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Financial family assistance for housing and housing consumption: Insights from the 2021 Netherlands' Housing Survey

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ABSTRACT

As the family home is often a household's most expensive acquisition, understanding factors impacting the housing consumption patterns is crucial. Therefore, this study examines the association between financial family assistance for housing and housing consumption in the Netherlands, building on the economic principle that an increase in budget leads to higher (housing) consumption.

While previous research has examined the effects of more general forms of financial assistance on housing consumption, the specific influence of e.g. family-assisted mortgages remained underexplored. This study addresses this gap using empirical analyses, revealing a significant and positive association: family-assisted mortgages and tax-free gifts are associated with a 2.12% and 4.70% increase in housing consumption, respectively. For younger households, the benefits from family assistance on housing consumption are larger (4.39%) compared to older households (1.82%).

These findings underscore the importance of financial family assistance in shaping housing consumption patterns and offer a valuable reflection and addition to the life-cycle model, based on age-related dynamics. Policymakers should consider these insights when designing measures to 'provide equal housing opportunities', particularly for younger and first-time buyers. Future research could further explore these relationships, e.g. embedded in different national contexts or with more detailed data on the assistance volume.

Keywords: Housing, housing consumption, household budget, housing budget, financial family assistance for housing, family-assisted mortgages, tax-free gifting for housing

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"Master theses are preliminary materials to stimulate discussion and critical comment. The analysis and conclusions set forth are those of the author and do not indicate concurrence by the supervisor or research staff."

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Motivation

With a total value of 70 billion euros in 2020, family-assisted mortgages in the Netherlands make up almost 10% of the total debt burden of mortgages in the Netherlands (Eijsink & Mastrogiacomo, 2023). This mortgage type could contribute to the ability-to-pay of households and fluctuations in the housing market (van Rein, 2023). A recent study by De Nederlandsche Bank (DNB) – the central bank of the Netherlands – shows that 18% of Dutch households (645,000 in total) use a family-assisted mortgage and that the average house value of this group is around €50,000 higher compared to households with another type of mortgage (Eijsink & Mastrogiacomo, 2023). This is in line with earlier research by De Nederlandsche Bank which analyses the relationship between borrowing capacity and housing prices (Eijsink & van Dijk, 2023).

In recent years, it has become a policy aim in the Netherlands to 'provide more equal opportunities on the housing market' and to slow down the growth of housing prices. An outcome of this policy aim is the decommissioning of the 'Jubelton' since 2023 (Ministry of Finance, 2022). The 'Jubelton' (the joyful ton), introduced in 2013, was a tax-free wealth transfer policy especially focused on housing. The original aim of the 'Jubelton' was to contribute to the reduction of homeowners' – or insiders' – debt burden, following from the popular interest-only mortgages (Ministry of Finance, 2016). This policy was an example of a measure contributing to the expansion of the budget for housing. In contrast, housing prices in the Netherlands have been increasing rapidly over the last ten years (CBS, 2024b). Multiple factors are seen as causes for the increasing housing prices, such as low interest rates, rising incomes and the growing housing shortage in the Netherlands (NOS, 2024). The low interest rates and rising incomes are factors impacting the demand side of the housing market. They are two of the main determinants for the borrowing capacity and budget for housing. The increasing housing prices lead to less affordable housing and a growing gap between high- and low- and middle-income groups or 'insiders' and 'outsiders' on the housing market (NOS, 2021).

While the earlier mentioned 'Jubelton' was based on tax-free (familiarly) gifting for housing, the opportunity to financially support relatives for housing is still possible in the Netherlands by using a family-assisted mortgage. The findings by the DNB suggest that households utilising such mortgages tend to spend more on housing, indicating that this type of mortgage may contribute to an expansion of the overall housing budget, in comparison to other types of mortgages. On the contrary, the higher spending on housing could also result from a pre-existing stronger financial position, for example following from a higher overall family wealth or better financial literacy, enabling the household to afford a more expensive property independently of the mortgage type.

For now, it remains unclear whether the discussed forms of financial family assistance for housing[1] lead to higher housing consumption, in terms of house values.

[1] For this study, the term 'financial family assistance for housing' or 'family assistance' covers both using a family mortgage and receiving a tax-free gift for housing.

1.2. Academic relevance

This study addresses this unclearness by focusing on the relationship between financial family assistance for housing and housing consumption. Based on the economic theory that a higher budget in general leads to higher expenditures, as Case et al. (2020) explain, a higher household- and housing budget is expected to lead to more housing consumption. Empirical findings support this expectation: Bostic et al. (2009) and Berger et al. (2018) find, based on microdata, a significant positive relationship between budget and housing consumption measured in housing value. Similarly, Bunn and Rostom (2015), based on data from the Bank of England, demonstrate that households with a higher overall budget have a higher housing consumption in terms of house prices.

In addition, Wang and Squires (2023) conducted a comprehensive literature review on intergenerational housing support, or financial family assistance for housing. Next to indicating that parental support plays a crucial role in a household's housing consumption patterns, they indicate that the impact of specific forms of family assistance is still underexplored. Generally, existing literature on family-assisted mortgages is quite scarce, which could indicate that it is a more specific Dutch field of interest, based on the DNB analyses. This gap emphasizes the need for targeted research on the relationship between specific forms of financial family assistance for housing and housing consumption.

1.3. Research problem statement

To bridge the identified research gap, this study investigates the relationship between financial family assistance for housing and housing consumption, with the 2021 WOZ value as a measure of housing consumption and family-assisted mortgages and tax-free gifts for housing as the specific forms of financial family assistance for housing. The central question guiding this study is:

"How does financial family assistance for housing associate with housing consumption?"

The sub-questions which are formulated to answer the central research question are:

1. *What is the relationship, based on theory, between receiving financial family assistance for housing and housing consumption?*
2. *What is the strength of the relationship between receiving financial family assistance for housing and house prices, and does this relationship differ based on age?*
3. *What is the strength of the relationship between different forms of financial family assistance for housing and house prices?*

To explore the strength of the relationship, and the effect of age, following the literature review, the dataset of WoON21 will be examined and regression analysis will be conducted, considering the dependent and independent variables and interactions, as well as relevant control variables. The same applies to the relationship between the different forms of financial family assistance for housing and house prices.

2. THEORY, LITERATURE REVIEW & HYPOTHESES

2.1. Budget and housing consumption

The relationship between a household's budget and housing consumption is a fundamental concept in housing economies. General economic theories suggest that an increase in budget leads to higher consumption, including housing consumption. It is essential to examine the existing literature on this economic theory since financial family assistance for housing may contribute to a household's budget. Foundational studies (Case et al., 2005, 2020; Goodman & Kawai, 1982) support the theory by indicating a positive relationship between budget and consumption, with the latter study specifically addressing housing consumption.

Berger et al. (2018) expand on this by highlighting how credit supply, which makes up an important part of the housing budget of households, intensifies housing consumption in regions with lower downpayment requirements. Additionally, this indicates that a reduction in downpayment requirements stimulates higher housing consumption. This phenomenon is not only relevant in the U.S., where the study was conducted, but also in the Dutch housing market, with similarly low downpayment requirements.

Bunn and Rostom (2015) support the generalizability of this relationship by indicating that also in the UK housing consumption responds significantly to changes in the household budget, despite the higher downpayment requirements (Lang et al., 2020). This consistency across markets and specifications underscores the robustness of the mechanism between household budget and housing consumption. Bostic et al. (2009) provide additional insights by indicating that no deviation in the elasticity of housing consumption is found based on a household's current house value and the current home equity (house value minus mortgages and loans). These findings support the consistency of the relationship, aligning with the general economic theory.

2.2. Financial family assistance for housing

As indicated, in this study, financial family assistance or family assistance for housing covers both using a family-assisted mortgage and receiving a tax-free gift for housing.

Wang and Squires (2023) highlight that general financial family assistance for housing significantly impacts achieving homeownership for younger generations and housing consumption patterns.

More specifically, for gifting and tax-free gifts for housing, a wide international body of literature establishes the theorized impact on housing consumption (Engelhardt & Mayer, 1994; Guiso & Jappelli, 2002; Helderman & Mulder, 2007; Luea, 2008; Mayer & Engelhardt, 1996). Engelhardt and Mayer (1994) and Mayer and Engelhardt (1996) indicate that tax-free gifting for housing is widely used for 'outsiders' to become 'insiders', or first-time buyers. Around 20% of first-time buyers receive financial help for housing, mostly used for making a downpayment. Additionally, receiving a family gift is found to be associated with purchasing a home at a younger age, compared to non-receiving households. Similar trends have been observed in the Netherlands with Helderman and Mulder (2007) and Mulder

and Smits (1999) emphasizing that, based on the Dutch case of 'gift-giving' or inter-generational transmission for housing, family gifts also play a strong role in the opportunities of first-time buyers, with receivers of support having a higher chance of becoming insiders in the housing market.

Moreover, Guiso and Jappelli (2002) support the findings related to the association between gifts for housing and housing consumption by indicating that receiving a family gift for housing leads to buying a larger and more expensive house, which both exemplify higher housing consumption.

Expanding the examination of forms of gifts for housing, Luea (2008) examines the effects of either financial help, which is explained as more frequent and smaller amounts, or gifts from friends and/or relatives on housing demand. This study shows that when a household receives a gift, the demand for housing for this specific household rises between 9% and 11%.

Although the literature on other forms of financial family assistance for housing, e.g. family assisted mortgages, is less extensive, Poirine (1997) and Guiso and Jappelli (2002) theorize that the specifications of a loan between family members compared to regular or other loan terms would be, on average, more favourable for the borrower because of the family association.

In general, family-assisted mortgages are quite similar to 'normal' or other mortgage types, regarding the form and general specifications. Therefore, it is additionally insightful to consider the effects of mortgages and mortgage interest rates on housing consumption.

Relating the theory on family loan specifications to mortgage interest rates, Damen et al. (2016) indicate that lower mortgage interest rates lead to higher housing budgets, or 'ability to pay', and higher house prices, based on modelling in over 7 countries. These findings are supported by additional studies (Boelhouwer, 2001; Boelhouwer et al., 2004; Hort, 1998; Levin & Wright, 1997; van der Drift et al., 2023) and are indicated to be a result of the lower monthly mortgage payments, following the lower interest rates. Because of little specific literature on family-assisted mortgages, this broader origin related to mortgages generally is important to consider when examining family-assisted mortgages.

For the literature focusing on the Dutch case of family-assisted mortgages, Eijsink and Mastrogiacomo (2023) indicate some key trends. Regarding the loan specifications, a family-assisted mortgage needs to be in line with market conditions before it is acknowledged as an official mortgage. However, Eijsink and Mastrogiacomo (2023) show that the average interest rate for existing family-assisted mortgages is 10% lower compared to other types of mortgages (3% and 3.3%).

In addition, they find that the average LTV and mortgage principal are higher for family-mortgage-using households (71.4%, €274,877) compared to households with 'other' types of mortgages (54.6%, €178,709), indicating differences in the household's housing budget and housing consumption levels.

Overall, the existing literature leads to a clear understanding of the effect of tax-free gifting. Considering the limited literature on other forms of financial family assistance for housing and family-assisted mortgages, the theories on family loans, findings on mortgage specifications and key trends of family-assisted mortgages are jointly related.

2.3. Combination of family-assisted mortgages and tax-free gifting

As described above, the lower average interest rate on family-assisted mortgages can lead to higher housing budgets (Boelhouwer, 2001; Eijsink & Mastrogiacomo, 2023). Additionally, housing budget is positively correlated with housing consumption (Berger et al., 2018; Bostic et al., 2009; Bunn & Rostom, 2015; Goodman & Kawai, 1982; Lehnert, 2004). With the addition of information on tax-free gifting for housing, which shows to be positively associated with housing budget and housing consumption as well (Engelhardt & Mayer, 1994; Guiso & Jappelli, 2002; Helderman & Mulder, 2007; Luea, 2008; Mayer & Engelhardt, 1996), the theoretical view on the impact of these two financial support possibilities, separately, is quite clear. However, the reciprocity between the two remains an under-explored area. The theories and existing data suggest that an interaction between these variables could lead to interesting insights into the quantitative magnitude of the effect of being able to use both a family-assisted mortgage and receiving a tax-free gift on housing consumption.

Although it is possible in the Netherlands to have a loan-to-value on a mortgage of 100% (Ministry of General Affairs, 2024), downpayments are required in other countries and in general are favourable because of risk mitigation. When a tax-free gift is used for the downpayment on the mortgage, which often already is the case (Engelhardt & Mayer, 1994), and the lower interest rate of the family-assisted mortgage leads to a higher mortgage, a potential outcome of this interaction could be that receiving a tax-free gift and having a family-assisted mortgage amplifies the housing consumption for a household.

2.4. Role of age

A factor discussed in several of the research mentioned above is age. A key theory to consider when examining the effect of age is the life-cycle model or Buffer-Stock saving (Carroll, 1997; Carroll & Summers, 1989). These indicate the general influence of different life stages, connected to age, and income on wealth and e.g. consumption. The theorized 'consumption/income parallel' examines, among others, the elasticity between the two components and the effect of the elasticity.

More focused on housing, Lehnert (2004) finds deviating elasticities of housing consumption also based on age. With a higher consumption elasticity of the first age quantile (25-34 years) compared to the consumption elasticity of the following age cohorts, the findings are consistent with 'standard' economic theories on younger households being more likely to be liquidity-constrained. Therefore, it is theorized that younger households also are more likely to spend bigger parts of their income on assets such as housing, following the life-cycle model. The higher consumption elasticity for housing of younger age cohorts indicates that an increase in the income or wealth of a household leads to higher expenditure on housing, compared to older households.

The findings by Skinner (1996) support this by emphasizing the connection of these findings to the life-cycle model. A higher elasticity between consumption and housing wealth or budget is therefore explainable for younger households when taking the overall financial situation of the age cohort into account, compared to the elderly. Older households, specified 40 years and above, are more likely to

start saving more of their wealth for e.g. their pension, according to a further expansion of the life-cycle model (Gourinchas & Parker, 2000).

Further examination of the mechanism related to age shows supporting outcomes, with a significant, positive relationship between family gifts for housing and a (lower) age of becoming an 'insider' on the housing market (Engelhardt & Mayer, 1994; Mayer & Engelhardt, 1996). Haurin et al (1996) find that younger households are more sensitive to changes in income and wealth when deciding on housing investments, highlighting the impact of liquidity constraints. This aligns with the life-cycle hypothesis, as younger individuals often prioritize homeownership to capitalize on property appreciation over time.

Additionally, Linneman and Wachter (1989) emphasize that first-time homebuyers, typically younger, face more significant financial constraints. Linking this back to the role of financial family assistance for housing, financial support plays a more crucial role in facilitating a household's entry into the housing market.

2.5. Hypotheses

Based on the examined literature discussed above, the following hypotheses, per research sub-question, are formulated to test the theories related to the aim and main research question of this study.

The first hypothesis, that will be used to test the relationship between receiving financial family assistance for housing and housing consumption, is:

Hypothesis 1: *"Receiving financial family assistance for housing is positively associated with higher housing consumption compared to not receiving assistance."*

Additionally, the second hypothesis will test whether the relationship between receiving financial family assistance for housing and housing consumption varies across different age groups. Based on the literature, it is expected that the association will be higher for younger age cohorts. Therefore, the second hypothesis is:

Hypothesis 2: *"The relationship between receiving financial family assistance for housing and housing consumption is stronger for younger age cohorts compared to older age cohorts."*

The third and final hypothesis will expand on the first hypothesis and examine whether the relationship differs between different types of family assistance and the combination of types. Following the literature on the different forms of assistance, the hypothesis is as follows:

Hypothesis 3: *"The combined use of the forms of financial family support for housing is positively associated with higher housing consumption compared to either financial support form used individually."*

3. CONTEXT

The discussed forms of financial family assistance for housing can play an important role in the housing budget and housing consumption of households. In the context of rapidly increasing housing prices over the last decade, a clear understanding of factors affecting the housing budget and consumption is crucial.

Although the forms of financial family assistance are similar across countries, specifications and legislation deviate. Therefore, it is important to consider differences between countries and economies.

For the Dutch context, the possibilities for tax-free gifting for housing have been limited since the decommissioning of the Jubelton in 2022 (Ministry of Finance, 2022). The remaining (indirect) assistance possibilities largely consist of family-assisted mortgages, of which the volume has been growing since the decommissioning of the Jubelton (Eijsink & Mastrogiacomo, 2023). Although the mortgage specifications of family-assisted mortgages need to be in line with market conditions or 'other' mortgages, Eijsink and Mastrogiacomo (2023) show that the average interest rate for family-assisted mortgages is 10% lower compared to other types of mortgages (3% and 3.3%). Furthermore, the average mortgage principal (€178,709) and LTV (54.6%) for households with a different mortgage type is lower compared to households with a family-assisted mortgage (€274,877 and 71.4%).

In the UK, where financial family assistance for housing is commonly known as 'the bank of mum and dad', the possibilities for gifts for housing are subject to the inheritance tax rules. This limits the volume of tax-free gifts. For mortgages, family members are mostly limited to co-signing mortgages or acting as guarantors. By using a Shared Ownership Scheme, family members could act as landlords and indirectly support relatives. However, users are still bound to leasehold and strict tax regulations (GOV UK, 2022).

Regarding the US, family members can provide substantial gifts, not only for housing but in general, under both the annual gift tax exclusion and the lifetime estate. In addition, co-signing mortgages, family loans and direct housing support are common and tied to relatively loose tax regulations (Adams, 2024).

Comparing the context and policies regarding financial family assistance for housing in the Netherlands, the UK and the US, the possibilities for tax-free gifting are the broadest in the US. Even though the measures are not directly meant for housing, the looser tax regulations in general provide these possibilities. With the stricter regulations and even the recent decommissioning of tax-free gifting measures for housing, there are fewer possibilities regarding gifting in the UK and the Netherlands. In general, the same applies to financial assistance through mortgages or other (direct) forms. For the UK, the support measures are less formalized compared to the Netherlands but are similar in terms of volume and legislation. Comparing these to the US, the possibilities for assistance are broader, either through direct or indirect support.

Regarding the volume, Eijsink and Mastrogiacomo (2023) provide some key insights for the Netherlands.

4. DATA & METHODS

4.1. Methodology

While previous research has examined aspects of the relationship between financial family assistance for housing and housing consumption and the role of age, this study more thoroughly examines these dynamics by specifying underexplored forms of financial family assistance for housing and deeply investigating the role of age. This study aims to do so by using a multivariable regression model, drawing on the principles of the Hedonic Pricing Model.

In a Hedonic Pricing Model, the implicit worth of the underlying, 'objectively measured' characteristics of a property (demographical, structural and locational) is inferred by using housing transactions. Theoretically, this is based on the association provided by Rosen (1974) who demonstrates that the value of marginal changes in one attribute or characteristic within a 'composite commodity' like housing can be estimated by observing price differentials in the market under the assumption of equilibrium. In this state of equilibrium, households maximize their utility and housing prices reflect the collective valuation of these characteristics.

When examining the impact of financial family assistance for housing, such as tax-free gifts or family-assisted mortgages, it is crucial to consider how these financial supports change the overall budget and purchasing power of households, eventually influencing housing consumption.

Most of the attributes for housing can be considered, at least short-term, fixed. This is because of the relative lags that need to be considered in e.g. construction to get back in line with market demand. Therefore, the demand side, representing customers' subjective evaluations and including financial family assistance for housing, primarily determines the equilibrium market price of housing. An important assumption is that market participants are highly informed and rational when considering the qualities or characteristics of properties. According to Freeman et al. (2014), the housing costs or consumption is therefore a function of the structural, locational and household-specific characteristics.

By incorporating financial family assistance for housing into the model, we can better understand its direct impact on housing consumption. The following form describes the model used:

$$P_i = f_i(S_i, L_i, H_i, F_i) \quad (1)$$

In this base model (1), P_i is property i's price, which can be explained by the attributes or characteristics of the property such as the surface, the type of property and the energy label (structural variables, S_i), the region and type of living environment (locational variables, L_i), the household income and -debt (household variables, H_i) and the whether the household received e.g. a tax-free gift (financial assistance, F_i).

By applying these theoretical principles, this study aims to quantify the impact of financial family assistance for housing on housing consumption, additionally considering the differentiated effects across age cohorts. This approach helps to understand how financial support mechanisms contribute to housing market dynamics and informs policy decisions aimed at promoting equitable housing opportunities.

Specifying the empirical model for this study, the left-hand side variable is the natural logarithm of the 2021 WOZ Value, which indicates the property price or the housing consumption. This value is a function of a constant, the main independent variable of whether someone receives family assistance or not, and several control variables. All the control variables are based on the literature discussed earlier.

The empirical model is as follows:

$$lnP_i = \rho + \beta FamilyAssistance_i + \theta_i\gamma_i + \epsilon_i \quad (2)$$

In this model (2), $\ln P_i$ is the natural logarithm of the property's 2021 WOZ Value. ρ represents the constant, β is the coefficient related to a binary variable, and the key independent variable for this formula, of whether the household received family assistance, γ_i is a vector of control variables which includes structural characteristics, neighborhood or locational characteristics (including regional dummies) and household characteristics. ϵ is the error term of the regression model. All the terms are for property $_i$. Next to the examination of the combined variable family assistance, separate models for both family-assisted mortgage and tax-free gift will be examined.

In addition to the specified model, model (3) includes an interaction between receiving family assistance and the age of the household head (binary variable, ≤ 34 or ≥ 35 years) as recorded at the time of the questionnaire, represented by δ.

$$lnP_i = \rho + \beta FamilyAssistance_i + \delta(FamilyAssistance_i \times I(Age \leq 34)_i) + \theta_i\gamma_i + \epsilon_i \quad (3)$$

For the third hypothesis, regarding the combination of using both a family-assisted mortgage and receiving a tax-free gift for housing, the empirical model is formulated as follows:

$$lnP_i = \rho + \beta_1 FamilyMortgage_i + \beta_2 TaxFreeGift_i + \varphi(FamilyMortgage_i \times TaxFreeGift_i) + \theta_i\gamma_i + \epsilon_i \quad (4)$$

In this model (4), in deviation from the base model, β_1 represents the binary variable of whether someone uses a family-assisted mortgage and β_2 represents the binary variable of whether someone received a tax-free gift for housing. In addition, an interaction between the two binary variables of interest is included and symbolized by φ. This is incorporated based on the possible added value of using a combination of the form of financial family assistance for housing, as further discussed in 2.3. Furthermore, the control variables are similar to the base model and ϵ is the error term of the regression model. All the terms are for property $_i$.

The VIF & Correlation matrix of the variables used are presented in Appendix C. As indicated, the control variables considered in the regressions are based on similar models as used in the reviewed literature and availability in the dataset. Some control variables show somewhat high correlation values, such as the number of rooms and the property surface. Based on the value presented in the VIF matrix and the effect of the variables on the adjusted R^2 and the dependent variable, the variables are still incorporated in the model.

4.2. Heterogeneity check

To test for the robustness of the analysis, a Chow F-test (Chow, 1960) will be conducted. Through a Chow test, structural breaks within the dataset can be identified by comparing regression results conducted 'pooled' and 'unpooled'. For this study, the pools – or groups – will be based on different age cohorts. The examination of the Chow test will indicate whether coefficients and therefore a relationship or association remain consistent or differ across age cohorts.

4.3. Data

To examine the relationship between financial family assistance for housing and housing consumption, this study relies on data obtained from the 2021 Dutch Housing Survey or "WoonOnderzoek Nederland (WoON21)". The Dutch Housing Survey or WoON is a triennial national survey conducted by Statistics Netherlands, in cooperation with the Ministry of the Interior and Kingdom Relations (BZK). For this study, the most recent version of 2021 is used. The WoON21 dataset provides nationally representative high-quality data on housing situations, housing financing, housing preferences and more (qualitative and quantitative) measurements regarding housing. All the information is collected by carrying out randomly sampled questionnaires. The total number of observations for the 2021 version is 46,658. The targeted population consists of persons aged 18 years or older, living in private households (CBS, 2024a). Besides the primary collected data, register data on e.g. the WOZ-value are linked to the observations. In total, the WoON21 dataset contains 872 variables.

After an application, the data are provided by Data Archiving and Networked Services (DANS), which is part of The Royal Netherlands Academy of Arts and Sciences (KNAW). The obtained data are strictly used for this study and will be deleted after the grading process. During the study, the data are treated with confidentiality and are stored password-protected. For the analysis, the statistical software STATA is used.

Regarding the ethical considerations, the researchers of the Dutch housing survey obtained permission from respondents for the results to be used in an academic setting before publishing. Additionally, WoON21 does not contain any form of identifying information. As mentioned, an application had to be made to gain access to the data. Therefore, the risk of ethical issues is seen as low.

For the data selection process, only households who have indicated whether they do or do not use a family-assisted mortgage are selected. Based on the routing of the WoON21 survey, missing values for the variable "Tax-free gift" are handled as "no" or 0. Additionally, missing values for some (key) control variables (e.g. energy label) are dropped, as well as outliers based on multiple other (key) control variables. The total remaining number of observations after the cleaning process is 10,802. The full Stata DoFile of this study is included in Appendix F, including the bookkeeping of the data.

Aligning with the aim of this study, the dependent variable needs to represent housing consumption, in terms of house value.

In the examined studies discussed in Chapter 2, several measurements are used to determine the housing consumption of households. For example, Bostic et al. (2009) and Berger et al. (2018) use a proxy for house value and control for property characteristics, such as floor space. In addition, Guiso and Jappelli (2002) use the price of housing per square meter as a measurement for housing consumption.

Given the data available in the WoON21 dataset and considering the used proxies in the literature, the WOZ value is found to be the most appropriate measurement for this study.

The WOZ value of a property is a yearly, municipality-appraised value for taxing (Kuijper & Kathmann, 2015; Ministry of General Affairs, 2013) and is used before by Engelhardt and Mayer (1994) as a measurement of housing consumption in the Netherlands.

This study uses the 2021 WOZ value, which represents the appraised value on the first of January 2020, irrespective of recent transactions. The WOZ value is known to be, in general, slightly below and less volatile than the 'actual' market value (Giltay, n.d.).

The sale price of a property, as used by van der Drift et al. (2023), is also considered to be used in this study. However, a strong limitation of this variable in the WoON21 data is that the sale price is self-reported, which enables respondents to misestimate the value, leading to a more difficult interpretation. The 2021 WOZ value is automatically assigned from register data. To assess the robustness of the results, additional regressions with both the self-reported sale price and the 2021 WOZ value per square meter will be executed.

After a visual examination of the distribution of the 2021 WOZ value, the variable is found to be not normally distributed. The variable is right-skewed, which is common for variables such as property values. Therefore, the variable is transformed, using the natural logarithm of the variable. As a result, the 'new' variable (lnwozvalue2021) is more normally distributed. The distribution and further diagnostics are presented in Appendix B.

4.4. Descriptive statistics

Table 1 shows all the variables of interest. In addition, Table 2 presents the descriptive statistics on some key variables, grouped based on the type of family assistance (family-assisted mortgage and tax-free gift).

A full overview of the descriptive statistics of all variables is included in Appendix A.

Table 1 Descriptive statistics (1)

						Family assistance			
						Yes		No	
Variables	Obs.	Mean	S.D.	Min.	Max.	Mean	S.D.	Mean	S.D.
WOZ Value 2021 (in k euros)	10,802	335.633	143.246	29.780	1,038	333.527	142.810	335.890	143.305
Family mortgage (1 = yes)	10,802	0.067	0.251	0	1	0.619	0.486	0.000	0.000
Tax-free gift (1 = yes)	10,802	0.051	0.220	0	1	0.470	0.499	0.000	0.000
Family assistance (1 = yes)	10,802	0.109	0.311	0	1	1.000	0.000	0.000	0.000
Property characteristics									
Floor space (in m2)	10,802	131.551	48.550	10	395	119.298	48.915	133.047	48.296
Building age	10,802	45.553	35.752	1	1,016	53.895	44.144	44.534	34.452
Garage or carport (1 = yes)	10,802	0.469	0.499	0	1	0.342	0.475	0.484	0.500
Property especially for elderly (1 = yes)	10,802	0.024	0.152	0	1	0.012	0.109	0.025	0.156
Any type of sustainability measurements (1 = yes)	10,802	0.572	0.495	0	1	0.538	0.499	0.576	0.494
Multiple households on address (1 = yes)	10,802	0.009	0.096	0	1	0.009	0.096	0.009	0.096
Entrance accesibile without stairs (1 = yes)	10,802	0.859	0.348	0	1	0.805	0.396	0.865	0.342
Number of rooms	10,802	4.769	1.401	1	10	4.613	1.507	4.789	1.386
Property type									
Flat or appartment	10,802	0.188	0.391	0	1	0.257	0.437	0.180	0.384
Terraced house	10,802	0.449	0.497	0	1	0.476	0.500	0.446	0.497
Semi-detached	10,802	0.181	0.385	0	1	0.137	0.344	0.187	0.390
Detached	10,802	0.173	0.379	0	1	0.122	0.328	0.180	0.384
Farm	10,802	0.005	0.071	0	1	0.004	0.065	0.005	0.071
Property with attached business unit	10,802	0.003	0.053	0	1	0.003	0.058	0.003	0.052
Energy label									
A	10,802	0.282	0.450	0	1	0.245	0.430	0.287	0.452
B	10,802	0.167	0.373	0	1	0.108	0.311	0.174	0.379
C	10,802	0.257	0.437	0	1	0.252	0.434	0.257	0.437
D	10,802	0.121	0.326	0	1	0.149	0.356	0.118	0.322
E	10,802	0.075	0.264	0	1	0.109	0.312	0.071	0.257
F	10,802	0.056	0.230	0	1	0.085	0.279	0.052	0.223
G	10,802	0.042	0.200	0	1	0.053	0.224	0.041	0.197
Financial									
Income category (5 categories)									
Mortgage on property (1 = yes)	10,802	0.844	0.363	0	1	0.857	0.350	0.842	0.364
Monthly living costs	10,802	962.878	483.378	161	5,150	988.376	493.403	959.763	482.072
Household debt (in k euros)	10,802	180.529	141.648	0	802	183.479	139.371	180.168	141.926
Locational									
Livability score region (2020)	10,802	4.147	0.125	3.611	4.615	4.148	0.132	4.147	0.124
Living environment									
Centre / urban	10,802	0.050	0.218	0	1	0.073	0.260	0.047	0.212
Close to centre	10,802	0.378	0.485	0	1	0.469	0.499	0.367	0.482
Green and urban	10,802	0.156	0.363	0	1	0.122	0.328	0.160	0.367
Village centre	10,802	0.309	0.462	0	1	0.242	0.429	0.317	0.465
Rural	10,802	0.107	0.310	0	1	0.094	0.291	0.109	0.312
Region (31 included)									

Table 1 shows that the average 2021 WOZ value is €335,633 for the total, cleaned dataset. In total, 10.9% of the households received family assistance[2]. 6.7% of the respondents use a family-assisted mortgage and 5.1% of the respondents received a tax-free gift for housing. As shown in Table 1, the average 2021 WOZ value for households who receive family assistance is €333,527, compared to €335,890 for households who do not receive family assistance. Furthermore, the properties of family assistance-receiving households have a smaller surface (119.3m^2) compared to households that do not receive financial assistance (133m^2). Also, the properties of support-receivers tend to be older (53.9 years on average) compared to the properties of non-receivers of financial support (34.5 years).

Table 2 Descriptive statistics (2) – Types of family assistance

		Family mortgage				Tax-free gift				Family assistance			
		Yes		No		Yes		No		Yes		No	
Variables	Obs.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
WOZ Value 2021 (in k euros)	10.802	342,137	152,200	335,162	142,574	325,495	129,651	336,180	143,929	333,527	142,810	335,890	143,305
Family mortgage (1 = yes)	10.802	1,000	0,000	0,000	0,000	0,190	0,393	0,061	0,239	0,619	0,486	0,000	0,000
Tax-free gift (1 = yes)	10.802	0,144	0,352	0,044	0,206	1,000	0,000	0,000	0,000	0,470	0,499	0,000	0,000
Family assistance (1 = yes)	10.802	1,000	0,000	0,044	0,206	1,000	0,000	0,061	0,239	1,000	0,000	0,000	0,000
Property characteristics													
Floor space (in m2)	10.802	123,390	48,498	132,140	48,504	111,056	47,419	132,656	48,367	119,298	48,915	133,047	48,296
Building age	10.802	53,223	41,347	44,999	35,251	55,949	48,334	44,992	34,859	53,895	44,144	44,534	34,452
Number of rooms	10.802	4,694	1,439	4,775	1,398	4,452	1,576	4,787	1,389	4,613	1,507	4,789	1,386
Financial													
Income category													
Below modal income	10.802	0,124	0,329	0,077	0,267	0,081	0,274	0,080	0,272	0,104	0,305	0,078	0,268
1 to 1,5 times modal income	10.802	0,180	0,384	0,175	0,380	0,177	0,382	0,175	0,380	0,177	0,382	0,175	0,380
1,5 to 2 times modal income	10.802	0,201	0,401	0,208	0,406	0,203	0,402	0,208	0,406	0,200	0,400	0,209	0,406
2 to 3 times modal income	10.802	0,258	0,438	0,311	0,463	0,311	0,463	0,308	0,462	0,286	0,452	0,311	0,463
3 times modal income and more	10.802	0,238	0,426	0,228	0,419	0,228	0,420	0,229	0,420	0,234	0,423	0,228	0,419
Mortgage on property (1 = yes)	10.802	0,824	0,381	0,845	0,362	0,892	0,311	0,841	0,365	0,857	0,350	0,842	0,364
Monthly living costs	10.802	951,081	520,811	963,730	480,576	1.029,257	453,790	959,296	484,685	988,376	493,403	959,763	482,072
Household debt (in k euros)	10.802	178,057	143,715	180,707	141,503	189,503	133,469	180,044	142,066	183,479	139,371	180,168	141,926

Table 2 shows that 14.4% of households who use a family-assisted mortgage also receive a tax-free gift. The other way around, 19% of the households who receive a tax-free gift also use a family-assisted mortgage. The mean 2021 WOZ Value is highest for households who use a family-assisted mortgage (€342,137) and lowest for households who receive a tax-free gift (€325,495). For floor space, the mean surface for both users of a family-assisted mortgage and receivers of a tax-free gift is smaller (123.4 m^2 and 111.1 m^2) than for households without support (132.1 m^2 and 132.7 m^2).

[2] The binary variable "Family assistance" is a combination of family-assisted mortgage and tax-free gifting. The variable outcome (1) is the same for a respondent who received or used either one or both the assistance forms.

5. RESULTS & DISCUSSION

5.1. Baseline results

Table 3 reports key coefficients and (robust) standard errors of multiple model specifications including the baseline specifications, i.e. equations 2 and 4. The first table column (1) focuses on the variable 'Family assistance'. Columns 2, 3 and 4 present the results of the models including the variables "Family mortgage" or family-assisted mortgage, "Tax-free gift" and an interaction between the two variables. All full regression results are presented in Appendix D.

Table 3 Estimation results (1) – Baseline specifications

Model	1	2	3	4
Dependent variable:	Log WOZ Value 2021			
Family assistance (0/1)	0.028***			
	(0.006)			
Family mortgage (0/1)		0.021***		0,012
		(0.008)		(0.008)
Tax-free gift (0/1)			0,046***	0.037***
			(0.008)	(0.009)
Family mortgage * Tax-free gift				0.042*
				(0.025)
Structural characteristics (21)	YES	YES	YES	YES
Neighborhood characteristics (37)	YES	YES	YES	YES
Household characteristics (8)	YES	YES	YES	YES
Constant	6.517***	6.515***	6.514***	6.516***
	(0.094)	(0.094)	(0.094)	(0.094)
Observations	10.802	10.802	10.802	10.802
Adjusted R^2	0,767	0,766	0,767	0,767
Robust standard errors in parentheses	* p< 0.10 ** p<0.05 *** p<0.01			

Table 3 shows that all coefficients related to financial family assistance for housing are positive and, for columns 1, 2 and 3, significant. This indicates a positive relationship between family assistance, family mortgage and tax-free gifts for housing, separately, and housing consumption, measured in the 2021 WOZ value. After controlling for structural characteristics, neighborhood characteristics (including regional dummies) and household characteristics in all models, the adjusted R^2 is 0.77, % of the variance in housing consumption is explained by the model.

The sign, size and significance of the coefficients in the first three columns indicate that the 2021 WOZ value increases by 2.84% (%=(exp(coefficient)−1)×100) when households receive family assistance (1), 2.12% when a household uses a family-assisted mortgage (2) and 4.70% when a household receives a tax-free gift for housing (3). Notably, the coefficient for tax-free gifting (3) is more than double the size of the coefficient for the family-assisted mortgage variable (2).

Relating these outcomes to the reviewed literature in Chapter 2, they align with existing theories and research outcomes. The positive coefficient for family assistance, indicating any form of assistance, is in line with Case et al. (2005, 2020) and Wang and Squires (2023) who also indicate a positive relationship between budget, financial family assistance and housing consumption. The same applies for multiple additional studies (Berger et al., 2018; Bostic et al., 2009; Bunn & Rostom, 2015; Goodman & Kawai, 1982; Lehnert, 2004), who indicate a positive relationship between a household's housing budget and housing consumption, as Table 3 also shows.

For the tax-free gifts, the positive coefficient aligns with e.g. Engelhardt and Mayer (1994) and Guiso and Jappelli (2002). Both studies indicate increased buying possibilities or higher consumption for households who received tax-free gifts. Relating this to the findings presented in Table 3, the outcomes are comparable. For a comparison of the size of the association, Luea (2008) indicates that the demand for housing rises between 9% and 11% after receiving a gift. Although the measurement method for housing consumption differs, the 4.70% following from model 3 is considerably lower.

The positive "family mortgage" coefficient is in line with the literature-based expectations, following from the combination of the theory on family loans by both Poirine (1997) and Guiso and Jappelli (2002), the findings on mortgage specifications by Damen et al. (2016), among others, and the key trends of family-assisted mortgages by Eijsink and Mastrogiacomo (2023), as further discussed in 2.2.

The coefficient size is more difficult to relate to existing literature. With an average difference of 0.3% between the mortgage interest rates of family-assisted mortgages and other types of mortgages found by Eijsink and Mastrogiacomo, there seems to be somewhat of (a possibility of) a leverage effect, considering the model's control variables. Overall, this aligns with additional studies (Boelhouwer et al., 2004; Boelhouwer, 2001; van der Drift et al., 2023) on the effect of mortgage specifications.

The coefficients of the incorporated control variables in the models show expected signs and align with the signs from the outcomes of the examined literature. As shown in Appendix D, the usage of a mortgage negatively affects the 2021 WOZ value or housing consumption. This aligns with the notion that households using a mortgage may be more financially constrained and the significance of the coefficient indicates the importance of considering whether a household does or does not use a mortgage.

Furthermore, the elasticity of property surface and housing consumption is, as expected, rather high. Certain attributes, such as good accessibility of the property, the number of rooms, a garage or carport and the neighborhood livability score, are positively associated with the 2021 WOZ value or housing consumption. For the categorical variable 'property type', the deviation based on different types of property is logical, based on the theorized quality of property types. The same applies to the energy label of the property, with 'lower' energy labels showing the lowest negative coefficients (Energy label A = reference category). A higher income category is positively associated with higher housing consumption, showing gradual steps per income category for the effect on the 2021 WOZ value. The effect of the living environment is comparable, with negatively changing coefficients when moving from more urban to rural living environments.

An interesting deviation is the coefficient for the binary variable 'sustainability', which indicates whether sustainability measures have been conducted. The coefficient is negative, which could be explained by the fact that the WOZ value does not necessarily capture certain sustainability measures. The other control variables have somewhat expected coefficients but are insignificant. To test the robustness of the regression results, the self-reported sale price and the 2021 WOZ value per square meter are used as dependent variables in additional regressions, as presented in Appendix E models 7.1 and 7.2. In these regressions, a similar (significant and positive) association is found between family assistance and housing consumption as presented in Table 3.

The differences in the size of the coefficient in Table 3 indicates that the effect of tax-free gifting is more than double that of family-assisted mortgages. This could follow from the different nature of the forms of assistance. Tax-free gifts represent direct wealth transfers, while family-assisted mortgages are long-term financial liabilities. Alternatively, considering the specifications of both forms of assistance, this difference in effect may follow from the (in)direct volume of the assistance. As indicated in 2.2, the volume of financial assistance possibilities via family-assisted mortgages is limited compared to tax-free gifting. These differences could affect the effect or coefficients because of the impact on household budgets and long-term financial commitments. The assistance volume is not accounted for in this study.

Relating the outcomes discussed above to the hypotheses reported in Chapter 2, evidence is found to support hypothesis 1: *"Receiving financial family assistance for housing is positively associated with higher housing consumption compared to not receiving assistance."* Based on model column 1 in Table 3, receiving family assistance is associated with an increase of 2.84% of the housing consumption of a household, measured in the 2021 WOZ value, after controlling for all the relevant control variables.

5.2. Interacting assistance

Column 4 of Table 3 shows the coefficients for a model with a combined use of a family-assisted mortgage and tax-free gifting. As indicated, at a 95% significance level, the coefficients for family-assisted mortgage and the interaction variable are insignificant. This indicates that in this setting, considering the control variables and the data, no significant relationship is found between a combined use of the forms of family assistance and housing consumption, measured in the 2021 WOZ value.

Although there was little literature indicating such a relationship, e.g. Engelhardt and Mayer (1994) indicate that tax-free gifts are often used for downpayments. Additionally, a mortgage with a loan-to-value of 100% is possible in the Netherlands (Ministry of General Affairs, 2024), which creates the possibility for a similar relationship. Apart from the significance, the coefficients for all the key variables are still positive. The coefficient for the tax-free gifting variable is insignificant.

Based on these outcomes, considering the research settings, data and control variables, no evidence is found in this study to support hypothesis 3: *"The combined use of the forms of financial family support is positively associated with higher housing consumption compared to either financial support form used individually."* This follows from the coefficients being insignificant for both the variable family-assisted mortgage and the interaction variable.

5.3. Exploring the role of age

Table 4 below presents the results of both equations 2 and 3. As indicated, this model aims to explore the role of age interacting with the relationship between family assistance and housing consumption, measured in 2021 WOZ value.

Table 4 Estimation results (2) – Interaction with age

Model	1	6
	Dependent variable:	Log WOZ Value 2021
Family assistance (0/1)	0.028***	0.019***
	(0.006)	(0.010)
Age - binary variable (≥35 years = 0)	-0.056***	-0.060***
	(0.005)	(0.005)
Family assistance * Age (bv)		0.025**
		(0.013)
Structural characteristics (21)	YES	YES
Neighborhood characteristics (37)	YES	YES
Household characteristics (8)	YES	YES
Constant	6.517***	6.518***
	(0.094)	(0.094)
Observations	10.802	10.802
Adjusted R^2	0.767	0.767
Robust standard errors in parentheses	** p<0.05	*** p<0.01

Column 1 in Table 4 presents a similar outcome to column 1 in Table 3. Additionally, the column includes the coefficient for age. Age is indicated as a binary variable, separating the age cohort of ≥ 35 years (0) from ≤ 34 years (1). As shown, there is a negative significant relationship between age and housing consumption, with a decrease of the 2021 WOZ value of approximately 5.76% for the younger age cohort. With similar outcomes for the control variables as for Table 3, the adjusted R^2 is 0.77.

From the perspective of the older age cohort, the positive effect of ageing on housing consumption aligns with the theory from the life-cycle or Buffer-Stock model, as indicated by Carroll and Carrol and Summers (1997, 1989). Although older individuals are more likely to save a relatively larger part of their wealth for their pension (Gourinchas & Parker, 2000), their absolute wealth is generally higher and therefore the higher housing consumption is relatable (Linneman & Wachter, 1989).

Column 2 in Table 4 includes the result of equation 3, including an interaction between family assistance and age. The family assistance and interaction coefficient are both positive and significant. The age coefficient is negative and significant. For the model, the adjusted R^2 remains equal.

Interpreting the outcomes and coefficients of this model, the positive coefficient for the interaction variable indicates that the relationship between family assistance and housing consumption, measured as 2021 WOZ value, increases from 0.019 or 1.92% for households ≥ 35 years to 0.044 or 4.50% (0.019 + 0.025) for households ≤ 34 years. This indicates a difference for the specific association of 2.58%. On the contrary, the coefficient for age specifically is negative and significant (-0.060 or -5.82%). The coefficients for the control variables are comparable to the outcomes discussed in 5.1.

The regression results from column 2 in Table 4 indicate that the association between family assistance and housing consumption is stronger for younger age cohorts (≤ 34 years), compared to the older age cohort (≥ 35 years).

In addition to testing the role of age based on a binary variable, a regression is executed with age categorized based on 3 cohorts. The results are presented in Appendix E Model 8.1. Although the signs of the coefficients align with the results presented in Table 4, indicating a stronger association for younger age cohorts, the results are insignificant. The frequency table related to Model 8.1 (Appendix E) shows that the frequency for receivers of family assistance over 64 years is relatively low.

Furthermore, Model 8.2 in Appendix E presents a regression with the variables family-assisted mortgage and tax-free gift separately interacting with age. For this specification, the signs of the coefficients indicate a similar relationship to the relationship based on family assistance, but the results are insignificant. Overall, this underlines the robustness of the relationship and the underlying results.

Relating these outcomes to the literature, Lehnert (2004) indicates a similar effect. The elasticity of housing consumption was found to be higher for the age cohort 25-34 years compared to the elasticity of the following age cohorts. Although the result in this study is for the age cohort 18-34 years, the effect is similar. The stronger association of family assistance for younger age cohorts indicates a higher consumption/wealth or income elasticity, as also indicated by Carroll and Summers in the life-cycle model (Carroll & Summers, 1989) and related to by Skinner (1996).

The positive interaction between family assistance and (lower) age on housing consumption aligns with findings by Engelhardt and Mayer and Mayer and Engelhardt (1994; 1996), who show a significant relationship between households who receive a (family) gift for housing and the lower age of these households for becoming an ‘insider’.

When looking at, next to the association, the volume and frequency of family assistance, Table 5 offers additional insights based on the descriptive statistics of the categorized size of the tax-free gift.

Table 5 Descriptive statistics (3) – Frequency and percentage of age cohort total

Age	Volume of tax-free gift								Total	
	- €25,000		€25,000 - €53,000		€53,000 - €100,000		€100,000 +			
-34 years	118	33%	103	29%	65	18%	70	20%	356	100%
35 + years	63	32%	82	42%	27	14%	25	13%	197	100%

Table 5 shows that the frequency of receiving a tax-free gift for housing is higher for the younger age cohort. Next to the frequency, the volume of the gifts is also bigger, with 38% of the younger age cohort receiving a tax-free gift > €53,000, compared to 27% of the age cohort 35+ years. The total number of observations of the categorical variable of the volume of tax-free gifting is 553 and therefore considerably smaller compared to the number of observations for the empirical analysis. Furthermore, no information is available about the volume of family-assisted mortgages hence no further (regression) analysis of these data is performed.

5.4. Sensitivity Analysis

To check the robustness of the results found from the addition of an interaction variable in equation 3 and column 2 of Table 4, and to assess heterogeneity, a Chow test is conducted, based on a total of 3 age cohorts (≤34 years, 35-64 years, and ≥ 65 years).

Table 6 Estimation results (3) – Chow test

Model	1	2	3	4
Dependent variable:		Log WOZ Value 2021		
K = 63	R RSS	U RSS [1]	U RSS [2]	U RSS [3]
Family assistance (0/1)	0.016**	0.057***	0.031***	-0.012
	(0.006)	(0.010)	(0.008)	(0.211)
Structural characteristics (21)	YES	YES	YES	YES
Neighborhood characteristics (37)	YES	YES	YES	YES
Household characteristics (8)	YES	YES	YES	YES
Constant	6.363***	7.894***	6.679***	6.266***
	(0.078)	(0.171)	(0.105)	(0.174)
Residual sum of squares	415.528	61.351	222.306	107.46
Observations	10,802	2,078	6,153	2,571
Adjusted R^2	0.767	0.766	0.778	0.720
Standard errors in parentheses	* p< 0.10 ** p<0.05 *** p<0.01			

At first, column 1 of Table 6 shows the restricted model (R RSS). The model specifications are quite similar to equation 2 as used before, except for the variable 'bvage' being excluded from the regression, because the models for group 1 (column 2), group 2 (column 3) and group 3 (column 4) are distinguished based on a similar variable, namely 'lfthh3'. This variable categorizes the 3 age cohorts mentioned earlier.

As Table 6 indicates, the explained variance of the models (or adjusted R^2) is quite similar to the 'regular' model indicated in Table 4. The significance of the Chow test can be determined using the F-statistic. The F-statistic is derived from the residuals of the models as indicated in Table 6, as well as the number of observations (n, 10,802), the 63 parameters (k) and the number of groups (g, 3). The

resulting F-statistic is 5,257. This exceeds the approximate critical F-statistic of 1.3 (from the F-distribution table). Therefore, the null hypothesis of the Chow test can be rejected, and the findings suggest that the differences between the subgroups based on the age cohorts and the restricted model are significant or there is heterogeneity across age groups.

Expanding the interpretation of the Chow test results, Table 6 shows that the association between family assistance and housing consumption, in terms of the 2021 WOZ value and under the same condition, is 5.90% for the first age cohort and 3.15% for the second age cohort. The coefficient for the third age cohort is insignificant, with a coefficient of -0.012 or an association of -1.19%. For the first two age cohorts, this indicates a 2.75% difference between both, suggesting that the impact of family assistance on housing consumption may be bigger for the lower age cohort, compared to the middle age cohort. However, the difference between the coefficients of the subgroups is not so straightforward to interpret because of the difference in the observations examined. No reliable conclusions can be drawn regarding the oldest age cohort due to the insignificance of the coefficient.

Table 7 presents descriptive statistics on the mean 2021 WOZ values, divided by assistance-receiving and non-receiving households, using the same age categorization as Table 6. The observed differences in mean WOZ values between assistance-receiving and non-receiving households align with the signs of the coefficients presented in Table 6 across all three age cohorts. This alignment offers additional support for the findings from the Chow test.

Table 7 Descriptive statistics (4) – Age categorization

Age category	- 34 years		35 - 64 years		65 + years	
2021 WOZ Value (€)	Mean	S.D.	Mean	S.D.	Mean	S.D.
Family assistance (no)	271,303	102,654	349,866	149,644	345,745	139,833
Family assistance (yes)	286,641	107,956	374,749	158,652	327,529	125,600
Total	274,957	104,121	352,204	150,675	345,015	139,314

As discussed in 5.3, the findings of heterogeneity across age groups, related to (the elasticity of) the association between family assistance and housing consumption, in terms of the 2021 WOZ value, are supported by several related studies and theories.

Relating these outcomes to the hypotheses, evidence is found based on both the model presented in column 2 of Table 4 and the conducted Chow test to support hypothesis 3: *"The relationship between receiving financial family assistance for housing and housing consumption is stronger for younger age cohorts compared to older age cohorts."* Based on the interaction model, the association for younger age cohorts (≤34 years) is 2.57% bigger compared to the older age cohort (≥35 years), and significant, after controlling for all relevant control variables. For the Chow test, a deviation in the effect is examined based on 3 age cohorts. Although the exact difference in the size of the association is more difficult to interpret for this test, the significance of the Chow test itself indicates heterogeneity across the age groups and the coefficient for the youngest age cohort is the highest.

6. CONCLUSION

This study examines the relationship between financial family assistance for housing and housing consumption in the Netherlands. Empirical analyses of data from the 2021 Dutch Housing Survey reveal that family assistance for households, in the form of a family-assisted mortgage or tax-free gifts, is positively and significantly associated with housing consumption, measured by the 2021 WOZ value of a property Specifically, family assistance in general increases housing consumption by 2.84%, family-assisted mortgage by 2.12% and tax-free gifts by 4.70%, considering relevant control variables.

The study further explores the role of age, revealing that younger households (under 35 years) experience a greater association between family assistance and housing consumption compared to older households (≥ 35 years). The interaction between age and family assistance suggests a 2.57% higher increase in housing consumption for younger households. Several robustness tests support these results.

The combined insights from these findings indicate that financial family assistance for housing may play a significant role in forming housing consumption patterns, with varying effects based on the form of assistance and the age of the receivers.

The results and findings from this study make significant contributions to the academic field by more thoroughly testing and quantifying the association between financial family assistance for housing and housing consumption, measured by 2021 WOZ value, compared to previous literature. By paying explicit attention to specific and underexplored (Wang & Squires, 2023) forms of financial family assistance for housing, this study expands insights and (partially) addresses the identified literature gap. An additional contribution follows from the in-depth analysis of the role of age, which shows a varying relationship among the defined age cohorts, regarding the size and significance.

The empirical findings align with existing theories and literature on budget and consumption in general (Case et al., 2005, 2020), the impact of mortgage interest rates (Damen et al., 2016; Levin & Wright, 1997; van der Drift et al., 2023) and observed trends in family-assisted mortgage (Eijsink & Mastrogiacomo, 2023). The same applies to the effect of (intergenerational) gifting and housing opportunities (Engelhardt & Mayer, 1994; Helderman & Mulder, 2007; Mulder & Smits, 1999) and the difference in elasticity between income/wealth and housing consumption based on age (Carroll, 1997; Carroll & Summers, 1989). The insights from this study related to the role of age can be seen as supportive or in addition to the widely discussed life-cycle model.

To consider the importance of financial family assistance for housing in housing policy is crucial, especially in light of the policy aims of ‘providing more equal opportunities on the housing market’ and slowing down the growth of housing prices. Housing consumption plays a key role in this context and, as indicated, family assistance contributes significantly to housing consumption. To enhance equal opportunities in the housing market, policymakers could apply measures that address the disparities created by forms of financial family assistance for housing, such as family-assisted mortgages. For instance, limiting the advantages of family-assisted mortgages by implementing stricter regulations

regarding the interest rate or other loan specifications compared to market conditions could diminish the effect or advantage. In this way, a more level playing field can be created between assistance-receiving and non-receiving outsiders or starters in the housing market.

On the contrary, 'positively discriminating' non-assistance-receivers by providing targeted subsidies or financial support in the form of government-backed mortgages could help to bridge the gap between receivers and non-receivers and eventually provide more equal opportunities on the housing market.

The data used in this study is limited to the Netherlands, restricting the generalizability of findings because of country-specific financial support systems. Incorporating different forms of financial family assistance for housing as used in other countries might lead to different outcomes. Additionally, the used family assistance variables are binary. Therefore, the exact volume of assistance is not captured, which limits the depth of understanding of how different amounts of support impact housing consumption.

This study's applied proxy for housing consumption is the household's house value, measured in the 2021 WOZ value. Other proxies such as transaction prices were unavailable in the used data set. The usage of alternatives for house value to measure housing consumption, such as (receiving) households buying into more favourable locations, was not deemed feasible based on the scope of this study. For the WOZ value of a property, it is known that it is, in general, (slightly) below and less volatile than market values. These limitations can affect the strength of the outcomes. Alternatively, the use of transaction or market valuation prices in future research could provide more specific and generalizable insights into the examined association, compared to the WOZ value.

Although this study indicates and explains an important part of the association between family assistance and housing consumption, future research could expand the empirical analysis to an international context to compare associations across different countries. Country-specific factors, such as financial gifting and transfer policies, housing market conditions, and broader economic and political contexts may influence the association. Consequently, such research could uncover factors that either amplify or mitigate the association between financial family assistance and housing consumption.

The examination of detailed data on the volume of family assistance would allow for more nuanced insights into the relationship between varying volumes of support and housing consumption. For example, microdata with clear insights into household finances could offer more detailed insights into the variation based on age or type of financial family assistance for housing. However, it is important to consider that the policy of tax-free gifting is decommissioned in the Netherlands and that the specifications of family-assisted mortgages need to be in line with 'market' specifications.

In general, examining the long-term effects of family assistance on housing stability and the financial well-being of receiving households could be valuable for understanding the broader implications of this support. For instance, it could explore whether financial assistance contributes to sustained housing security compared to non-receiving households in the long term.

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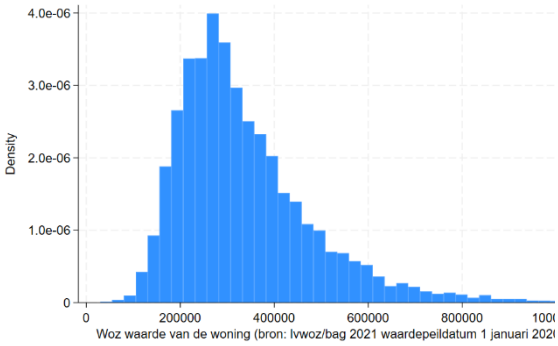
APPENDIX A: FULL DESCRIPTIVE STATISTICS

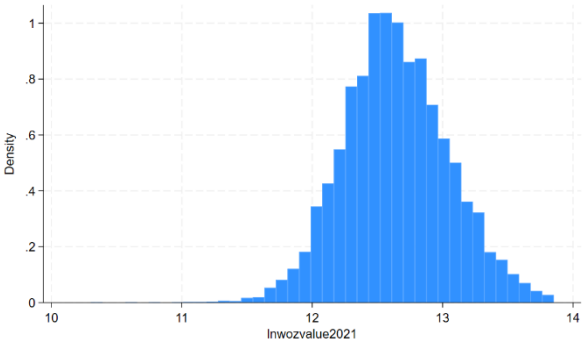
Table 8 Descriptive statistics (5) - Full descriptive statistics

						Familymortgage				Tax free gift				Family assistance			
						Yes		No		Yes		No		Yes		No	
Variables	Obs.	Mean	S.D.	Min.	Max.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
WOZ Value 2021 (in k euros)	10.802	335,633	143,246	29,780	1.038	342,137	152,200	335,162	142,574	325,495	129,651	336,180	143,929	333,527	142,810	335,890	143,305
Family mortgage (1 = yes)	10.802	0,067	0,251	0	1	1,000	0,000	0,000	0,000	0,190	0,393	0,061	0,239	0,619	0,486	0,000	0,000
Tax-free gift (1 = yes)	10.802	0,051	0,220	0	1	0,144	0,352	0,044	0,206	1,000	0,000	0,000	0,000	0,470	0,499	0,000	0,000
Family assistance (1 = yes)	10.802	0,109	0,311	0	1	1,000	0,000	0,044	0,206	1,000	0,000	0,061	0,239	1,000	0,000	0,000	0,000
Property characteristics																	
Floor space (in m2)	10.802	131,551	48,550	10	395	123,390	48,498	132,140	48,504	111,056	47,419	132,656	48,367	119,298	48,915	133,047	48,296
Building age	10.802	45,553	35,752	1	1.016	53,223	41,347	44,999	35,251	55,949	48,334	44,992	34,859	53,895	44,144	44,534	34,452
Garage or carport (1 = yes)	10.802	0,469	0,499	0	1	0,376	0,485	0,475	0,499	0,277	0,448	0,479	0,500	0,342	0,475	0,484	0,500
Property especially for elderly (1 = yes)	10.802	0,024	0,152	0	1	0,018	0,133	0,024	0,153	0,004	0,060	0,025	0,155	0,012	0,109	0,025	0,156
Any type of sustainability measurements (1 = yes)	10.802	0,572	0,495	0	1	0,537	0,499	0,574	0,494	0,530	0,500	0,574	0,494	0,538	0,499	0,576	0,494
Multiple households on address (1 = yes)	10.802	0,009	0,096	0	1	0,012	0,111	0,009	0,095	0,009	0,095	0,009	0,096	0,009	0,096	0,009	0,096
Entrance accesibile without stairs (1 = yes)	10.802	0,859	0,348	0	1	0,834	0,373	0,860	0,347	0,759	0,428	0,864	0,343	0,805	0,396	0,865	0,342
Number of rooms	10.802	4,769	1,401	1	10	4,694	1,439	4,775	1,398	4,452	1,576	4,787	1,389	4,613	1,507	4,789	1,386
Property type																	
Flat or appartment	10.802	0,188	0,391	0	1	0,221	0,415	0,186	0,389	0,320	0,467	0,181	0,385	0,257	0,437	0,180	0,384
Terraced house	10.802	0,449	0,497	0	1	0,474	0,500	0,447	0,497	0,485	0,500	0,447	0,497	0,476	0,500	0,446	0,497
Semi-detached	10.802	0,181	0,385	0	1	0,154	0,361	0,183	0,387	0,108	0,311	0,185	0,389	0,137	0,344	0,187	0,390
Detached	10.802	0,173	0,379	0	1	0,140	0,347	0,176	0,381	0,085	0,279	0,178	0,383	0,122	0,328	0,180	0,384
Farm	10.802	0,005	0,071	0	1	0,007	0,083	0,005	0,070	0,000	0,000	0,005	0,072	0,004	0,065	0,005	0,071
Property with attached business unit	10.802	0,003	0,053	0	1	0,004	0,064	0,003	0,052	0,002	0,043	0,003	0,053	0,003	0,058	0,003	0,052
Energy label																	
A	10.802	0,282	0,450	0	1	0,250	0,433	0,285	0,451	0,235	0,424	0,285	0,451	0,245	0,430	0,287	0,452
B	10.802	0,167	0,373	0	1	0,114	0,318	0,171	0,376	0,096	0,295	0,171	0,376	0,108	0,311	0,174	0,379
C	10.802	0,257	0,437	0	1	0,261	0,439	0,257	0,437	0,228	0,420	0,258	0,438	0,252	0,434	0,257	0,437
D	10.802	0,121	0,326	0	1	0,147	0,354	0,119	0,324	0,150	0,357	0,120	0,324	0,149	0,356	0,118	0,322
E	10.802	0,075	0,264	0	1	0,085	0,279	0,075	0,263	0,146	0,354	0,071	0,258	0,109	0,312	0,071	0,257
F	10.802	0,056	0,230	0	1	0,087	0,281	0,054	0,225	0,089	0,284	0,054	0,226	0,085	0,279	0,052	0,223
G	10.802	0,042	0,200	0	1	0,056	0,231	0,041	0,198	0,056	0,230	0,041	0,199	0,053	0,224	0,041	0,197
Financial																	
Income category																	
Below modal income	10.802	0,081	0,272	0	1	0,124	0,329	0,077	0,267	0,081	0,274	0,080	0,272	0,104	0,305	0,078	0,268
1 to 1,5 times modal income	10.802	0,175	0,380	0	1	0,180	0,384	0,175	0,380	0,177	0,382	0,175	0,380	0,177	0,382	0,175	0,380
1,5 to 2 times modal income	10.802	0,208	0,406	0	1	0,201	0,401	0,208	0,406	0,203	0,402	0,208	0,406	0,200	0,400	0,209	0,406
2 to 3 times modal income	10.802	0,308	0,462	0	1	0,258	0,438	0,311	0,463	0,311	0,463	0,308	0,462	0,286	0,452	0,311	0,463
3 times modal income and more	10.802	0,228	0,420	0	1	0,238	0,426	0,228	0,419	0,228	0,420	0,229	0,420	0,234	0,423	0,228	0,419
Mortgage on property (1 = yes)	10.802	0,844	0,363	0	1	0,824	0,381	0,845	0,362	0,892	0,311	0,841	0,365	0,857	0,350	0,842	0,364
Monthly living costs	10.802	962,878	483,378	161	5.150	951,081	520,811	963,730	480,576	1.029,257	453,790	959,296	484,685	988,376	493,403	959,763	482,072
Household debt (in k euros)	10.802	180,529	141,648	0	802	178,057	143,715	180,707	141,503	189,503	133,469	180,044	142,066	183,479	139,371	180,168	141,926
Locational																	
Livability score region (2020)	10.802	4,147	0,125	3,611	4,615	4,158	0,136	4,146	0,124	4,135	0,128	4,147	0,125	4,148	0,132	4,147	0,124
Living environment																	
Centre / urban	10.802	0,050	0,218	0	1	0,081	0,273	0,048	0,213	0,078	0,268	0,048	0,214	0,073	0,260	0,047	0,212
Close to centre	10.802	0,378	0,485	0	1	0,430	0,495	0,374	0,484	0,528	0,500	0,370	0,483	0,469	0,499	0,367	0,482
Green and urban	10.802	0,156	0,363	0	1	0,126	0,332	0,158	0,365	0,114	0,318	0,158	0,365	0,122	0,328	0,160	0,367
Village centre	10.802	0,309	0,462	0	1	0,260	0,439	0,312	0,463	0,201	0,401	0,315	0,464	0,242	0,429	0,317	0,465
Rural	10.802	0,107	0,310	0	1	0,103	0,304	0,108	0,310	0,080	0,271	0,109	0,312	0,094	0,291	0,109	0,312
Region																	
Groningen	10.802	0,036	0,186	0	1	0,025	0,155	0,035	0,183	0,029	0,168	0,034	0,182	0,026	0,158	0,035	0,184
Leeuwarden	10.802	0,016	0,127	0	1	0,023	0,151	0,016	0,125	0,013	0,112	0,016	0,127	0,020	0,139	0,016	0,125
Heerenveen	10.802	0,016	0,124	0	1	0,019	0,137	0,015	0,123	0,007	0,085	0,016	0,126	0,014	0,119	0,016	0,125
Emmen	10.802	0,018	0,134	0	1	0,015	0,122	0,018	0,135	0,004	0,060	0,019	0,137	0,011	0,105	0,019	0,137
Zwolle	10.802	0,066	0,249	0	1	0,063	0,243	0,067	0,249	0,040	0,196	0,068	0,251	0,055	0,229	0,068	0,251
Enschede	10.802	0,044	0,206	0	1	0,027	0,164	0,046	0,209	0,027	0,163	0,045	0,208	0,029	0,168	0,046	0,210
Lelystad	10.802	0,025	0,155	0	1	0,023	0,151	0,025	0,155	0,009	0,095	0,025	0,158	0,017	0,129	0,026	0,158
Apeldoorn	10.802	0,025	0,158	0	1	0,018	0,133	0,026	0,159	0,022	0,146	0,026	0,158	0,019	0,136	0,026	0,160
Doetinchem	10.802	0,014	0,119	0	1	0,012	0,111	0,014	0,119	0,007	0,085	0,015	0,120	0,011	0,105	0,015	0,120
Arnhem	10.802	0,026	0,159	0	1	0,019	0,137	0,026	0,160	0,018	0,133	0,026	0,160	0,020	0,141	0,026	0,161
Nijmegen	10.802	0,023	0,151	0	1	0,023	0,151	0,023	0,151	0,027	0,163	0,023	0,150	0,026	0,158	0,023	0,150
Ede	10.802	0,022	0,146	0	1	0,012	0,111	0,023	0,149	0,013	0,112	0,022	0,148	0,014	0,116	0,023	0,150
Amersfoort	10.802	0,025	0,155	0	1	0,037	0,189	0,024	0,153	0,029	0,168	0,024	0,155	0,034	0,181	0,024	0,152
Utrecht	10.802	0,085	0,279	0	1	0,151	0,358	0,080	0,271	0,231	0,422	0,077	0,266	0,178	0,382	0,073	0,261
Alkmaar	10.802	0,041	0,198	0	1	0,032	0,175	0,041	0,199	0,025	0,157	0,042	0,200	0,030	0,170	0,042	0,201
Amsterdam	10.802	0,098	0,297	0	1	0,143	0,350	0,095	0,293	0,145	0,352	0,095	0,294	0,137	0,344	0,093	0,290
Gouda	10.802	0,020	0,139	0	1	0,014	0,116	0,020	0,141	0,007	0,085	0,020	0,141	0,012	0,109	0,021	0,142
Leiden	10.802	0,020	0,141	0	1	0,014	0,116	0,021	0,143	0,018	0,133	0,020	0,141	0,014	0,119	0,021	0,143
Den Haag	10.802	0,059	0,235	0	1	0,063	0,243	0,058	0,234	0,069	0,253	0,058	0,234	0,065	0,246	0,058	0,233
Rotterdam	10.802	0,065	0,247	0	1	0,041	0,199	0,067	0,250	0,054	0,227	0,066	0,248	0,046	0,209	0,068	0,251
Dordrecht	10.802	0,017	0,130	0	1	0,008	0,090	0,018	0,132	0,009	0,095	0,018	0,132	0,008	0,087	0,018	0,134
Middelburg	10.802	0,028	0,165	0	1	0,038	0,192	0,027	0,163	0,016	0,127	0,029	0,167	0,030	0,170	0,028	0,164
Roosendaal	10.802	0,017	0,130	0	1	0,010	0,098	0,018	0,132	0,009	0,095	0,018	0,132	0,010	0,101	0,018	0,134
Breda	10.802	0,039	0,193	0	1	0,032	0,175	0,039	0,195	0,034	0,182	0,039	0,194	0,036	0,186	0,039	0,194
Tilburg	10.802	0,019	0,138	0	1	0,026	0,160	0,019	0,136	0,025	0,157	0,019	0,137	0,025	0,155	0,019	0,135
Den Bosch	10.802	0,022	0,148	0	1	0,014	0,116	0,023	0,150	0,027	0,163	0,022	0,147	0,020	0,141	0,023	0,148
Oss	10.802	0,018	0,134	0	1	0,022	0,147	0,018	0,134	0,013	0,112	0,019	0,136	0,019	0,136	0,018	0,134
Eindhoven	10.802	0,039	0,192	0	1	0,033	0,179	0,039	0,193	0,033	0,178	0,039	0,193	0,034	0,181	0,039	0,194
Venlo	10.802	0,024	0,154	0	1	0,022	0,147	0,025	0,155	0,011	0,104	0,025	0,157	0,019	0,136	0,025	0,157
Sittard	10.802	0,020	0,140	0	1	0,010	0,098	0,021	0,143	0,016	0,127	0,020	0,141	0,014	0,116	0,021	0,143
Maastricht	10.802	0,013	0,115	0	1	0,010	0,098	0,014	0,116	0,013	0,112	0,013	0,115	0,010	0,101	0,014	0,116

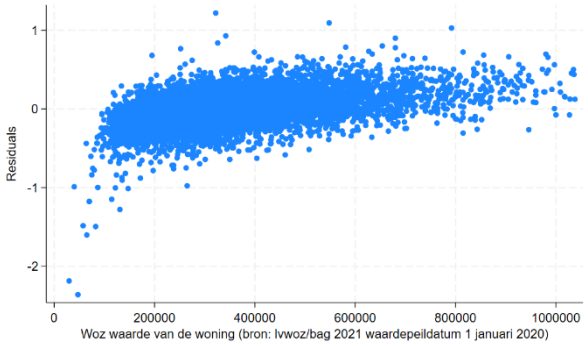
APPENDIX B: DIAGNOSTICS AND OLS ASSUMPTIONS

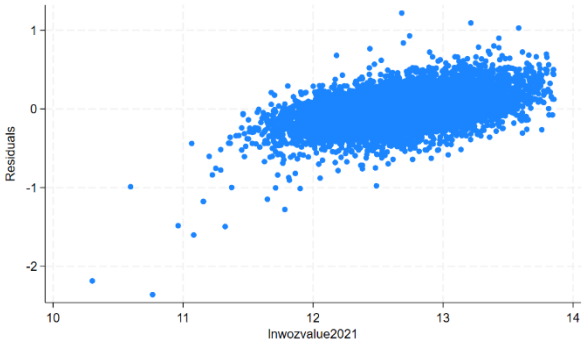
Transformation of dependent variable – histogram of wozvalue2021 and lnwozvalue2021

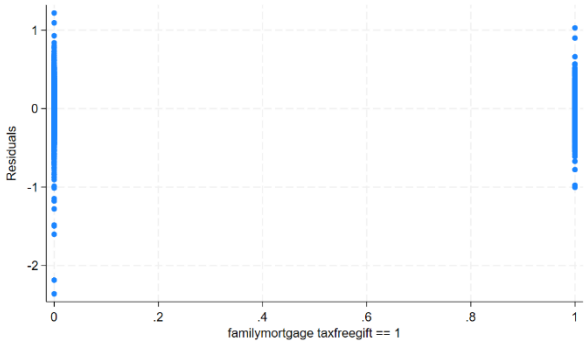




Assumption: Independence of Errors, regressions residuals and lnwozvalue2021, wozvalue2021 and family assistance. Homoskedasticity, hettest before using robust standard errors.



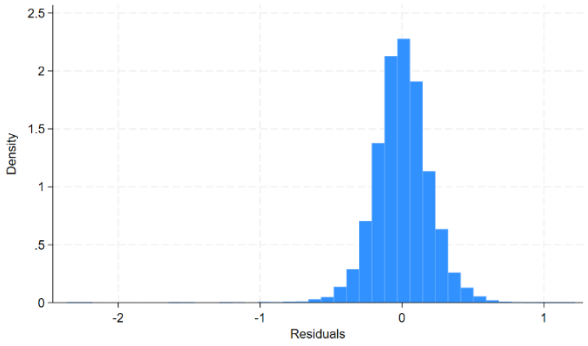


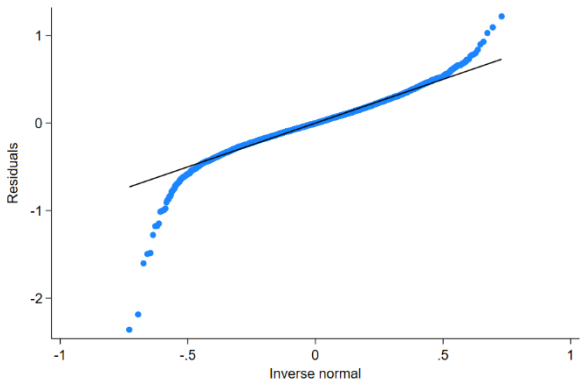



```
H0: Constant variance

    chi2(1) =  41.50
Prob > chi2 =  0.0000
```

Normality of Residuals. Hist e, qnorm e





APPENDIX C: VIF & CORRELATION MATRIX

Variable	VIF	1/VIF
familyassi~e	1.08	0.927587
bvage	1.19	0.840826
mortgage	1.57	0.635488
lnusablefl~a	2.71	0.369013
sustainabi~y	1.10	0.910979
entrance	1.42	0.705662
nrooms	1.88	0.532157
propertytype		
2	3.31	0.302210
3	3.18	0.314139
4	3.79	0.263938
5	1.19	0.841063
6	1.06	0.942466
energylabel		
2	1.42	0.704456
3	1.77	0.564915
4	1.67	0.597339
5	1.53	0.654836
6	1.48	0.677022
7	1.46	0.685437
garagecarp~t	1.57	0.637411
incomecat		
2	2.69	0.372202
3	3.02	0.330741
4	3.87	0.258285
5	3.83	0.261282
livabil~2020	1.34	0.745259
livingenvi~t		
2	5.85	0.171056
3	3.89	0.256850
4	5.81	0.172259
5	3.42	0.292371
livingcost~y	2.47	0.405193
debthouseh~d	1.73	0.578983
region		
2	1.47	0.681264
3	1.45	0.689052
4	1.52	0.656133
5	2.80	0.357166
6	2.25	0.444257
7	1.71	0.586264
8	1.72	0.582499
9	1.41	0.708830
10	1.74	0.575627
11	1.66	0.602596
12	1.63	0.612444
13	1.73	0.578962
14	3.43	0.291607
15	2.16	0.464023
16	3.74	0.267195
17	1.58	0.631419
18	1.62	0.617267
19	2.74	0.364625
20	2.87	0.348444
21	1.51	0.663339
22	1.79	0.558504
23	1.51	0.660999
24	2.10	0.476718
25	1.56	0.639376
26	1.63	0.611857
27	1.53	0.655045
28	2.08	0.481261
29	1.69	0.590872
30	1.59	0.630474
31	1.40	0.716416
households~s	1.01	0.988951
buildingage	1.88	0.531689
elderlyprop	1.05	0.953504
Mean VIF	2.12	

	lnw~2021	famil~ce	famil~ge	taxfre~t	bvage	mortgage	lnusab~a	sustai~y	entrance	nrooms	garage~t	liv~2020	living~y	debtho~d	househ~s	buildi~e	elderl~p
lnwozva~2021	1.0000																
familyassi~e	-0.0055	1.0000															
familymort~e	0.0084	0.7691	1.0000														
taxfreegift	-0.0126	0.6646	0.1135	1.0000													
bvage	0.2204	-0.2027	-0.0646	-0.2660	1.0000												
mortgage	0.0316	0.0127	-0.0146	0.0305	-0.0908	1.0000											
lnusablefl~a	0.5806	-0.1118	-0.0565	-0.1236	0.2450	0.0253	1.0000										
sustainabi~y	0.0319	-0.0238	-0.0189	-0.0198	0.0714	0.0074	0.1148	1.0000									
entrance	0.0997	-0.0535	-0.0192	-0.0661	0.0743	0.0305	0.2301	0.0802	1.0000								
nrooms	0.3821	-0.0390	-0.0145	-0.0526	0.1261	0.0709	0.6198	0.1439	0.2155	1.0000							
garagecarp~t	0.2681	-0.0889	-0.0498	-0.0894	0.1770	-0.0524	0.4338	0.0974	0.1086	0.2424	1.0000						
livabil~2020	0.5011	0.0035	0.0243	-0.0221	0.1446	0.0051	0.3098	0.0610	0.0517	0.1952	0.1802	1.0000					
livingcost~y	0.4615	0.0184	-0.0066	0.0319	-0.0644	0.5309	0.3585	0.0323	0.0699	0.3278	0.0801	0.2326	1.0000				
debthouseh~d	0.3900	0.0073	-0.0047	0.0147	-0.0166	0.3820	0.2739	0.0152	0.0667	0.2529	0.0611	0.1900	0.6200	1.0000			
households~s	0.0092	0.0000	0.0084	-0.0007	0.0108	-0.0139	0.0069	0.0257	-0.0186	-0.0087	-0.0065	0.0166	-0.0043	-0.0121	1.0000		
buildingage	-0.0639	0.0816	0.0577	0.0675	-0.0552	-0.0131	-0.1025	0.1738	-0.1038	0.0327	-0.1257	0.0989	0.0188	-0.0079	0.0478	1.0000	
elderlyprop	-0.0335	-0.0269	-0.0102	-0.0306	0.0558	-0.0995	-0.0319	-0.0232	-0.0157	-0.1041	0.0250	0.0121	-0.0999	-0.0766	0.0356	-0.0671	1.0000

APPENDIX D: REGRESSION RESULTS

Model 0.1

```
. reg lnwozvalue2021 familymortgage
```

Source	SS	df	MS		
Model	.123254667	1	.123254667	Number of obs	10,802
Residual	1761.53471	10,800	.163105066	F(1, 10800)	0.76
Total	1761.65796	10,801	.163101376	Prob > F	0.3847
				R-squared	0.0001
				Adj R-squared	-0.0000
				Root MSE	.40386

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familymortgage	.0134737	.0154996	0.87	0.385	-.0169083	.0438557
_cons	12.64049	.0040238	3141.46	0.000	12.6326	12.64838

Model 0.2

```
. reg lnwozvalue2021 taxfreegift
```

Source	SS	df	MS		
Model	.280865549	1	.280865549	Number of obs	10,802
Residual	1761.3771	10,800	.163090472	F(1, 10800)	1.72
Total	1761.65796	10,801	.163101376	Prob > F	0.1894
				R-squared	0.0002
				Adj R-squared	0.0001
				Root MSE	.40384

lnwozva~2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
taxfreegift	-.0231365	.0176304	-1.31	0.189	-.0576954	.0114224
_cons	12.64258	.0039891	3169.29	0.000	12.63477	12.6504

Model 0.3

```
. reg lnwozvalue2021 familyassistance
```

Source	SS	df	MS		
Model	.053652527	1	.053652527	Number of obs	10,802
Residual	1761.60431	10,800	.16311151	F(1, 10800)	0.33
Total	1761.65796	10,801	.163101376	Prob > F	0.5663
				R-squared	0.0000
				Adj R-squared	-0.0001
				Root MSE	.40387

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	-.0071552	.0124758	-0.57	0.566	-.03161	.0172996
_cons	12.64218	.0041164	3071.16	0.000	12.63411	12.65025

Model 1.1

```
. reg lnwozvalue2021 familyassistance b1.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylab
> el garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress b
> uildingage elderlyprop
```

Source	SS	df	MS		
Model	1350.51149	63	21.4366903	Number of obs	10,802
Residual	411.146475	10,738	.038288925	F(63, 10738)	559.87
Total	1761.65796	10,801	.163101376	Prob > F	0.0000
				R-squared	0.7666
				Adj R-squared	0.7652
				Root MSE	.19568

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0277723	.006276	4.43	0.000	.0154702	.0400745
0.bvage	-.0557204	.005209	-10.70	0.000	-.065931	-.0455098
mortgage	-.1000175	.0065073	-15.37	0.000	-.1127731	-.0872619
lnusablefloorarea	.4245449	.0086797	48.91	0.000	.4075311	.4415587
sustainability	-.017488	.0039866	-4.39	0.000	-.0253024	-.0096735
entrance	.0413282	.006433	6.42	0.000	.0287183	.0539381
nrooms	.0090271	.0018424	4.90	0.000	.0054156	.0126386
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0489782	.0068856	-7.11	0.000	-.0624752	-.0354812
half-vrijstaande woning	.0055543	.0087179	0.64	0.524	-.0115343	.022643
vrijstaande woning	.1417009	.0096778	14.64	0.000	.1227307	.1606711
boerderij, woning met tuindersbedrijf	.1179033	.0291081	4.05	0.000	.0608461	.1749606
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0712088	.0368508	1.93	0.053	-.0010256	.1434432
energylabel						
B	-.0560392	.0060181	-9.31	0.000	-.0678358	-.0442426
C	-.1036946	.0057338	-18.08	0.000	-.1149338	-.0924553
D	-.1096133	.0074671	-14.68	0.000	-.1242501	-.0949765
E	-.110364	.0088189	-12.51	0.000	-.1276508	-.0930773
F	-.1330957	.0099589	-13.36	0.000	-.152617	-.1135744
G	-.1552663	.0113451	-13.69	0.000	-.1775047	-.1330279
garagecarport	.0526052	.0047255	11.13	0.000	.0433422	.0618681
incomecat						
1 tot 1,5 keer modaal	.0301778	.0081139	3.72	0.000	.014273	.0460825
1,5 tot 2 keer modaal	.0463863	.0080695	5.75	0.000	.0305686	.062204
2 tot 3 keer modaal	.0736271	.0080256	9.17	0.000	.0578954	.0893589
vanaf 3 keer modaal	.1179995	.0087727	13.45	0.000	.1008034	.1351957
livabilityscore2020	.9025507	.0174297	51.78	0.000	.8683853	.9367161
livingenvironment						
buiten-centrum	-.0628491	.0093872	-6.70	0.000	-.0812497	-.0444485
groen-stedelijk	-.0767042	.0102407	-7.49	0.000	-.0967778	-.0566306
centrum-dorps	-.1105186	.0098192	-11.26	0.000	-.1297661	-.0912712
landelijk wonen	-.1522795	.0112463	-13.54	0.000	-.1743243	-.1302347

livingcostsmonthly	.0001266	6.12e-06	20.70	0.000	.0001146	.0001386
debthousehold	1.55e-07	1.75e-08	8.89	0.000	1.21e-07	1.89e-07
region						
Leeuwarden	-.035341	.0180173	-1.96	0.050	-.0706582	-.0000237
Heerenveen	.0043742	.0182764	0.24	0.811	-.031451	.0401994
Emmen	-.1031034	.0173702	-5.94	0.000	-.1371522	-.0690546
Zwolle	.1625612	.0126548	12.85	0.000	.1377554	.187367
Enschede	.048353	.0137078	3.53	0.000	.0214831	.0752229
Lelystad	.1941438	.0158659	12.24	0.000	.1630438	.2252438
Apeldoorn	.1882504	.0156611	12.02	0.000	.1575518	.2189491
Doetinchem	.0358173	.0188635	1.90	0.058	-.0011587	.0727934
Arnhem	.1782671	.0156439	11.40	0.000	.1476021	.2089322
Nijmegen	.2052291	.0160987	12.75	0.000	.1736726	.2367856
Ede	.3575336	.0164228	21.77	0.000	.3253419	.3897252
Amersfoort	.4120501	.0159364	25.86	0.000	.3808117	.4432884
Utrecht	.5252105	.012515	41.97	0.000	.5006788	.5497423
Alkmaar	.2565287	.0139669	18.37	0.000	.229151	.2839063
Amsterdam	.5562342	.0122639	45.36	0.000	.5321947	.5802738
Gouda	.3395177	.0170417	19.92	0.000	.3061128	.3729225
Leiden	.4892618	.017003	28.78	0.000	.4559327	.5225908
Den Haag	.3836083	.0132845	28.88	0.000	.3575682	.4096484
Rotterdam	.3374158	.0129046	26.15	0.000	.3121203	.3627112
Dordrecht	.2633753	.0177699	14.82	0.000	.2285431	.2982075
Middelburg	.0557179	.0152819	3.65	0.000	.0257626	.0856733
Roosendaal	.1668815	.0177545	9.40	0.000	.1320795	.2016835
Breda	.3160168	.0141056	22.40	0.000	.2883672	.3436665
Tilburg	.2665277	.0170934	15.59	0.000	.2330215	.3000339
Den Bosch	.3328131	.0162968	20.42	0.000	.3008683	.3647578
Oss	.1605388	.0172987	9.28	0.000	.1266302	.1944473
Eindhoven	.2656201	.0141035	18.83	0.000	.2379746	.2932656
Venlo	.0469249	.0158621	2.96	0.003	.0158322	.0780175
Sittard	-.0416945	.0168997	-2.47	0.014	-.0748211	-.0085679
Maastricht	.2051205	.0193949	10.58	0.000	.167103	.243138
householdsadress	.0118842	.0196711	0.60	0.546	-.0266748	.0504431
buildingage	.0001152	.0000722	1.60	0.111	-.0000264	.0002568
elderlyprop	.0266693	.0126997	2.10	0.036	.0017755	.051563
_cons	6.517138	.0791156	82.37	0.000	6.362057	6.672219

Model 1.2

```
. reg lnwozvalue2021 familyassistance b1.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylab
> el garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress b
> uildingage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(63, 10738)      =     545.43
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7666
                                                Root MSE          =     .19568
```

lnwozvalue2021	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0277723	.0061787	4.49	0.000	.015661	.0398837
0.bvage	-.0557204	.0050335	-11.07	0.000	-.065587	-.0458538
mortgage	-.1000175	.0072511	-13.79	0.000	-.1142311	-.0858039
lnusablefloorarea	.4245449	.0134629	31.53	0.000	.3981551	.4509347
sustainability	-.017488	.0039147	-4.47	0.000	-.0251616	-.0098144
entrance	.0413282	.0075275	5.49	0.000	.0265729	.0560836
nrooms	.0090271	.0021241	4.25	0.000	.0048634	.0131907
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0489782	.0078003	-6.28	0.000	-.0642682	-.0336881
half-vrijstaande woning	.0055543	.0098337	0.56	0.572	-.0137216	.0248303
vrijstaande woning	.1417009	.011599	12.22	0.000	.1189647	.1644371
boerderij, woning met tuindersbedrijf	.1179033	.0471694	2.50	0.012	.0254426	.2103641
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0712088	.0770936	0.92	0.356	-.0799089	.2223264
energylabel						
B	-.0560392	.0058853	-9.52	0.000	-.0675755	-.0445029
C	-.1036946	.0058585	-17.70	0.000	-.1151783	-.0922109
D	-.1096133	.0078211	-14.02	0.000	-.124944	-.0942826
E	-.110364	.0095958	-11.50	0.000	-.1291736	-.0915545
F	-.1330957	.0112997	-11.78	0.000	-.1552452	-.1109462
G	-.1552663	.0137866	-11.26	0.000	-.1822906	-.1282421
garagecarport	.0526052	.0051868	10.14	0.000	.042438	.0627723

incomecat						
1 tot 1,5 keer modaal	.0301778	.0087779	3.44	0.001	.0129715	.047384
1,5 tot 2 keer modaal	.0463863	.0086464	5.36	0.000	.0294378	.0633348
2 tot 3 keer modaal	.0736271	.0087129	8.45	0.000	.0565482	.0907061
vanaf 3 keer modaal	.1179995	.009656	12.22	0.000	.0990719	.1369272
livabilityscore2020	.9025507	.0188904	47.78	0.000	.865522	.9395795
livingenvironment						
buiten-centrum	-.0628491	.0102063	-6.16	0.000	-.0828553	-.0428428
groen-stedelijk	-.0767042	.0108717	-7.06	0.000	-.0980148	-.0553937
centrum-dorps	-.1105186	.0105504	-10.48	0.000	-.1311995	-.0898378
landelijk wonen	-.1522795	.0123678	-12.31	0.000	-.1765226	-.1280364
livingcostsmonthly	.0001266	7.25e-06	17.46	0.000	.0001124	.0001409
debthousehold	1.55e-07	1.97e-08	7.87	0.000	1.17e-07	1.94e-07
region						
Leeuwarden	-.035341	.0178139	-1.98	0.047	-.0702595	-.0004225
Heerenveen	.0043742	.0178552	0.24	0.806	-.0306253	.0393736
Emmen	-.1031034	.0182761	-5.64	0.000	-.138928	-.0672788
Zwolle	.1625612	.0130945	12.41	0.000	.1368935	.188229
Enschede	.048353	.0136628	3.54	0.000	.0215713	.0751346
Lelystad	.1941438	.0163444	11.88	0.000	.1621057	.2261818
Apeldoorn	.1882504	.0152026	12.38	0.000	.1584506	.2180503
Doetinchem	.0358173	.020685	1.73	0.083	-.004729	.0763637
Arnhem	.1782671	.0162374	10.98	0.000	.1464388	.2100955
Nijmegen	.2052291	.0160837	12.76	0.000	.173702	.2367562
Ede	.3575336	.0158074	22.62	0.000	.3265481	.3885191
Amersfoort	.4120501	.015124	27.24	0.000	.3824042	.4416959
Utrecht	.5252105	.0133342	39.39	0.000	.4990729	.5513481
Alkmaar	.2565287	.0145464	17.64	0.000	.2280149	.2850424
Amsterdam	.5562342	.0138325	40.21	0.000	.52912	.5833485
Gouda	.3395177	.0179347	18.93	0.000	.3043624	.3746729
Leiden	.4892618	.0161398	30.31	0.000	.4576248	.5208988
Den Haag	.3836083	.0137331	27.93	0.000	.3566889	.4105278
Rotterdam	.3374158	.0141149	23.90	0.000	.3097479	.3650837
Dordrecht	.2633753	.016568	15.90	0.000	.2308991	.2958516
Middelburg	.0557179	.0168657	3.30	0.001	.022658	.0887778
Roosendaal	.1668815	.0178357	9.36	0.000	.1319203	.2018427
Breda	.3160168	.0142413	22.19	0.000	.2881013	.3439324
Tilburg	.2665277	.0153398	17.37	0.000	.2364589	.2965965
Den Bosch	.3328131	.0172192	19.33	0.000	.2990603	.3665658
Oss	.1605388	.0155739	10.31	0.000	.130011	.1910665
Eindhoven	.2656201	.01459	18.21	0.000	.2370211	.2942191
Venlo	.0469249	.0160507	2.92	0.003	.0154625	.0783872
Sittard	-.0416945	.0169831	-2.46	0.014	-.0749845	-.0084045
Maastricht	.2051205	.0210184	9.76	0.000	.1639206	.2463204
householdsadress	.0118842	.0179905	0.66	0.509	-.0233805	.0471488
buildingage	.0001152	.0000941	1.22	0.221	-.0000692	.0002996
elderlyprop	.0266693	.0154824	1.72	0.085	-.0036791	.0570177
_cons	6.517138	.0939545	69.36	0.000	6.33297	6.701307

Model 2

```
. reg lnwozvalue2021 familymortgage b1.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel
>  garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress bui
> ldingage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(63, 10738)      =     544.66
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7664
                                                Root MSE          =     .19579
```

lnwozvalue2021	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
familymortgage	.0208093	.0078167	2.66	0.008	.005487	.0361315
0.bvage	-.0524034	.0049923	-10.50	0.000	-.0621891	-.0426176
mortgage	-.0999646	.0072527	-13.78	0.000	-.1141813	-.0857479
lnusablefloorarea	.4236075	.0134453	31.51	0.000	.3972522	.4499627
sustainability	-.0174829	.0039168	-4.46	0.000	-.0251605	-.0098053
entrance	.0410197	.0075286	5.45	0.000	.0262622	.0557773
nrooms	.0091584	.0021236	4.31	0.000	.0049957	.0133211
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0492959	.0078072	-6.31	0.000	-.0645994	-.0339924
half-vrijstaande woning	.0053604	.0098383	0.54	0.586	-.0139245	.0246454
vrijstaande woning	.1416756	.0116009	12.21	0.000	.1189356	.1644155
boerderij, woning met tuindersbedrijf	.1171959	.0470435	2.49	0.013	.0249818	.2094099
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0717843	.0769381	0.93	0.351	-.0790285	.2225972

energylabel						
B	-.056371	.0058857	-9.58	0.000	-.067908	-.044834
C	-.1037545	.0058542	-17.72	0.000	-.1152299	-.0922791
D	-.1095197	.0078123	-14.02	0.000	-.1248332	-.0942061
E	-.109966	.0095933	-11.46	0.000	-.1287706	-.0911613
F	-.1329126	.0112949	-11.77	0.000	-.1550526	-.1107725
G	-.155355	.0137769	-11.28	0.000	-.1823603	-.1283497
garagecarport	.0524739	.00519	10.11	0.000	.0423006	.0626472
incomecat						
1 tot 1,5 keer modaal	.0300726	.0087902	3.42	0.001	.0128422	.0473031
1,5 tot 2 keer modaal	.0461287	.0086625	5.33	0.000	.0291487	.0631088
2 tot 3 keer modaal	.0734601	.0087307	8.41	0.000	.0563464	.0905739
vanaf 3 keer modaal	.1179376	.0096705	12.20	0.000	.0989817	.1368935
livabilityscore2020	.9040703	.0188784	47.89	0.000	.8670651	.9410755
livingenvironment						
buiten-centrum	-.0622838	.0102249	-6.09	0.000	-.0823265	-.0422412
groen-stedelijk	-.076585	.0108869	-7.03	0.000	-.0979254	-.0552447
centrum-dorps	-.110502	.0105684	-10.46	0.000	-.131218	-.0897859
landelijk wonen	-.1521187	.0123834	-12.28	0.000	-.1763924	-.127845
livingcostsmonthly	.0001269	7.26e-06	17.48	0.000	.0001126	.0001411
debthousehold	1.55e-07	1.97e-08	7.85	0.000	1.16e-07	1.94e-07
region						
Leeuwarden	-.0349173	.0178154	-1.96	0.050	-.0698387	4.18e-06
Heerenveen	.0045927	.0178639	0.26	0.797	-.0304239	.0396093
Emmen	-.1034186	.0182707	-5.66	0.000	-.1392325	-.0676047
Zwolle	.1625093	.0130894	12.42	0.000	.1368517	.1881668
Enschede	.0483574	.0136672	3.54	0.000	.0215671	.0751477
Lelystad	.193937	.016344	11.87	0.000	.1618998	.2259742
Apeldoorn	.1885037	.0152025	12.40	0.000	.1587041	.2183034
Doetinchem	.036088	.020644	1.75	0.080	-.004378	.0765539
Arnhem	.1786347	.0162205	11.01	0.000	.1468396	.2104298
Nijmegen	.2058394	.0160901	12.79	0.000	.1742998	.2373789
Ede	.3575834	.0158324	22.59	0.000	.3265489	.388618
Amersfoort	.4129192	.0151132	27.32	0.000	.3832945	.442544
Utrecht	.5272383	.013312	39.61	0.000	.5011443	.5533322
Alkmaar	.2566855	.0145483	17.64	0.000	.2281682	.2852029
Amsterdam	.5569979	.0138348	40.26	0.000	.5298792	.5841166
Gouda	.3392599	.0179572	18.89	0.000	.3040604	.3744594
Leiden	.4891434	.0161459	30.30	0.000	.4574944	.5207923
Den Haag	.3838165	.0137376	27.94	0.000	.3568883	.4107447
Rotterdam	.3372675	.0141171	23.89	0.000	.3095954	.3649396
Dordrecht	.2624184	.0165696	15.84	0.000	.229939	.2948978
Middelburg	.0560057	.0168653	3.32	0.001	.0229467	.0890648
Roosendaal	.1669818	.0178102	9.38	0.000	.1320704	.2018932
Breda	.3166067	.0142492	22.22	0.000	.2886756	.3445377
Tilburg	.267436	.0153458	17.43	0.000	.2373553	.2975167
Den Bosch	.3336618	.0172363	19.36	0.000	.2998755	.3674481
Oss	.1610838	.0155695	10.35	0.000	.1305647	.1916028
Eindhoven	.2660772	.014594	18.23	0.000	.2374704	.2946841
Venlo	.0470235	.0160493	2.93	0.003	.0155638	.0784831
Sittard	-.0412827	.0169705	-2.43	0.015	-.074548	-.0080174
Maastricht	.2052965	.0209871	9.78	0.000	.164158	.246435
householdsadress	.0115294	.0179938	0.64	0.522	-.0237419	.0468006
buildingage	.0001197	.0000935	1.28	0.201	-.0000636	.000303
elderlyprop	.0262818	.0154861	1.70	0.090	-.0040737	.0566374
_cons	6.515327	.0939526	69.35	0.000	6.331163	6.699492

Model 3

```
. reg lnwozvalue2021 taxfreegift b1.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel ga
> ragecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildi
> ngage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(63, 10738)      =     546.01
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7668
                                                Root MSE          =     .19561
```

lnwozvalue2021	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
taxfreegift	.0460964	.0084814	5.43	0.000	.0294712	.0627216
0.bvage	-.0580196	.0050637	-11.46	0.000	-.0679454	-.0480938
mortgage	-.1001489	.0072448	-13.82	0.000	-.1143501	-.0859477
lnusablefloorarea	.4245097	.0134487	31.57	0.000	.3981477	.4508716
sustainability	-.0177035	.0039155	-4.52	0.000	-.0253787	-.0100283

entrance	.0415195	.0075275	5.52	0.000	.0267641	.0562748
nrooms	.0090618	.0021227	4.27	0.000	.0049009	.0132226
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0485319	.0077993	-6.22	0.000	-.06382	-.0332439
half-vrijstaande woning	.0060174	.0098308	0.61	0.540	-.0132528	.0252876
vrijstaande woning	.1419891	.0115925	12.25	0.000	.1192656	.1647126
boerderij, woning met tuindersbedrijf	.1198622	.0467929	2.56	0.010	.0281395	.2115849
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0727321	.0767759	0.95	0.343	-.0777629	.223227
energylabel						
B	-.0561956	.0058845	-9.55	0.000	-.0677303	-.044661
C	-.1034958	.0058557	-17.67	0.000	-.114974	-.0920175
D	-.1094081	.0078142	-14.00	0.000	-.1247254	-.0940908
E	-.1109668	.0095956	-11.56	0.000	-.1297758	-.0921577
F	-.1328212	.0112868	-11.77	0.000	-.1549455	-.1106969
G	-.1553487	.0137851	-11.27	0.000	-.1823701	-.1283273
garagecarport	.052433	.0051848	10.11	0.000	.04227	.0625961
incomecat						
1 tot 1,5 keer modaal	.029326	.0087631	3.35	0.001	.0121487	.0465032
1,5 tot 2 keer modaal	.0455244	.0086239	5.28	0.000	.0286199	.0624289
2 tot 3 keer modaal	.0726022	.0086933	8.35	0.000	.0555617	.0896426
vanaf 3 keer modaal	.117111	.0096407	12.15	0.000	.0982135	.1360085
livabilityscore2020	.9036599	.0188752	47.88	0.000	.866661	.9406589
livingenvironment						
buiten-centrum	-.0632767	.0102313	-6.18	0.000	-.083332	-.0432214
groen-stedelijk	-.0772	.0108877	-7.09	0.000	-.0985418	-.0558582
centrum-dorps	-.1108289	.0105688	-10.49	0.000	-.1315458	-.0901121
landelijk wonen	-.1527583	.0123819	-12.34	0.000	-.1770291	-.1284874
livingcostsmonthly	.0001265	7.26e-06	17.43	0.000	.0001123	.0001408
debthousehold	1.55e-07	1.97e-08	7.87	0.000	1.17e-07	1.94e-07
region						
Leeuwarden	-.0338317	.0177697	-1.90	0.057	-.0686636	.0010003
Heerenveen	.0055774	.0179109	0.31	0.756	-.0295313	.0406862
Emmen	-.1020407	.0182203	-5.60	0.000	-.1377558	-.0663256
Zwolle	.1633715	.0130992	12.47	0.000	.1376946	.1890483
Enschede	.0486196	.0136708	3.56	0.000	.0218222	.075417
Lelystad	.1951126	.0163422	11.94	0.000	.1630789	.2271464
Apeldoorn	.1880803	.0151964	12.38	0.000	.1582926	.217868
Doetinchem	.036639	.020739	1.77	0.077	-.0040133	.0772914
Arnhem	.1786532	.0162634	10.98	0.000	.1467739	.2105325
Nijmegen	.2057035	.0161191	12.76	0.000	.1741071	.2373
Ede	.357772	.0158015	22.64	0.000	.3267981	.3887459
Amersfoort	.4131699	.0151041	27.35	0.000	.3835631	.4427768
Utrecht	.5250999	.0133422	39.36	0.000	.4989468	.551253
Alkmaar	.2568941	.0145492	17.66	0.000	.2283749	.2854133
Amsterdam	.5567363	.013834	40.24	0.000	.5296192	.5838534
Gouda	.3401862	.0179169	18.99	0.000	.3050658	.3753065
Leiden	.4889493	.0161332	30.31	0.000	.4573252	.5205734
Den Haag	.3839732	.0137398	27.95	0.000	.3570407	.4109057
Rotterdam	.3374954	.0141169	23.91	0.000	.3098236	.3651672
Dordrecht	.2634389	.0165496	15.92	0.000	.2309985	.2958792
Middelburg	.0572333	.0168506	3.40	0.001	.024203	.0902636
Roosendaal	.167235	.0178338	9.38	0.000	.1322774	.2021926
Breda	.3164241	.0142383	22.22	0.000	.2885145	.3443337
Tilburg	.2670472	.0153364	17.41	0.000	.236985	.2971095
Den Bosch	.3323625	.0172341	19.29	0.000	.2985805	.3661444
Oss	.1616441	.0155557	10.39	0.000	.1311522	.1921361
Eindhoven	.2659714	.0145826	18.24	0.000	.2373869	.2945559
Venlo	.0478605	.0160638	2.98	0.003	.0163725	.0793486
Sittard	-.041831	.0169538	-2.47	0.014	-.0750635	-.0085984
Maastricht	.2050226	.0210324	9.75	0.000	.1637951	.2462501
householdsadress	.0118565	.0180573	0.66	0.511	-.0235392	.0472522
buildingage	.0001164	.000094	1.24	0.216	-.0000679	.0003007
elderlyprop	.0267098	.0154704	1.73	0.084	-.003615	.0570346
_cons	6.514282	.0939158	69.36	0.000	6.33019	6.698374

Model 4

```
. reg lnwozvalue2021 i.familymortgage##i.taxfreegift b1.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertyt
> ype i.energylabel garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region hou
> seholdsadress buildingage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(65, 10736)      =     528.71
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7669
                                                Root MSE          =     .19555
```

lnwozvalue2021	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
familymortgage						
ja	.0122565	.0082179	1.49	0.136	-.003852	.028365
taxfreegift						
ja	.0369913	.0088104	4.20	0.000	.0197213	.0542613
familymortgage#taxfreegift						
ja#ja	.041904	.0247393	1.69	0.090	-.0065896	.0903976
0.bvage	-.0584163	.0050664	-11.53	0.000	-.0683474	-.0484853
mortgage	-.0999078	.0072439	-13.79	0.000	-.1141073	-.0857083
lnusablefloorarea	.4248994	.0134642	31.56	0.000	.398507	.4512918
sustainability	-.0175402	.0039143	-4.48	0.000	-.025213	-.0098674
entrance	.0413974	.0075221	5.50	0.000	.0266526	.0561421
nrooms	.0089832	.002122	4.23	0.000	.0048237	.0131427
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0488129	.0077969	-6.26	0.000	-.0640964	-.0335295
half-vrijstaande woning	.0056321	.0098278	0.57	0.567	-.0136322	.0248963
vrijstaande woning	.1417571	.0115939	12.23	0.000	.1190309	.1644832
boerderij, woning met tuindersbedrijf	.1193977	.0469364	2.54	0.011	.0273937	.2114017
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0720549	.076914	0.94	0.349	-.0787108	.2228206
energylabel						
B	-.0560125	.0058851	-9.52	0.000	-.0675484	-.0444766
C	-.1034549	.0058571	-17.66	0.000	-.114936	-.0919739
D	-.1094798	.0078193	-14.00	0.000	-.124807	-.0941526
E	-.1108003	.0096019	-11.54	0.000	-.1296219	-.0919787
F	-.1332068	.0112967	-11.79	0.000	-.1553505	-.1110632
G	-.1558516	.0137912	-11.30	0.000	-.1828849	-.1288184
garagecarport	.0524815	.005184	10.12	0.000	.04232	.062643
incomecat						
1 tot 1,5 keer modaal	.0299151	.0087703	3.41	0.001	.0127237	.0471065
1,5 tot 2 keer modaal	.0461795	.0086362	5.35	0.000	.0292509	.0631081
2 tot 3 keer modaal	.0735033	.0087079	8.44	0.000	.0564342	.0905724
vanaf 3 keer modaal	.1177973	.009647	12.21	0.000	.0988873	.1367072
livabilityscore2020	.9022806	.0188708	47.81	0.000	.8652903	.9392709
livingenvironment						
buiten-centrum	-.0623707	.0102491	-6.09	0.000	-.0824608	-.0422805
groen-stedelijk	-.076239	.0109056	-6.99	0.000	-.0976161	-.0548619
centrum-dorps	-.1097719	.0105841	-10.37	0.000	-.1305187	-.0890252
landelijk wonen	-.1518692	.0123984	-12.25	0.000	-.1761724	-.127566
livingcostsmonthly	.0001267	7.26e-06	17.46	0.000	.0001125	.0001409
debthousehold	1.55e-07	1.97e-08	7.87	0.000	1.17e-07	1.94e-07

region						
Leeuwarden	-.0341915	.0177998	-1.92	0.055	-.0690824	.0006993
Heerenveen	.0052151	.017925	0.29	0.771	-.0299213	.0403515
Emmen	-.1019509	.0182636	-5.58	0.000	-.137751	-.0661508
Zwolle	.1633791	.013125	12.45	0.000	.1376518	.1891065
Enschede	.0489582	.0136887	3.58	0.000	.0221258	.0757906
Lelystad	.1947639	.0163676	11.90	0.000	.1626803	.2268476
Apeldoorn	.1880463	.0152114	12.36	0.000	.1582291	.2178634
Doetinchem	.0366856	.0207261	1.77	0.077	-.0039414	.0773127
Arnhem	.1789431	.0162687	11.00	0.000	.1470534	.2108328
Nijmegen	.2056591	.0161218	12.76	0.000	.1740574	.2372609
Ede	.3581408	.0158257	22.63	0.000	.3271196	.389162
Amersfoort	.4126313	.0151436	27.25	0.000	.3829471	.4423155
Utrecht	.5242562	.0133713	39.21	0.000	.498046	.5504664
Alkmaar	.25688	.0145659	17.64	0.000	.2283282	.2854319
Amsterdam	.5559183	.0138357	40.18	0.000	.5287977	.5830389
Gouda	.3403905	.0179352	18.98	0.000	.3052341	.3755468
Leiden	.4888467	.0161527	30.26	0.000	.4571843	.520509
Den Haag	.3837541	.0137605	27.89	0.000	.356781	.4107272
Rotterdam	.3375207	.0141388	23.87	0.000	.3098061	.3652353
Dordrecht	.2634833	.0165838	15.89	0.000	.2309761	.2959905
Middelburg	.0567277	.0168908	3.36	0.001	.0236187	.0898367
Roosendaal	.1675054	.0178472	9.39	0.000	.1325216	.2024891
Breda	.316719	.0142636	22.20	0.000	.2887597	.3446782
Tilburg	.2662655	.015365	17.33	0.000	.2361473	.2963837
Den Bosch	.33284	.0172548	19.29	0.000	.2990175	.3666626
Oss	.1613614	.0155685	10.36	0.000	.1308443	.1918786
Eindhoven	.2660538	.0146051	18.22	0.000	.237425	.2946826
Venlo	.0479329	.0160756	2.98	0.003	.0164217	.0794441
Sittard	-.0412773	.0169795	-2.43	0.015	-.0745602	-.0079943
Maastricht	.2048838	.0210083	9.75	0.000	.1637036	.2460639
householdsadress	.0107726	.0180859	0.60	0.551	-.0246792	.0462243
buildingage	.0001147	.0000943	1.22	0.224	-.0000702	.0002997
elderlyprop	.0267093	.0154669	1.73	0.084	-.0036086	.0570273
_cons	6.516334	.0938993	69.40	0.000	6.332274	6.700394

Model 5

```
. reg lnwozvalue2021 i.familyassistance##ib1.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energ
> ylabel garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadre
> ss buildingage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(64, 10737)      =     536.93
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7667
                                                Root MSE          =     .19565
```

lnwozvalue2021	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
1.familyassistance	.0185944	.007828	2.38	0.018	.0032501	.0339387
0.bvage	-.06017	.0054732	-10.99	0.000	-.0708985	-.0494415
familyassistance#bvage						
1 0	.0246828	.0125078	1.97	0.048	.0001653	.0492003
mortgage	-.1001138	.0072493	-13.81	0.000	-.1143238	-.0859038
lnusablefloorarea	.4244852	.0134581	31.54	0.000	.3981048	.4508656
sustainability	-.0175491	.0039149	-4.48	0.000	-.0252231	-.0098751
entrance	.041347	.0075237	5.50	0.000	.0265992	.0560949
nrooms	.00907	.0021243	4.27	0.000	.0049059	.013234
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0486341	.0078024	-6.23	0.000	-.0639283	-.03334
half-vrijstaande woning	.005752	.0098325	0.59	0.559	-.0135215	.0250256
vrijstaande woning	.1416919	.011597	12.22	0.000	.1189596	.1644241
boerderij, woning met tuindersbedrijf	.1186108	.0470618	2.52	0.012	.026361	.2108606
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0719042	.0769479	0.93	0.350	-.0789279	.2227364
energylabel						
B	-.0560065	.0058855	-9.52	0.000	-.0675432	-.0444698
C	-.1035193	.0058617	-17.66	0.000	-.1150094	-.0920292
D	-.1092975	.0078211	-13.97	0.000	-.1246283	-.0939667
E	-.110574	.0096017	-11.52	0.000	-.1293951	-.091753
F	-.1328804	.0113013	-11.76	0.000	-.1550329	-.1107278
G	-.1550531	.0137863	-11.25	0.000	-.1820768	-.1280294
garagecarport	.052411	.0051847	10.11	0.000	.042248	.062574

incomecat						
1 tot 1,5 keer modaal	.0298943	.0087696	3.41	0.001	.0127042	.0470843
1,5 tot 2 keer modaal	.0463488	.0086392	5.36	0.000	.0294144	.0632832
2 tot 3 keer modaal	.0735324	.0087043	8.45	0.000	.0564704	.0905944
vanaf 3 keer modaal	.117927	.0096499	12.22	0.000	.0990114	.1368426
livabilityscore2020	.9025183	.0188852	47.79	0.000	.8654999	.9395368
livingenvironment						
buiten-centrum	-.0627333	.0102069	-6.15	0.000	-.0827408	-.0427259
groen-stedelijk	-.0763118	.0108783	-7.02	0.000	-.0976353	-.0549883
centrum-dorps	-.110209	.0105542	-10.44	0.000	-.1308973	-.0895208
landelijk wonen	-.1519407	.0123686	-12.28	0.000	-.1761854	-.1276961
livingcostsmonthly	.0001271	7.27e-06	17.48	0.000	.0001128	.0001413
debthousehold	1.55e-07	1.97e-08	7.87	0.000	1.17e-07	1.94e-07
region						
Leeuwarden	-.0347502	.0178259	-1.95	0.051	-.0696922	.0001918
Heerenveen	.0044331	.0178683	0.25	0.804	-.0305921	.0394583
Emmen	-.1028575	.018271	-5.63	0.000	-.138672	-.067043
Zwolle	.1626719	.0130983	12.42	0.000	.1369968	.188347
Enschede	.048204	.0136706	3.53	0.000	.021407	.075001
Lelystad	.1943226	.0163654	11.87	0.000	.1622435	.2264017
Apeldoorn	.1880963	.0152117	12.37	0.000	.1582785	.2179141
Doetinchem	.0361033	.0207137	1.74	0.081	-.0044994	.0767061
Arnhem	.1783338	.0162525	10.97	0.000	.1464758	.2101917
Nijmegen	.2049747	.0161046	12.73	0.000	.1734067	.2365428
Ede	.3571562	.0158084	22.59	0.000	.3261689	.3881435
Amersfoort	.4119079	.0151392	27.21	0.000	.3822321	.4415836
Utrecht	.5246573	.0133459	39.31	0.000	.4984969	.5508177
Alkmaar	.2565605	.014554	17.63	0.000	.2280321	.2850889
Amsterdam	.5562279	.0138362	40.20	0.000	.5291063	.5833495
Gouda	.3395205	.0179235	18.94	0.000	.3043871	.3746539
Leiden	.4890319	.0161355	30.31	0.000	.4574034	.5206604
Den Haag	.3835823	.0137386	27.92	0.000	.3566521	.4105125
Rotterdam	.3373675	.0141208	23.89	0.000	.309688	.3650469
Dordrecht	.2638258	.0165732	15.92	0.000	.2313392	.2963123
Middelburg	.0557066	.0168569	3.30	0.001	.0226641	.0887492
Roosendaal	.167346	.0178335	9.38	0.000	.1323891	.2023029
Breda	.3159083	.0142441	22.18	0.000	.2879873	.3438294
Tilburg	.2660448	.0153499	17.33	0.000	.2359561	.2961334
Den Bosch	.3326162	.0172313	19.30	0.000	.2988397	.3663926
Oss	.160409	.0155749	10.30	0.000	.1298794	.1909386
Eindhoven	.2653899	.0145901	18.19	0.000	.2367906	.2939891
Venlo	.0472683	.0160513	2.94	0.003	.0158048	.0787319
Sittard	-.0419041	.016987	-2.47	0.014	-.0752017	-.0086064
Maastricht	.2050838	.0210326	9.75	0.000	.163856	.2463117
householdsadress	.0117076	.0180541	0.65	0.517	-.0236818	.047097
buildingage	.0001125	.0000943	1.19	0.233	-.0000722	.0002973
elderlyprop	.0266714	.0154756	1.72	0.085	-.0036637	.0570066
_cons	6.517609	.0939108	69.40	0.000	6.333527	6.701692

Model 6.1 – Chow test

```
. reg lnwozvalue2021 familyassistance mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel garagec
> arport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildingage
> elderlyprop
```

Source	SS	df	MS		
Model	1346.13031	62	21.7117791	Number of obs	10,802
Residual	415.527655	10,739	.038693329	F(62, 10739)	561.12
				Prob > F	0.0000
				R-squared	0.7641
				Adj R-squared	0.7628
Total	1761.65796	10,801	.163101376	Root MSE	.19671

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0158444	.0062087	2.55	0.011	.0036742	.0280146
mortgage	-.0980885	.0065391	-15.00	0.000	-.1109064	-.0852707
lnusablefloorarea	.4389569	.0086196	50.93	0.000	.4220609	.455853

sustainability	-.0157242	.0040042	-3.93	0.000	-.0235731	-.0078753
entrance	.0434765	.0064637	6.73	0.000	.0308064	.0561466
nrooms	.0092359	.001852	4.99	0.000	.0056056	.0128662
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0499814	.0069212	-7.22	0.000	-.0635482	-.0364146
half-vrijstaande woning	.0068241	.008763	0.78	0.436	-.0103529	.0240012
vrijstaande woning	.1442557	.0097258	14.83	0.000	.1251913	.16332
boerderij, woning met tuindersbedrijf	.1167245	.0292612	3.99	0.000	.0593671	.1740818
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0780391	.0370393	2.11	0.035	.0054352	.1506431
energylabel						
B	-.0552062	.0060493	-9.13	0.000	-.067064	-.0433485
C	-.1036544	.005764	-17.98	0.000	-.1149528	-.0923559
D	-.1097378	.0075064	-14.62	0.000	-.1244517	-.0950239
E	-.1138241	.0088594	-12.85	0.000	-.1311902	-.096458
F	-.1339991	.010011	-13.39	0.000	-.1536225	-.1143757
G	-.1566319	.0114041	-13.73	0.000	-.178986	-.1342777
garagecarport	.0550135	.004745	11.59	0.000	.0457124	.0643147
incomecat						
1 tot 1,5 keer modaal	.0284774	.0081551	3.49	0.000	.0124919	.0444628
1,5 tot 2 keer modaal	.0419524	.0081013	5.18	0.000	.0260724	.0578325
2 tot 3 keer modaal	.0685763	.0080539	8.51	0.000	.0527891	.0843635
vanaf 3 keer modaal	.1168107	.0088182	13.25	0.000	.0995253	.134096
livabilityscore2020	.921112	.0174345	52.83	0.000	.8869372	.9552867
livingenvironment						
buiten-centrum	-.0617089	.009436	-6.54	0.000	-.0802053	-.0432126
groen-stedelijk	-.0763705	.0102946	-7.42	0.000	-.0965497	-.0561912
centrum-dorps	-.1115334	.0098705	-11.30	0.000	-.1308813	-.0921854
landelijk wonen	-.1539154	.0113045	-13.62	0.000	-.1760743	-.1317565
livingcostsmonthly	.0001173	6.09e-06	19.27	0.000	.0001054	.0001293
debthousehold	1.55e-07	1.76e-08	8.81	0.000	1.20e-07	1.89e-07
region						
Leeuwarden	-.0354722	.0181122	-1.96	0.050	-.0709755	.0000311
Heerenveen	.0069852	.0183711	0.38	0.704	-.0290255	.0429958
Emmen	-.1033945	.0174616	-5.92	0.000	-.1376225	-.0691664
Zwolle	.1639405	.0127208	12.89	0.000	.1390054	.1888757
Enschede	.0482216	.01378	3.50	0.000	.0212102	.075233
Lelystad	.1960495	.0159484	12.29	0.000	.1647877	.2273114
Apeldoorn	.1930085	.0157372	12.26	0.000	.1621606	.2238564
Doetinchem	.0377557	.018962	1.99	0.046	.0005866	.0749248
Arnhem	.1836036	.0157183	11.68	0.000	.1527927	.2144145
Nijmegen	.2052331	.0161835	12.68	0.000	.1735104	.2369558
Ede	.3621523	.0165036	21.94	0.000	.3298023	.3945023
Amersfoort	.4172195	.016013	26.06	0.000	.3858311	.4486079
Utrecht	.5302623	.012572	42.18	0.000	.5056189	.5549057
Alkmaar	.2630802	.0140269	18.76	0.000	.2355849	.2905756
Amsterdam	.5658226	.0122956	46.02	0.000	.541721	.5899241
Gouda	.3457662	.0171214	20.19	0.000	.3122052	.3793273
Leiden	.4954505	.0170827	29.00	0.000	.4619653	.5289357
Den Haag	.3910299	.0133363	29.32	0.000	.3648884	.4171715
Rotterdam	.343308	.0129608	26.49	0.000	.3179025	.3687135
Dordrecht	.2643395	.0178632	14.80	0.000	.2293243	.2993548
Middelburg	.0593937	.0153585	3.87	0.000	.0292882	.0894992
Roosendaal	.1707516	.0178443	9.57	0.000	.1357735	.2057297
Breda	.3207124	.0141731	22.63	0.000	.2929306	.3484942
Tilburg	.2707533	.0171788	15.76	0.000	.2370796	.3044269
Den Bosch	.3370297	.0163779	20.58	0.000	.3049261	.3691334
Oss	.1624489	.0173888	9.34	0.000	.1283636	.1965343
Eindhoven	.266586	.0141775	18.80	0.000	.2387954	.2943765
Venlo	.0480619	.0159453	3.01	0.003	.0168062	.0793177
Sittard	-.0389808	.0169868	-2.29	0.022	-.0722782	-.0056835
Maastricht	.2079518	.0194952	10.67	0.000	.1697375	.246166
householdsadress	.0131838	.0197743	0.67	0.505	-.0255775	.0519452
buildingage	.0001085	.0000726	1.49	0.135	-.0000338	.0002508
elderlyprop	.032245	.0127558	2.53	0.011	.0072413	.0572488
_cons	6.362894	.0782002	81.37	0.000	6.209607	6.51618

Model 6.2 – Chow test

```
. reg lnwozvalue2021 familyassistance mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel garagec
> arport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildingage
> elderlyprop if lfthh3 == 1
```

Source	SS	df	MS		
Model	208.577924	62	3.36416007	Number of obs	= 2,078
Residual	61.351199	2,015	.030447245	F(62, 2015)	= 110.49
				Prob > F	= 0.0000
Total	269.929123	2,077	.129961061	R-squared	= 0.7727
				Adj R-squared	= 0.7657
				Root MSE	= .17449

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0573133	.0095131	6.02	0.000	.0386567	.0759699
mortgage	-.1458947	.0177907	-8.20	0.000	-.1807849	-.1110046
lnusablefloorarea	.287009	.0184515	15.55	0.000	.2508229	.323195
sustainability	-.0097558	.0081641	-1.19	0.232	-.0257667	.0062552
entrance	.0289458	.0132655	2.18	0.029	.0029303	.0549613
nrooms	.0166492	.0039896	4.17	0.000	.0088251	.0244734
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	.0127274	.0148784	0.86	0.392	-.0164513	.0419061
half-vrijstaande woning	.0578862	.0210712	2.75	0.006	.0165626	.0992099
vrijstaande woning	.1436237	.0252076	5.70	0.000	.094188	.1930593
boerderij, woning met tuindersbedrijf	.3809961	.0722866	5.27	0.000	.2392317	.5227604
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0128728	.17763	0.07	0.942	-.335485	.3612305
energylabel						
B	-.0864044	.0140498	-6.15	0.000	-.113958	-.0588508
C	-.1159526	.0125113	-9.27	0.000	-.140489	-.0914163
D	-.1146979	.0154811	-7.41	0.000	-.1450585	-.0843373
E	-.1152992	.0163057	-7.07	0.000	-.147277	-.0833213
F	-.118052	.0192095	-6.15	0.000	-.1557246	-.0803794
G	-.1765702	.0223883	-7.89	0.000	-.2204769	-.1326635
garagecarport	.0583481	.0107783	5.41	0.000	.0372103	.0794859
incomecat						
1 tot 1,5 keer modaal	.0222975	.0173701	1.28	0.199	-.0117676	.0563627
1,5 tot 2 keer modaal	.0591612	.0170136	3.48	0.001	.0257951	.0925274
2 tot 3 keer modaal	.1036376	.0171829	6.03	0.000	.0699394	.1373358
vanaf 3 keer modaal	.146975	.0194854	7.54	0.000	.1087613	.1851886
livabilityscore2020	.6826194	.0369006	18.50	0.000	.610252	.7549868
livingenvironment						
buiten-centrum	-.0774814	.0174141	-4.45	0.000	-.1116329	-.0433298
groen-stedelijk	-.0913269	.0201267	-4.54	0.000	-.1307982	-.0518556
centrum-dorps	-.1407106	.0188434	-7.47	0.000	-.1776653	-.1037559
landelijk wonen	-.1561928	.0226786	-6.89	0.000	-.2006688	-.1117169
livingcostsmonthly	.0002423	.0000154	15.72	0.000	.000212	.0002725
debthousehold	1.83e-07	3.76e-08	4.88	0.000	1.10e-07	2.57e-07

region						
Leeuwarden	-.0364605	.0352649	-1.03	0.301	-.1056199	.0326989
Heerenveen	-.0482489	.0427091	-1.13	0.259	-.1320076	.0355097
Emmen	-.0676646	.0348648	-1.94	0.052	-.1360394	.0007102
Zwolle	.156224	.0248812	6.28	0.000	.1074285	.2050195
Enschede	.0331386	.0270077	1.23	0.220	-.0198274	.0861046
Lelystad	.1698731	.0318225	5.34	0.000	.1074648	.2322815
Apeldoorn	.1070899	.0352598	3.04	0.002	.0379404	.1762394
Doetinchem	-.0049459	.0394683	-0.13	0.900	-.0823488	.0724571
Arnhem	.1741457	.0337651	5.16	0.000	.1079276	.2403639
Nijmegen	.1718666	.0299391	5.74	0.000	.1131519	.2305814
Ede	.3331252	.0338874	9.83	0.000	.2666673	.3995831
Amersfoort	.3331934	.0333205	10.00	0.000	.2678472	.3985397
Utrecht	.4525466	.0241065	18.77	0.000	.4052703	.4998228
Alkmaar	.2069079	.0298578	6.93	0.000	.1483525	.2654632
Amsterdam	.5337904	.0251493	21.22	0.000	.4844692	.5831117
Gouda	.2386129	.0355607	6.71	0.000	.1688732	.3083526
Leiden	.4226149	.0356196	11.86	0.000	.3527599	.4924699
Den Haag	.3145352	.026698	11.78	0.000	.2621766	.3668937
Rotterdam	.3015266	.0254588	11.84	0.000	.2515983	.351455
Dordrecht	.243329	.0320604	7.59	0.000	.180454	.3062041
Middelburg	.0226051	.0329001	0.69	0.492	-.0419167	.0871269
Roosendaal	.1424424	.0366969	3.88	0.000	.0704746	.2144101
Breda	.2853902	.0289093	9.87	0.000	.228695	.3420855
Tilburg	.2341553	.0345926	6.77	0.000	.1663142	.3019963
Den Bosch	.3140941	.0341452	9.20	0.000	.2471305	.3810577
Oss	.1615464	.0367742	4.39	0.000	.089427	.2336658
Eindhoven	.2377683	.0283307	8.39	0.000	.1822077	.2933289
Venlo	.0690155	.0328015	2.10	0.035	.0046871	.1333439
Sittard	-.057536	.0361582	-1.59	0.112	-.1284474	.0133753
Maastricht	.049968	.0390387	1.28	0.201	-.0265923	.1265284
householdsadress	-.0384029	.046381	-0.83	0.408	-.1293625	.0525568
buildingage	.0000111	.0001398	0.08	0.937	-.0002631	.0002853
elderlyprop	-.0107724	.0495839	-0.22	0.828	-.1080135	.0864686
_cons	7.893505	.1707863	46.22	0.000	7.558569	8.228441

Model 6.3 – Chow test

```
. reg lnwozvalue2021 familyassistance mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel garagec
> arport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildingage
> elderlyprop if lfthh3 == 2
```

Source	SS	df	MS		
Model	790.978357	62	12.7577154	Number of obs	= 6,153
Residual	222.305982	6,090	.036503445	F(62, 6090)	= 349.49
				Prob > F	= 0.0000
Total	1013.28434	6,152	.164708118	R-squared	= 0.7806
				Adj R-squared	= 0.7784
				Root MSE	= .19106

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0307838	.0084738	3.63	0.000	.0141723	.0473954
mortgage	-.1079191	.0098473	-10.96	0.000	-.1272234	-.0886148
lnusablefloorarea	.4028492	.0118515	33.99	0.000	.3796161	.4260823
sustainability	-.0144954	.0052024	-2.79	0.005	-.0246941	-.0042968
entrance	.0180854	.0087764	2.06	0.039	.0008805	.0352904
nrooms	.0081966	.0023537	3.48	0.001	.0035826	.0128106
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0200946	.0098842	-2.03	0.042	-.0394711	-.0007181
half-vrijstaande woning	.0456197	.0123161	3.70	0.000	.0214758	.0697637
vrijstaande woning	.176802	.0136432	12.96	0.000	.1500565	.2035475
boerderij, woning met tuindersbedrijf	.1161501	.0394034	2.95	0.003	.0389055	.1933948
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0928791	.0426856	2.18	0.030	.0092002	.1765579
energylabel						
B	-.0670646	.0078693	-8.52	0.000	-.0824912	-.0516379
C	-.1041658	.0074783	-13.93	0.000	-.1188259	-.0895056
D	-.1098627	.0096699	-11.36	0.000	-.1288191	-.0909064
E	-.1053849	.0118087	-8.92	0.000	-.1285341	-.0822357
F	-.1364755	.012787	-10.67	0.000	-.1615425	-.1114084
G	-.1455142	.0145167	-10.02	0.000	-.1739721	-.1170563
garagecarport	.0310696	.0061251	5.07	0.000	.0190622	.0430769
incomecat						
1 tot 1,5 keer modaal	.0263806	.0133069	1.98	0.047	.0002944	.0524668
1,5 tot 2 keer modaal	.0331494	.0127785	2.59	0.010	.008099	.0581997
2 tot 3 keer modaal	.070288	.0124764	5.63	0.000	.0458298	.0947462
vanaf 3 keer modaal	.1264188	.0130161	9.71	0.000	.1009027	.1519349
livabilityscore2020	.8895342	.0228445	38.94	0.000	.8447509	.9343174

livingenvironment						
buiten-centrum	-.0660049	.0128243	-5.15	0.000	-.0911451	-.0408648
groen-stedelijk	-.0862832	.0139708	-6.18	0.000	-.113671	-.0588955
centrum-dorps	-.1143552	.0134683	-8.49	0.000	-.1407578	-.0879526
landelijk wonen	-.149179	.0150597	-9.91	0.000	-.1787013	-.1196568
livingcostsmonthly	.0001312	7.40e-06	17.73	0.000	.0001167	.0001457
debthousehold	1.90e-07	2.20e-08	8.66	0.000	1.47e-07	2.34e-07
region						
Leeuwarden	-.0573798	.0239041	-2.40	0.016	-.1042402	-.0105194
Heerenveen	-.0149059	.0240098	-0.62	0.535	-.0619735	.0321617
Emmen	-.1007633	.0233391	-4.32	0.000	-.1465161	-.0550105
Zwolle	.1340337	.016693	8.03	0.000	.1013095	.1667578
Enschede	.0333489	.0180775	1.84	0.065	-.0020894	.0687871
Lelystad	.1848153	.0213434	8.66	0.000	.1429746	.2266559
Apeldoorn	.1716726	.0202094	8.49	0.000	.132055	.2112902
Doetinchem	.0180654	.0247965	0.73	0.466	-.0305445	.0666754
Arnhem	.1609405	.0202244	7.96	0.000	.1212936	.2005875
Nijmegen	.1711746	.0221497	7.73	0.000	.1277533	.2145959
Ede	.3168432	.0218504	14.50	0.000	.2740087	.3596778
Amersfoort	.3959684	.0211901	18.69	0.000	.3544283	.4375084
Utrecht	.5193237	.016414	31.64	0.000	.4871465	.551501
Alkmaar	.2470447	.0181138	13.64	0.000	.2115352	.2825542
Amsterdam	.5414042	.0160776	33.67	0.000	.5098864	.5729221
Gouda	.3244127	.0226669	14.31	0.000	.2799776	.3688479
Leiden	.4761607	.0219331	21.71	0.000	.433164	.5191573
Den Haag	.3657485	.0174738	20.93	0.000	.3314937	.4000032
Rotterdam	.3162857	.0170107	18.59	0.000	.2829387	.3496327
Dordrecht	.2380682	.0237456	10.03	0.000	.1915184	.2846179
Middelburg	.0210414	.0206489	1.02	0.308	-.0194378	.0615207
Roosendaal	.1535967	.0229158	6.70	0.000	.1086736	.1985198
Breda	.2946926	.0186041	15.84	0.000	.2582219	.3311633
Tilburg	.260823	.0219231	11.90	0.000	.217846	.3038001
Den Bosch	.3170897	.0211717	14.98	0.000	.2755857	.3585936
Oss	.1517458	.0224238	6.77	0.000	.1077871	.1957044
Eindhoven	.2524193	.0186549	13.53	0.000	.2158491	.2889896
Venlo	.0213738	.0207747	1.03	0.304	-.0193519	.0620995
Sittard	-.0588599	.0223051	-2.64	0.008	-.1025858	-.0151339
Maastricht	.2066655	.0262232	7.88	0.000	.1552588	.2580723
householdsadress	.0298587	.0243959	1.22	0.221	-.0179659	.0776834
buildingage	.0001637	.0000954	1.72	0.086	-.0000234	.0003508
elderlyprop	.0237479	.0246598	0.96	0.336	-.024594	.0720898
_cons	6.679492	.104794	63.74	0.000	6.474059	6.884925

Model 6.4 – Chow test

```
. reg lnwozvalue2021 familyassistance mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel garagec
> arport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildingage
> elderlyprop if lfthh3 == 3
```

Source	SS	df	MS		
Model	285.082672	62	4.59810762	Number of obs	= 2,571
Residual	107.460029	2,508	.042846901	F(62, 2508)	= 107.31
Total	392.542701	2,570	.152740351	Prob > F	= 0.0000
				R-squared	= 0.7262
				Adj R-squared	= 0.7195
				Root MSE	= .20699

lnwozvalue2021	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	-.0121183	.0211565	-0.57	0.567	-.0536044	.0293678
mortgage	-.0715273	.0111448	-6.42	0.000	-.0933812	-.0496733
lnusablefloorarea	.4612831	.0183829	25.09	0.000	.425236	.4973303
sustainability	-.0309907	.0087579	-3.54	0.000	-.0481643	-.0138172
entrance	.059361	.0132169	4.49	0.000	.0334439	.0852782
nrooms	.0121589	.0041248	2.95	0.003	.0040706	.0202472
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0833685	.0138831	-6.01	0.000	-.1105921	-.056145
half-vrijstaande woning	-.0399314	.0162872	-2.45	0.014	-.0718691	-.0079937
vrijstaande woning	.1011829	.0176633	5.73	0.000	.0665467	.1358191
boerderij, woning met tuindersbedrijf	.0487474	.0540012	0.90	0.367	-.0571441	.1546389
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0681768	.0812644	0.84	0.402	-.0911753	.2275289
energylabel						
B	-.0295092	.0119963	-2.46	0.014	-.0530329	-.0059856
C	-.093933	.0121085	-7.76	0.000	-.1176767	-.0701892
D	-.0955317	.0166996	-5.72	0.000	-.1282782	-.0627852
E	-.1230293	.0210388	-5.85	0.000	-.1642844	-.0817741
F	-.1446855	.025208	-5.74	0.000	-.1941162	-.0952549
G	-.1317298	.0276872	-4.76	0.000	-.1860218	-.0774377

garagecarport	.0643326	.0099959	6.44	0.000	.0447315	.0839337
incomecat						
1 tot 1,5 keer modaal	.0366901	.0128945	2.85	0.004	.0114053	.061975
1,5 tot 2 keer modaal	.0758219	.0139445	5.44	0.000	.048478	.1031658
2 tot 3 keer modaal	.1108114	.0151073	7.33	0.000	.0811875	.1404354
vanaf 3 keer modaal	.1323566	.01986	6.66	0.000	.093413	.1713003
livabilityscore2020	.9026972	.0384445	23.48	0.000	.8273109	.9780835
livingenvironment						
buiten-centrum	-.036021	.020261	-1.78	0.076	-.0757511	.003709
groen-stedelijk	-.0331799	.021257	-1.56	0.119	-.0748629	.0085031
centrum-dorps	-.0689218	.0204136	-3.38	0.001	-.1089511	-.0288926
landelijk wonen	-.132141	.0239521	-5.52	0.000	-.1791089	-.085173
livingcostsmonthly	.0001195	.0000183	6.54	0.000	.0000837	.0001553
debthousehold	1.63e-07	4.26e-08	3.82	0.000	7.92e-08	2.46e-07
region						
Leeuwarden	.0250165	.0386347	0.65	0.517	-.0507428	.1007757
Heerenveen	.0914424	.0362812	2.52	0.012	.0202981	.1625866
Emmen	-.1027723	.03566	-2.88	0.004	-.1726984	-.0328463
Zwolle	.22438	.0274059	8.19	0.000	.1706395	.2781205
Enschede	.1065824	.0296206	3.60	0.000	.0484991	.1646658
Lelystad	.2217571	.0325598	6.81	0.000	.1579103	.285604
Apeldoorn	.2524736	.0327751	7.70	0.000	.1882045	.3167426
Doetinchem	.120828	.039124	3.09	0.002	.0441094	.1975466
Arnhem	.203894	.0333002	6.12	0.000	.1385954	.2691926
Nijmegen	.2691325	.0337356	7.98	0.000	.2029799	.335285
Ede	.4178446	.0338473	12.34	0.000	.3514731	.4842162
Amersfoort	.4488189	.0327642	13.70	0.000	.3845712	.5130667
Utrecht	.5415514	.0295773	18.31	0.000	.4835529	.5995499
Alkmaar	.3037878	.0298866	10.16	0.000	.2451829	.3623928
Amsterdam	.5575136	.0267922	20.81	0.000	.5049765	.6100507
Gouda	.3941894	.0348853	11.30	0.000	.3257824	.4625964
Leiden	.5215071	.037175	14.03	0.000	.4486102	.594404
Den Haag	.4490909	.0290483	15.46	0.000	.3921298	.5060521
Rotterdam	.37998	.028231	13.46	0.000	.3246215	.4353385
Dordrecht	.3057661	.041254	7.41	0.000	.2248707	.3866615
Middelburg	.1175514	.0302411	3.89	0.000	.0582513	.1768515
Roosendaal	.1874174	.0389551	4.81	0.000	.1110299	.2638048
Breda	.3504476	.0298144	11.75	0.000	.2919841	.408911
Tilburg	.2846645	.0389859	7.30	0.000	.2082167	.3611124
Den Bosch	.3436337	.0349785	9.82	0.000	.2750441	.4122233
Oss	.1982122	.0367979	5.39	0.000	.1260549	.2703695
Eindhoven	.3014675	.0298108	10.11	0.000	.2430112	.3599238
Venlo	.1058968	.0338018	3.13	0.002	.0396146	.172179
Sittard	.0062088	.0347398	0.18	0.858	-.0619128	.0743303
Maastricht	.2904953	.0393413	7.38	0.000	.2133507	.36764
householdsadress	.0157413	.0442088	0.36	0.722	-.0709483	.1024309
buildingage	.0000757	.0001669	0.45	0.650	-.0002516	.000403
elderlyprop	.0031283	.01673	0.19	0.852	-.0296777	.0359343
_cons	6.265648	.1743065	35.95	0.000	5.923849	6.607448

APPENDIX E: ADDITIONAL TESTING, ROBUSTNESS

Model 7.1 – Alternative dependent variable

```
. reg lnsaleprice familyassistance bvage mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energylabel gara
> gecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildinga
> ge elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(63, 10738)      =     107.43
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3911
                                                Root MSE          =     .52922
```

lnsaleprice	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0875485	.0158677	5.52	0.000	.0564449	.1186521
bvage	-.1312021	.0105522	-12.43	0.000	-.1518864	-.1105177
mortgage	-.1102576	.0236298	-4.67	0.000	-.1565764	-.0639387
lnusablefloorarea	.1982816	.0257584	7.70	0.000	.1477903	.2487729
sustainability	-.0349117	.0111078	-3.14	0.002	-.056685	-.0131383
entrance	.0438505	.0171093	2.56	0.010	.0103131	.0773879
nrooms	-.0184897	.0053929	-3.43	0.001	-.0290608	-.0079185
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.2283186	.0180302	-12.66	0.000	-.2636612	-.1929761
half-vrijstaande woning	-.2060995	.0236271	-8.72	0.000	-.2524131	-.159786
vrijstaande woning	-.0802704	.0267727	-3.00	0.003	-.1327498	-.027791
boerderij, woning met tuindersbedrijf	-.4004615	.134149	-2.99	0.003	-.6634183	-.1375047
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	-.3881359	.1645952	-2.36	0.018	-.7107728	-.0654989
energylabel						
B	-.1031673	.0159156	-6.48	0.000	-.1343648	-.0719697
C	-.1616839	.0169814	-9.52	0.000	-.1949707	-.1283972
D	-.1444783	.0225569	-6.41	0.000	-.188694	-.1002627
E	-.1596492	.0282506	-5.65	0.000	-.2150255	-.1042729
F	-.1601557	.0330071	-4.85	0.000	-.2248557	-.0954557
G	-.2073035	.0407773	-5.08	0.000	-.2872346	-.1273723
garagecarport	.0267756	.0131402	2.04	0.042	.0010183	.0525328
incomecat						
1 tot 1,5 keer modaal	.1033501	.0296449	3.49	0.000	.0452407	.1614596
1,5 tot 2 keer modaal	.177557	.0287375	6.18	0.000	.1212261	.2338879
2 tot 3 keer modaal	.2540736	.028182	9.02	0.000	.1988317	.3093156
vanaf 3 keer modaal	.2961009	.0295322	10.03	0.000	.2382124	.3539895
livabilityscore2020	.5544199	.0474854	11.68	0.000	.4613396	.6475001
livingenvironment						
buiten-centrum	-.0997056	.0229924	-4.34	0.000	-.144775	-.0546362
groen-stedelijk	-.1059196	.0252903	-4.19	0.000	-.1554934	-.0563459
centrum-dorps	-.1227793	.0247156	-4.97	0.000	-.1712263	-.0743322
landelijk wonen	-.1490192	.0293199	-5.08	0.000	-.2064916	-.0915467
livingcostsmonthly	.0004326	.0000166	26.00	0.000	.0004	.0004652
debthousehold	8.33e-07	4.69e-08	17.77	0.000	7.41e-07	9.25e-07

region						
Leeuwarden	.051167	.0517543	0.99	0.323	-.050281	.152615
Heerenveen	.1370715	.0445616	3.08	0.002	.0497225	.2244204
Emmen	-.0004563	.0449043	-0.01	0.992	-.088477	.0875644
Zwolle	.1208211	.032674	3.70	0.000	.056774	.1848682
Enschede	.0393395	.0361139	1.09	0.276	-.0314503	.1101294
Lelystad	.1746098	.0375324	4.65	0.000	.1010393	.2481803
Apeldoorn	.1038744	.0423179	2.45	0.014	.0209236	.1868253
Doetinchem	.0801703	.0515628	1.55	0.120	-.0209024	.1812429
Arnhem	.1143312	.0395459	2.89	0.004	.036814	.1918485
Nijmegen	.076591	.0418606	1.83	0.067	-.0054635	.1586455
Ede	.2306037	.0422678	5.46	0.000	.147751	.3134564
Amersfoort	.2070834	.0474606	4.36	0.000	.1140519	.3001148
Utrecht	.2862763	.0319494	8.96	0.000	.2236495	.3489031
Alkmaar	.1346656	.0362524	3.71	0.000	.0636042	.2057271
Amsterdam	.2285548	.032724	6.98	0.000	.1644097	.2927
Gouda	.1853123	.0470104	3.94	0.000	.0931632	.2774614
Leiden	.2080061	.0438939	4.74	0.000	.121966	.2940463
Den Haag	.1531975	.0329329	4.65	0.000	.088643	.217752
Rotterdam	.1412278	.0342599	4.12	0.000	.0740721	.2083834
Dordrecht	.1230947	.0470837	2.61	0.009	.030802	.2153874
Middelburg	.0948909	.0432823	2.19	0.028	.0100495	.1797323
Roosendaal	.1558295	.0520495	2.99	0.003	.0538028	.2578561
Breda	.2322159	.0380062	6.11	0.000	.1577166	.3067151
Tilburg	.1525599	.0491531	3.10	0.002	.0562108	.2489091
Den Bosch	.1814558	.044174	4.11	0.000	.0948667	.268045
Oss	.1612448	.0436103	3.70	0.000	.0757605	.2467291
Eindhoven	.1385721	.0402446	3.44	0.001	.0596852	.217459
Venlo	-.0510425	.0470646	-1.08	0.278	-.1432978	.0412127
Sittard	-.0615764	.0500318	-1.23	0.218	-.159648	.0364952
Maastricht	.1039734	.0499506	2.08	0.037	.0060611	.2018858
householdsadress	.0313769	.0597398	0.53	0.599	-.0857242	.148478
buildingage	-.0011658	.0003315	-3.52	0.000	-.0018157	-.000516
elderlyprop	.1726832	.0356148	4.85	0.000	.1028716	.2424948
_cons	8.754642	.2264695	38.66	0.000	8.31072	9.198564

Model 7.2 – Alternative dependent variable

```
. reg lnwozvalue2021psqm familyassistance bvage mortgage sustainability entrance nrooms i.propertytype i.energylabel garagecarport i
> .incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress buildingage elderlyp
> rop, robust

Linear regression                               Number of obs     =     10,802
                                                F(62, 10739)      =     163.24
                                                Prob > F          =     0.0000
                                                R-squared         =     0.5221
                                                Root MSE          =     .02904
```

lnwozvalue2021psqm	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
familyassistance	.0052347	.0009771	5.36	0.000	.0033195	.00715
bvage	-.0116136	.0008438	-13.76	0.000	-.0132676	-.0099596
mortgage	.008531	.0011978	7.12	0.000	.006183	.0108789
sustainability	.0000206	.0005939	0.03	0.972	-.0011435	.0011846
entrance	.0024712	.0012502	1.98	0.048	.0000206	.0049218
nrooms	-.0080986	.0002538	-31.91	0.000	-.0085961	-.0076012
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0268745	.0014339	-18.74	0.000	-.0296851	-.0240638
half-vrijstaande woning	-.0304883	.0017699	-17.23	0.000	-.0339577	-.0270189
vrijstaande woning	-.0364285	.0019954	-18.26	0.000	-.04034	-.0325171
boerderij, woning met tuindersbedrijf	-.0518503	.0042616	-12.17	0.000	-.0602038	-.0434968
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	-.0327882	.0111452	-2.94	0.003	-.0546348	-.0109415
energylabel						
B	.0019335	.000949	2.04	0.042	.0000733	.0037937
C	.0040222	.0009038	4.45	0.000	.0022507	.0057937
D	.0054632	.0012557	4.35	0.000	.0030019	.0079245
E	.0103347	.0016609	6.22	0.000	.007079	.0135904
F	.0100804	.001698	5.94	0.000	.006752	.0134089
G	.0079112	.0019506	4.06	0.000	.0040877	.0117347
garagecarport	-.0094954	.0007525	-12.62	0.000	-.0109704	-.0080204
incomecat						
1 tot 1,5 keer modaal	-.0028348	.0014212	-1.99	0.046	-.0056206	-.0000489
1,5 tot 2 keer modaal	-.0068377	.0014762	-4.63	0.000	-.0097313	-.0039442
2 tot 3 keer modaal	-.0075002	.0012895	-5.82	0.000	-.0100279	-.0049726
vanaf 3 keer modaal	-.0090347	.0013913	-6.49	0.000	-.0117618	-.0063075
livabilityscore2020	-.0188966	.0031463	-6.01	0.000	-.025064	-.0127292

livingenvironment						
buiten-centrum	.0001598	.001813	0.09	0.930	-.003394	.0037136
groen-stedelijk	-.0016302	.001819	-0.90	0.370	-.0051958	.0019353
centrum-dorps	.0013468	.0018932	0.71	0.477	-.0023643	.0050578
landelijk wonen	.002142	.0021149	1.01	0.311	-.0020036	.0062876
livingcostsmonthly	-.0000115	8.64e-07	-13.33	0.000	-.0000132	-9.82e-06
debthousehold	-4.05e-09	2.26e-09	-1.79	0.073	-8.49e-09	3.78e-10
region						
Leeuwarden	-.002655	.0020293	-1.31	0.191	-.0066328	.0013228
Heerenveen	.0009778	.0020573	0.48	0.635	-.0030548	.0050105
Emmen	-.0022377	.0021428	-1.04	0.296	-.006438	.0019625
Zwolle	.0021198	.0014454	1.47	0.143	-.0007135	.0049531
Enschede	-.0012359	.0015962	-0.77	0.439	-.0043648	.0018929
Lelystad	.002019	.0030529	0.66	0.508	-.0039653	.0080033
Apeldoorn	.0039915	.0017019	2.35	0.019	.0006555	.0073276
Doetinchem	-.0055924	.0019932	-2.81	0.005	-.0094995	-.0016854
Arnhem	-.0002143	.0018408	-0.12	0.907	-.0038227	.0033941
Nijmegen	-.0006769	.001905	-0.36	0.722	-.004411	.0030571
Ede	.0045886	.0022558	2.03	0.042	.0001668	.0090104
Amersfoort	.0042093	.0018956	2.22	0.026	.0004935	.0079251
Utrecht	.0144872	.0016291	8.89	0.000	.0112939	.0176805
Alkmaar	.0065946	.0016644	3.96	0.000	.0033321	.0098571
Amsterdam	.0151714	.0016358	9.27	0.000	.0119649	.018378
Gouda	.0051192	.0021985	2.33	0.020	.0008097	.0094287
Leiden	.011248	.0022807	4.93	0.000	.0067773	.0157186
Den Haag	.0039582	.0016852	2.35	0.019	.0006548	.0072616
Rotterdam	.0050956	.0023754	2.15	0.032	.0004395	.0097518
Dordrecht	.0042674	.0021074	2.02	0.043	.0001364	.0083984
Middelburg	-.0008213	.0017024	-0.48	0.629	-.0041583	.0025156
Roosendaal	-.0032808	.0019025	-1.72	0.085	-.0070101	.0004485
Breda	.0023314	.0016147	1.44	0.149	-.0008338	.0054966
Tilburg	-.0009141	.0019693	-0.46	0.643	-.0047742	.0029461
Den Bosch	.0036839	.0018902	1.95	0.051	-.0000212	.007389
Oss	-.0019139	.0018291	-1.05	0.295	-.0054993	.0016715
Eindhoven	-.0037185	.0015811	-2.35	0.019	-.0068178	-.0006191
Venlo	-.0046367	.00179	-2.59	0.010	-.0081455	-.001128
Sittard	-.0056181	.0024376	-2.30	0.021	-.0103962	-.0008401
Maastricht	-.003898	.0030453	-1.28	0.201	-.0098674	.0020715
householdsadress	-.0045884	.0027802	-1.65	0.099	-.010038	.0008613
buildingage	.0000901	.0000164	5.50	0.000	.000058	.0001222
elderlyprop	-.0015652	.0019261	-0.81	0.416	-.0053408	.0022103
_cons	.2598839	.0131474	19.77	0.000	.2341127	.2856552

Model 8.1 – Alternative interaction

```
. reg lnwozvalue2021 i.familyassistance##i.lfthh3 mortgage lnusablefloorarea sustainability entrance nrooms i.propertytype i.energyl
> abel garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.region householdsadress
> buildingage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(66, 10735)      =     538.45
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7713
                                                Root MSE          =     .19375
```

lnwozvalue2021	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
1.familyassistance	.0461429	.0097609	4.73	0.000	.0270097	.065276
lfthh3						
35 - 64 jaar	.045144	.0053934	8.37	0.000	.0345719	.0557161
65 jaar en ouder	.1259946	.0076874	16.39	0.000	.1109259	.1410634
familyassistance#lfthh3						
1#35 - 64 jaar	-.0111205	.0127396	-0.87	0.383	-.0360925	.0138515
1#65 jaar en ouder	-.0600233	.0236844	-2.53	0.011	-.1064491	-.0135976
mortgage	-.0955411	.0071853	-13.30	0.000	-.1096255	-.0814566
lnusablefloorarea	.4025737	.0133502	30.15	0.000	.3764048	.4287427
sustainability	-.0182735	.0038766	-4.71	0.000	-.0258724	-.0106746
entrance	.0359844	.0074789	4.81	0.000	.0213244	.0506444
nrooms	.0101188	.0020936	4.83	0.000	.0060148	.0142227
propertytype						
rijtjeshuis, tussenwoning, hoekwoning	-.0376347	.0077394	-4.86	0.000	-.0528053	-.0224642
half-vrijstaande woning	.0164798	.0096966	1.70	0.089	-.0025274	.0354869
vrijstaande woning	.1489179	.0114188	13.04	0.000	.1265349	.1713009
boerderij, woning met tuindersbedrijf	.1259422	.046325	2.72	0.007	.0351366	.2167478
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte	.0815178	.076538	1.07	0.287	-.0685108	.2315465

energylabel						
B	-.0583796	.0058302	-10.01	0.000	-.0698079	-.0469512
C	-.1043962	.0058391	-17.88	0.000	-.1158419	-.0929506
D	-.1073223	.0077516	-13.85	0.000	-.1225168	-.0921278
E	-.1094259	.0095668	-11.44	0.000	-.1281786	-.0906733
F	-.129275	.0111865	-11.56	0.000	-.1512027	-.1073473
G	-.1517854	.0137015	-11.08	0.000	-.1786428	-.1249281
garagecarport	.0462337	.0051139	9.04	0.000	.0362095	.056258
incomecat						
1 tot 1,5 keer modaal	.0316251	.0087761	3.60	0.000	.0144223	.0488279
1,5 tot 2 keer modaal	.0576232	.0086474	6.66	0.000	.0406726	.0745737
2 tot 3 keer modaal	.0923595	.0087905	10.51	0.000	.0751285	.1095906
vanaf 3 keer modaal	.1430267	.0098148	14.57	0.000	.123788	.1622655
livabilityscore2020	.8685056	.0189596	45.81	0.000	.8313413	.9056698
livingenvironment						
buiten-centrum	-.0604908	.0101837	-5.94	0.000	-.0804528	-.0405288
groen-stedelijk	-.075323	.0108049	-6.97	0.000	-.0965027	-.0541433
centrum-dorps	-.109043	.0105168	-10.37	0.000	-.1296579	-.0884281
landelijk wonen	-.1479719	.0123378	-11.99	0.000	-.1721563	-.1237874
livingcostsmonthly	.0001426	7.44e-06	19.16	0.000	.0001281	.0001572
debthousehold	1.82e-07	1.97e-08	9.21	0.000	1.43e-07	2.20e-07
region						
Leeuwarden	-.031449	.0177	-1.78	0.076	-.0661444	.0032463
Heerenveen	.0053972	.0177588	0.30	0.761	-.0294134	.0402077
Emmen	-.1009892	.0183096	-5.52	0.000	-.1368795	-.0650989
Zwolle	.1603004	.0129981	12.33	0.000	.1348217	.185779
Enschede	.0489159	.0135471	3.61	0.000	.022361	.0754707
Lelystad	.1893827	.0162698	11.64	0.000	.1574909	.2212745
Apeldoorn	.1842561	.0150959	12.21	0.000	.1546653	.213847
Doetinchem	.0358694	.0204356	1.76	0.079	-.0041882	.0759271
Arnhem	.1747596	.0161788	10.80	0.000	.1430461	.206473
Nijmegen	.1984591	.0158313	12.54	0.000	.1674268	.2294913
Ede	.3482622	.0155735	22.36	0.000	.3177352	.3787892
Amersfoort	.402183	.0151075	26.62	0.000	.3725695	.4317966
Utrecht	.5167782	.0133197	38.80	0.000	.490669	.5428873
Alkmaar	.2518427	.0144691	17.41	0.000	.2234805	.2802048
Amsterdam	.5466569	.0138534	39.46	0.000	.5195017	.5738122
Gouda	.3285239	.0178895	18.36	0.000	.2934573	.3635906
Leiden	.4782917	.0161136	29.68	0.000	.4467061	.5098772
Den Haag	.3753708	.0136517	27.50	0.000	.3486109	.4021307
Rotterdam	.3286965	.0140537	23.39	0.000	.3011487	.3562444
Dordrecht	.2570009	.0164315	15.64	0.000	.2247922	.2892096
Middelburg	.0501944	.0166659	3.01	0.003	.0175262	.0828625
Roosendaal	.1635036	.0178669	9.15	0.000	.1284811	.1985261
Breda	.3082551	.014193	21.72	0.000	.2804342	.3360761
Tilburg	.2625897	.0153374	17.12	0.000	.2325255	.2926538
Den Bosch	.326153	.0172661	18.89	0.000	.2923082	.3599977
Oss	.1614277	.0155385	10.39	0.000	.1309693	.191886
Eindhoven	.2626622	.0145522	18.05	0.000	.2341373	.2911872
Venlo	.0478622	.0158945	3.01	0.003	.016706	.0790184
Sittard	-.0439564	.0168002	-2.62	0.009	-.076888	-.0110248
Maastricht	.195865	.0205132	9.55	0.000	.1556554	.2360746
householdsadress	.0191109	.0181083	1.06	0.291	-.0163848	.0546066
buildingage	.000101	.000095	1.06	0.288	-.0000853	.0002872
elderlyprop	.0067058	.0154723	0.43	0.665	-.0236227	.0370344
_cons	6.657531	.0943455	70.57	0.000	6.472597	6.842466

Model 8.2 – Alternative interaction

```
. reg lnwozvalue2021 i.familymortgage##i.bvage i.taxfreegift##i.bvage mortgage lnusablefloorarea sustainability entrance nrooms i.pr
> opertytype i.energylabel garagecarport i.incomecat livabilityscore2020 i.livingenvironment livingcostsmonthly debthousehold i.regi
> on householdsadress buildingage elderlyprop, robust

Linear regression                               Number of obs     =     10,802
                                                F(66, 10735)      =     521.17
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7669
                                                Root MSE          =     .19557

------------------------------------------------------------------------------
                             |               Robust
                lnwozvalue2021 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                familymortgage |
                            ja |   .0292143   .0144986     2.01   0.044     .0007944    .0576342
                        1.bvage |   .0616291    .005447    11.31   0.000     .0509519    .0723062
                                |
      familymortgage#bvage |
                       ja#1 |  -.0159689   .0171347    -0.93   0.351    -.0495561    .0176184
                                |
                    taxfreegift |
                            ja |   .0523801   .0110526     4.74   0.000     .0307149    .0740452
                                |
          taxfreegift#bvage |
                       ja#1 |  -.0218383   .0167551    -1.30   0.192    -.0546815    .0110049
                                |
                       mortgage |  -.1000428   .0072463   -13.81   0.000    -.1142468   -.0858388
                lnusablefloorarea |   .4248773   .0134581    31.57   0.000     .398497    .4512576
                   sustainability |  -.0175891   .0039144    -4.49   0.000    -.0252619   -.0099162
                         entrance |   .0414597   .0075226     5.51   0.000     .026714    .0562053
                          nrooms |    .009024   .0021234     4.25   0.000     .0048617    .0131862
                                |
                      propertytype |
rijtjeshuis, tussenwoning, hoekwoning |  -.0484863   .0077986    -6.22   0.000    -.0637729   -.0331997
            half-vrijstaande woning |   .0058388    .009829     0.59   0.552    -.0134278    .0251055
                vrijstaande woning |   .1417562   .0115957    12.22   0.000     .1190265     .164486
boerderij, woning met tuindersbedrijf |   .1194084    .046975     2.54   0.011     .0273287    .2114882
woning met aparte winkel, kantoor-, praktijk- of bedrijfsruimte |   .0721057    .076907     0.94   0.348    -.0786464    .2228577
                                |
                      energylabel |
                             B |  -.0559263   .0058843    -9.50   0.000    -.0674605   -.0443921
                             C |  -.1033929   .0058642   -17.63   0.000    -.1148878    -.091898
                             D |  -.1092999   .0078273   -13.96   0.000    -.1246429   -.0939569
                             E |  -.1108044   .0096095   -11.53   0.000    -.1296408   -.0919679
                             F |  -.1330336   .0113024   -11.77   0.000    -.1551884   -.1108788
                             G |  -.1552913   .0137888   -11.26   0.000    -.1823198   -.1282628
                                |
                  garagecarport |   .0523655   .0051838    10.10   0.000     .0422044    .0625267
                                |
                     incomecat |
          1 tot 1,5 keer modaal |   .0298217   .0087674     3.40   0.001     .0126359    .0470075
          1,5 tot 2 keer modaal |   .0463221   .0086422     5.36   0.000     .0293819    .0632624
            2 tot 3 keer modaal |   .0735959   .0087116     8.45   0.000     .0565195    .0906723
            vanaf 3 keer modaal |   .1178992   .0096488    12.22   0.000     .0989857    .1368127
                                |
           livabilityscore2020 |   .9021125   .0188751    47.79   0.000     .8651138    .9391112
                                |
                livingenvironment |
                  buiten-centrum |  -.0625695   .0102387    -6.11   0.000    -.0826392   -.0424997
                  groen-stedelijk |   -.076125   .0109075    -6.98   0.000    -.0975058   -.0547442
                    centrum-dorps |  -.1098359   .0105792   -10.38   0.000     -.130573   -.0890987
                   landelijk wonen |  -.1517319   .0123933   -12.24   0.000    -.1760251   -.1274386
                                |
                 livingcostsmonthly |    .000127   7.28e-06    17.46   0.000     .0001128    .0001413
                      debthousehold |   1.55e-07   1.97e-08     7.87   0.000     1.17e-07    1.94e-07
```

region						
Leeuwarden	-.0343954	.0178155	-1.93	0.054	-.0693171	.0005263
Heerenveen	.0047521	.0179062	0.27	0.791	-.0303473	.0398515
Emmen	-.1022578	.0182675	-5.60	0.000	-.1380655	-.0664502
Zwolle	.1630078	.0131232	12.42	0.000	.1372839	.1887316
Enschede	.0484769	.0136884	3.54	0.000	.0216451	.0753086
Lelystad	.1946418	.0163716	11.89	0.000	.1625505	.2267331
Apeldoorn	.1879236	.0152252	12.34	0.000	.1580793	.2177679
Doetinchem	.0363953	.0207424	1.75	0.079	-.0042636	.0770543
Arnhem	.1785884	.0162708	10.98	0.000	.1466947	.2104821
Nijmegen	.2050383	.0161212	12.72	0.000	.1734378	.2366389
Ede	.3574712	.0158162	22.60	0.000	.3264685	.3884739
Amersfoort	.4120732	.015149	27.20	0.000	.3823784	.4417679
Utrecht	.5237923	.0133685	39.18	0.000	.4975876	.549997
Alkmaar	.2566728	.0145666	17.62	0.000	.2281196	.285226
Amsterdam	.555859	.0138359	40.18	0.000	.528738	.5829799
Gouda	.3399693	.0179247	18.97	0.000	.3048336	.3751049
Leiden	.488869	.016146	30.28	0.000	.4572199	.5205181
Den Haag	.3835389	.013757	27.88	0.000	.3565727	.4105051
Rotterdam	.3374063	.0141374	23.87	0.000	.3096944	.3651182
Dordrecht	.2638516	.0165806	15.91	0.000	.2313505	.2963528
Middelburg	.056178	.016874	3.33	0.001	.0231019	.0892541
Roosendaal	.1674852	.0178471	9.38	0.000	.1325017	.2024688
Breda	.3161319	.0142538	22.18	0.000	.2881919	.344072
Tilburg	.2657561	.0153642	17.30	0.000	.2356395	.2958727
Den Bosch	.3324221	.0172476	19.27	0.000	.2986135	.3662307
Oss	.1606827	.0155743	10.32	0.000	.1301542	.1912112
Eindhoven	.2654769	.0146008	18.18	0.000	.2368566	.2940972
Venlo	.0476739	.0160672	2.97	0.003	.0161792	.0791685
Sittard	-.0417851	.0169891	-2.46	0.014	-.0750869	-.0084834
Maastricht	.2050125	.0210312	9.75	0.000	.1637875	.2462375
householdsadress	.0110677	.0180941	0.61	0.541	-.0244	.0465355
buildingage	.0001109	.0000946	1.17	0.241	-.0000745	.0002963
elderlyprop	.0267348	.0154704	1.73	0.084	-.0035901	.0570597
_cons	6.455626	.0928894	69.50	0.000	6.273546	6.637707

Frequency table – Model 8.1

```
. tab familyassistance lfthh3
```

familymortgage taxfreegift == 1	Leeftijd (pot) hoofd huishouden (3 klassen)			Total
	tot 35 ja	35 - 64 j	65 jaar e	
0	1,583	5,575	2,468	9,626
1	495	578	103	1,176
Total	2,078	6,153	2,571	10,802

Frequency table 1 – Model 8.2

```
. tab familymortgage bvage
```

(8.4) Geld geleend van familie of vrienden voor aankoop woning	bvage		Total
	0	1	
0	1,869	8,205	10,074
ja	209	519	728
Total	2,078	8,724	10,802

Frequency table 2 – Model 8.2

```
. tab taxfreegift bvage
```

(8.2) Geld gekregen van (schoon)ouders voor aankoop woning	bvage		Total
	0	1	
0	1,722	8,527	10,249
ja	356	197	553
Total	2,078	8,724	10,802

APPENDIX F: DATA MANAGEMENT PLAN

1. General	
1.1 Name & title of thesis	Financial family assistance for housing and housing consumption: Insights from the 2021 Netherlands' Housing Survey
1.2 *(if applicable)* Organisation. Provide details on the organisation where the research takes place if this applies (in case of an internship).	-
2 Data collection – the creation of data	
2.1. Which data formats or which sources are used in the project? For example: - theoretical research, using literature and publicly available resources - Survey Data - Field Data - Interviews	Both academic literature, e.g. obtained via SmartCat, and data from the 2021 Dutch Housing Survey or "WoonOnderzoek Nederland (WoON21)".
2.2 Methods of data collection What method(s) do you use for the collection of data. (Tick all boxes that apply)	☐ Structured individual interviews ☐ Semi-structured individual interviews ☐ Structured group interviews ☐ Semi-structured group interviews ☐ Observations ☐ Survey(s) ☐ Experiment(s) in real life (interventions) ☒ Secondary analyses on existing data sets (if so: please also fill in 2.3) ☒ Public sources (e.g. University Library) ☐ Other (explain):
2.3. (If applicable): if you have selected 'Secondary analyses on existing datasets': who provides the data set?	☐ Data is supplied by the University of Groningen. ☒ Data have been supplied by an external party. Data Archiving and Networked Services (DANS)

3 Storage, Sharing and Archiving	
3.1 Where will the (raw) data be stored *during* research? If you want to store research data, it is good practice to ask yourself some questions: • How big is my dataset at the end of my research? • Do I want to collaborate on the data? • How confidential is my data? • How do I make sure I do not lose my data? Need more information? Take a look at the site of the Digital Competence Centre (DCC)) Feel free to contact the DCC for questions: dcc@rug.nl	☐ X-drive of UG network ☐ Y-drive of UG network ☒ (Shared) UG Google Drive ☐ Unishare ☒ Personal laptop or computer ☐ External devices (USB, harddisk, NAS) ☐ Other (explain):
3.2 Where are you planning to store / archive the data after you have finished your research? Please explain where and for how long. Also explain who has access to these data NB do not use a personal UG network or google drive for archiving data!	☐ X-drive of UG network ☐ Y-drive of UG network ☐ (Shared) UG Google Drive ☐ Unishare ☐ In a repository (i.e. DataverseNL) ☒ Other (explain): Data will be deleted after completion and access can be obtained via the data supplier, DANS. The retention period will be 0 years.
3.3 Sharing of data With whom will you be sharing data during your research?	☐ University of Groningen ☐ Universities or other parties in Europe ☐ Universities or other parties outside Europe ☒ I will not be sharing data
4. Personal data	
4.1 Collecting personal data Will you be collecting personal data?	No

If you are conducting research with personal data you have to comply to the General Data Privacy Regulation (GDPR). Please fill in the questions found in the appendix 3 on personal data.	
If the answer to 4.1 is 'no', please skip the section below and proceed to section 5	
4.2 What kinds of categories of people are involved? Have you determined whether these people are vulnerable in any way (see FAQ)? If so, your supervisor will need to agree.	My research project involves: ☐ Adults (not vulnerable) ≥ 18 years ☐ Minors < 16 years ☐ Minors < 18 years ☐ Patients ☐ (other) vulnerable persons, namely (please provide an explanation what makes these persons vulnerable) (Please give a short description of the categories of research participants that you are going to involve in your research.)
4.3 Will participants be enlisted in the project without their knowledge and/or consent? (E.g., via covert observation of people in public places, or by using social media data.)	Yes/no If yes, please explain if, when and how you will inform the participants about the study.
4.4 Categories of personal data that are processed. Mention all types of data that you systematically collect and store. If you use particular kinds of software, then check what the software is doing as well. Of course, always ask yourself if you need all categories of data for your project.	☐ Name and address details ☐ Telephone number ☐ Email address ☐ Nationality ☐ IP-addresses and/or device type ☐ Job information ☐ Location data ☐ Race or ethnicity ☐ Political opinions ☐ Physical or mental health

	☐ Information about a person's sex life or sexual orientation ☐ Religious or philosophical beliefs ☐ Membership of a trade union ☐ Biometric information ☐ Genetic information ☐ Other (please explain below):
4.5 Technical/organisational measures Select which of the following security measures are used to protect personal data.	☐ Pseudonymisation ☐ Anonymisation ☐ File encryption ☐ Encryption of storage ☐ Encryption of transport device ☐ Restricted access rights ☐ VPN ☐ Regularly scheduled backups ☐ Physical locks (rooms, drawers/file cabinets) ☐ None of the above ☐ Other (describe below):
4.6 Will any personal data be transferred to organisations within countries outside the European Economic Area (EU, Norway, Iceland and Liechtenstein)? If the research takes places in a country outside the EU/EEA, then please also indicate this.	Yes/no If yes, please fill in the country.

5 – Final comments	
Do you have any other information about the research data that was not addressed in this template that you think is useful to mention?	No