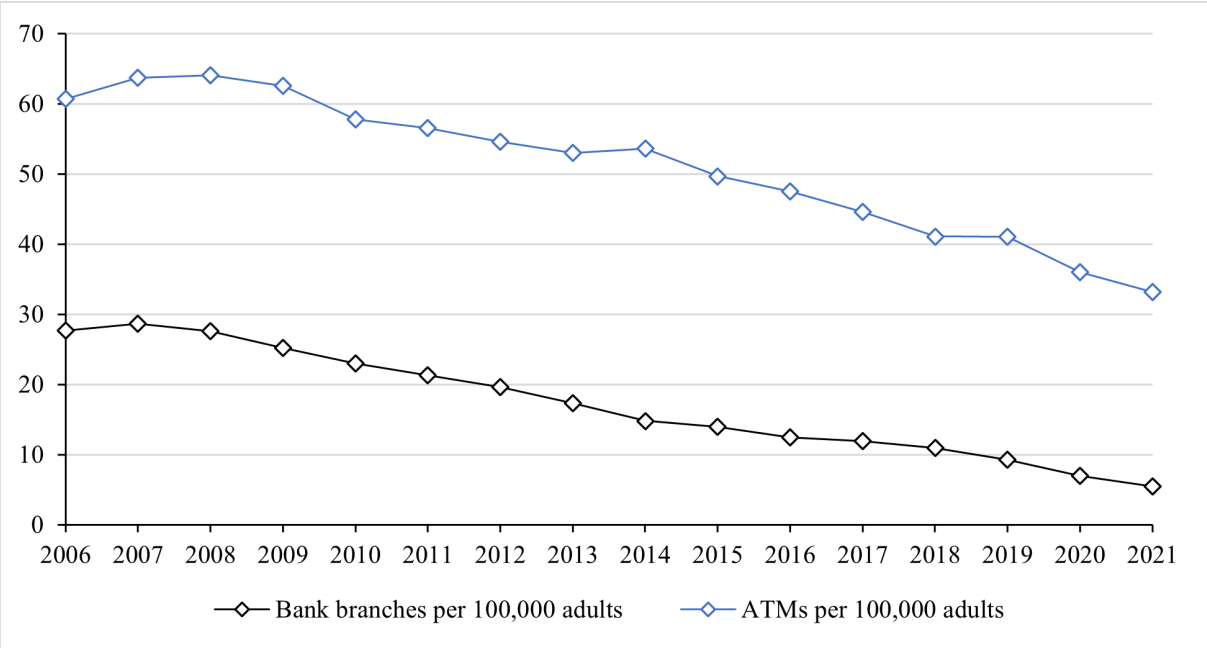

Figure 5.14: Bank branches and ATMs per 100,000 adults in the Netherlands. *Source: GFDD.*

However, these two indicators should be questioned because the relevance with the Netherlands is debatable. Čihák et al. (2012) argue, as with proxies for the efficiency of financial intermediaries, that these indicators are imperfect. For example, the number of bank branches would be misleading because branchless banking is becoming more common. In addition, the digitalization of payments has increased significantly in recent years (DNB, 2023). The Dutch increasingly pay with their debit cards or cell phones and use less and less cash. Operations such as checking bank balances, applying for debit cards, and opening checking accounts are also increasingly taking place online. This development of Internet or online banking is accompanied by the number of bank branch closures, according to DNB (2023). In addition, the number of ATMs has declined in recent years as fewer and fewer people pay with cash (Rijksoverheid, 2023). Because of these developments, we are not convinced that the indicators in Figure 5.14 are relevant to the Netherlands. DNB (2021) examined the accessibility of payment services for consumers. For the average consumer, the accessibility of payment services improved slightly. In 2016, the average consumer gave a rating of 7.6 and in 2021 a 7.7. For vulnerable groups such as the disabled, the elderly, and those with low digital skills, the rating decreased from 7.5 to 7.1. The reason is that the increased digitalization of payment services and the closure of bank branches negatively affect the level of satisfaction and autonomy of this group. Unfortunately, we have been unable to find other data for a longer period of time on the accessibility of payment services in the Netherlands. Therefore, we do not include this determinant in the regression analysis and recommend it for further research.

Globalization The final factor we will address among the macroeconomic level is globalization. This factor, according to Hasan et al. (2020), is expressed as trade openness. This is a common indicator to measure globalization and can be calculated by adding imports and exports and then dividing by GDP. The World Bank has data on the Netherlands' trade openness for the period from 2006 to 2021. Another indicator is the KOF Globalization Index. Gygli et al. (2019) argue that some indicators, such as openness to trade, are often used as proxies for

globalization. However, globalization is a multi-faceted concept beyond capital flows and openness to trade. The KOF Globalization Index considers multiple variables and measures political and social as well as economic dimensions. The disadvantage of this index is that there is no data for 2021. Trade openness and the KOF Globalization Index have a significant correlation with each other ($r = 0.892$). Figure 5.15 shows the trends of both indicators. It shows that the globalization rate increased during the period 2006-2021. The KOF Globalization Index was 87.26 in 2006 and 90.48 in 2020. The degree of trade openness was 127.8% in 2006 and 155.7% in 2021. Since the latter covers the entire period, this indicator will be used for the regression analysis.

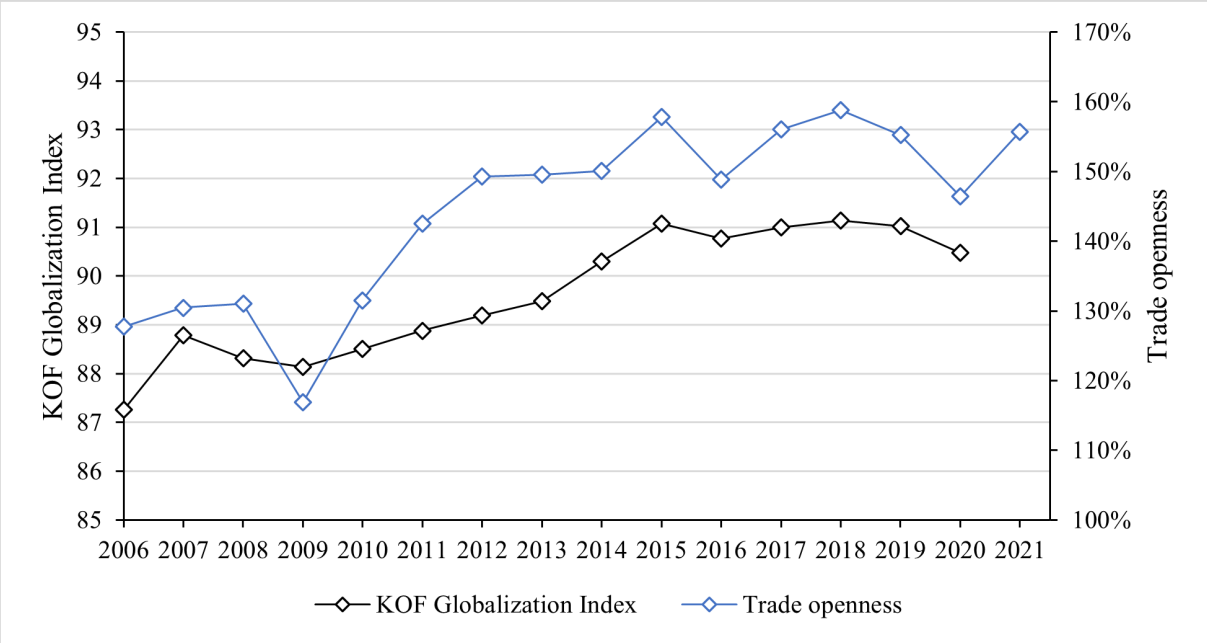

Figure 5.15: KOF Globalization Index and trade openness in the Netherlands. *Source: KOF Swiss Economic Institute, World Bank.*

5.1.3 Household Level

In Subsubsection 4.1.2, hypotheses were formulated for the factors categorized at the household level. Each factor and associated indicator will be examined one by one. Again, an attempt will be made to adhere to the period 2006-2021.

(Mortgage) debts The literature has found that debt, especially mortgage debt, affects wealth inequality (Berisha & Meszaros, 2020; Salverda, 2019). Subsubsection 5.1.1 examined the household portfolios of the bottom 90% and the top 10%, see Figure 5.7 and Figure 5.8, respectively. These figures show that the portfolio of the bottom 90% consists largely of mortgage debt, which ultimately pulls down their net worth, and that the top 10% have relatively few (mortgage) debt. Many indicators are constructed by plotting the variable of interest against GDP. This allows one to see the importance of mortgage debt in the economy. Therefore, we will use the indicator mortgage debt to GDP, which is shown in Figure 5.16 for the period 2006-2021. We have just briefly discussed the portfolios of the bottom 90% and the top 10%. To show how much mortgage debt the top 10% have relative to the bottom 90%, this ratio is also shown in the figure. Moreover, it is interesting to see these figures side by side in one figure because they have a negative significant correlation ($r = -0.794$). According to the descriptive

analysis in Subsubsection 5.1.1, wealth inequality is highest in 2013. This is evident from the two indicators in the figure. The mortgage debt to GDP ratio is very high at that time, which obviously indicates that household mortgage debt (especially at the bottom of society) is high. The mortgage debt ratio of the top 10% to the bottom 90% is on the low side at that time, indicating that the top 10% have relatively little debt relative to the bottom of society. Looking at the entire period, household mortgage debt increased from 2006 through 2013. After 2013, however, household mortgage debt merely declines up to 2021, with the exception of the year 2020. Again, it is important to keep in mind the limitation of using GDP as part of an indicator when drawing conclusions.

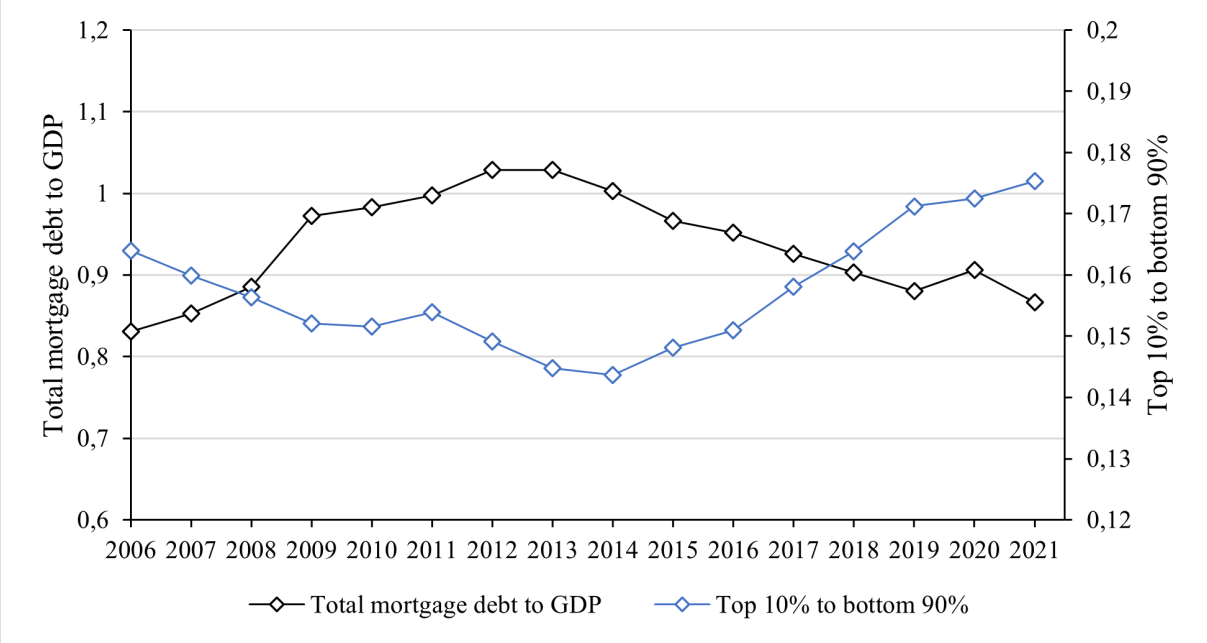

Figure 5.16: Mortgage debt to GDP in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

Home ownership rate Like mortgage debt, home ownership is an important part of households' portfolio. Figure 5.7 shows that real estate, which consists of principal residence (housing), is by far the largest wealth component among the bottom 90%. It also remains an important component among the top 10%, but is relatively less important. The OECD has in its database several indicators related to the housing market context. For example, under the theme of housing tenure, they have mapped housing distribution by year for all OECD countries, including the Netherlands. The housing distribution is divided into the share of owner outright and owner with a mortgage in the total number of households. The disadvantage of this data is that it only covers the period 2010-2020. However, data from the CBS offer a solution, as they have data available on the number of home owners (outright and with mortgage) in the period 2006-2021. In addition, they have data on the total number of households in the Netherlands during this period. The home ownership rate is calculated as the total number of home owners (outright and with mortgage) among households divided by the total number of households in the year (t) in question. In formula form, this looks as follows:

$$\text{Home ownership rate}_t = \frac{\text{Owner outright}_t + \text{Owner with mortgage}_t}{\text{Total households}_t} \tag{5.7}$$

Figure 5.17 shows the home ownership rate for the period 2006-2021. Between 2006 and 2009, there was a sharp increase in the home ownership rate from 52.7% to 55.9%. Since then, the home ownership rate has remained stable around 56%, of which owner outright at about 9% and owner with a mortgage at about 47%.

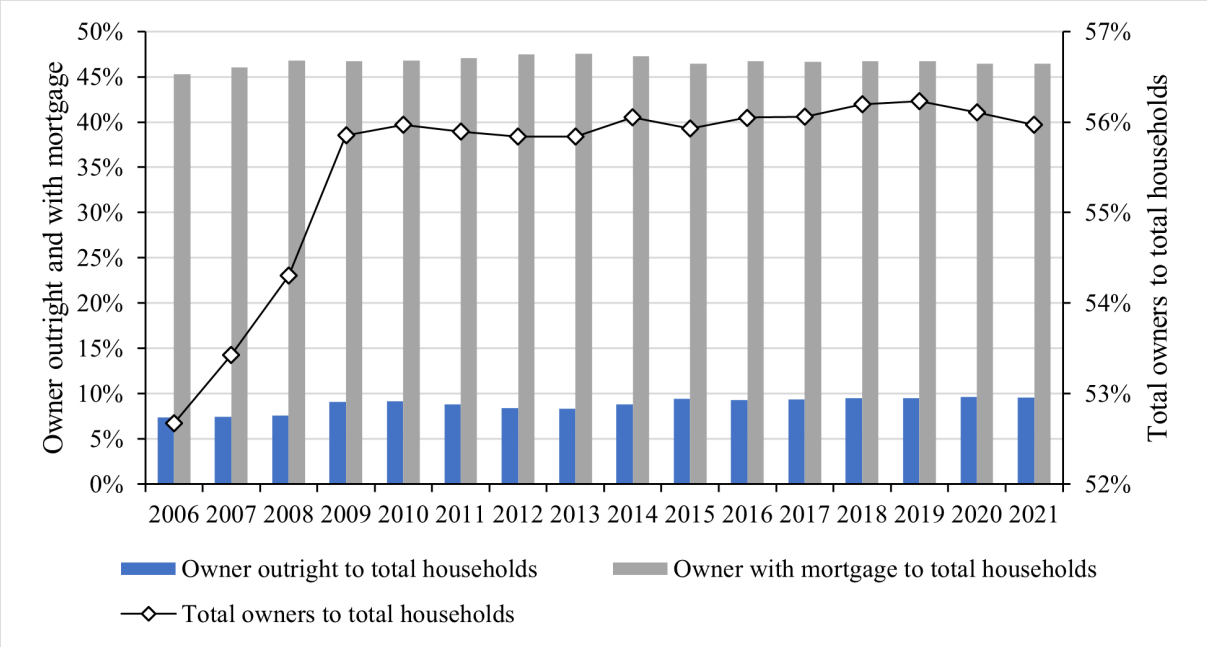

Figure 5.17: Home ownership rate in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

Saving rate inequality The saving rate is an important part of accumulating wealth and it is therefore necessary for the bottom of the wealth distribution to save. If this does not happen sufficiently then the gap between rich and poor is likely to widen (Cowell et al., 2018). The calculation of the saving rate is fairly straightforward (t is the year in question):

$$\text{Saving rate}_t = \frac{\text{Income after tax}_t - \text{spending}_t}{\text{Income after tax}_t} \tag{5.8}$$

We could show the development of inequality in the saving rate using the same indicators as those for wealth inequality. However, we lack data to calculate and present these indicators for the Netherlands. Therefore, this factor is not considered further.

Financial assets ownership rate inequality Financial assets are primarily owned by the very rich. This makes this wealth component a major driver of wealth inequality (Balestra & Tonkin, 2018; Van Bavel & Frankema, 2017). According to Salverda (2019), the top 10% would own nearly 73% of all financial wealth in 2014. Looking at the household portfolios of the bottom 90% (Figure 5.7) and the top 10% (Figure 5.8), it can indeed be seen that the lion's share of financial assets is held by the top 10% wealthiest. However, for example, if we look at the share of financial assets of the top 10% richest in 2014, it is 'only' 59.3%, according to the CBS. This difference could be attributed to the fact that Salverda (2019) used a different definition for financial assets. In fact, they used the term financial wealth, which refers to all types of wealth

other than housing wealth. The CBS defined financial assets as the sum of bank- and savings deposits, and securities (shares and bonds). The indicator we use to measure financial assets ownership rate inequality is the ratio of the top 10% to the bottom 90%. The higher this ratio, the more financial assets are owned by the top 10%, and according to the corresponding hypothesis, the higher the wealth inequality. Inequality in financial assets ownership rate, measured by the ratio of the share of the top 10% to the bottom 90%, is shown in Figure 5.18 for the period 2006-2021. From 2006 through 2008, the ratio dropped very slightly from 1.36 to 1.35, before dropping to a value of 1.19 in 2009. From then until 2014, the ratio rose to 1.46. Since then, the ratio has only declined (with the exception of 2020) to a ratio of 1.14 in 2021, the lowest level in the period. This implies that in 2021 the top 10% and the bottom 90% hold nearly equal amounts of financial assets.

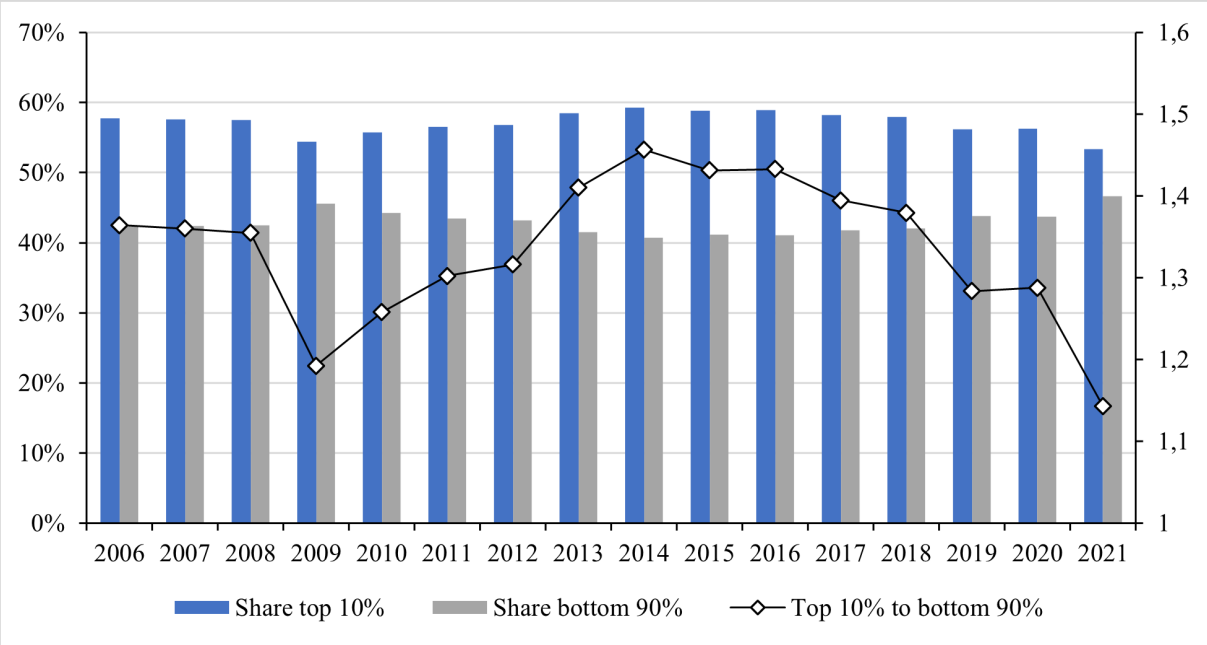

Figure 5.18: Financial assets ownership rate inequality in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

Income inequality The main difference between income and wealth is that income is a flow and wealth is a stock (Piketty & Saez, 2014). Income inequality is also invariably smaller than wealth inequality. This is because the bottom 50% of households have virtually no wealth. This is evident when Figure B.1 and Figure B.2 in Appendix B are compared. At their peak in 2021, the bottom 50% households have €28 billion of net wealth. By comparison, the next 40% (p50-p90) have €826 billion of net wealth in the same year, which is also their peak. Furthermore, income is a lot less concentrated than wealth (Piketty & Saez, 2014). According to Saez and Zucman (2016), income and wealth would have a reinforcing effect on each other, or snowballing-effect. This will be examined during the regression analysis. First, the development of income inequality in the Netherlands during the period 2006-2021 will be investigated. Income inequality can basically be measured with the same indicators as wealth inequality. Again, the Gini coefficient is a popular indicator. The CBS has data in its database on the Gini coefficient, mean and median income, and income per decile. However, these data are only available as of 2011, which is a major drawback. It is noteworthy, to say the least, that the CBS has data on household wealth (inequality) for a longer period than household income (inequal-

ity). Income inequality has been studied more often in the literature, so one would expect more data on that subject. Fortunately, we were able to find an article that published income inequality measured as the Gini coefficient also for the years 2006 through 2010 (CBS, 2023). This article states that in 2021 income data were harmonized from 1977. This could be a possible explanation why data prior to 2011 are not included in the database. Again, it is remarkable that there are small, negligible, differences between the 2011-2021 Gini coefficients from the article and from the database. For the years 2006-2010, we used the data from the article. For the years thereafter, we took the data from the database. Figure 5.19 shows the trend in the Gini coefficient of income inequality in the Netherlands for the period 2006-2021. In 2006, income inequality was lowest with a Gini coefficient of 0.281. Subsequent years were with small peaks and drops. In 2019, income inequality was highest with a Gini coefficient of 0.306. From 2006 through 2021, you could virtually draw a straight line going through most of the points. Based on this line, one could say that income inequality increased slightly over the period from 0.281 in 2006 to 0.294 in 2021. Overall, these are not large differences and income inequality has not changed much. Looking at the correlations between the indicators of income inequality (Gini, mean to median, S80/S20) for the period 2011-2021, we can conclude that they all correlate significantly with each other. Thus, we can have confidence in the development of the Gini coefficient for at least the period 2011-2021.

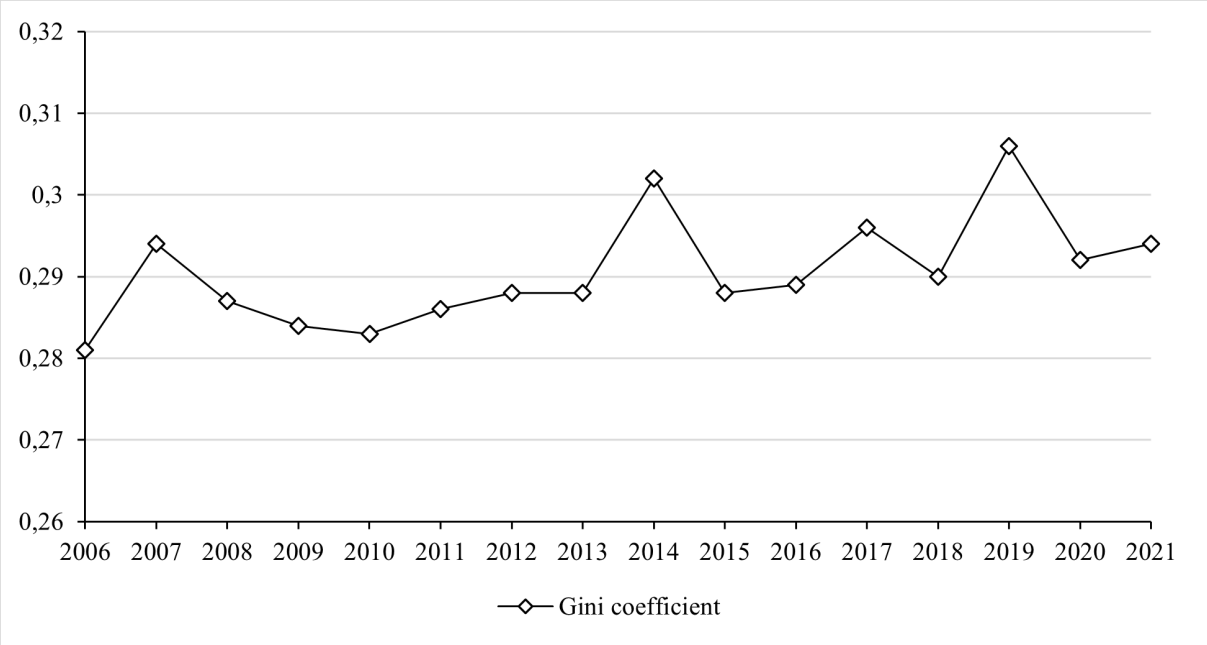

Figure 5.19: Income inequality measured as the Gini coefficient in the Netherlands. Data for 2021 are preliminary figures. *Source: CBS StatLine, CBS (2023).*

Inheritance inequality Differences in inheritance between households can also affect wealth inequality, according to the literature. Some studies distinguish between short- and long-term inequality (Elinder et al., 2018; Nekoei & Seim, 2023). However, we follow Leitner (2016) who makes no distinction and argues that differences in inheritances increase wealth inequality anyway. The CBS has data on the average and median net inheritances from deceased persons' bequests. These are the amounts of after-tax inheritances. Based on these data, we calculated the ratio of the mean to the median. The disadvantage of the data is that it only covers the period 2007-2020. Therefore, the indicator of inheritance inequality is less useful for the regression

analysis to be performed. Figure 5.20 shows the development of inheritance inequality in the Netherlands for the period 2007-2020. From 2007 to 2014, the ratio keeps fluctuating between 2.15 and 2.35, before rising to 2.74 in 2018. From then on, the ratio drops again to 2.28 in 2020. In other words, inheritance inequality was highest in 2018.

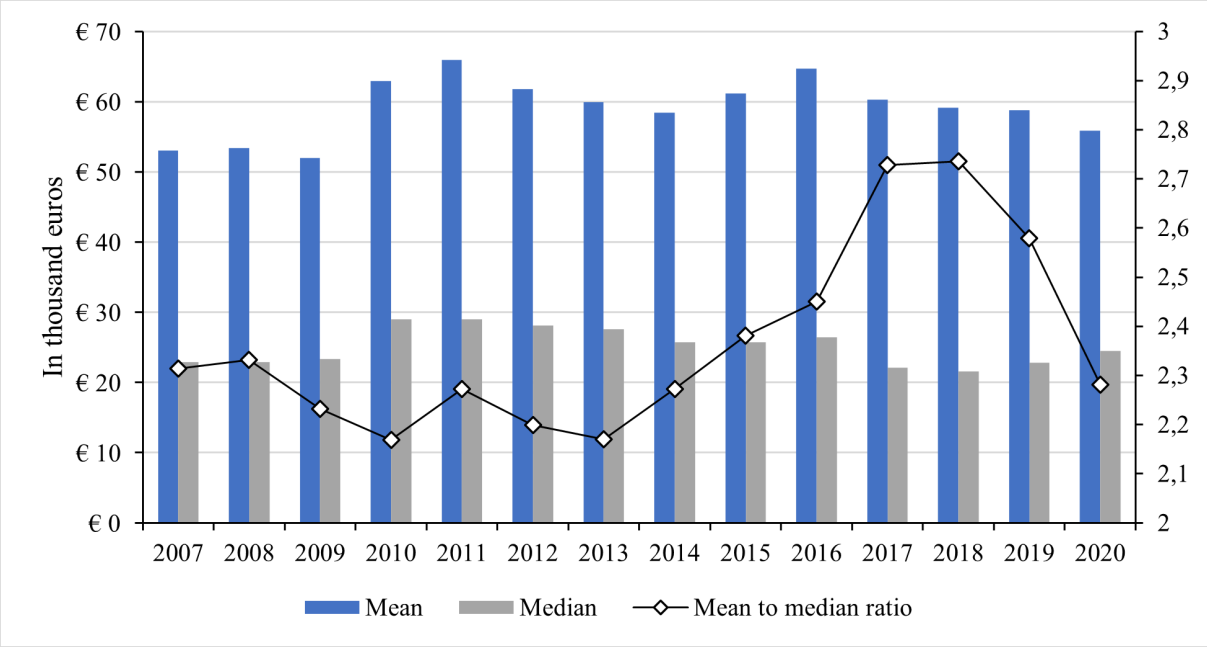

Figure 5.20: Mean to median net inheritances from bequests in the Netherlands. Data for 2019 and 2020 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

Average household age As people age, they accumulate more wealth (Maestri et al., 2014). Thus, age can affect the wealth distribution. The CBS has data on the average age of the total Dutch population. We assume that these figures approximate the average age of Dutch households. Figure 5.21 shows the development of the average age of households in the Netherlands for the period 2006-2021. It can be seen that the average age has only increased during this period. This indicates that the Dutch population is aging. According to the hypothesis, wealth inequality should have increased due to this aging population.

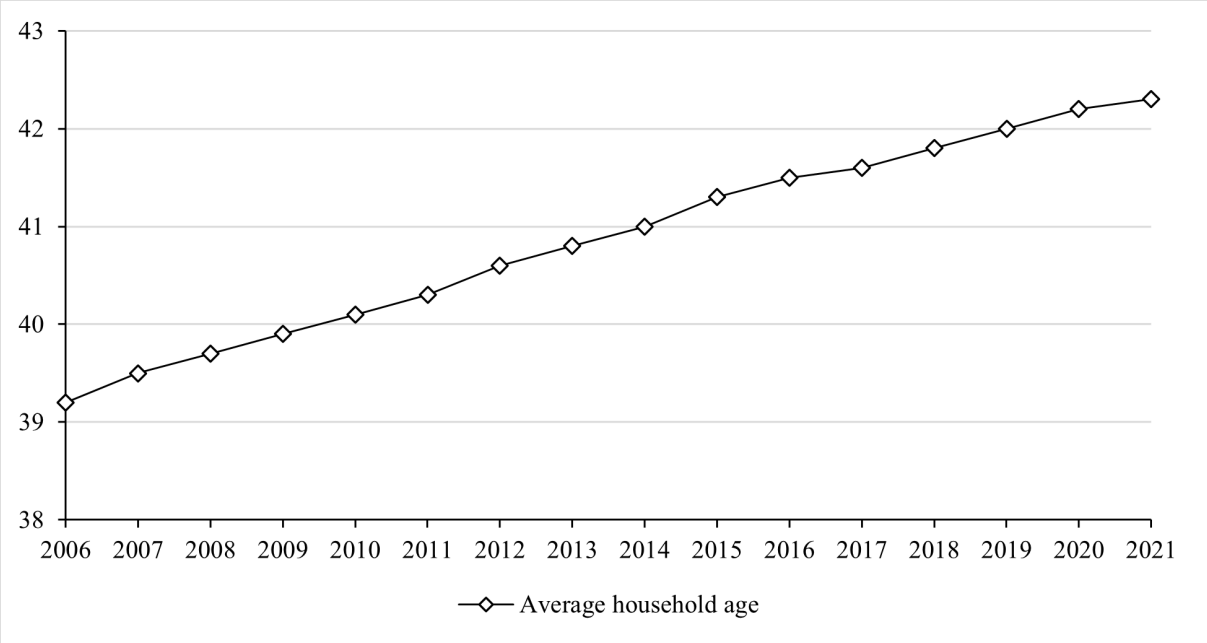

Figure 5.21: Average household age in the Netherlands. *Source: CBS StatLine*.

Education level That higher levels of education affect wealth inequality follows from the studies by Hasan et al. (2020) and Leitner (2016). However, they reveal no theories as to why this would be the case. Presumably, higher levels of education among the population (or households) create better career opportunities. Thus, they are more likely to accumulate wealth with the income they earn. Another theory is that households manage their financial resources better when they are more highly educated. However, we cannot support these theories with evidence. The CBS has data on the highest level of education attained by the population aged 15 to 90 in the Netherlands. This is the highest level of education for which a degree has been obtained. We focus here only on the degrees obtained after secondary school, in Dutch the 'middelbare school' or 'voortgezet onderwijs'. We distinguish between the following degrees:

- Vocational Education and Training (VET) or Middle-level Applied Education. In Dutch, this is called 'Middelbaar Beroepsonderwijs (MBO1 to MBO4)'.
- Higher Professional Education. In Dutch, this is called 'Hoger Beroepsonderwijs (HBO)'.
- Scientific Education. In Dutch, this is called 'Wetenschappelijk Onderwijs (WO)'.

At colleges (HBO) and universities (WO), both bachelor's and master's degrees can be obtained. These degrees are taken together and categorized as 'HS education'. The degrees of HS education and VET make up the total. The level of education is calculated by the ratio of the number of HS education degrees to the total number of degrees. The development of the level of education in the Netherlands for the period 2006-2021 is shown in Figure 5.22. It can be observed that the proportion of HS education has only increased. According to the hypothesis, this should imply that wealth inequality should have decreased. In 2021, nearly half of the population (48%) has obtained a HS education degree.

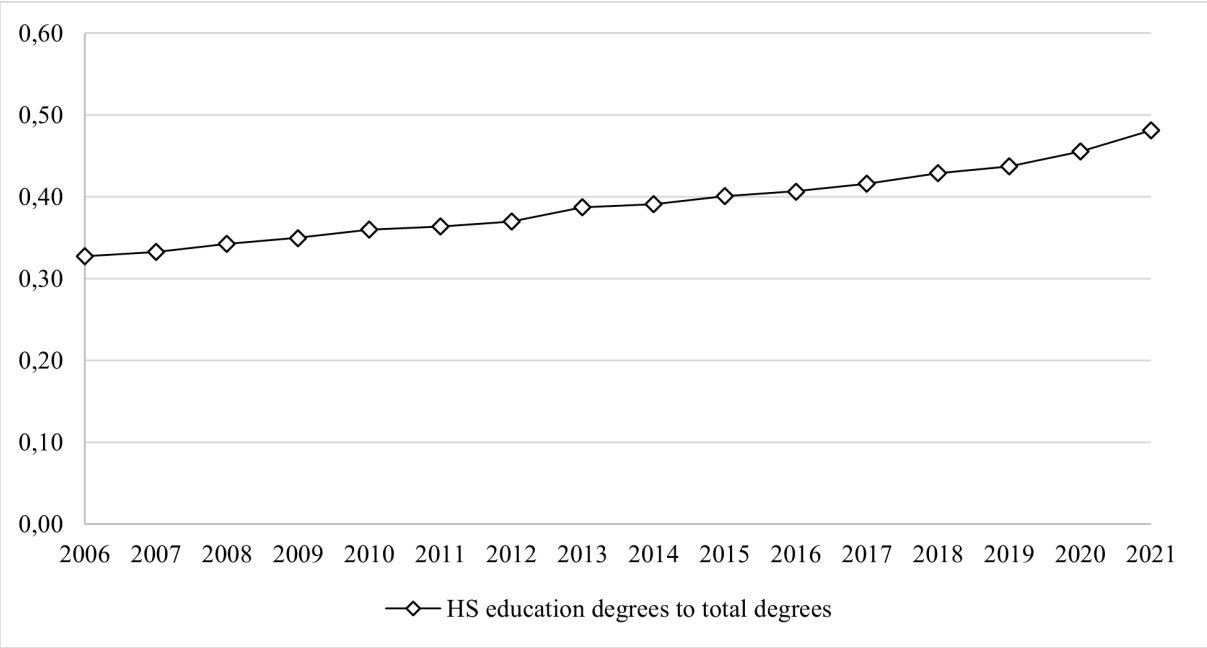

Figure 5.22: Education level measured as the ratio of the number of HS education degrees to the total number of degrees in the Netherlands. *Source: Author's calculations, CBS StatLine*.

5.1.4 Conclusion

We have analyzed wealth inequality for the Netherlands in a descriptive manner for the period 2006-2021. From 2006 to 2008, wealth inequality decreased slightly. From 2008 to 2013, it rose to record levels, after which it fell again. In 2021, the level of wealth inequality was similar to 2008, that is, at a relatively low level compared to other years. Furthermore, we analyzed possible factors affecting wealth inequality. Appendix C provides an overview of all factors, corresponding indicators, and data sources involved. The factors are listed in the order in which the descriptive analysis was conducted.

5.2 Simple Regression Analysis

In Subsection 5.1, we attempted to map the development of wealth inequality and its determinants for the period 2006-2021. We did so by identifying indicators representative of these factors. This often involved consulting the literature, but sometimes indicators were also constructed through logical reasoning. For those factors for which an indicator has been established, we will first conduct a single regression analysis. This is applied in situations where an independent variable hypothetically influences the dependent variable (Sekaran & Bougie, 2016). This relationship between independent and dependent variable can be described by the following simple linear regression equation:

$$y = \beta_0 + \beta_1 x + \varepsilon \tag{5.9}$$

In the above formula, y represents the dependent variable and x represents the independent variable. Furthermore, β_0 and β_1 represent the coefficients. These are the intercept and slope of

the regression line, respectively. Finally, there is the error term or residual ε, which represents the error in predicting y given the value of x (Sekaran & Bougie, 2016). The residual "is equal to the difference between the observed values of y and the values predicted by the independent variable(s)" (Wolf & Best, 2015, pp. 57–58). If we subtract the error term on both sides of the equation, we get the following:

$$y - \varepsilon = \hat{y} = \beta_0 + \beta_1 x \tag{5.10}$$

Where $\hat{y}$ is the predicted value of y. We will come back to this later and clarify it with an example. For any collection of data points, we can think of several linear relationships and lines that represent these data points. The question here, however, is which linear relationship or line best represents this set of data points. The line we are looking for is the line that minimizes the difference between observed and predicted values (Wolf & Best, 2015). The most commonly used method to obtain this relationship is by minimizing the sum of squared differences between the observed and predicted values. This method is also called Ordinary Least Squares (OLS) and will be used for the linear regression analyses (Wolf & Best, 2015). According to Meuleman et al. (2015), regression analyses are typically used to draw conclusions about the population parameters of the regression model or to describe the data structure. However, for these functions to perform optimally, certain conditions or assumptions must be met. In the literature, there is no consensus on the exact number of assumptions. Meuleman et al. (2015) list 6 assumptions that they believe are most important and most often cited in the literature:

- The relationship between independent and dependent variables is linear.
- The residuals are homoscedastic.
- The residuals are independent of each other.
- The residuals are normally distributed.
- Absence of multicollinearity.
- Absence of influential observations.

Appendix D explains these assumptions in more detail. As mentioned, we will first conduct simple regression analyses to filter out the factors with a significant effect on wealth inequality. We will then conduct a multiple regression analysis with these remaining factors to examine the joint effect of these factors on wealth inequality. The above six assumptions are mainly applicable to the multiple regression analysis because not all of them can be tested for a simple regression analysis. Moreover, the number of observations available to us is small, making the results of the diagnostic checks of the assumptions difficult to interpret. Therefore, we will perform the diagnostic checks only for the multiple regression analyses, and omit them for the simple regression analyses.

We will now clarify Equation 5.10 with an example, using hypothesis H1.1: *higher housing prices reduce wealth inequality in the Netherlands*. Housing prices are measured as the price index of existing own homes (2015 = 100), and wealth inequality is measured as the Gini combined. We can represent the regression by plotting the dependent variable against the independent variable. In this case, we plotted wealth inequality against housing prices, see Figure 5.23. It can be seen that higher housing prices lead to lower wealth inequality. Note that there are some outliers in the regression that could affect the results.

Figure 5.23: Simple regression of wealth inequality (DV) as a function of housing prices (IV). Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine*.

The straight line in the figure represents the relationship between wealth inequality and housing prices, i.e., it is the predicted value of y, and can be represented in formulaic form as follows:

$$\hat{y} = 0.896 - 0.001x \tag{5.11}$$

The coefficients β_0 and β_1 were obtained from the regression analysis and can also be seen in the figure. The p-value of this regression analysis is 0.007 and is therefore significant (α-value = 0.05). Thus, according to the simple regression analysis, the alternative hypothesis H1.1 can be accepted, i.e., there is a significant effect of housing prices on wealth inequality in the Netherlands. Note, however, that we did not perform a diagnostic check of the assumptions here. Therefore, we do not know whether the functions of this simple regression analysis work optimally. Equation 5.11 can be used as a predictive model of wealth inequality ($\hat{y}$) as a function of housing prices (x). For example, if you were interested in knowing how high the Gini combined would be at a price index of existing homes of 150, you simply enter this number in the place of x and a prediction of $\hat{y}$ would follow, namely 0.745.

In addition to the two coefficients β_0 and β_1, there are a few other important results to consider in a simple regression analysis, namely: the number of observations (N), the coefficient of determination (R-squared or R^2), and the F-statistic. The number of observations is simply the number of data points in the dataset and says something about the reliability and generalizability of the results. The above example has only 16 data points (period 2006-2021). These are relatively few observations and negatively affect the reliability and generalizability of the results. Again, this is the reason why it is difficult to interpret the results of the diagnostic checks of the linear regression assumptions and the rationale why we will perform these checks only for the multiple regression analysis. In addition, R-squared is also an important result of simple

regression analysis. Among other things, R-squared can be obtained by squaring the Pearson correlation coefficient (r), as discussed earlier. The coefficient of determination is a statistical measure of how well the regression line fits the actual data points (i.e., observations) (Sekaran & Bougie, 2016). In other words, R-squared is the variance in the dependent variable that can be explained by the independent variable. When R-squared is equal to 1, it means that the independent variable perfectly explains the variance in the dependent variable and the regression model perfectly describes the data. In Figure 5.23, R-squared is also shown and equal to 0.411. This means that housing prices explain about 41% of the variance in wealth inequality. Cohen (1988) established rules of thumb for both simple and multiple regression analyses regarding the interpretation of the effect size of the coefficient of determination, see Table 5.2. It follows that housing prices have a large effect on wealth inequality.

Table 5.2: Interpretation of the coefficient of determination according to Cohen (1988).

Effect size	**Simple regression analysis**	**Multiple regression analysis**
Small	$0.01 \leq R^2 < 0.09$	$0.02 \leq R^2 < 0.13$
Medium	$0.09 \leq R^2 < 0.25$	$0.13 \leq R^2 < 0.26$
Large	$R^2 \geq 0.25$	$R^2 \geq 0.26$

The final result considered meaningful in a simple regression analysis is the F-statistic. When this statistic is significant, it means that at least one independent variable (a simple regression analysis always includes one independent variable) affects the dependent variable (Wolf & Best, 2015). In multiple regression analysis, the F-statistic has an additional dimension. In this analysis, an additional independent variable is added to the regression model each time, as we will see in Subsection 5.3. Suppose we begin the multiple regression analysis with one independent variable with a significant F-statistic of 5.0. Then we add a second independent variable to the model. In scenario 1, the F-statistic changes from 5.0 to 4.0 (significant), and in scenario 2 from 5.0 to 6.0 (significant). In scenario 1, the addition of the second independent variable did not add explanatory value to the regression model. In scenario 2, the addition of the second independent variable did add explanatory value to the regression model. In this way, during the multiple regression analysis, you can see which independent variables add explanatory value to the regression model.

Table 5.3 presents the simple regression results of the factors at the macroeconomic level. The dependent variable is wealth inequality, measured as the Gini combined over the period 2006-2021. Again, the indicators used for the relevant factors can be found in Appendix C. This simple regression analysis was also conducted for the other two indicators of wealth inequality: the top 10% to bottom 90%, and the mean to median ratio. The results of these analyses are presented in Appendix E. If the residuals have a negative or positive mean, bias may occur. In this case, the regression model will make predictions that are too low or too high. The constant term or intercept (β_0) prevents this by making the mean of the residuals zero. Apart from constructing the regression model to make predictions, this term has no important meaning, nor does its significance level. Thus, although we will not discuss the results of the intercept, it is shown in the tables of regression results. The slope (β_1) of the regression model, on the other hand, is interesting and important to discuss. This term indicates the direction of the relationship between the independent and dependent variable.

The table below shows that three of the six macroeconomic factors have a significant effect

on wealth inequality, measured as the Gini combined. As discussed in the example above, housing prices were found to be statistically significant at 1% with a negative slope, consistent with alternative hypothesis H1.1. In addition, this factor explains 41.1% of the variance in wealth inequality. When comparing this result with the simple regression analysis with the other two indicators of wealth inequality (see Appendix E), housing prices are still found to be significant. When the dependent variable, measured as the mean to median ratio, is considered, as much as 69.0% of the variance would be explained. The generous welfare state is the second macroeconomic factor that is statistically significant at 5%. The direction of the slope is positive and consistent with alternative hypothesis H1.2. This factor explains 36.4% of the variance in wealth inequality. Approximately the same result was found for wealth inequality measured as the top 10% to bottom 90%. However, for the mean to median ratio, this factor does not seem significant even at 10%. Nevertheless, it would explain 17.9% of the variance, which is considered a moderate effect according to Cohen (1988). The third and final macroeconomic factor found to be statistically significant at 5% is globalization. The direction of the slope is positive and corresponds to alternative hypothesis H1.7. This factor explains 38.2% of the variance in wealth inequality. For wealth inequality measured as the top 10% to bottom 90%, this factor is also significant at 5%. However, as with generous welfare state, this factor is not significant, even at 10%, for the mean to median ratio. Regardless, it would explain 10.2% of the variance (moderate effect). None of the three remaining macroeconomic factors are significant at 5%. Interestingly, financial asset prices do not affect wealth inequality. Indeed, this is a factor we would expect to be significant. We will discuss this further in Section 6.

Table 5.3: Simple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the Gini combined.

Factor	β_0	β_1	**N**	$\mathbf{R^2}$	**F-statistic**
Housing prices	0.896*** (23.625)	-0.001*** (-3.124)	16	0.411	9.759
Generous welfare state	0.487*** (4.709)	1.063** (2.828)	16	0.364	7.998
Financial asset prices	0.800*** (28.528)	-4.7E-05 (-0.785)	16	0.042	0.616
Size of financial markets	0,772*** (31,766)	0,006 (0,301)	16	0.006	0.091
Efficiency of financial intermediaries	0.984** (2.862)	-0.960 (-0.586)	14	0.028	0.344
Globalization	0.587*** (8.977)	0.133** (2.943)	16	0.382	8.662

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table 5.4 presents the simple regression results of the factors at the household level. The dependent variable is wealth inequality, measured as the Gini combined over the period 2006-2021. The table shows that three of the seven household factors have a significant effect on wealth inequality. First, mortgage debts have a significant effect at 1%. The direction of the slope is positive and consistent with alternative hypothesis H2.1. This factor explains 42.2% of the variance in wealth inequality and is also significant in the regression of the other indicators. The second factor that is significant at 5% is the home ownership rate. However, the direc-

tion of the slope is positive and inconsistent with alternative hypothesis H2.2. A higher home ownership rate should actually reduce wealth inequality. There was no doubt about this and a clear consensus in the literature. When regressing the other indicators of wealth inequality, this factor is not significant. For these reasons, we do not include this factor in the multiple regression analysis. The last household factor found to be statistically significant is financial assets ownership rate inequality with a significance of 1%. The direction of the slope is positive and consistent with alternative hypothesis H2.4. This factor explains 50.0% of the variance in wealth inequality. The regressions of the other indicators also show a clear significant relationship. Again, remarkable issues can be observed. First, the positive β_1 of the home ownership rate, as previously discussed. Second, we had expected income inequality to also contribute to wealth inequality. However, this does not appear to be the case. If we were to test the influence of wealth inequality on income inequality (i.e., hypothesis H2.6), we would get the same result and therefore this has not been reported in a table. All in all, we cannot identify the snowballing-effect as defined by Saez and Zucman (2016) in the Netherlands.

Table 5.4: Simple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the Gini combined.

Factor	β_0	β_1	**N**	$\mathbf{R^2}$	**F-statistic**
(Mortgage) debts	0.516*** (6.262)	0.281*** (3.200)	16	0.422	10.242
Home ownership rate	0.041 (0.124)	1.329** (2.263)	16	0.268	5.121
Financial assets ownership rate inequality	0.484*** (6.127)	0.221*** (3.742)	16	0.500	14.005
Income inequality	0.513 (1.650)	0.915 (0.856)	16	0.050	0.732
Inheritance inequality	0.730*** (7.742)	0.022 (0.557)	14	0.025	0.311
Average household age	0.369 (1.322)	0.010 (1.471)	16	0.134	2.164
Education level	0.728*** (11.659)	0.128 (0.807)	16	0.044	0.652

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

To conclude this subsection, we list the factors that were found to be at least 5% significant and will be used for the multiple regression analysis. At the macroeconomic level: housing prices, generous welfare state, and globalization. At the household level: mortgage debts and financial assets ownership rate inequality.

5.3 Multiple Regression Analysis

Multiple regression analysis is used in situations where multiple independent variables hypothetically affect the dependent variable. Thus, this analysis is similar to a simple regression analysis. The only difference is multiple independent variables that can explain the variance in the dependent variable, rather than a single one (Sekaran & Bougie, 2016). This relationship between independent variables and dependent variable can be described by the following

multiple linear regression equation:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n + \varepsilon \tag{5.12}$$

Where n is the regression coefficient of the last independent variable. Again, to get the predicted value of y, we need to subtract the error term ε on both sides of the equation:

$$y - \varepsilon = \hat{y} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n \tag{5.13}$$

Subsection 5.2 discussed some important results of the simple regression analysis, such as the coefficients (β_0 and β_1), the number of observations (N), the coefficient of determination (R^2), and the F-statistic. The multiple regression analysis introduces another important result, the adjusted R^2. Multiple regression typically uses the adjusted R^2 instead of the standard R^2 (Wolf & Best, 2015). If multiple independent variables are added to the multiple regression model, the standard R^2 can only increase even if variables that are not relevant with respect to the dependent variable are added. The adjusted R^2 corrects for multiple independent variables and may decrease if variables are added that are not relevant with respect to the dependent variable (Wolf & Best, 2015). In this study, we used two categories into which the factors hypothetically affecting wealth inequality were classified. We will maintain this categorization for the multiple regression analysis as well. The choice to perform a multiple regression analysis with the remaining significant factors rather than with all factors in the respective category was made due to a rule of thumb. The number of degrees of freedom (df) in a multiple regression analysis can be calculated using the following formula:

$$df = N - k - 1 \tag{5.14}$$

Where N is the number of observations, and k is the number of independent variables used in the model. The first supervisor of this study stated as a rule of thumb that the number of degrees of freedom in a multiple regression analysis should be greater than or equal to 12, because of the power of the test. Since we have 16 observations and use 3 and 2 independent variables for the regression for the macroeconomic level and household level, respectively, we meet this rule of thumb.

Prior to the multiple regression analyses, we performed diagnostic checks for the assumptions of linear regression analysis, as described in Appendix D. The detailed results of these diagnostic checks can be found in Appendix F. It can be concluded that not all assumptions were satisfied. However, it should be stressed again that it is difficult to draw strong conclusions due to the small number of observations. This complicates the interpretation of the diagnostic checks. Nevertheless, it can be said that at both the macroeconomic and household levels, the most important assumption is satisfied. Namely, there is no multicollinearity, i.e., there are no correlations between the independent variables.

Table 5.5 presents the multiple regression results of the factors at the macroeconomic level. The dependent variable is wealth inequality, measured as the Gini combined over the period

2006-2021. This multiple regression analysis was also conducted for the other two indicators of wealth inequality: the top 10% to bottom 90%, and the mean to median ratio. The results of these analyses can be found in Appendix E.

In the first regression, only the determinant housing prices was used as the independent variable. This result is the same as the result of the simple regression analysis of housing prices in Table 5.3. In the second regression, the independent variable generous welfare state was added. Both the factor housing prices and generous welfare state are statistically significant. The explained variance in wealth inequality increased considerably from 41.1% to 71.3%. In addition, the F-statistic increased from 9.759 to 19.622. For the other two indicators of wealth inequality, the two factors are also significant, and both the explained variance and F-statistic increased. In the third regression, the last independent variable globalization was added. Again, all factors are statistically significant, the explained variance increased from 71.3% to 93.7%, and the F-statistic increased from 19.622 to 75.457. This implies that the three macroeconomic factors together explain the regression model quite well. The factors are also significant for the other two indicators of wealth inequality, with both the explained variance and F-statistic increasing. However, the results of the regression model of the Gini combined are more prominent. This is particularly evident in the F-statistic of the third regression, which is 37.645 and 37.013 for the top 10% to bottom 90% and mean to median ratio, respectively.

Table 5.5: Multiple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the Gini combined.

	Regression 1	**Regression 2**	**Regression 3**
Constant term	0,896***	0.610***	0.600***
	(23,625)	(8.419)	(17.684)
Housing prices	-0.001***	-0.001***	-0.001***
	(-3.124)	(-4.500)	(-10.567)
Generous welfare state		1.029***	0.501***
		(4.217)	(3.641)
Globalization			0.116***
			(6.879)
N	16	16	16
R^2	0.411	0.751	0.950
Adjusted R^2	0.369	0.713	0.937
F-statistic	9.759	19.622	75.457

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

The above table shows that the coefficient of housing prices is very small compared to the other two determinants. However, this does not necessarily mean that this determinant has a small share in predicting the dependent variable. We will therefore clarify the relative importance of the determinants in the regression model. We can do this based on the coefficients of the determinants and the change of the independent and dependent variables during the period under consideration. In a multiple regression model in which the independent variables perfectly predict the dependent variables, we get the following:

$$\begin{aligned} \Delta y &= \beta_1 \cdot \Delta x_1 + \beta_2 \cdot \Delta x_2 + ... + \beta_n \cdot \Delta x_n \\ \frac{\Delta y}{\Delta y} &= \frac{\beta_1 \cdot \Delta x_1}{\Delta y} + \frac{\beta_2 \cdot \Delta x_2}{\Delta y} + ... + \frac{\beta_n \cdot \Delta x_n}{\Delta y} \\ 1 &= \sum_{k=1}^{n} \frac{\beta_k \cdot \Delta x_k}{\Delta y} \end{aligned} \tag{5.15}$$

However, the independent variables in our model do not perfectly predict the dependent variable. Moreover, the coefficients refer to the level-values and not the changes, so the sum can never equal 1. Nevertheless, we can calculate the relative importance of the determinants. We do so as follows:

$$\text{Relative importance determinant } a = \frac{\beta_a \cdot \Delta x_a}{\sum_{k=1}^{n} \beta_k \cdot \Delta x_k} \tag{5.16}$$

Since the coefficients are fitted for the period 2006-2021, we will use this period to determine the relative importance of the determinants. We obtained the following values for housing prices, generous welfare state, and globalization, respectively: 926.7%, -295.4%, and -531.3%. Based on these figures, we can state that the change in housing prices contributed strongly to the reduced wealth inequality during the period 2006-2021 (Δy is -0.011, measured as the Gini combined). This is partially offset by the other two determinants. The determinant generous welfare state contributes relatively least to the change in wealth inequality.

Table 5.6 presents the multiple regression results of the factors at the household level. The dependent variable is wealth inequality, measured as the Gini combined over the period 2006-2021. In the first regression, only the determinant (mortgage) debts was used as the independent variable. This result is the same as the result of the simple regression analysis of (mortgage) debts in Table 5.4. In the second regression, the independent variable financial assets ownership rate inequality was added. Both the factor (mortgage) debts and financial assets ownership rate inequality are statistically significant. The explained variance in wealth inequality increased considerably from 42.2% to 73.8%. In addition, the F-statistic increased from 10.242 to 22.171. For the other two indicators of wealth inequality, the two factors are also significant, and both the explained variance and F-statistic increased. The F-statistics of the second regression of the top 10% to bottom 90% and mean to median ratio are 17.882 and 50.843, respectively. Thus, the results of the regression model of the mean to median ratio are more prominent. However, if we base the conclusion on the Gini combined, we can still claim that the two household factors together explain the regression model well. Again, we calculated the relative importance of the independent variables in the change of the dependent variable for the period 2006-2021. We obtained the following values for (mortgage) debts and financial assets ownership rate inequality, respectively: -24.9% and 124.9%. This suggests that the change in financial assets ownership rate inequality contributed much more to the reduction of wealth inequality than (mortgage) debts.

Table 5.6: Multiple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the Gini combined.

	Regression 1	**Regression 2**
Constant term	0.516*** (6.262)	0.311*** (4.428)
(Mortgage) debts	0,281*** (3.200)	0.230*** (3.958)
Financial assets ownership rate inequality		0.189*** (4.485)
N	16	16
R^2	0.422	0.773
Adjusted R^2	0.381	0.738
F-statistic	10.242	22.171

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

5.4 Final Conceptual Model

Based on the descriptive and regression analyses, the final conceptual model was constructed (see Figure 5.24). The green lines show the significant factors with corresponding coefficients from the multiple regression analyses. The red line shows the factor that was significant for the combined Gini, but whose coefficient did not match the direction of the hypothesis. The blue lines are the factors that we at least expected to be significant, while ultimately were not. The black dashed lines show the factors that were not tested because they were eventually deemed irrelevant, or because there was no data for them. The remaining black lines show non-significant factors.

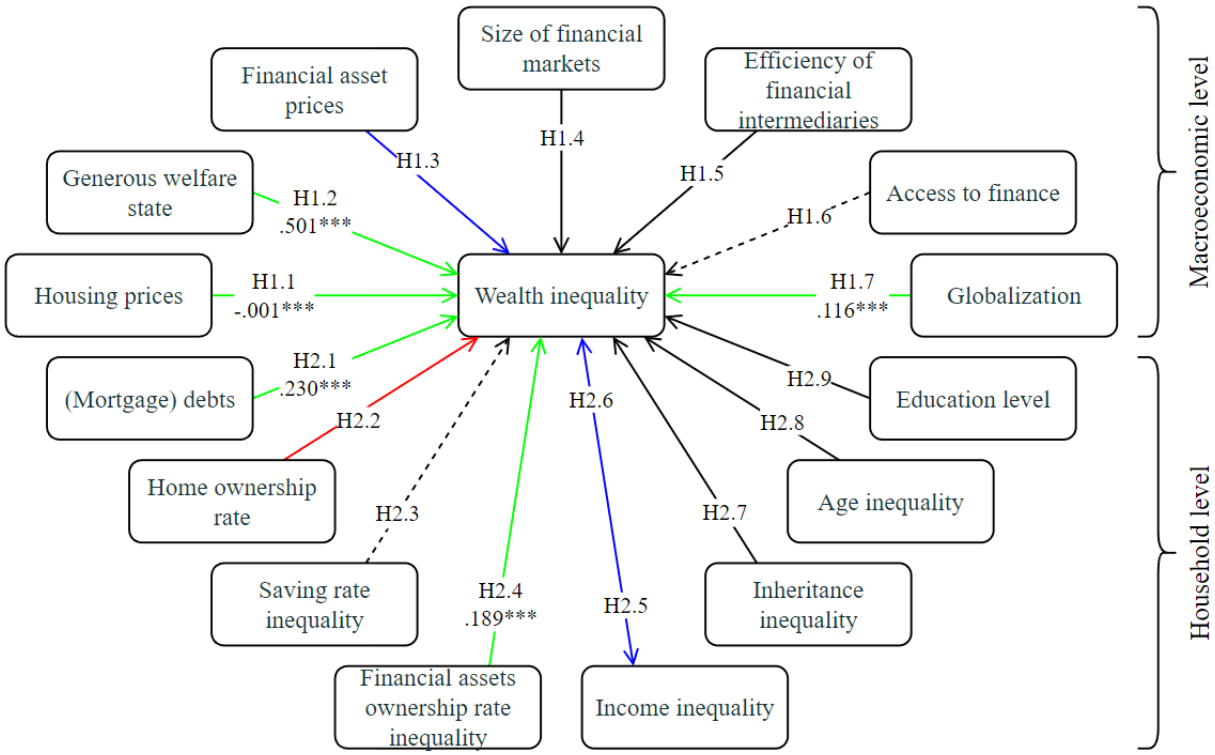

Figure 5.24: Final conceptual model of the causes of wealth inequality, measured as the Gini combined, in the Netherlands. Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

The main conclusions are as follows. At the macroeconomic level, three determinants are significant and consistent with the formulated hypotheses:

- There is a negative relationship between housing prices and wealth inequality in the Netherlands. This is in agreement with the findings of Blanchet and Martinez-Toledano (2022), De Luigi et al. (2023), Salverda (2019), and Van Bavel and Frankema (2017).
- There is a positive relationship between generous welfare state and wealth inequality in the Netherlands. This is in agreement with the findings of Cowell et al. (2018).
- There is a positive relationship between globalization and wealth inequality in the Netherlands. This is in agreement with the findings of Hasan et al. (2020).

At the household level, two determinants are significant and consistent with the formulated hypotheses:

- There is a positive relationship between (mortgage) debts and wealth inequality in the Netherlands. This is in agreement with the findings of Berisha and Meszaros (2020) and Salverda (2019).
- There is a positive relationship between financial assets ownership rate inequality and wealth inequality in the Netherlands. This is in agreement with the findings of Balestra and Tonkin (2018) and Van Bavel and Frankema (2017).

6 Discussion

This thesis aimed to identify the factors that have contributed to the development of wealth inequality in the Netherlands. To achieve this objective, it was first necessary to identify possible causes of wealth inequality through a literature review. The next step was to map the development of wealth inequality and possible causes in the Netherlands. Data were collected through the databases of the CBS, DNB, and World Bank. In this section, the key findings are discussed and interpreted. In addition, theoretical contributions, practical implications, limitations, suggestions for further research, and reflections are discussed.

6.1 Key Findings

Underlying the results of this thesis is the literature review. This section first provided background information on wealth (inequality). It became clear that the definition of wealth often uses households as the unit of analysis. Consequently, household net wealth is defined as the difference between the current value of all household assets minus the current value of all household liabilities. Furthermore, it became clear that there are several indicators of wealth inequality: the Gini coefficient, the top wealth shares, and mean to median ratio. We then analyzed what has and has not been studied so far in the Netherlands regarding wealth inequality. Several studies have shown that wealth inequality increased between 2006 and 2015. There is also reason to believe that it decreased after 2015, but this has not been shown as clearly. What these studies did not do, however, was to juxtapose different indicators of wealth inequality to validate these findings. They also gave some suggestions of possible factors affecting wealth inequality in the Netherlands, namely: housing prices, mortgage debts, and the share of financial assets owned by the wealthiest. However, they did not analyze this empirically using a regression analysis or anything similar. Moreover, we did not believe that these would be the only determinants. Therefore, we tried to paint a holistic picture of all possible causes of wealth inequality. We did this primarily by analyzing studies that examined wealth inequality outside the Netherlands. In doing so, we ensured that the studies in question studied countries with similar Western social and economic cultures to the Netherlands. We found that at least 10 macroeconomic and 8 household factors could potentially influence wealth inequality in a given country (we are referring here to the direct factors and not the indirect factors). As a final point, we examined the potential effects of wealth inequality in the literature review. A total of 10 areas were found to be potentially affected by wealth inequality, including income inequality. With the exception of income inequality, examining these potential effects was beyond the scope of this thesis. This is because income inequality and wealth inequality would reinforce each other, also known as the snowballing-effect. This answers the first sub-research question:

SRQ 1: What are possible causes of wealth inequality?

In the hypothesis development section, hypotheses were formulated for the determinants of wealth inequality identified in the literature review. A total of 7 hypotheses were developed for the macroeconomic level and 9 hypotheses were developed for the household level. At the macroeconomic level, no hypotheses were eventually developed for the determinants wealth tax, inheritance tax, and political stability. For both taxes, rates have remained virtually constant over the years. Political stability would be measured by the number of wars or conflicts, and thus is not relevant to the Netherlands. At the household level, one would expect 8 hypotheses because 8 determinants have been identified. However, the effect of wealth inequality on income inequality is also hypothesized, as previously mentioned. Using the hypotheses, a conceptual

model of the causes of wealth inequality in the Netherlands was constructed, which served as the basis for the empirical analysis we will now discuss in detail.

First, a descriptive analysis of wealth inequality in the Netherlands was conducted. Most household wealth data run from 2006 to 2021. Therefore, this period was used to analyze both wealth inequality and its possible determinants. To validate the development of wealth inequality, we used three different indicators of wealth inequality: the Gini coefficient, the ratio of the share of net household wealth of the top 10% to the bottom 90%, and the ratio of mean to median net household wealth. Data on the Gini coefficient from the CBS were only available from 2011 to 2021. Therefore, we calculated the Gini coefficient ourselves for the period 2006-2021. The calculated Gini and that of the CBS do not quite match in the 2011-2018 period. Two possible explanations are that the CBS probably used microdata, and treated negative values of the lower percentiles differently. For the best possible estimate, we combined the calculated Gini coefficient and that of the CBS. The necessary data on the other two indicators of wealth inequality were simply available for the period 2006-2021. Although these indicators are also self-calculated, they are not subject to a complex calculation like that of the Gini coefficient and are therefore quite reliable. To validate the development of wealth inequality in the Netherlands for the period 2006-2021, we had these three indicators correlated with each other. All three indicators have a strong and significant correlation with each other. Thus, the development of wealth inequality in the Netherlands can be confirmed with certainty. From 2006 to 2008 there was a small decrease, after which wealth inequality increased sharply until 2013. From 2013 to 2021, wealth inequality fell again to approximately the 2008 level. At this time, it cannot be argued whether this level of wealth inequality is desirable or not. It is not only subjective, but also unknown what the consequences of the development of wealth inequality have been. In order to say anything meaningful about what level of wealth inequality is desirable, this would first have to be examined. The findings regarding the development of wealth inequality in the Netherlands are quite consistent with other studies that have examined wealth inequality in the Netherlands. Indeed, according to Salverda (2019) and Van Bavel and Frankema (2017), wealth inequality would also have decreased between 2006 and 2008/2009. Thereafter, it would have increased with a peak in 2013, and in 2014 it would have decreased slightly. Furthermore, Rijksoverheid (2022) argued that wealth inequality would have decreased between 2013 and 2020. Again, this is consistent with our findings. This answers the second sub-research question:

SRQ 2: How did wealth inequality develop in the Netherlands before and after 2015?

After the comprehensive analysis of wealth inequality, the development of possible determinants was examined. Finding suitable indicators for the various determinants was a difficult task. It was especially problematic to determine whether the indicator measured the specific factor it was supposed to measure. Moreover, data were not always available for the desired time period. We did not validate the development of the determinants and their associated indicators as we did for the wealth inequality indicators. As a result, the results are to some extent uncertain. An example of an indicator that is not so obvious and involves uncertainty is the indicator of the generous welfare state factor (social protection expenditure to GDP). Suppose that during a recession (in which GDP falls) social protection expenditure remains the same. Consequently, the value of the indicator will increase. However, this does not imply that the welfare state has become more 'generous'. In addition, there are a number of other factors that use GDP as part of their indicator. As a consequence, no firm conclusions can be drawn regarding these factors. Incidentally, we believe that uncertainty does not apply to all factors

and associated indicators. For example, we are convinced that the housing price indicator (price index of existing own homes) does measure the factor we intend to measure. However, we have not scientifically established this in this thesis. It is therefore a recommendation to do so for both housing prices and all other determinants.

Online or Internet banking has become increasingly popular in the Netherlands in recent years. In addition, Dutch people are increasingly paying with cell phones or debit cards. Both developments have led to the closure of bank branches and ATMs, which according to the literature are the proxies for access to finance. Since both indicators are not relevant for the Netherlands and we could not find another suitable indicator, we did not include this macroeconomic factor in the regression analysis. A second (household) factor that we did not include in the regression analysis is the saving rate inequality, because no data were available with which to construct the relevant indicator. The saving rate is an important component of household wealth accumulation and we therefore expected this factor to significantly affect wealth inequality. Ultimately, 6 macroeconomic and 7 household determinants remained for the simple regression analysis. This answers the third sub-research question:

SRQ 3: How have the possible causes of wealth inequality developed over the years in the Netherlands?

The simple regression analysis used the Gini combined as an indicator of the dependent variable wealth inequality. At the macroeconomic level, the determinants housing prices, generous welfare state, and globalization were found to be significant. These determinants explained 41.1%, 36.4%, and 38.2% of the variance in wealth inequality, respectively. Moreover, the direction of the slope was consistent with the corresponding hypothesis in all cases. The factors financial asset prices, size of financial markets, and efficiency of financial intermediaries were not found to be significant. We ourselves expected the determinant financial asset prices to have a significant effect on wealth inequality. Looking at household portfolios (Figure 5.7 and Figure 5.8), we see that the top 10% hold more financial assets than the bottom 90%. This is also reflected in the development of the factor financial assets ownership rate inequality. Presumably, the rich also hold much more risky financial assets. However, it was not possible to zoom in on the composition of financial assets. Most likely the AEX-index does not fully measure what we intend to measure, and further research is needed to find a more suitable indicator. At the household level, the determinants mortgage debts, home ownership rate, and financial assets ownership rate inequality were found to be significant. These determinants explained 42.2%, 26.8%, and 50.0% of the variance in wealth inequality, respectively. The direction of the slope was inconsistent with the corresponding hypothesis only for the determinant home ownership rate. There was clear agreement in the literature on the direction of the hypothesis and therefore we excluded this factor from further consideration. The determinants income inequality, inheritance inequality, average household age, and education level were not found to be significant. We ourselves expected the determinant income inequality to have a significant effect on wealth inequality. One possible explanation could be that income inequality remained fairly constant over the period 2006-2021. The lowest point of income inequality measured as the Gini coefficient in this period is 0.281 in 2006, the highest point is 0.306 in 2019. This means that the largest difference in the Gini coefficient is 0.025. Wolff (2017) published figures on income inequality measured as the Gini coefficient in the U.S. for the period 2006-2015. The lowest point in this period is 0.549 in 2010, the highest point is 0.598 in 2015. This means that the largest difference in the Gini coefficient is 0.049, almost 2 times higher compared to

the Netherlands. If we disregard the size of the indicator and only consider the trend, we see that the Gini coefficient is less constant in the U.S. Thus, if we were to perform a regression analysis between income inequality and wealth inequality in the U.S., it is more likely that we would find a relationship. Saez and Zucman (2016) found this at least in the U.S. for the past 30 years. If there were more observations of both income inequality and wealth inequality in the Netherlands, perhaps the snowballing-effect could be observed. For the period 2011-2021, we had several indicators of income inequality correlated with each other. This proved that they all correlated strongly and significantly with each other. Therefore, we can argue that the result is not due to the indicator used. Ultimately, 3 macroeconomic and 2 household determinants remained for the multiple regression analysis.

The multiple regression analysis was divided into a macroeconomic-level and a household-level model. Diagnostic checks of the assumptions of the linear regression analysis were performed prior to these analyses. Not all assumptions were met, but in both cases there was no multicollinearity. However, the results of the diagnostic checks are difficult to interpret due to the small number of observations. The multiple regression analyses also used the Gini combined as the indicator for the dependent variable wealth inequality. The macroeconomic determinants were found to explain 93.7% of the variance in wealth inequality with an F-statistic of 75.457. Compared to the other two indicators of wealth inequality, this result is by far the most significant. Furthermore, as in the simple regression analysis, the direction of the slopes was found to be consistent with the hypotheses. This implies that the three macroeconomic factors predict wealth inequality, measured as the Gini combined, very well. This is in agreement with the findings of Blanchet and Martinez-Toledano (2022), Cowell et al. (2018), De Luigi et al. (2023), Hasan et al. (2020), Salverda (2019), and Van Bavel and Frankema (2017). Looking at the relative importance of macroeconomic determinants in the change of wealth inequality, the determinant housing prices (926.7%) was found to have the largest effect. This is followed by globalization (-531.3%) and a generous welfare state (-295.4%). The household determinants were found to explain 73.8% of the variance in wealth inequality with an F-statistic of 22.171. The direction of the slopes was again consistent with the hypotheses. Compared to the other two indicators of wealth inequality, this result is not the most significant. Nevertheless, these two household factors together predict wealth inequality, measured as the Gini combined, quite well. This is in agreement with the findings of Balestra and Tonkin (2018), Berisha and Meszaros (2020), Salverda (2019), and Van Bavel and Frankema (2017). Looking at the relative importance of household determinants in the change of wealth inequality, the determinant financial assets ownership rate inequality (124.9%) was found to have the largest effect, followed by (mortgage) debts (-24.9%). Based on the descriptive and regression analyses, the final conceptual model was created. All things considered, we can conclude that both regression models predict the development of wealth inequality fairly good. This answers the main research question:

Main RQ: What factors have contributed to the development of wealth inequality in the Netherlands?

Due to the small number of observations, we were not able to verify whether a correlation exists between the models. If we rationally consider the significant determinants, it would not be entirely unexpected if a correlation is found between housing prices and mortgage debts. Moreover, the small number of observations has the effect of reducing the statistical power of the analyses, so that no firm conclusions can be drawn. However, we had to make do with

what we had and can state that, despite the limitations, the sub-research questions and the main research question were successfully answered.

6.2 Theoretical Contributions

Wealth inequality is a socioeconomic issue that has been increasingly studied internationally in recent years. In particular, much literature can be found on wealth inequality in leading countries such as the U.S. and the U.K. After conducting the literature review, we found that while there are studies that have studied wealth inequality in the Netherlands, these are only a handful. Moreover, to date there is no study that has studied the Netherlands over a longer period of time using various indicators of wealth inequality to validate its development. In addition, no studies were found that attempted to provide a comprehensive overview of possible causes of wealth inequality. The literature often focused on examining one or two possible causes in a particular country. Finally, little to no research has been done on the causes of the development of wealth inequality in the Netherlands. A number of studies have suggested possible causes, but these have not been empirically established. This thesis has filled these knowledge gaps by (1) examining and validating the development of wealth inequality in the Netherlands using various indicators, (2) constructing a comprehensive overview of possible causes of wealth inequality, and (3) empirically establishing the causes of the development of wealth inequality in the Netherlands. To restate, the determinants of wealth inequality at the macroeconomic level are: housing prices, generous welfare state, and globalization. The determinants of wealth inequality at the household level are: (mortgage) debts and financial assets ownership rate inequality.

6.3 Practical Implications

With this thesis, we have provided policymakers with insight into the development and level of wealth inequality in the Netherlands. As mentioned, it cannot be said whether the current level of wealth inequality is desirable or not. Further research would have to show this. However, policymakers could compare the mapped development with policy implementation in the period in question and learn from it. It could also provide new insights into the possible causes of wealth inequality. Furthermore, this thesis provides insight into which knobs policymakers in the Netherlands can turn to reduce or increase wealth inequality. This applies in particular to the macroeconomic determinants generous welfare state and globalization, and the household determinant financial assets ownership rate inequality. For example, the level of social protection expenditure (generous welfare state) and the level of imports and exports (globalization) could be directly affected. One way to reduce financial assets ownership rate inequality is through a sovereign wealth fund (SWF). These are large government-owned portfolios consisting of international assets, such as bonds and stocks (Lonergan & Blyth, 2020). An SWF can be managed either by the government itself or by a third party. Such a fund is often financed from a balance of payments (BoP) surplus, which occurs when a country exports more than it imports. A country with a BoP surplus can strengthen its exchange rate, or use the foreign currency received to accumulate assets. Data from DNB show that the Netherlands has a BoP surplus almost every year. With this surplus, the state could accumulate international assets. The excess return from these assets could in turn be redistributed to the part of society that does not own financial assets (Lonergan & Blyth, 2020). In this way, financial assets ownership rate inequality could be reduced and, consequently, wealth inequality. According to Lonergan and Blyth (2020), however, there are risks involved. For example, a global economic crisis or a world war could hurt an SWF due to falling asset prices. At the time of writing, these risks are

not entirely absent. Thus, the question is whether it is advisable to implement it now.

6.4 Limitations and Future Research

This study has a number of limitations for which recommendations can be made. First, the period in which wealth inequality and its identified determinants were examined is quite short (2006-2021). As a result, firm conclusions cannot be drawn because the results of inferential statistics are less reliable. This is due to the fact that a small number of observations affects the statistical power of the analyses. The CBS can play an important role here by ensuring that pre-2006 data are also made available. Furthermore, the Gini coefficient used for the analyses was itself calculated for the years 2006-2010. The CBS probably used microdata for the period 2011-2021, while we were dealing with macrodata. Moreover, they probably treated negative values differently than we did when calculating the Gini coefficient. Again, the CBS could play an important role here by (1) making microdata on wealth available, (2) publishing data on the Gini coefficient prior to 2011, and (3) indicating more clearly how the Gini coefficient was calculated. Also, some determinants, such as inheritance tax and wealth tax, were not analyzed because the tax burden in the Netherlands has remained virtually constant over the years. Nevertheless, it is plausible that these factors may influence wealth inequality. Therefore, it is recommended to try to simulate a change in these possible determinants to analyze their effect on wealth inequality. In addition, we did not examine the effect of saving rate inequality on wealth inequality because data were not available. In our view, this is an important determinant of wealth inequality because it underlies wealth accumulation. It would be helpful if the CBS provided data that could be used to calculate the saving rate for different deciles. Furthermore, the indicators of the determinants of wealth inequality have not been validated (except for income inequality), as has been done for the indicators of wealth inequality. This is important to ensure that the indicators measure what we intend to measure, and thus carry less uncertainty. Finally, while we performed diagnostic checks on the assumptions of linear regression, we did not correct the respective model when the assumptions were not met. In addition, there could be a correlation between the two multiple regression models, which has not yet been examined. This was mainly due to the fact that if more data had been available, it would have been more meaningful to correct and investigate.

Apart from limitations and recommendations, there are a number of items for the research agenda. In the literature review, we briefly discussed the possible consequences of wealth inequality. However, we did not investigate this empirically in this study, as we did with the possible causes of wealth inequality. First, research on the consequences of wealth inequality in the Netherlands would be a very useful addition to the literature. Moreover, such a study could provide guidance for determining the desired level of wealth inequality in the Netherlands. Policymakers could then specifically turn the knobs facilitated by this research to subsequently steer wealth inequality in the desired direction. For example, a certain level of wealth inequality would stimulate technological development and innovation. To remain internationally competitive as a country, it is important that this remains optimally stimulated. Second, it would be interesting to compare the development of wealth inequality and its determinants with other comparable countries. Here, however, it is important that the data used be defined in the same way for each country, so as not to compare apples with oranges. In this way it can be made insightful whether the situation in the Netherlands is similar or different from that of other countries. In 2020, COVID-19 brought a pandemic to the world and in 2022, Russia invaded Ukraine. The data used for this study ran until 2021, so it was not possible to accurately

analyze these events in relation to wealth inequality. Finally, it would be interesting to examine the effects of these events on wealth inequality when more data are available in the future.

6.5 Reflections

Looking back and reflecting on the course of this study, we can state a number of things about it. First, we learned a lot and gained new insights. For example, we independently conducted a scientific study for the first time which we did not know how to do beforehand. The most instructive part when we look at the method of doing research was conducting the regression analyses. Looking at the content, we can cautiously say that we have become experts on wealth inequality. However, we must be critical of the method by which we conducted this study. In the literature review, we sought to identify the possible determinants of wealth inequality. Then, perhaps we should have consulted experts to validate these determinants and establish associated indicators. They could also have made other suggestions for possible causes of wealth inequality. This could have saved much time in several respects and increased the reliability of this study. Earlier we mentioned that with this study we cannot actually establish causal relationships because it is simply not possible to conduct experiments. So if we critically examine the results, we have not established causal relationships, but merely correlations. Thus, hypothetical research is in fact inappropriate for this issue. Finally, what we find very unfortunate is that we had to work with a small number of observations. The study would have been more meaningful if we had more data so that we could have drawn more reliable conclusions.

Furthermore, we would like to reflect on some determinants that were found to be significant. As mentioned, we have provided insight into which knobs policymakers in the Netherlands can turn to reduce or increase wealth inequality. Suppose wealth inequality is at too high and thus undesirable a level. Reducing globalization should lower wealth inequality in the Netherlands. However, reducing globalization also has its downsides. According to Stobierski (2021), it could have a negative effect on economic growth. Indeed, there would be less access to labor, jobs, and resources. In addition, there are fewer incentives to cooperate with other countries, making conflicts more likely to occur. Wealth inequality can also be reduced by increasing housing prices. Figure 5.9 shows that housing prices have only increased since 2013. The regression analysis showed that this is the main reason for the decrease in wealth inequality. According to economists, low interest rates are the main cause of this increase in housing prices (NOS Nieuws, 2021). Rising housing prices have proved problematic in recent years (NOS Nieuws, 2020). Indeed, it has become increasingly difficult for first-time buyers to buy a house. In addition to housing prices, the level of mortgage debts also depends on monetary policy. With lower interest rates, debt can be paid off more quickly, leading to a reduction in wealth inequality. Thus, the period of low interest rates in recent years has (temporarily) reduced wealth inequality. By mid-2021, Dutch inflation began to rise, and to counteract this inflation, interest rates went up. Therefore, wealth inequality is expected to increase again in the coming years. All in all, we want to emphasize that there are potential drawbacks when policymakers try to influence wealth inequality.

7 Conclusion

Wealth inequality is prevalent across the world and is increasingly being studied. The first objective of this research was to study the development of wealth inequality in the Netherlands using various indicators. The second and main objective of this research was to examine the causes of this development. Therefore, the main question of this thesis was as follows:

Main RQ: What factors have contributed to the development of wealth inequality in the Netherlands?

To answer this question, it was first necessary to identify the possible causes of wealth inequality through a literature review. We found that at least 10 macroeconomic and 8 household factors can directly influence wealth inequality in a given country. We then formulated hypotheses for these identified determinants. Ultimately, hypotheses were formulated for 7 macroeconomic factors and 8 household factors. A number of determinants were dropped because of their relevance to the Netherlands or because they were not considered meaningful to analyze after all. We then mapped the development of wealth inequality for the period 2006-2021. We validated this trend using three indicators that are highly correlated. We found that wealth inequality decreased slightly between 2006 and 2008. From 2008 to 2013, however, wealth inequality rose to record levels. From 2013 to 2021, wealth inequality fell again to about 2008 levels. Whether this is the desired level of wealth inequality, however, we cannot say and remains to be investigated. In addition, we mapped the development of the possible determinants of wealth inequality for the period 2006-2021. We did not validate these indicators as with the indicators of wealth inequality. Moreover, we could not find a suitable indicator for all determinants. Consequently, 6 macroeconomic and 7 household determinants remained at the end of the descriptive analysis. Next, we conducted a simple regression analysis to filter out the factors that have a significant effect on wealth inequality. At the macroeconomic level, three determinants were found to be significant and consistent with the formulated hypotheses: housing prices, generous welfare state, and globalization. At the household level, these were two determinants: mortgage debts and financial assets ownership rate inequality. The multiple regression showed that the three remaining macroeconomic determinants were again significant and explained 93.7% of the variance in wealth inequality. Housing prices contributed the most to this, followed by globalization and generous welfare state, respectively. The two household determinants were also found to be significant and together explained 73.8% of the variance in wealth inequality. Financial assets ownership rate inequality contributed the most to this. This answers the main research question of this thesis.

This study has filled a number of knowledge gaps by (1) identifying and validating the development of wealth inequality in the Netherlands using multiple indicators, (2) providing a comprehensive overview of possible causes of wealth inequality, and (3) empirically identifying the causes of the development of wealth inequality in the Netherlands. It also enables policymakers in the Netherlands to reduce or increase wealth inequality in the future by influencing the identified causes. Further research should mainly focus on identifying the consequences of the development of wealth inequality in the Netherlands. Wealth inequality can affect a country's technological development, and to remain internationally competitive it is important that technological development remains fostered. In addition, the effects can provide insight into the desired level of wealth inequality in the Netherlands. Ultimately, the most optimal level of wealth inequality depends on the context in which a country finds itself.

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A Literature Review Approach

Table A.1: Overview of keywords used during the literature review.

Keywords	**Synonyms and related words**
Wealth inequality	Wealth distribution, -concentration, -accumulation, -share, -growth, -dynamics, -composition, household wealth, private wealth, saving inequality, income inequality
The Netherlands	Dutch, North-Western-Europe, Western-Europe, U.K., Germany, Belgium, Luxembourg, France, Switzerland, Austria, Denmark, Norway, Sweden, Finland, Iceland, U.S., Canada, Australia
Social problem	Economic problem, problem, problematic, challenge, issue
Cause	Causation, causality, driver, antecedent, determinant, origin, source, reason
Consequence	Effect, result, resultant, implication, outcome, ramification, development
Definition	Description, explanation, interpretation

Table A.2: Selection criteria used during the literature review.

Criterion	**Inclusion**	**Exclusion**
Countries	Countries with more or less the same 'Western' social and economic culture	Developing countries and countries lacking the 'Western' social and/or economic culture
Language	English, Dutch	Non-English, non-Dutch
Research type	Peer-reviewed scientific journals, journals, books, grey literature	Wikipedia, blogs, forums
Period	Preference: most recent	-
Citations	Preference: as highly as possible	Zero citations unless very recently published

Table A.3: Search terms used during the literature review.

Database	**Search terms**	**Results**
Scopus	TITLE-ABS-KEY (("wealth inequality" OR "wealth distribution" OR "wealth concentration") AND "the netherlands")	14
Scopus	TITLE-ABS-KEY (("wealth inequality" OR "wealth distribution" OR "wealth concentration") AND europe)	117
Scopus	TITLE-ABS-KEY ("wealth inequality" OR "wealth distribution" OR "wealth concentration")	3,282
Scopus	TITLE-ABS-KEY ("wealth inequality" AND ("social problem" OR "economic problem"))	15
Scopus	TITLE-ABS-KEY ("wealth inequality" AND (cause OR driver OR antecedent OR determinant))	236
Scopus	TITLE-ABS-KEY ("wealth inequality" AND (consequence OR effect OR result OR implication))	889

B Household Wealth Portfolios

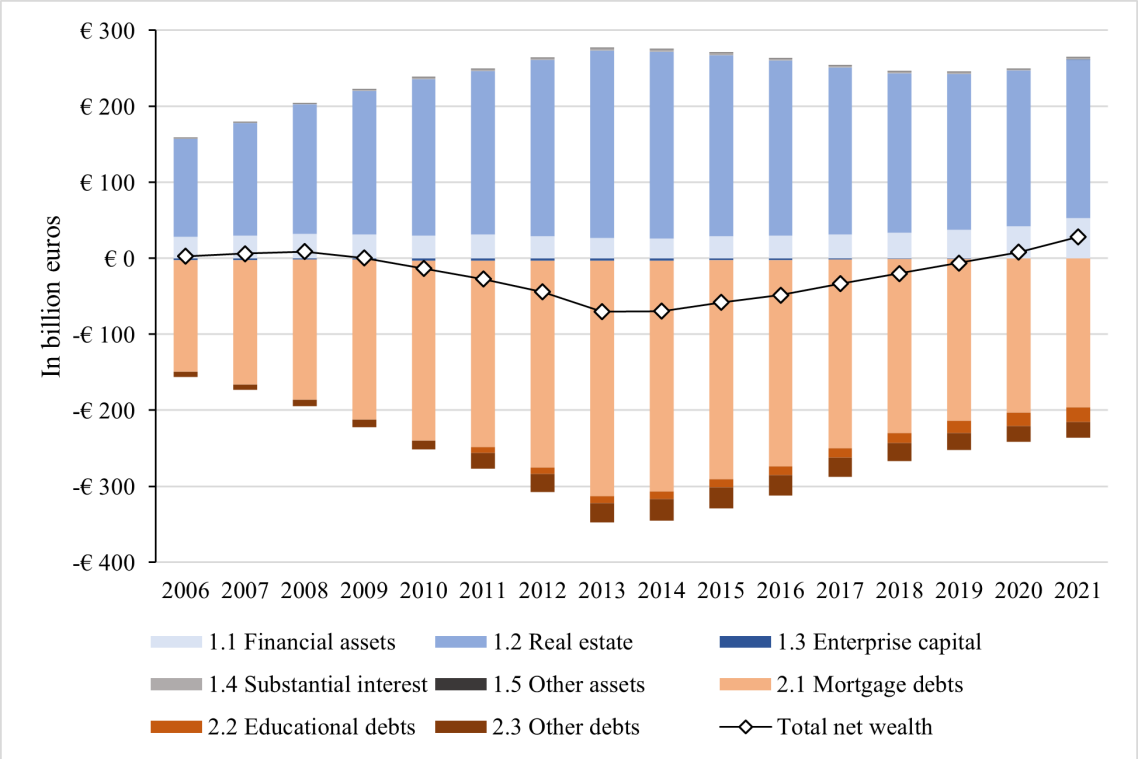

Figure B.1: Household wealth portfolio of the bottom 50% in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine.*

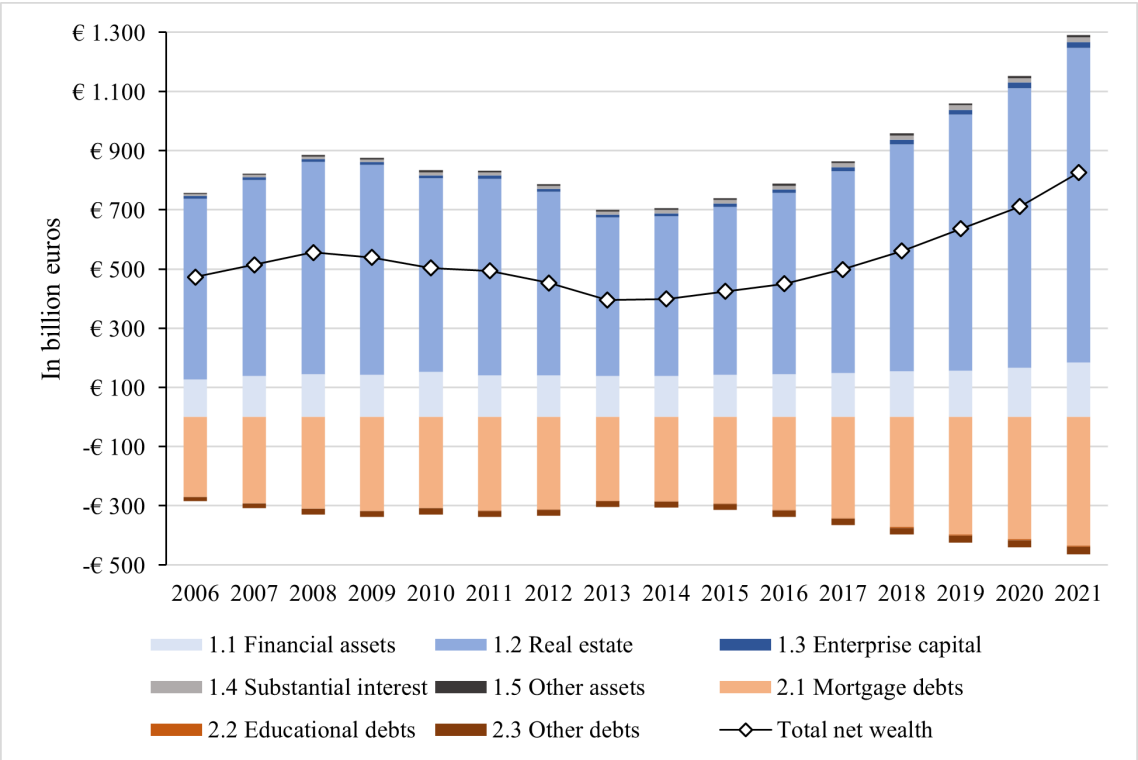

Figure B.2: Household wealth portfolio of the next 40% in the Netherlands. Data for 2021 are preliminary figures. *Source: Author's calculations, CBS StatLine.*

C Overview of All Factors and Corresponding Indicators

Table C.1: Overview of all factors, corresponding indicators, and data sources involved.

Factor	**Indicator(s)**	**Data source(s)**
Wealth inequality	Gini combined Top 10% to bottom 90% Mean to median ratio	CBS StatLine
Housing prices	Price index of existing own homes	CBS StatLine
Generous welfare state	Social protection expenditure to GDP	CBS StatLine
Financial asset prices	Mean of the AEX-index	DNB
Size of financial markets	Market capitalization to GDP	DNB
Efficiency of financial intermediaries	Herfindahl-Hirschman Index	DNB
Globalization	Trade openness	World Bank
(Mortgage) debts	Total mortgage debt to GDP	CBS StatLine
Home ownership rate	Total owners to total households	CBS StatLine
Financial assets ownership rate inequality	Top 10% to bottom 90%	CBS StatLine
Income inequality	Gini coefficient	CBS StatLine, CBS (2023)
Inheritance inequality	Mean to median ratio	CBS StatLine
Average household age	Average household age	CBS StatLine
Education level	HS education degrees to total degrees	CBS StatLine

D Assumptions of Linear Regression Analysis

Assumption 1: Linearity When using the OLS regression model to describe the relationship between the independent (x) and dependent (y) variables, y is assumed to be a linear function of x. This means that the model is linear in its parameters and in its variables (Meuleman et al., 2015). From the point of view of error terms or residuals, a perfectly linear relationship between y and x means that all residuals are zero. If there is non-linearity, it means that the model is not suitable to describe the dependence between y and x. In this case, the estimates of the regression parameters are biased (Meuleman et al., 2015). To check the assumption of linearity, a statistical test called the lack-of-fit test and two graphical methods can be used (Meuleman et al., 2015). One of the graphical methods that can be used to establish linearity is a residual plot. The values of the residuals $\varepsilon = y - \hat{y}$ can be plotted against any independent variable x. The residuals are shown on the vertical axis, while the values of the independent variable are shown on the horizontal axis. In the graph, there is a horizontal line where the residuals are equal to zero, i.e., zero-line. To represent the trend of the residuals, a lowess line (locally weighted scatter plot smoother) can be used. The lowess method produces a smooth line that follows the trend of the data points. Linearity is established when the lowess line approximately follows the zero-line (Meuleman et al., 2015).

Assumption 2: Homoscedasticity This assumption relates to the distribution or dispersion of the residuals of the model and is also called constant variance assumption (Meuleman et al., 2015). The assumption is that for any covariate pattern of x, the variance of the residuals is constant. Heteroscedasticity is the opposite of homoscedasticity and holds when the variance of the residuals changes as the value of x changes. An example of heteroscedasticity is when the variance of the residuals decreases as the predicted value of y increases. With homoscedasticity, the variance of the residuals remains constant regardless of a decrease or increase in the predicted value of y. If the assumption of homoscedasticity is incorrect, the calculation of the estimated standard errors of the regression parameters is no longer correct. This renders the estimates of the coefficients inefficient, which may lead to wrong conclusions (Meuleman et al., 2015). To check the assumption of homoscedasticity, two statistical tests, the White's test and the Breusch-Pagan test, and a graphical method can be used. The graphical method that can be used to establish homoscedasticity is a residual plot, where the residuals are plotted against the predicted value of y. If the residuals spread out at higher or lower values of $\hat{y}$, there is heteroscedasticity. If the residuals remain constantly scattered, there is homoscedasticity.

Assumption 3: Independence of residuals This assumption implies that the values of the residuals do not correlate. The residuals may not have a pattern, meaning that the residual value of an observation does not depend on other residuals (Meuleman et al., 2015). Non-dependence of residuals often occurs with time series data, where a dependent variable has been measured multiple times at different times. Autocorrelation occurs when the correlation between residuals of successive observations is non-zero (Meuleman et al., 2015). If the assumption does not hold then it mainly affects the standard errors of the regression parameters. This has little impact on regression analysis as a descriptive tool, but does affect statistical inference (Meuleman et al., 2015). The Durbin Watson (DW) statistic is a test that can be used to diagnose autocorrelation.

Assumption 4: Normality This assumption assumes that the residuals or error terms follow a normal distribution. If this assumption does not hold, it is not guaranteed that the regression parameters follow a t-distribution. As a result, the t-values and p-values may be biased. This ultimately affects the statistical inference of the regression coefficients (Meuleman et al., 2015). However, the consequences of non-normality are not very significant and some authors therefore argue that this assumption can be ignored. To check the assumption of normality, two statistical tests, the Shapiro-Wilk test and the Kolmogorov-Smirnov test, and a graphical method can be used. The graphical method is also called quantile-quantile (QQ) plot or normal probability plot (Meuleman et al., 2015).

Assumption 5: Absence of multicollinearity This assumption implies that there should be no strong correlations between the independent variables. Perfect multicollinearity exists when an independent variable can be perfectly predicted by other independent variables. When the assumption does not hold and multicollinearity exists, it is more difficult to interpret regression coefficients. In addition, it becomes more difficult to find statistically significant effects (Meuleman et al., 2015). To verify that there is no multicollinearity, the variance inflation factor (VIF) and tolerance (TOL) statistics can be used.

Assumption 6: Absence of influential observations Influential observations are those that differ greatly from other observations. Such observations can significantly affect the result of the regression analysis. An influential observation is spoken of if it changes the value of a regression coefficient at the time it is removed from the analysis (Meuleman et al., 2015). Two observations can be distinguished: outliers and leverage points. Outliers have an abnormal score on the dependent variable and are often characterized by a high residual value. Leverage points are cases with extreme values on the independent or predictor variables. These extreme values can act as levers by driving the regression line toward these values (Meuleman et al., 2015). To verify that there are no influential observations, three measures (DFFITS, DFBETA, and Cook's distance) and a graphical method can be used. Outliers can be identified graphically using residual plots.

E Linear Regression Results

E.1 Simple Regression Analysis

Table E.1: Simple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the top 10% to bottom 90%.

Factor	β_0	β_1	**N**	$\mathbf{R^2}$	**F-statistic**
Housing prices	3.313*** (5.799)	-0.013** (-2.708)	16	0.344	7.334
Generous welfare state	-2.417 (-1.645)	15.294** (2.862)	16	0.369	8.193
Financial asset prices	1.969*** (4.854)	-4.1E-4 (-0.477)	16	0.016	0.227
Size of financial markets	1.619*** (4.693)	0.149 (0.496)	16	0.017	0.246
Efficiency of financial intermediaries	2.580 (0.517)	-3.526 (-0.148)	14	0.002	0.022
Globalization	-1.054 (-1.155)	1.966*** (3.121)	16	0.410	9.740

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table E.2: Simple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the top 10% to bottom 90%.

Factor	β_0	β_1	**N**	$\mathbf{R^2}$	**F-statistic**
(Mortgage) debts	-1.757 (-1.437)	3.780** (2.901)	16	0.375	8.414
Home ownership rate	-8.286 (-1.751)	18.132* (2.129)	16	0.244	4.531
Financial assets ownership rate inequality	-2.420* (-2.143)	3.147*** (3.729)	16	0.498	13.903
Income inequality	-2.872 (-0.656)	16.021 (1.063)	16	0.075	1.131
Inheritance inequality	1.338 (0.954)	0.210 (0.355)	14	0.010	0.126
Average household age	-4.517 (-1.149)	0.154 (1.603)	16	0.155	2.569
Education level	0.903 (1.024)	2.250 (1.004)	16	0.067	1.008

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table E.3: Simple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the mean to median ratio.

Factor	β_0	β_1	**N**	$\mathbf{R^2}$	**F-statistic**
Housing prices	15.218*** (8.691)	-0.083*** (-5.580)	16	0.690	31.142
Generous welfare state	-7.481 (-1.001)	47.452 (1.746)	16	0.179	3.048
Financial asset prices	8.376*** (5.082)	-0.006* (-1.771)	16	0.183	3.138
Size of financial markets	6.664*** (4.386)	-1.016 (-0.768)	16	0.040	0.590
Efficiency of financial intermediaries	2.580 (0.517)	-3.526 (-0.148)	14	0.002	0.022
Globalization	-0.751 (-0.150)	4.366 (1.260)	16	0.102	1.587

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table E.4: Simple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the mean to median ratio.

Factor	β_0	β_1	**N**	$\mathbf{R^2}$	**F-statistic**
(Mortgage) debts	-12.413** (-2.511)	19.182*** (3.641)	16	0.486	13.258
Home ownership rate	-16.685 (-0.709)	40.042 (0.945)	16	0.060	0.893
Financial assets ownership rate inequality	-14.518*** (-3.120)	15.025*** (4.321)	16	0.572	18.673
Income inequality	3.212 (0.158)	8.041 (0.115)	16	0.001	0.013
Inheritance inequality	9.156 (1.506)	-1.430 (-0.558)	14	0.025	0.311
Average household age	5.708 (0.299)	-0.004 (-0.008)	16	5.06E-06	7.09E-05
Education level	7.589* (1.882)	-5.224 (-0.509)	16	0.018	0.260

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

E.2 Multiple Regression Analysis

Table E.5: Multiple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the top 10% to bottom 90%.

	Regression 1	**Regression 2**	**Regression 3**
Constant term	3.313***	-0.812	-0.955
	(5.799)	(-0.705)	(-1.426)
Housing prices	-0.013**	-0.013***	-0.014***
	(-2.708)	(-3.687)	(-7.072)
Generous welfare state		14.852***	7.054**
		(3.829)	(2.599)
Globalization			1.715***
			(5.151)
N	16	16	16
R^2	0.344	0.692	0.904
Adjusted R^2	0.297	0.644	0.880
F-statistic	7.334	14.575	37.645

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table E.6: Multiple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the top 10% to bottom 90%.

	Regression 1	**Regression 2**
Constant term	-1.757	-4.704***
	(-1.437)	(-4.322)
(Mortgage) debts	3.780**	3.049***
	(2.901)	(3.386)
Financial assets ownership rate inequality		2.719***
		(4.178)
N	16	16
R^2	0.375	0.733
Adjusted R^2	0.331	0.692
F-statistic	8.414	17.882

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table E.7: Multiple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the mean to median ratio.

	Regression 1	**Regression 2**	**Regression 3**
Constant term	15.218***	2.824	2.502
	(8.691)	(0.783)	(0.832)
Housing prices	-0.083***	-0.082***	-0.086***
	(-5.580)	(-7.559)	(-9.366)
Generous welfare state		44.618***	26.973**
		(3.672)	(2.212)
Globalization			3.880**
			(2.594)
N	16	16	16
R^2	0.690	0.848	0.902
Adjusted R^2	0.668	0.824	0.878
F-statistic	31.142	36.201	37.013

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Table E.8: Multiple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the mean to median ratio.

	Regression 1	**Regression 2**
Constant term	-12.413**	-26.307***
	(-2.511)	(-8.314)
(Mortgage) debts	19.182***	15.739***
	(3.641)	(6.012)
Financial assets ownership rate inequality		12.817***
		(6.775)
N	16	16
R^2	0.486	0.887
Adjusted R^2	0.450	0.869
F-statistic	13.258	50.843

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

F Diagnostic Checks of Linear Regression Analysis

F.1 Macroeconomic Level

Assumption 1: Linearity Appendix D briefly discusses the method(s) by which each assumption can be tested. Assumption 1 can be tested by means of a residual plot, as well as a scatter plot (not discussed). A scatter plot can be used to check whether the data points show a negative or positive linear relationship. Figure F.1, Figure F.2, and Figure F.3 show the scatter plots of the macroeconomic factors. Figure F.1 shows a clear negative linear relationship between independent and dependent variable. In Figure F.2 and Figure F.3, this is more difficult to observe. This is mainly due to the small number of observations. We have previously pointed out that this complicates the interpretation of the diagnostic checks, as is the case now.

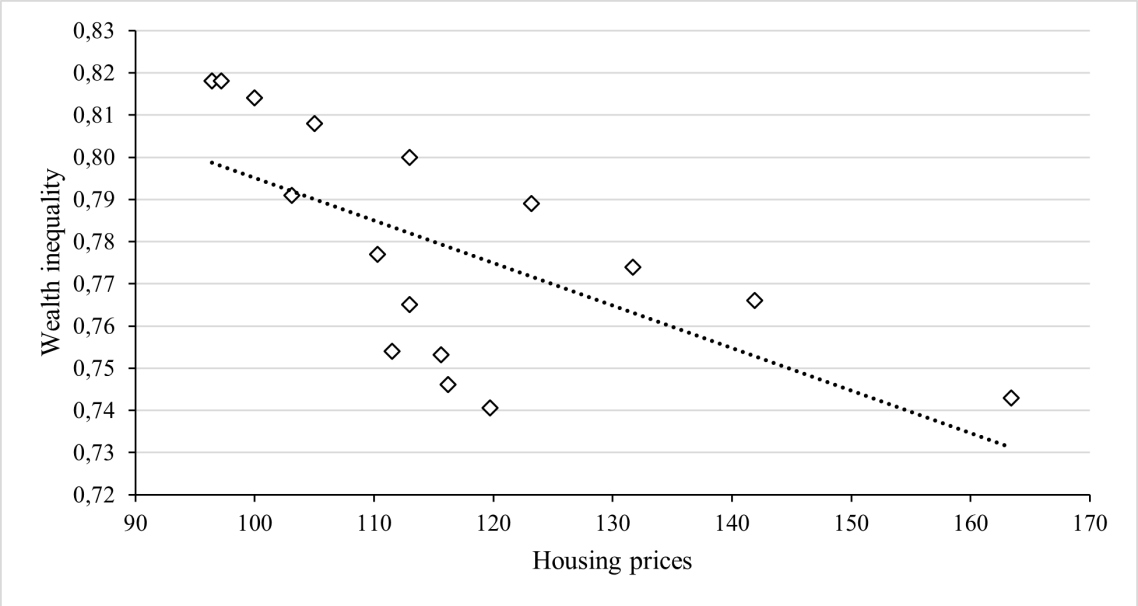

Figure F.1: Scatter plot of wealth inequality measured as the Gini combined as a function of housing prices.

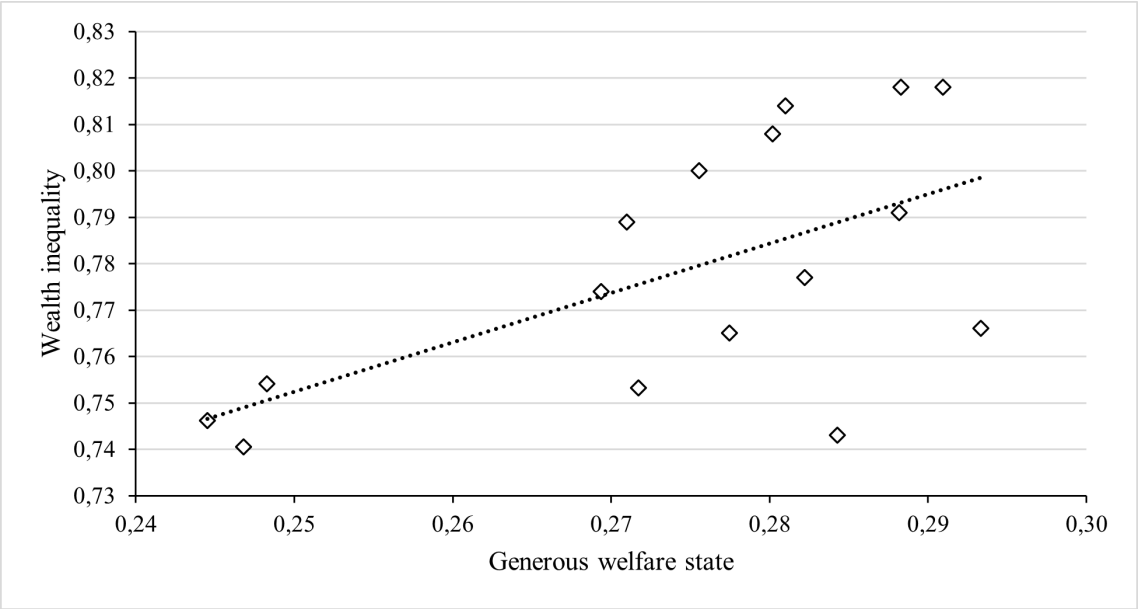

Figure F.2: Scatter plot of wealth inequality measured as the Gini combined as a function of generous welfare state.

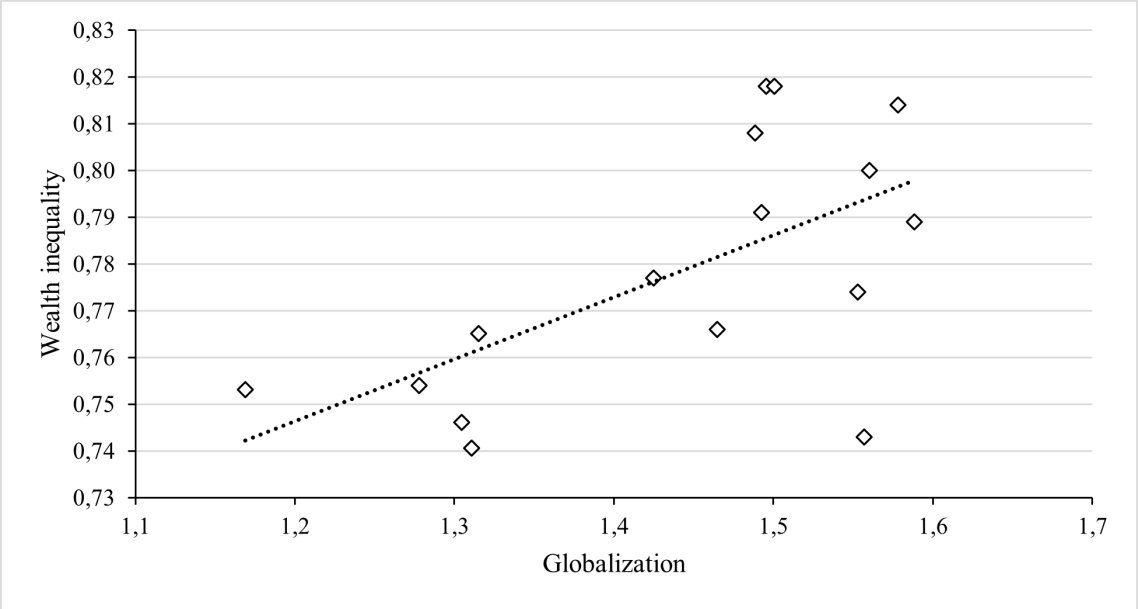

Figure F.3: Scatter plot of wealth inequality measured as the Gini combined as a function of globalization.

Assumption 2: Homoscedasticity With homoscedasticity, the variance of the residuals is constant. We can test this assumption using a graphical method, where the residuals are plotted against the predicted values. According to Meuleman et al. (2015), homoscedasticity exists if (1) the residuals are randomly distributed around the mean, (2) the residuals are within ± 2 standard deviations of the mean, and (3) the residuals do not spread out at higher or lower values of $\hat{y}$. We see in Figure F.4 that there is a residual with a standard deviation less than -2. It also appears that the residuals spread out slightly at higher values of $\hat{y}$, indicating heteroscedasticity.

However, due to the small number of observations, it is difficult to make a clear judgment on this.

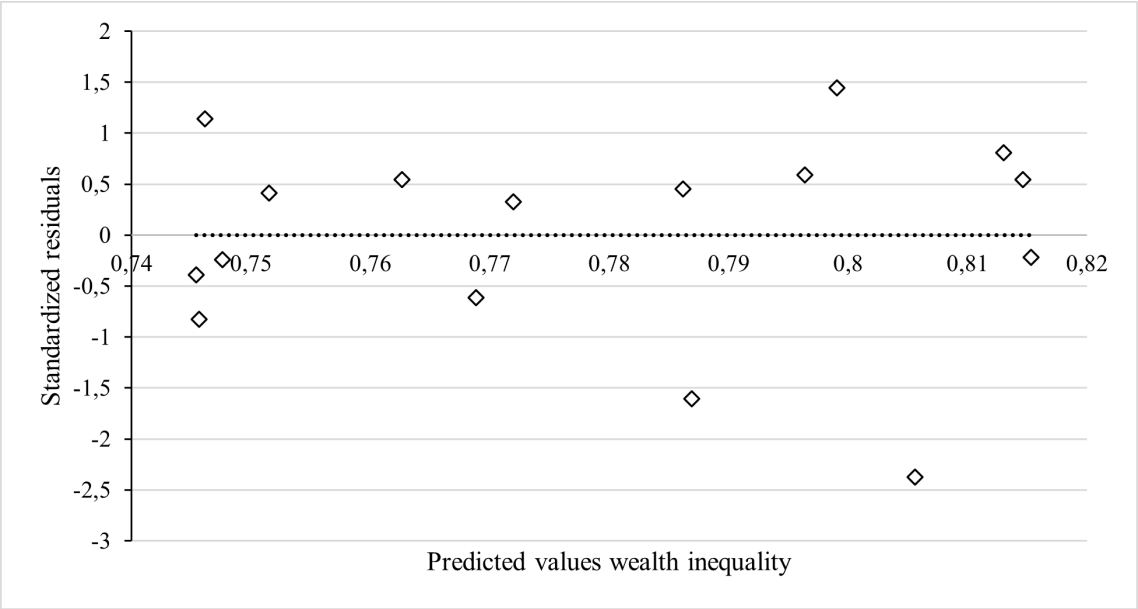

Figure F.4: Standardized residuals vs. predicted values of wealth inequality measured as the Gini combined (macroeconomic level).

Assumption 3: Independence of residuals Independence of residuals means that there is no correlation between the residuals of successive observations. If correlation does exist between residuals of successive observations, this is called autocorrelation. This assumption can be checked using the Durbin Watson (DW) statistic. Savin and White (1977) created two tables, for α is 0.01 and 0.05, to determine whether the DW-statistic is statistically significant. This takes into account the number of observations (N) and the number of independent variables (k). For the respective values of N and k, the table gives a lower critical value (dL) and an upper critical value (dU). For α = 0.05, N = 16, and k = 1, 2 and 3, respectively, the following critical areas apply: $dL_{k=1} = 1.106$ and $dU_{k=1} = 1.371$, $dL_{k=2} = 0.982$ and $dU_{k=2} = 1.539$, $dL_{k=3} = 0.857$ and $dU_{k=3} = 1.728$. We test for positive autocorrelation in the following way:

- If DW $< dL$: statistical evidence that the residuals are positively autocorrelated.
- If DW $> dU$: no statistical evidence that the residuals are positively autocorrelated.
- If $dL \leq$ DW $\leq dU$: the test is inconclusive.

We test for negative autocorrelation in the following way:

- If (4 - DW) $< dL$: statistical evidence that the residuals are negatively autocorrelated.
- If (4 - DW) $> dU$: no statistical evidence that the residuals are negatively autocorrelated.
- If $dL \leq$ (4 - DW) $\leq dU$: the test is inconclusive.

Table F.1 shows the DW-statistics for the multiple regression at the macroeconomic level. In the multiple regression model that includes all three factors, the DW-statistic is equal to 1.560. In other words, the test is inconclusive for positive autocorrelation, and there is no statistical evidence that the residuals are negatively autocorrelated.

Table F.1: Multiple regression results of the macroeconomic level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the Gini combined (including DW-statistic).

	Regression 1	**Regression 2**	**Regression 3**
Constant term	0,896*** (23,625)	0.610*** (8.419)	0.600*** (17.684)
Housing prices	-0.001*** (-3.124)	-0.001*** (-4.500)	-0.001*** (-10.567)
Generous welfare state		1.029*** (4.217)	0.501*** (3.641)
Globalization			0.116*** (6.879)
N	16	16	16
R^2	0.411	0.751	0.950
Adjusted R^2	0.369	0.713	0.937
F-statistic	9.759	19.622	75.457
DW-statistic	0.116	0.473	1.560

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Assumption 4: Normality To check that the residuals follow a normal distribution, a normal probability plot is used. To satisfy this assumption, the data points should follow approximately a straight line. The more linear the data points are, the more confidently it can be argued that the residuals follow a normal distribution. Figure F.5 indicates that the residuals roughly follow a normal distribution.

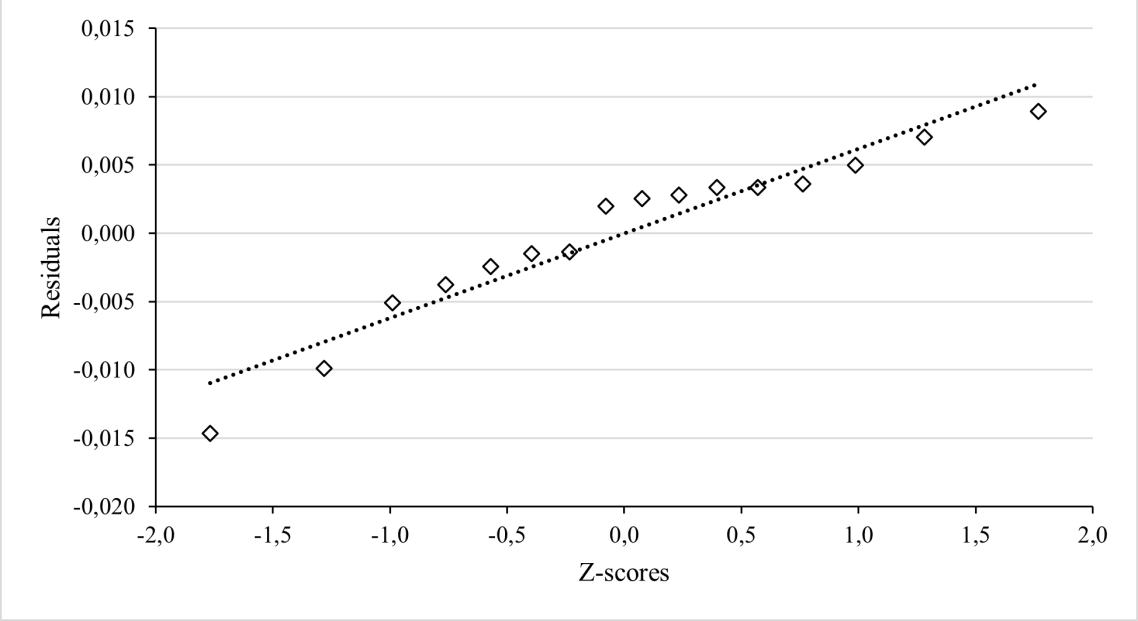

Figure F.5: Normal probability plot (macroeconomic level).

Assumption 5: Absence of multicollinearity To check for strong correlations between the independent variables, the Variance Inflation Factor (VIF) statistic can be used. According to Meuleman et al. (2015), VIF-values must be less than 10, otherwise multicollinearity may be present. Table F.2 shows that there is clearly no multicollinearity.

Table F.2: Multicollinearity measured as the Variance Inflation Factor (VIF) at the macroeconomic level.

Factor	**VIF**
Housing prices	1.026
Generous welfare state	1.453
Globalization	1.470

Assumption 6: Absence of influential observations Influential observations are very different from the rest of the observations and can be divided into outliers and leverage points. We restrict ourselves here to examining outliers. These are observations with an abnormal score on the dependent variable and are characterized by a high residual value (Meuleman et al., 2015). There are several ways to identify outliers, but we will use the standardized residuals. In practice, a standardized residual with an absolute value of 3 is considered an outlier. Table F.3 shows the standardized residuals for the single regressions of housing prices (HPPI), generous welfare state (GWSP), and globalization (GLTO), respectively, as well as for the multiple regression. All standardized residuals fall within the range of -3 and 3, therefore it can be concluded that there are no outliers.

Table F.3: Standardized residuals in which wealth inequality is measured as the Gini combined (macroeconomic level).

Observation	**HPPI**	**GWSP**	**GLTO**	**Multiple**
1	-1.392	0.157	-0.121	0.413
2	-1.544	-0.021	-0.653	-0.240
3	-1.640	-0.387	-0.948	-0.825
4	-1.238	-1.019	0.509	1.143
5	-0.798	-0.755	0.160	-0.611
6	-0.362	-0.443	0.037	-1.607
7	-0.042	-0.093	0.267	-2.374
8	0.918	1.006	1.500	0.546
9	0.956	1.134	1.469	0.807
10	0.900	1.304	0.806	-0.218
11	0.855	1.069	1.079	1.446
12	0.857	0.929	0.268	0.589
13	0.823	0.650	-0.414	0.455
14	0.518	0.044	-0.890	0.325
15	0.626	-1.483	-0.718	0.542
16	0.563	-2.093	-2.352	-0.391

F.2 Household Level

Assumption 1: Linearity Figure F.6 and Figure F.7 show the scatter plots of the household factors. Both show a linear relationship between the independent and dependent variable. Again, because of the small number of observations, it is difficult to draw a strong conclusion. However, this is true for all assumptions.

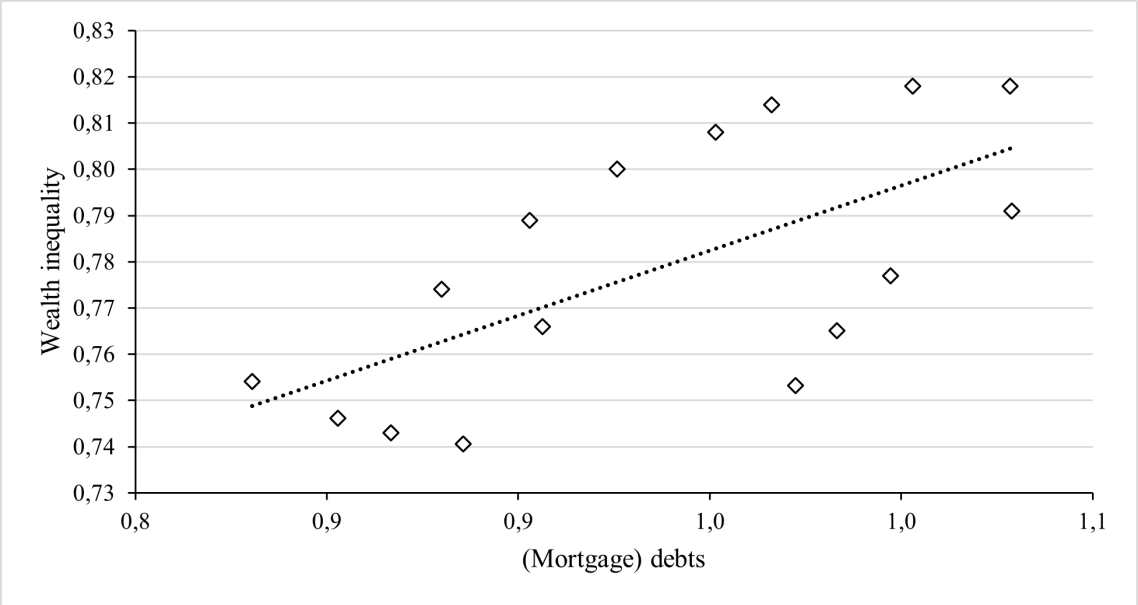

Figure F.6: Scatter plot of wealth inequality measured as the Gini combined as a function of mortgage debts.

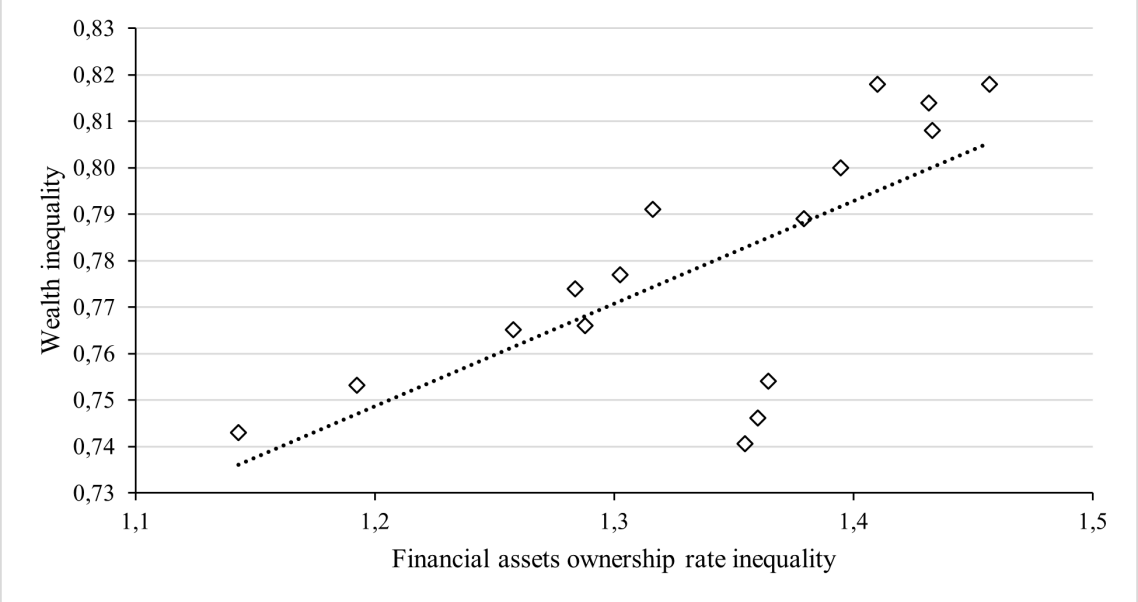

Figure F.7: Scatter plot of wealth inequality measured as the Gini combined as a function of financial assets ownership rate inequality.

Assumption 2: Homoscedasticity Figure F.8 shows that there is a residual with a standard deviation of less than -2. However, it does appear that the residuals are randomly distributed around the mean, and that they do not spread out at higher or lower values of $\hat{y}$. Therefore, we can cautiously state that the variance of the residuals is constant.

Figure F.8: Standardized residuals vs. predicted values of wealth inequality measured as the Gini combined (household level).

Assumption 3: Independence of residuals Table F.4 shows the DW-statistics for the multiple regression at the household level. In the multiple regression model that includes both factors, the DW-statistic is equal to 0.608. In other words, there is statistical evidence that the residuals are positively autocorrelated, and there is no statistical evidence that the residuals are negatively autocorrelated. To correct for autocorrelation, we could use a lagged dependent variable in the regression model. That is, we need to add wealth inequality measured as the Gini of a lagged period ($WIGC_{t-1}$) to the regression model. This would also imply going from 16 observations to 15 observations with a third independent variable, which would no longer satisfy the rule of thumb of at least 12 degrees of freedom. Therefore, we will not use this corrected model in this thesis. However, if we were to correct for autocorrelation anyway, the determinants would all be significant at 5% and the DW-statistic would be 2.810. In other words, there would be no statistical evidence that the residuals are positively correlated, and the test would be inconclusive for negative autocorrelation.

Table F.4: Multiple regression results of the household level, with the dependent variable being wealth inequality over the period 2006-2021, measured as the Gini combined (including DW-statistic).

	Regression 1	**Regression 2**
Constant term	0.516*** (6.262)	0.311*** (4.428)
(Mortgage) debts	0,281*** (3.200)	0.230*** (3.958)
Financial assets ownership rate inequality		0.189*** (4.485)
N	16	16
R^2	0.422	0.773
Adjusted R^2	0.381	0.738
F-statistic	10.242	22.171
DW-statistic	0.310	0.608

Note: *** = statistically significant at 1%; ** = statistically significant at 5%; * = statistically significant at 10%.

Assumption 4: Normality Figure F.9 indicates that the residuals roughly follow a normal distribution.

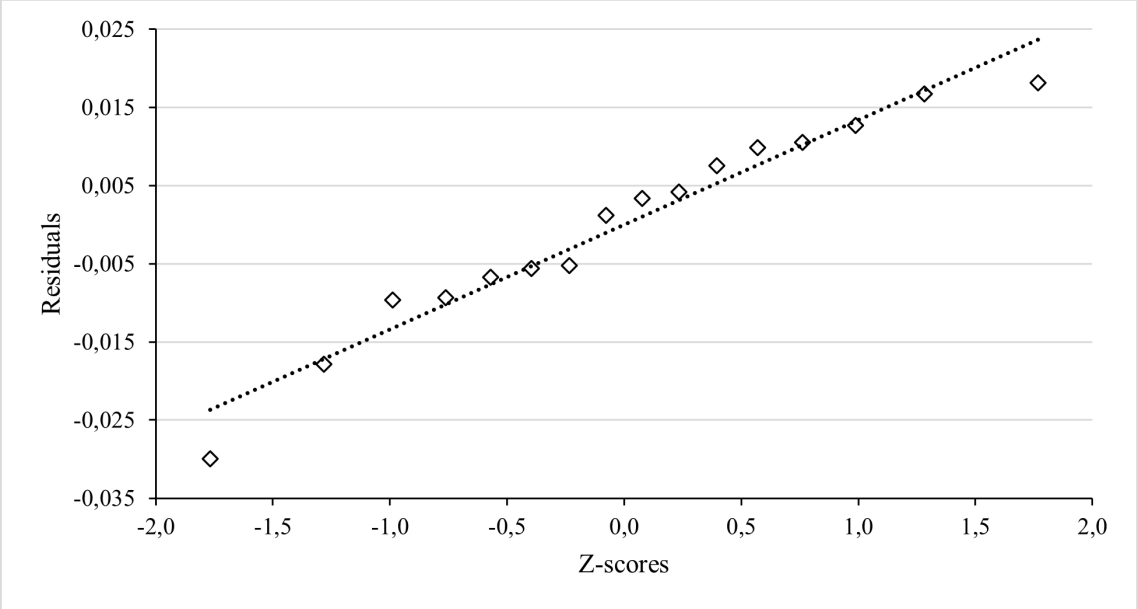

Figure F.9: Normal probability plot (household level).

Assumption 5: Absence of multicollinearity Table F.5 shows that there is clearly no multicollinearity.

Table F.5: Multicollinearity measured as the Variance Inflation Factor (VIF) at the household level.

Factor	VIF
(Mortgage) debts	1.039
Financial assets ownership rate inequality	1.039

Assumption 6: Absence of influential observations Table F.6 shows the standardized residuals for the single regressions of (mortgage) debts (MDTM) and financial assets ownership rate inequality (FOTB), respectively, as well as for the multiple regression. All standardized residuals fall within the range of -3 and 3, therefore it can be concluded that there are no outliers.

Table F.6: Standardized residuals in which wealth inequality is measured as the Gini combined (household level).

Observation	MDTM	FOTB	Multiple
1	0.249	-1.590	-0.429
2	-0.431	-1.949	-1.365
3	-1.138	-2.175	-2.290
4	-1.700	0.320	-0.512
5	-1.274	0.188	-0.736
6	-0.893	0.295	-0.713
7	-0.649	0.860	-0.398
8	0.651	1.183	0.321
9	0.992	0.650	0.091
10	1.297	0.733	0.803
11	1.206	0.408	0.579
12	1.168	0.432	0.972
13	0.948	0.039	0.753
14	0.539	0.354	1.389
15	-0.198	-0.105	0.255
16	-0.766	0.356	1.280