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„Household Saving Amid COVID-19 Uncertainty in Belgium“

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Abstract

This Master´s thesis analyses variations in consumption, net income and saving of households based on socio-economic characteristics before and during COVID-19 for the case of Belgium. The main data source is the Household Finance and Consumption Survey, which is one of the most extensive consumer surveys on financial parameters and sentiments of households in Europe. A significant decrease in median consumption for the year 2020 compared to 2017 is found, accompanied by increases in median saving rates over the same period. These results exhibit substantial discrepancies depending on the income quintile or the labour force status of individuals, highlighting the importance of heterogeneity when conducting economic research on the financial situation of households during the COVID-19 pandemic. The work introduces two income uncertainty measures, revealing that uncertainty significantly increased the probability to save for unexpected events at the household level in 2020.

Abstract

Diese Masterarbeit analysiert Variation in Konsum, Nettoeinkommen und im Sparen vor and während der COVID-19 Pandemie auf der Grundlage von sozioökonomischen Charakteristika von Haushalten in Belgien. Die Hauptdatenquelle ist die *Household Finance and Consumption Survey*, eine der umfassendsten Verbraucherumfragen zu finanziellen Parametern und Stimmungen von Haushalten in Europa. Im Rahmen der statistischen und ökonometrischen Analyse konnte im Jahr 2020 eine signifikante Abnahme des Mediankonsums im Vergleich zu 2017 festgestellt werden, während die Mediansparquoten in der gleichen Zeitperiode gestiegen sind. Diese Ergebnisse variieren erheblich abhängig vom Einkommensquintil und dem Beschäftigungsstatus von Referenzpersonen und betont somit die Notwendigkeit, die Heterogenität von Haushalten in der Forschung zu den Auswirkungen der COVID-19 Pandemie auf die finanzielle Situation im Privatsektor miteinzubeziehen. Die Arbeit führt darüber hinaus zwei Variablen zur Messung der Einkommensunsicherheit ein, und zeigt einen signifikanten, positiven Einfluss von Unsicherheit auf die Wahrscheinlichkeit, dass Haushalte im Jahr 2020 angeben, bewusst für unerwartete Ereignisse zu sparen.

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Contents

1 Introduction and Motivation

Saving concerns all of us, as it is inherently contained in our everyday decisions. To some degree, we can decide how much to spend and how much to put aside. Several characteristics or sentiments may influence this decision. One such sentiment may be the degree of uncertainty that came with the outbreak of the COVID-19 pandemic. Following economic restrictions, households may have either voluntarily or involuntarily adjusted their financial behaviour. To put these words into numbers, it is estimated that the Belgian real GDP dropped by 6.3% in the year 2020 (Coppens et al., 2021), where this decrease was almost entirely driven by the decline of private consumption (Muggenthaler et al., 2021). The behaviour of households is therefore essential to understand the consequences of the COVID-19 pandemic, as times were uncertain all over the world, including in Belgium (Basselier and Langenus, 2014; Levenko, 2020; Dossche and Zlatanos, 2020; Midões and Seré, 2020; Chetty et al., 2020; Adams-Prassl et al., 2020; Albacete et al., 2021). As this economic shock, following the outbreak of the COVID-19 pandemic, is characterized by several unprecedented peculiarities, I will tackle the following questions: which household characteristics influence the saving rate before and after the start of the pandemic? How does the saving behaviour differ depending on the labour force status? How do expectations about potential losses in income affect the financial behaviour of households?

To investigate this matter, the *Household Finance and Consumption Survey* (HFCS) provides one of the richest datasets regarding socio-economic characteristics, financial parameters, and sentiments on the micro-level in Europe. The data is collected by the Central Banks of the participating countries, mostly euro area countries, and published by the European Central Bank, making it one of the most reliable and largest consumer surveys in Europe (ECB, 2020). It allows research on the household level; a non-negligible, rather *essential* dimension necessary to understand the financial situation of households, as many studies state (Miles, 1997; Hurst et al., 2006; Fessler and Schürz, 2017; Chetty et al., 2020; Adams-Prassl et al., 2020; Balleerm et al., 2023; among many others). By using the *Household Finance and Consumption Survey* I found that about 38% of households in Belgium were not able to save in the year 2020. This is also supported by the national statistical institute of Belgium (STATBEL, 2023). Taking into account heterogeneity of households is therefore essential to correctly target policies that ease the consequences of crises such as the COVID-19 pandemic.

Heterogeneity of households is especially important when analysing financial behaviour in the private sector, including saving patterns, which lies at the centre of attention in this work. As mentioned, the country analysed in this thesis is Belgium. The decision was taken for the following two reasons: firstly, the recent literature on saving rates is not very vast for Belgium, as will be described in section 2. Secondly, and here lies one of the main contributions of this work, the preliminary data of the fourth wave of the HCFS, covering the year 2020, has just been released in February 2023, only weeks before the initiation of

this Master´s thesis. Due to its recent release date, it offers the opportunity to uncover relationships that have not been exposed yet with the HFCS.

Some important implications could be found throughout the thesis. Firstly, *consumption* has generally dropped drastically for many groups in 2020 compared to 2017, a finding for Belgium supported by the study of Sola Perea and Belle (2022). Since *net income* has barely changed, saving rates have increased in the median. Importantly, this decline is not evenly distributed across household types as the consumption basket varies substantially and not all households could adapt their financial behaviour freely (Baker et al., 2020; Bachas et al., 2020; Cox et al., 2020; Hacıoğlu-Hoke et al., 2021; Carvalho et al., 2020). The question arises whether this increment was because of *involuntary* saving, due to government restrictions impeding consumption of non-essential goods and services, or *voluntary*, as a form to insure oneself against future risk, following the precautionary saving motive. Therefore, two important implications follow. Firstly, the role of uncertainty may be especially important for financial behaviour in the year 2020, making it necessary to conduct research on this matter. Secondly, not all households may have been equally well-equipped before the pandemic to adjust their saving freely to the high degree of uncertainty that accompanied the COVID-19 pandemic. To dive deeper into this matter, I introduced two income uncertainty variables, *affected sector* and *income expectation*, thoroughly described in subsubsection 6.1.1 and investigated which socio-economic characteristics affect the saving pattern of households. I find that both income uncertainty variables have a significant, positive effect on the self-reported *probability to save for unexpected events*; but only for the year 2020, while this relationship could not be found for the year 2017. This is also supported by studies for other countries, where they find that income uncertainty influences financial decisions of households (Miles, 1997; Ercolani et al., 2021; Levenko, 2020; Dossche and Zlatanos, 2020).

To sum it up briefly, the financial behaviour of households in Belgium has changed in the year 2020, partly due to forced reduction in spending, and partly due to precautionary saving motives, while other households, which are generally at their financial margin, had no leeway to adapt to uncertainty. Further important implications for Belgium are described in the succeeding sections. The thesis is structured as follows. In section 2, the related literature is summarized, followed by the theoretical framework that surrounds this work in section 3. Subsequently, the data and methodology are introduced to the reader in section 4, which is the basis for the statistical evaluation in section 5 and the econometric analysis in section 6. Finally, concluding remarks and an outlook are presented in section 7.

2 Literature Review

The literature on financial behaviour is vast, yet it has only been for the last few years that heterogeneity within a population has gained gradually more attention and rightly

so. The recognition of differences between households, such as in terms of size, income, possession of real estate or wealth, is crucial for policy makers to correctly target the part of society for whom social benefits or taxation are destined for. As a result of improvements in computational power, it has become possible to collect and evaluate large, detailed datasets only in the recent history of economic research. Similarly, the following review of the literature regarding saving starts at the macro level, gradually incorporating the micro level.

As previously mentioned, many studies analyse private saving rates on the macroeconomic level. Particularly, they investigate which factors influence the saving rate of the private sector. These factors often include macroeconomic variables like debt of the private sector, the pension system of countries, income and wealth distribution, inflation and sometimes measures of macroeconomic instability, among many others, when cross-country analysis is performed (Loayza et al., 2000; Dossche and Zlatanos, 2020; Bouis, 2021). Similarly, research that focuses on one country takes changes in real interest rates, social security expenditures or general government budget balance into account (Dirschmid and Glatzer, 2004; Basselier et al., 2019), sometimes also including macroeconomic uncertainty as an explanatory variable (Altig et al., 2020).

The focus of the literature review, however, lies on studies employing micro-level data. Among them, a substantial number uses transaction data, allowing to break consumption into its smallest components and including a time factor due to the high frequency of data collection. In this regard, for instance, the studies by Baker et al. (2020), Bachas et al. (2020), and Cox et al. (2020) use transactional data, debit card data, and bank account data, respectively. They link consumption levels to income for the case of the US. They find that overall savings in bank accounts increased significantly along the income distribution, starting from the outbreak of the pandemic. The studies conclude that this is likely fuelled by sharp declines in spending, especially regarding non-essential goods and services, which triggered an upwards shift in the liquid asset balance of households. Additionally, the authors state that insurance policies and stimulus packages from the government have significantly contributed to restrain spending to decline further (Baker et al., 2020; Bachas et al., 2020; Cox et al., 2020). Likewise, the paper by Hacıoğlu-Hoke et al. (2021) comes to similar conclusions for the United Kingdom using high frequency transaction data. The authors also find that food delivery and online shopping increased substantially compared to the previous years´ figures, but expenditures for restaurants, travel or entertainment have decreased drastically. Further, they find that the lowest income quartile displayed the smallest spending cuts, while the wealthier households decreased their consumption sharply (Hacıoğlu-Hoke et al., 2021). Similarly, the study by Carvalho et al. (2020) states that the consumption basket of all households shifted more towards that of low-income households. In other words, consumption baskets were mostly composed of essential goods and services, that one cannot easily resign to, not even during

times of high uncertainty (Carvalho et al., 2020). This relates to the question of whether decreases in expenditures where voluntary or involuntary, as the cutback on non-essentials was significant and especially higher income households used to spend a substantial share on these types of goods before the pandemic. This, however, is an ambiguous question, where the overall expectations of a household would have to be considered, as will be explained throughout the thesis.

Whereas bank accounts and similar high-frequency data give insights into changes in time especially regarding consumption components, surveys typically include critical, additional information. The word "critical" is deliberately chosen as it has been shown by a substantial number of studies that variables such as income uncertainty, which in some form is often inquired in consumption surveys, have a significant effect on financial behaviour of households. For instance, the self-indicated probability to lose a job has been proven to have a significant effect on wages (Balleerm et al., 2023).

In this realm, in the literature published before 2020, several studies found that uncertainty affects spending behaviour and that precautionary saving, which people accumulate to insure themselves against future income risk, represent a substantial share of total savings (Miles, 1997). The study by Hurst et al. (2006) finds that precautionary savings make up about 10% of total household savings. They argue, however, that it is inherently misguiding to pool all households together. They show that business-owners often face a substantially higher risk regarding income than employed individuals, supporting the argument for incorporating household heterogeneity (Hurst et al., 2006). Others do not specifically include income uncertainty into their research yet give robust empirical arguments supporting the necessity to use micro-data, when analysing the implications of policies for different households especially along the income distribution (Fessler and Schürz, 2017).

More recent research, for instance in the US, shows that consumption has generally declined substantially in the year 2020. High-income households displayed even steeper declines than lower-income households; consequently, face-to-face businesses located in affluent areas were particularly hit by the implications of the restrictions. Further, especially lower-wage workers had a higher probability to lose their job than their higher income counterparts did, further suppressing the saving rate of low-income households (Chetty et al., 2020). While the US government also set policies to counteract the income losses due to the economic and health shock, the size and effectiveness may very well differ to those policies put in place in European countries. As a study by Adams-Prassl et al. (2020) argues, lay-offs, and drops in salaries have been much less pronounced in Germany when compared to the labour market in the US or the United Kingdom. They argue that this is partly because Germany has had a well-established short-work scheme before the pandemic, buffering part of the implications from the restrictions (Adams-Prassl et al.,

2020). This is also supported by another study that conducted research on the COVID-19 employment protection schemes in seven European countries, among them Belgium. They conclude that employment protection schemes, together with the suspension of rent or debt repayments was highly effective in reducing stress on the financially most vulnerable (Midões and Seré, 2020). The study by Basselier and Minne (2021), for instance, finds that in April 2020 about 36% of employed individuals and 50% of self-employed individuals where covered by government support schemes in Belgium, and concludes that this has significantly cushioned the effects of the restrictions on Belgians´ household income. To put this number into context, about 34% of employees in France and 15% in Germany are estimated to have been covered by employment protection schemes in April 2020 (Anderton et al., 2020).

A study for Austria found that those who were economically vulnerable before the pandemic were especially hit in terms of income losses, among them those being unemployed. It additionally finds that uncertainty was at an all times high in the year 2020 using the third wave of the HFCS and the Austrian Corona Panel Project from the University of Vienna (Albacete et al., 2021). For Italy, a study uses the *self-reported probability to lose a job* when employed, or *the probability to find a job* when unemployed, as a measure for uncertainty. The authors find that those declaring that they will likely lose their job in the near future had a significantly larger share of their saving attributed to a precautionary motive, in addition to the predominant involuntary increase in saving due to consumption restrictions (Ercolani et al., 2021). In accordance, a study for a number of European countries uses this same measure for income uncertainty together with the HFCS dataset and comes to very comparable results (Levenko, 2020), as does another paper, in which the authors argue that while most of the decrease in consumption is due to consumption restrictions, the share of precautionary saving is unprecedented in the year 2020, even when compared to the 2008 economic crisis (Dossche and Zlatanos, 2020).

As for Belgium, the recent literature on saving rates is not very extensive. Most works have been published by the National Bank of Belgium. Dating from the time before 2020, there is a study using the 2014 HFCS dataset to uncover the wealthy as well as poor hand-to-mouth households where they find that the hand-to-mouth, poor, and wealthy, make up 25% of the Belgian population. The authors argue that this fact must be considered when setting policies targeting consumption in times of crises as these households are characterized by high marginal propensities to consume (Cherchye et al., 2023). More closely related to the realm of saving rates, a paper utilizing the Belgian Household Budget Survey for the time ranging from 1995 to 2010 finds mild evidence for the life-cycle hypothesis of consumption and saving, but also argues that a precautionary saving motive could be incorporated as an additional explanatory variable for saving rates (Rock and Capéau, 2015). Regarding pre-COVID-19 uncertainty, the study by Basselier and Langenus (2014) uses the *consumer sentiment survey*, conducted by the National Bank of

Belgium, to uncover the fact that self-reported uncertainty regarding personal financial situation partly explains movements in saving rates, but that the definition of the income uncertainty measure matters (Basselier and Langenus, 2014).

Regarding the literature starting from 2020, the National Bank of Belgium (NBB) has published a paper showing preliminary findings for the fourth wave of the HFCS, covering the year 2020. Among many others, their main findings are the following: *income* has decreased only slightly, partly because the government attempted to cushion the negative effects of the restrictions on income, and *consumption* has declined sharply, which is especially true for higher income households, as they were also the ones attributing a larger share of their consumption to non-essential goods and services compared to low income households before the pandemic (Sola Perea and Belle, 2022). However, they do not conduct a thorough investigation of which characteristics affect the saving rate and whether uncertainty plays a role; in fact, the study is more of a statistical nature, as it depicts the first findings of the survey. Another study by Basselier and Minne (2021) also analysed determinants of Belgian saving rates. Instead of the HFCS dataset, it uses consumer surveys conducted by the National Bank of Belgium on a monthly basis. They come to very similar conclusions as the study by Sola Perea and Belle (2022), and additionally find that saving constituted 26% of disposable income at peak times and that the typical household that could not save in 2019, could not save in 2020 either (Basselier and Minne, 2021). However, the state-of-the-art dataset for financial and consumption data on the household level is the *Household Finance and Consumption Survey*, which´s fourth wave was not available for the authors Basselier and Minne (2021) at the time of publication.

As this dataset is administered by the European Central Bank and collected by the National Bank of each country, it is undoubtedly one of the most reliable information sources for household finances and sentiments. Therefore, I employ this dataset, together with others to, first, show the importance of heterogeneity of households and, second, to uncover what affects saving rates in times of uncertainty as the one experienced in 2020 due to the COVID-19 pandemic. For this, I do not only employ the newly released fourth wave covering the year 2020, but also the third wave that took place in 2017, to analyse which factors influenced the saving behaviour of households. Lastly, I investigate whether uncertainty plays a role in the financial behaviour of Belgian households.

3 Theoretical framework

To give the thesis a solid foundation to work with, I have opted for the life-cycle hypothesis of consumption and saving (LCH) as a theoretical framework. It is a classical workhorse model in the realm of consumption and saving literature. One of the first studies to introduce the life-cycle hypothesis of consumption and saving is the paper by Modigliani and Brumberg (1954). It builds up on the classical theory of the utility maximizing agent,

where the individual derives utility from current as well as future consumption and assets, subject to a budget constraint. Importantly, this model rules out a constant level of expenditures, as supported by the permanent income model, but argues that agents aim at upholding a constant marginal utility of consumption. The equation for the utility maximizing agent can be written in the following form:

$$\max U \quad with \quad U = \quad U(c_t, c_{t+1}, ..., +c_L, a_{L+1})$$

subject to the constraint that initial assets and total remaining discounted lifetime earnings (first and second term of the left hand side of the equation, respectively) must equal the discounted assets that the individual leaves after his or her lifetime and total remaining discounted consumption (first and second term of the right hand side of the equation, respectively). This may be written in the following way:

$$s.t. \quad a_t + \sum_{\tau=t}^{N} \frac{y_\tau}{(1+r)^{\tau+1-t}} \quad = \quad \frac{a_{L+1}}{(1+r)^{L+1-t}} + \sum_{\tau=t}^{L} \frac{c_\tau}{(1+r)^{\tau+1-t}}$$

where c_t is consumption in the t-th year of the individual´s life, y_t is earnings other than interest income in year t, a_t are assets at the beginning of period t, r is the interest rate[1], N is the number of years where the individual works, and L being the total lifespan. Through optimization, the authors conclude that individuals aim at consuming a certain amount c_t at a certain time of their life, and thus this depends on age t, where they try to smooth this level. Naturally, current income $y_t + ra_t$ may sometimes be below that envisioned consumption level c_t or above, leading to negative or positive saving rates respectively[2]. To explain the variations in saving, the authors derive different motives for saving: firstly, consumers may want to save to leave inheritance for their heirs[3]. Secondly, prospective income may simply deviate from its envisioned value, and thus not coincide with their preferred consumption level. Thirdly, agents may desire to accumulate wealth to prepare for emergencies, e.g., if income falls temporarily below the consumption requirements; this is also called the precautionary saving motive. And, lastly, individuals may want to save up to acquire equity, instead of taking out a loan. Naturally, more than one motive may drive the desire to save. For instance, the acquisition of a property can both satisfy the bequest motive and the precautionary saving motive simultaneously.

Through derivations, the authors argue that saving can be modelled in the following form:

$$s = \frac{M}{L} y^e + \frac{L-t}{L_t}(y - y^e) - \frac{1}{L_t}[a - a(y^e, t)]$$

where variables without time index denote current levels, s denotes saving, M is the number of years of retirement with $L = M + N$, and y^e denotes expected average income. In

1. Note that one important assumption in the basic model is that the interest rate is constant.

2. Current income is incurred both from earnings y_t as well as returns on assets ra_t.

3. This corresponds to $\overline{a}_{L+1} > a_t$, implying that individuals want to leave positive amounts of assets after their lifetime.

the equation above, the first term $\frac{M}{L}y^e$ denotes a constant fraction of expected lifetime earnings, as it is independent of age and current income. The second term $\frac{L-t}{L_t}(y - y^e)$ represents the fraction of the non-permanent component of income, as it depends on the difference between current income y and expected average lifetime income y^e. The third term $\frac{1}{L_t}[a - a(y^e, t)]$ represents a fraction that only depends on age, where $a(y^e, t)$ is increasing in age t when the individual is still in its active working life (N) and decreasing in age t if the individual is the retirement phase of his or her life (M), representing the accumulation of wealth and de-accumulation of wealth respectively.

The implication I want to draw the reader's attention to is the variable t which represents age; as the authors Modigliani and Brumberg (1954) put in their study, saving s crucially depends on the age of the reference person, as does the marginal propensity to consume. Therefore, age should be incorporated when analysing what affects the saving rate, and, more specifically, in a non-linear fashion (Modigliani and Brumberg, 1954). Individuals try to consume a certain level, which should be in line with anticipated lifetime earnings and is generally smoothed. Further, saving crucially depends on age and how current income departs from its expected average. To better grasp the idea, it is helpful to relate this information to the life cycle of a typical individual. Generally, *income* tends to be humped-shaped, where the pinnacle is often encountered at the age of 50. Thus, at the beginning of one´s productive lifetime M, income tends to increase until the age of 50, steadily decreasing after this. Income then experiences a substantial drop when entering retirement. *Consumption* typically adopts a similar, hump-shaped pattern, where it is strongly connected to household size, i.e., saving tends to fall strongly with children, whereas it increases substantially as soon as the children leave the dependency of their parents. Consequently, *wealth*, also being hump-shaped, typically peaks at the age of 60 to 65, the time where household consumption starts to decline. Towards the end of one´s lifetime, individuals often tend to save significantly less, or even dissave (Modigliani, 1986). Thus, at the beginning of the working life, people tend to consume and save little. The fact that many people are still involved in education or at the very beginning of their career with little income, supports this argument. Following that, households behave very differently, involving having children, marrying, buying a house and/or climbing up the career ladder. It is mostly characterized by high saving rates and wealth accumulation, as it is also the peak time of household earnings. Subsequently, before retirement, consumption tends to gradually decrease. In retirement, when income is low compared to the active working life, households start to dis-save (Browning and Crossley, 2001).

While there is substantial heterogeneity in a population and this pattern may not fit all data equally well, this should serve economists more as a framework than a model and several of the assumptions may be relaxed without loss of generality (Modigliani, 1986; Browning and Crossley, 2001). In subsection 5.3, it is discussed whether the life-cycle hypothesis of consumption and saving applies to the Belgian population in the years 2017

and 2020. Further, as one of the elements of this framework is *income uncertainty*, I will also analyse whether measures for income uncertainty have a statistically significant effect on financial behaviour of households in section 6. In fact, as Deaton (1991) puts it in his study, the higher the income uncertainty for a household, together with borrowing constraints, the higher is the urge for precautionary saving. A paper by Carroll (1994) comes to the same conclusion, stating that individuals decrease current consumption when faced with a high degree of income uncertainty, rather than conditioning consumption solely on lifetime income. Thus, opposed to the permanent income model, households do not consume a constant level in accordance with their lifetime income, but adjust their saving by taking income uncertainty into account.

4 Data and Methodology

The two main research questions of this Master´s thesis include which characteristics affect saving rate in the year 2017 and 2020, and whether income uncertainty affects the financial behaviour of households. To tackle them, a solid foundation in terms of data and methodology is essential. As the main data source, I selected the HFCS, short for *Household Finance and Consumption Survey*. As mentioned, it is one of the richest datasets on the household level considering financial variables for the euro area, including variables such as debt holdings, income, assets, wealth, and general expectations. It is specifically tailored to represent the entire population of a country through considerably large samples and containing a complex weighting system to authentically mirror reality. This extensive weighting system, implemented by the respective Central Banks, delays the release for a few years after each wave of interviews. As already mentioned, the fourth wave of the HFCS, covering the year 2020, has just been released in early 2023. This renders the possibility to derive brand new information for the very peculiar year of 2020.

4.1 Data description

As already mentioned, the main information sources are the third and fourth wave of the HFCS dataset, covering the years 2017 and 2020, which consist of many variables regarding finances and socio-economic characteristics of households. For this thesis, the preliminary data of the fourth wave for Belgium, published in February 2023, is used. To make values comparable across time periods, OECD data for the consumer price index of the years 2017 and 2020 are employed. Further, statistics from the Belgian Household Budget Survey from the years 2016, 2018 and 2020 are used to derive total expenditure. Finally, through the usage of the EUROMOD system, a tax-benefit microsimulation model for the European Union, I derive net disposable income from gross disposable income.

A detailed description of these datasets is included in the Appendix. The following section describes how the datasets mentioned above are utilized to answer the research

questions of this thesis.

4.2 Methodological approach

To find a suitable empirical strategy, the review on literature on saving gives an overview on the methodology employed for the field of financial behaviour analysis. Many economic studies, especially published by National Banks of different countries, are more of a statistical nature (see Fessler and Schürz, 2017; Albacete et al., 2021; Bachas et al., 2020; Kubota et al., 2021; Dossche and Zlatanos, 2020). They typically depict different financial values, such as consumption levels, income, the level of indebtedness amongst many others, across various categories, including income or age groups. While some of them include regression output, others lay their focus on econometric analysis more decisively. In this realm, especially older studies investigate what drives the aggregate private saving rate (see Levenko, 2020; Dossche and Zlatanos, 2020), while others look at more detailed data, taking into account heterogeneity of households (see Fessler and Schürz, 2017; Albacete et al., 2021; Bachas et al., 2020; Kubota et al., 2021; Dossche and Zlatanos, 2020; Hurst et al., 2006; Baker et al., 2020).

Of those studies focusing on the heterogeneity of households, quite a number use panel data (see Albacete et al., 2021; Bachas et al., 2020; Kubota et al., 2021; Hurst et al., 2006; Baker et al., 2020), allowing for a more detailed look on how consumption and saving patterns change over time, e.g. following the outbreak of the COVID-19 pandemic, which went hand in hand with economic restrictions. Amongst those, many consist of financial transaction data, allowing for an elaborate decomposition and timing of expenditures, yet lacking a variety of variables that the HFCS dataset includes, especially considering expectations and the decomposition of variables such as wealth or debt on a granular level.

Since both statistical and econometric approaches are similarly predominant in the economic literature on saving behaviour of households, the empirical strategy of this Master´s thesis consists of a statistical evaluation and an econometric analysis section.

The statistical section focuses on illustrating the median values of financial parameters. The reasoning behind this, is that these financial parameters can vary substantially, even within a sub-group (Fessler and Schürz, 2017; Albacete et al., 2021). In the appendix, however, mean values are also included for the interested reader, as well as standard deviations. The values include total consumption, net income, saving and saving rates. None of those values are inquired as such as part of the HFCS, making it necessary to compute them, requiring additional data. Total consumption is determined, using information from Household Budget Survey (HBS). Net income is derived using EUROMOD. Subsequently, saving and saving rates can be computed. A detailed description of all procedures is provided in section 5.1.

The econometric section defines measures for income uncertainty as a first step. Subsequently, three different models are laid out and both theoretical and statistical arguments are given for their selection. They differ regarding the dependent variable. In Model 1, the dependent variable takes on the value (1) if the household saves and (0) if it does not save. In Model 2, it is the continuous saving rate for all households that can save positive amounts. In Model 3, it is again a dummy, specifying whether the reference person of the household indicates saving for unexpected events (1) or not (0). Then, the set of controls is determined; for this, I revise the economic literature on saving behaviour to find potential controls, and then apply post-double selection to extract the most informative ones. Then, the regressions are run, including logistic regressions as well as ordinary least squares.

Importantly, as this thesis´ and the HFCS dataset´s goal is to represent the entire population of a country, in this case Belgium, a short discussion of the survey weights, established by the Central Banks, is crucial. Household weights are incorporated, as certain types of households may be over-, and others under-represented in the survey. Additional weights are included in accordance with calibration and non-response. Also, replicate weights and multiple imputation further refine the analysis. More precisely, data is often not reported, which makes it necessary to impute it, taking into account the socio-economic characteristics of the household. In the case of the HFCS, five imputations are provided for each missing value of consumption, income, or wealth (ECB, 2020). Therefore, household weights, 500 replicate weights and multiple imputations are incorporated in all of the results presented in the thesis.

5 Statistical evaluation of net income, consumption and saving

Understanding heterogeneity across households is essential to understand saving behaviour. This section explains the difference in consumption, net income and saving patterns across income quintiles and the labour force status: Firstly, it is intuitive to depict financial parameters across income quintiles, as it is inherently contained in the saving rate of a household. Consequently, many economic studies evaluating financial behaviour at the micro level use this category to give insights into the financial leeway of households (Fessler and Schürz, 2017; Albacete et al., 2021; Bachas et al., 2020; Kubota et al., 2021; Hacıoğlu-Hoke et al., 2021). Secondly, the labour force status is of considerable interest, as especially the unemployed and those out of labour force are often at their financial margin (Levenko, 2020). In many of these instances, affected households are not able to save, which is something important to narrate. Other categories such as age groups or wealth quintiles are insightful yet would be beyond the scope of this thesis and would require a study solely focusing on statistical evaluations.

In the following, these two categories, income quintiles and the labour force status, help to guide the reader to the notion of heterogeneity of households when it comes to analysing their financial situation. As previously mentioned, the variables of interest in this section are consumption, net income and saving. The median of these variables is displayed for each group within each category for the year 2017 and 2020. Further, changes in median consumption, net income and saving rates are depicted to reveal relevant changes in the median values. All values in this thesis are adjusted to 2020 prices. Before diving into the results, a short discussion of each variable is essential for a comprehensive understanding of the results.

5.1 Definitions of consumption, net income and saving rates

Consumption. The variable *total consumption* does not exist is such in the HFCS dataset, which makes is necessary to derive it from the data. As stated in the *Methodological report for the 2017 wave* from ECB, total consumption of households can be derived using components of consumption that are inquired in the survey (ECB, 2020). It further states that the reason why participants are not asked to indicate total expenditures, but segments, is the following: while it may be easy to recall how much you spend each month on, say, groceries, it is rather difficult to quantify how much you spend *in total*, as especially one-off payments may be forgotten easily. Therefore, inquiring individuals about expenditures for food at home or food outside home and utilizing these variables together with other household-specific indicators to assess total consumption, has proven to give more precise estimates of household total expenditures (ECB, 2020; Browning et al., 2002).

Thus, I implement an abridged approach, similar to the one suggested by ECB (2020) and Browning et al. (2002). For this, I use the *Household Budget Survey*. It gathers micro-data with a detailed breakdown of household expenditures and thus offers the opportunity to derive what share of total expenditure is dedicated to food at home for each income quartile (Eurostat, 2023). More precisely, in the median, Belgian households allocate 18.1% of their total expenditures to food at home in the year 2020. I therefore utilize the income quartile-specific proportion together with the expenditures for food at home provided by the HFCS dataset and assess the total consumption of each household. By employing the averages of the 2016 and 2018 wave, and the 2020 wave of the Belgian Household Budget Survey for the 2017 and the 2020 wave of the HFCS respectively, I obtain total expenditure. The resulting levels of total expenditure are similar to those inquired in the Household Budget Survey (STATBEL, 2023). In the next step, the sum of the available consumption components is deducted from the computed total consumption (amount spent on *food at home*, *food outside home*, *utilities*, *annual expenses on trips and holidays* (which is divided by twelve months), *the amount paid as alimony* and *rent*[4]) and

4. The specific variable names in the HFCS dataset are HI0100, HI0200, HI0210, HI0230/12, HI0310,

the remaining part is denoted by "consumption other".

Net income. Net income is derived from the variable *total household gross income, including interest payments*[5]. The variable is derived by each Central Bank, and consists of all sorts of income streams, such as labour, rental or pension income, income from assets and private or social transfers. It refers to the last 12 months relative to when the interview took place and is therefore divided by twelve to match monthly consumption from above. Notably, it is provided in gross terms; net income, however, gives a significantly more realistic perception of the amount households have at their disposal. Therefore, for estimating net income, I follow the approach by Boone et al. (2019) and Kuypers et al. (2020) using information from EUROMOD. The share of net disposable income to gross disposable income for every gross income percentile is merged with the HFCS data and, subsequently, net income is derived for each household. Note that *net income* will be referred to as *income* in graphs.

Saving rate. Similar to Fessler and Schürz (2017), I define saving as net income minus consumption plus debt repayments. The saving rate is subsequently calculated by dividing by net income again. Note that the definition of saving rate varies strongly in the literature. While the findings of this thesis may be evaluated with different definitions of saving, the resulting numbers for saving rates are in consonance with values found for Belgian households (OECD, 2023).

5.2 General findings of statistical evaluation

Consumption, net income and saving vary within a population depending on income or the labour force status. In Figure 1 and Figure 2, the median value for each of these variables is depicted across income quintiles and the labour force status for the year 2017 and 2020, respectively. By definition, net income increases with income quintiles. While consumption increases as well, it does so at a substantially lower rate, allowing higher income households to save positive amounts, while the lowest two income quintiles are not able to save in the median. To underline the substantial difference between households within a population, Figure 2 depicts the year 2020: median net income for the whole Belgian population is 2,802.29€ per month. This parameter takes on the value 1,514.40€ for the first income quintile, whereas the fifth income quintile displays a median net income of 6,358.25€ per month for the year 2020 (see Table 11 in the Appendix for the exact amounts and standard deviations). In studies on the findings of the preliminary data for the fourth and the data for the third wave of the HFCS, the authors come to similar results (Sola Perea and Belle, 2022; Sola Perea, 2020). The median consumption of all households in Belgium is 2,786.65€ per month, while the first- and fifth-income quintile

HC0110, respectively.

5. The name for this variable is DI2000 in the HFCS dataset.

spend about 1,868.97€ versus 3,969.53€ in the median respectively (see Table 9 in the Appendix). They coincide with the values obtained by the Belgian Household Budget Survey (STATBEL, 2023). Accordingly, the median saving per month is 433.06€ for the whole population in the year 2020, while this value ranges from -273.78€ to 3,194.57€ for the first to fifth income quintile (see Table 13). The year 2020 is characterized by a median household saving rate of 16.55% which coincides with the median saving rate found by the OECD (OECD, 2023). The saving rate is negative or 0 for the first- and second-income quintile, up to a median saving rate of 59.59% for the highest income quintile (see Table 15).

These numbers give several insights. Firstly, the first two income quintiles and households where the reference person is unemployed or out of labour force are often not able to save. Secondly, negative saving must be handled with care as prolonged periods of negative saving is not feasible, neither according to the No-Ponzi scheme, nor in real life, at least on a large scale. Nonetheless, periods of negative budgeting may be realistic in the short-run and, also, other studies find negative saving rates, assuming that these households cannot save (Fessler and Schürz, 2017).

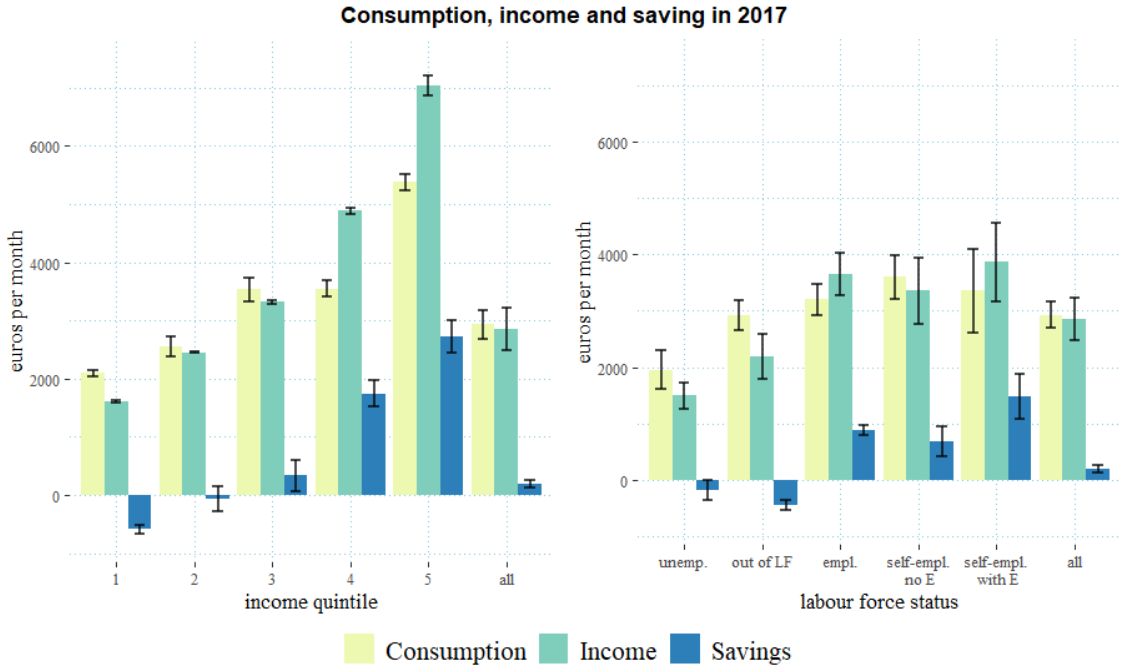

Figure 1: Consumption, income and saving across income quintiles and labour force status - 2017, with standard deviations

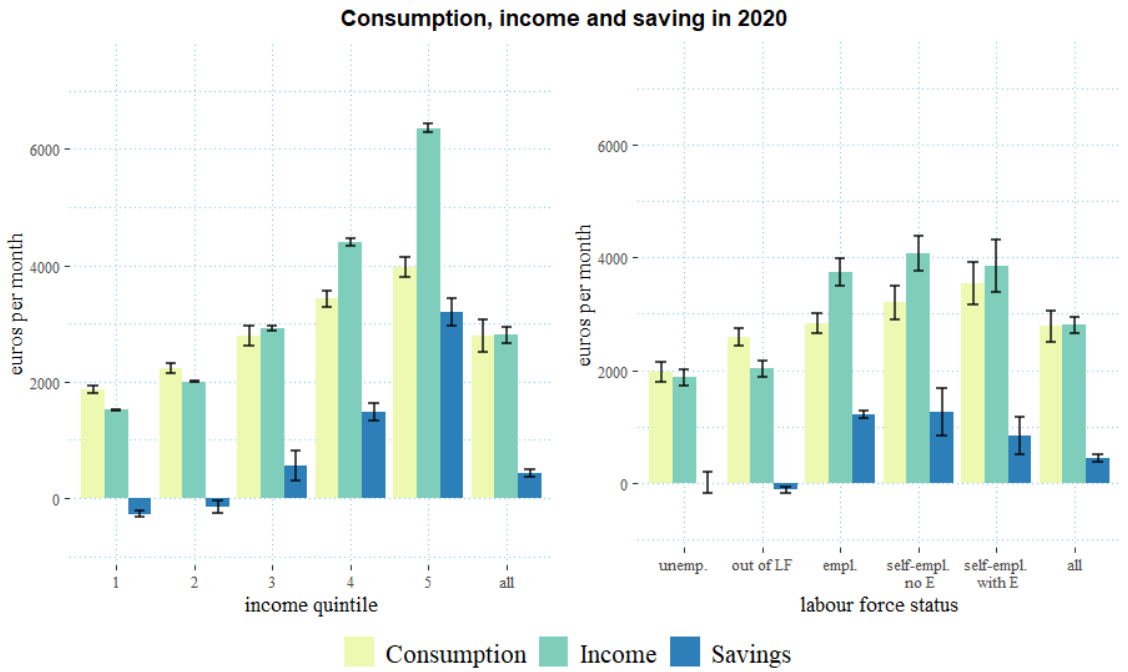

Figure 2: Consumption, income and saving across income quintiles and labour force status - 2020, with standard deviations

Not only is the difference in all these parameters of interest and importance within the year 2020; also, the numbers described above changed compared to 2017. As can be seen in Figure 3 below, median saving rates across income quintiles and the labour force status have generally increased in the year 2020 when compared to the year 2017. The changes in the median and mean saving rates, including standard deviations, can be seen in Table 16 in the Appendix. Overall, the median saving rate of all households has increased by 10.28 percentage points, a statistically significant effect. This is comparable to the change the OECD estimates; they find that the median household saving rate has increased by 9 percentage points in this period in Belgium (OECD, 2023). The change in the median saving rate is strongest for the first income quintile, and the households with a reference person that is out of the labour force. Conversely, the only group displaying a drop in the median saving rate on a statistically significant level are those that are self-employed with employees. For them, the median saving rate dropped by 19.26 percentage points in the median, specifically from 38.35% in 2017 to 19.09% in 2020. One must keep in mind that these are median values and values may be very different for households even within a group; however, the pronounced differences may be investigated in detail in further studies.

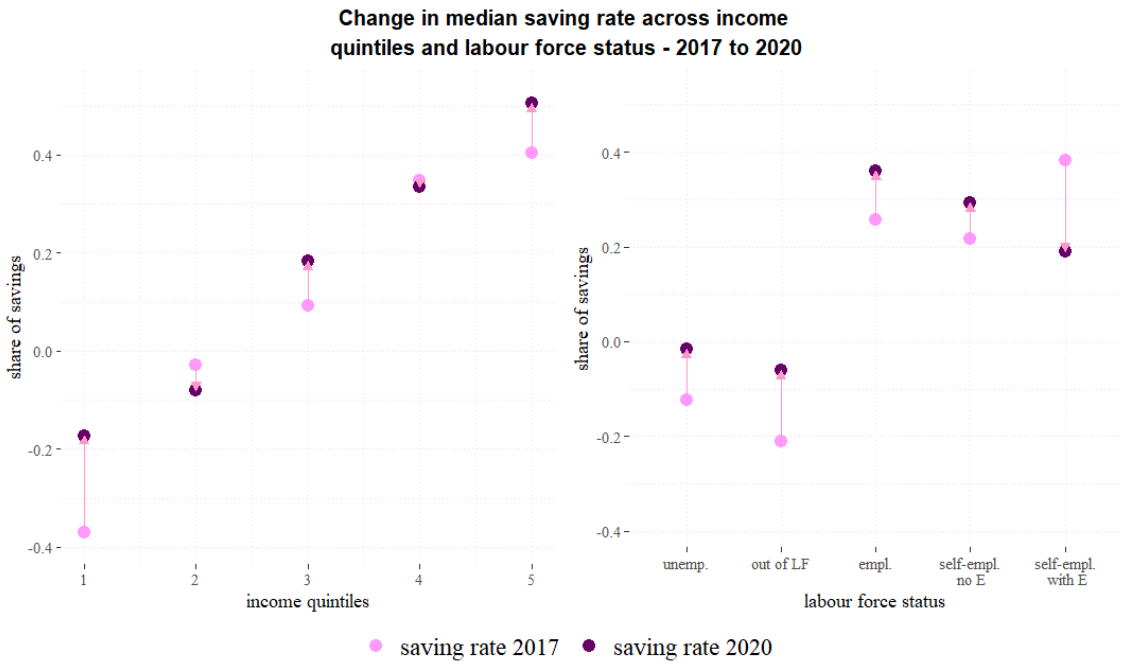

Figure 3: Saving rates across income quintiles and labour force status - 2017 and 2020

The question arises what drove this general increase in the saving rate. Attempting to answer this causally goes beyond the scope of this thesis, especially because timings of the interview vary; nonetheless, through analysing the components of the saving rate some meaningful inference can be made.

As can be seen in Figure 9 (and the corresponding Table 12 in the Appendix), median net income has largely decreased for almost all groups in 2020 compared to 2017. However, these changes are rather small, and for many groups statistically not significant. Similarly, the study by Sola Perea and Belle (2022) finds very similar results for net income and refers to the study by Coppens et al. (2021) which delivers evidence that the Belgian government has taken significant action to cushion the effects of the pandemic on income. Holding everything else constant, a decrease in net income would result in a decrease in saving rates. A counteracting force, however, is consumption in this instance; more precisely, consumption has decreased significantly for many groups across income quintiles and the labour force status. Overall median consumption has dropped by about 5%. The fifth income quintile has experienced the largest decrease, as their total consumption has dropped by 26% in the median for the year 2020, when compared to 2017. Similarly, several studies have also found that consumption has dropped sharply in some months in the year 2020, especially for high-income quintiles. Some of these studies coming to this result inspect the situation for Belgium (Sola Perea and Belle, 2022;, Coppens et al., 2021), for Italy (Ercolani et al., 2021), the United Kingdom (Hacıoğlu-Hoke et al., 2021), the US (Baker et al., 2020) and other countries (Dossche and Zlatanos, 2020; Chetty et al., 2020).

Thus, part of the significant increases in the household saving rate may be due to

substantial decreases in total expenditures. Consequently, a more exhaustive analysis of consumption can give insights into changes of financial behaviour. For this, the decomposition of consumption across income quintiles is pictured in Figure 4 below.

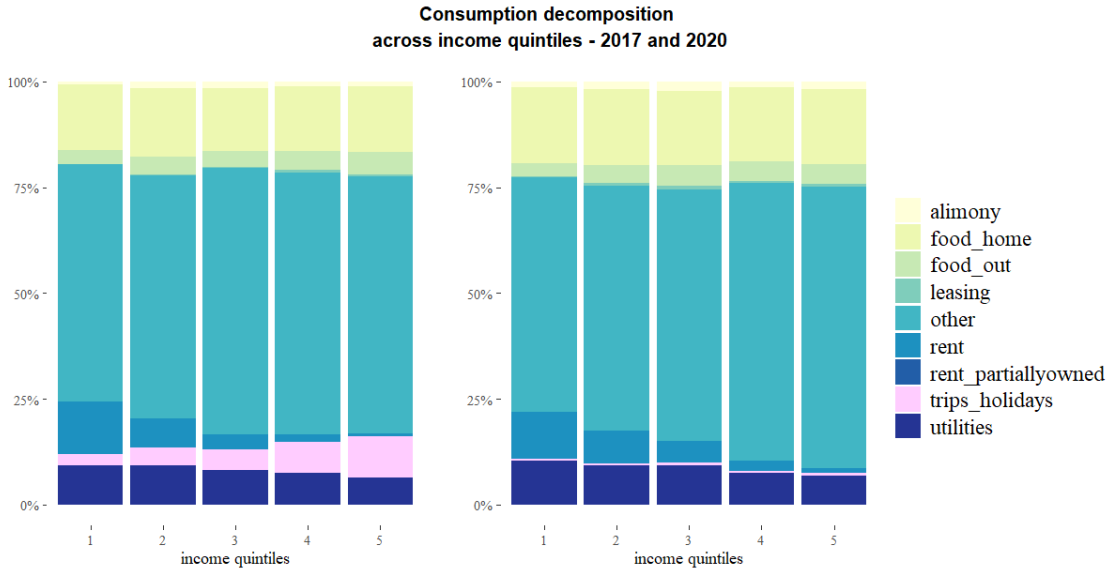

Figure 4: Consumption decomposition across income quintiles - 2017 and 2020

The figure above depicts what average share of expenditures is dedicated to different components of consumption. Lower income households tend to spend a larger share of total expenditures on rent than higher income households - this number is solely an average yet illustrates the fact that higher income households typically own their main residence, while lower income households often do not (Sola Perea and Belle, 2022). Further, as can be read from Table 5 and Table 6 in the Appendix, the higher the income quintile, the larger is the share that is spend on food outside of home, indicating that these households allocate more money on eating out. Further, the largest portion of consumption falls into the category "other", which includes, amongst others, durables, or energy consumption.

The component I want to guide the reader´s attention to, however, is the category *trips and holidays*. As can be seen in Figure 4 for 2017, *trips and holidays* makes up for a larger share of expenditures, the higher the income quintile. Specifically, this proportion ranges from 2.52% to 9.71% of total consumption along the income distribution. In the right-hand graph, which illustrates the situation for the year 2020, shares have shifted quite a bit: the share of total consumption spend on *trips and holidays* has dropped significantly and it is also the share of consumption that shrank the most compared to 2017. More precisely, the proportion now ranges between 0.28% and 0.72% on average (see Table 5 and Table 6 in the Appendix). Subsequently, the drop in spending for *trips and holidays* has very likely contributed to the decrease in consumption especially for the higher income households, which were also the ones spending the largest share on *trips and holidays* in the year 2017.

5.3 Life-cycle hypothesis of consumption and saving - findings

To recall, the life-cycle hypothesis of consumption and saving, as explained in section 3 considers typical consumption, income and saving patterns across age. It argues that households typically cannot save at the beginning of the reference person´s working life, as this is often before entering the labour market. This is supported by the data and can also be seen in Figure 5, which suggests that many under the age of thirty have rather low saving rates compared to the average population. Upon entering the labour market and substantially increasing the household´s income, the saving rate tends to go up substantially. In fact, the data suggests that the age group from thirty to fifty is the one with the highest median saving rates of the population. After this time of wealth accumulation, the period of retirement is typically characterized by gradual decreases in consumption, but, also, a substantial decrease in income. Consequently, many tend to dis-save in this period. This is both supported by theory and by the HFCS data, as can be deducted from Figure 5.

Figure 5: Median saving rates across age - 2017 and 2020

Figure 5 thus supports the life-cycle hypothesis. At first, individuals tend to dis-save, but starting around the age of twenty-five, median saving rates increase substantially. Around the age of thirty saving rates tend to be highest in the median. It is unsurprising for the following reason: at this age, many start having families and it is a typical moment in people´s lifetime to purchase property - generally accompanied by mortgage. Debt-repayments enter the saving rate positively, partly explaining why average saving rates are very pronounced. After this period, saving rates tend to decrease again, reaching a time of near zero saving rates towards the end of one´s lifetime (Deaton, 1991).

	age18_30	age31_45	age46_65	age66
2017	0.339	0.304	0.041	-0.242
2020	0.341	0.332	0.209	-0.138

Table 1: Median saving rates across age groups - 2017 and 2020

Table 1 summarizes median saving rates across different age groups, where the age group refers to the reference person interviewed in the HFCS. The table suggests the following for the year 2017: while the median saving rate for those aged 18 to 30 years is comparably high with 33.9%, it decreases with age. The median saving rate becomes negative for the households with a reference person 66 or older. While the trend for the year 2020 is similar, the decrease is not as pronounced and saving rates tend to be more comparable across age groups. Again, one must keep in mind that the year 2020 was peculiar in many dimensions, and that consumption decreased for many households, either due to involuntary or voluntary reasons.

To dive a bit deeper into the period of wealth accumulation, I analysed the share of mortgage holders for the following reason: Typically, the main residence represents the largest share of wealth of individuals. Also, it is generally the households with younger reference persons, that yet need to repay the mortgage. As can be seen in Figure 6, it is indeed the age group of 30 to 50, where a large share is making debt repayments for their main residence. As already mentioned, this contributes to a high degree to wealth accumulation, supporting the life-cycle hypothesis of consumption and saving.

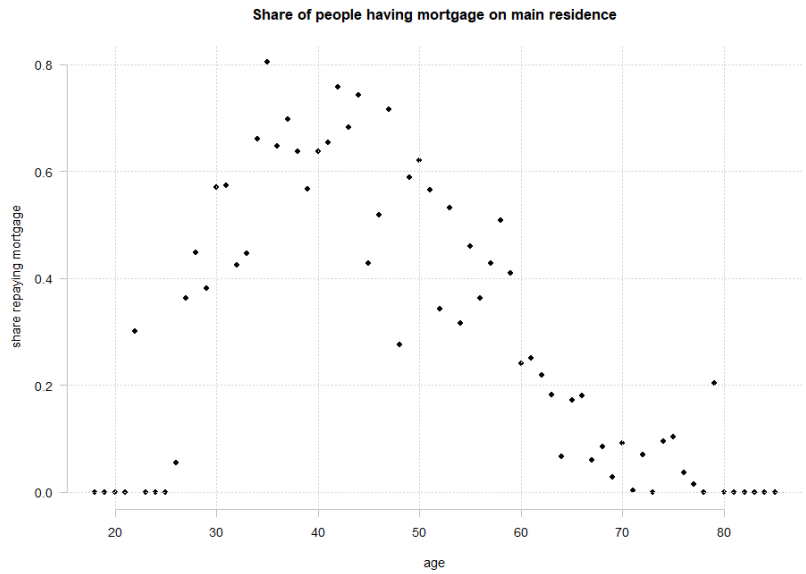

Figure 6: Share of people having mortgage on main residence across age - 2017

5.4 Remarks on the statistical section

To summarise the statistical evaluation shortly, net income, consumption and subsequently saving vary substantially depending on different socio-economic characteristics. While further categories are of interest, the distinction between different income quintiles and the labour force status of the reference person highlights how essential it is to consider heterogeneity of households. Apart from substantial variations in net income and total consumption, households´ saving rates differ significantly. While the lowest two income quintiles and those households where the reference person is unemployed or out of labour force, are typically not able to save, others are indeed able to save significant amounts and thus have more financial leeway. What most household groups have in common, are the changes from 2017 to 2020: in the median, consumption has decreased substantially, while saving rates have mostly increased. Further, the consumption component that has decreased the most, is the spending for *trips and holidays*.

Naturally, the question arises whether the drop in consumption in the year 2020 was intentional or forced due to restrictions introduced by governments. An argument for intentional saving may be that as uncertainty was high in the year 2020, precautionary saving has consequently increased. While one cannot simply cut down on essentials such as food or rent, the segment individuals can renounce to more flexibly are non-essentials such as *trips and holidays*. Thus, the drop in consumption and increase in the saving rate may be *voluntary*.

Conversely, forced saving may be justified by the fact that the government put restrictions into place to mitigate the effects of the pandemic. The economic interventions have resulted in less possibilities to spend one´s money. Intuitively, especially sectors that are non-essential were hit the most and thus, necessarily, less could be spend on cultural, recreational, or touristic activities. Therefore, the drop in consumption and increase in the saving rate may be *involuntary*.

To uncover which is the driving force behind the increase in saving rates goes beyond the scope of this work. On this subject, the study by Dossche and Zlatanos (2020) for the euro area finds that most of the increase in saving in the year 2020 was forced, and thus due to spending restrictions. The share of precautionary savings is rather small, yet considerably more pronounced than in other years. They therefore conclude that the increase in the saving rate is predominantly driven by forced decreases in consumption, yet that precautionary saving motive plays a more substantial role than it did before the pandemic (Dossche and Zlatanos, 2020).

The increase in saving rates can be attributed to both voluntary and involuntary saving. As the year 2020 is characterized by a high degree of uncertainty, the question which socio-economic characteristics influence the probability to save and the magnitude of saving, is

essential to understand the financial behaviour and situation of Belgian households. In the following, the econometric analysis gives additional insights into the matter.

6 Econometric analysis of the saving rate

In the following, the econometric part of the thesis answers one of the core questions of this work, namely: what socio-economic characteristics affect the probability to save on the one hand, and the magnitude of the saving rate of those that have financial leeway on the other hand? More specifically, rather than aiming at investigating the causal effects of the COVID-19 pandemic and the accompanying restrictions on financial behaviour, it tackles the question what affects the decisions to save, and how important the role of uncertainty is. This is an especially interesting question for the year 2020, because of high uncertainty and because of the government's attempts to counteract economic uncertainty by policies such as short-time work.

This section will be divided in the following parts: the first part lays out the specification of the models. Subsequently, the results of these regressions are presented and discussed in relation to the literature.

6.1 Specifications of regression models

One variable of major interest is a measure for income uncertainty. Thus, different measures for uncertainty are proposed, after which the dependent variables are introduced, followed by the selection of the control variables.

6.1.1 Uncertainty variables

Measures for income uncertainty are often represented by variance of past income in studies using aggregate data or panel data (Miles, 1997; Hurst et al., 2006). While the HFCS dataset does not offer the possibility to include time-varying variables on the household level, it includes questions regarding expectations. The following measures offer the possibility to capture income uncertainty:

Future income expectations, which is a subjective question on whether the reference person thinks that household income will increase more than prices, less than prices or about the same.

Strongly affected economic sector is a self-computed variable based on the study by Battistini and Stoevsky (2021). It takes on the value 0 if the household does not hold a job in sector heavily affected by COVID-19 restrictions, and 1 if it does (NACE coding G, H, I, R, S, T, U)[6] (Eurostat, 2023; Canton et al., 2022). For the self-employed, it is

6. The letters G, H, I, R, S, and U correspond to wholesale and retail trade (G), accommodation and food service activities (I), arts, entertainment, and recreation (R), other service activities (S), activities of

similarly defined, taking on the value 1 if their business operates in a strongly affected sector.

The information for the two suggested income uncertainty variables is contained in the preliminary data for the 2020 wave of the HFCS, released in February 2023. The 2017 wave further includes other potential income uncertainty measures, as described in detail in the Appendix.

6.1.2 Dependent variables

For policy making, it is of substantial interest to analyse whether uncertainty, *future income expectation* and *strongly affected economic sector*, influence saving behaviour of households. Importantly, not all households may be able to react to financial uncertainty; those which were already at their financial margin before the pandemic, may not be able to increase their saving rate because their consumption already predominantly consisted of essentials even before COVID-19. Notably, about 46% of the Belgian population could not save in the year 2017, and 38% in the year 2020. This is supported by the study on the preliminary results of the fourth wave of the HFCS, published by the National Bank of Belgium, which states that about 60% of households declared that their income exceeded expenditures (Sola Perea and Belle, 2022). Thus, this raises the necessity to use two different specifications for the dependent variable. Potentially, the estimates for the effect of financial uncertainty or other variables on saving rates may differ both in magnitude and significance, depending on whether these two groups are pooled together, or if the sample is restricted to those households that are able to save.

Therefore, in a first step, the dependent variable is a dummy variable, taking the value 0 if the household is not able to save (saving rate ≤ 0) and 1 if the household is able to save (saving rate > 0). Logit regressions give insights on what increases or decreases the odds of being able to save. Secondly, the sample of households is restricted to those that are financially more likely to adapt their consumption and saving according to their expectations. More specifically, households at their financial margin may want to increase their saving to insure themselves against future uncertainty but cannot do so because of binding constraints. Therefore, it is relevant to restrict the sample to households that are able to save (saving rate larger than 0). In this manner, households that have financial leeway can be extracted and it can be analysed in how far financial uncertainty and other variables affect saving rates. Lastly, the third specification for the dependent variable is again a dummy, taking on the value 1 if the household indicates that it saves for the "provision of unexpected events", and 0 if not. To give some background, in the year 2017, about 33% of the Belgian households indicate saving for unexpected events, while this number rose to 57% in the year 2020. Thus, uncertainty may have played a major role

households as employers - undifferentiated goods- and service-producing activities of households for own use (T), and activities of extraterritorial organisations and bodies (U).

and has potentially led to this stark difference in people providing for unexpected events.

Therefore, the specifications for the dependent variable are a dummy to indicate negative and positive saving rates, a continuous variable including solely positive saving rates, and another dummy indicating whether the household saves for unexpected events. The set of controls is described in the following segment.

6.1.3 Control variables and post-double selection

As approximately 1,000 variables are available in the HFCS dataset, the set of control variables must be assessed before starting with regressions. Naturally, they must be scaled down to the most relevant ones. Rather than trying different specifications in an intransparent way, I incorporate Machine Learning in the thesis. More specifically, I apply post-double selection to assess the importance of variables to predict the different dependent variables. It facilitates extracting which variables are suitable as regressors to reduce the probability to incorporate an omitted variable bias. Nonetheless, the relevant variables are extracted from the literature as a head start and are then given over to the algorithm.

Commonly used control variables in the realm of saving are either group dummies or log-terms for *income* and *wealth*. In fact, the former is, unsurprisingly, the common denominator of papers studying saving rates. Further, *age* in some form often enters the set of controls, either in terms of age groups or age plus it´s squared term. Other potential variables include the *household size*, the *marital status*, *education* variables or *gender*. Also, other financial variables may be utilized, such as dummies specifying whether someone *owns their main residence*; this information is crucial, as for many households, this is the most important component of wealth in Belgium (Sola Perea and Belle, 2022). Accordingly, whether someone has to *repay mortgage* is of major interest, as this is the highest outstanding debt for many households, especially for the group of 30- to 50-year-olds. Additionally, variables such as whether an individual has gotten a *credit denied in the past*, he or she *expects to be denied credit in the future*, somebody has mandatory vs. additional private *pension plans*, and dummies for whether a person *receives social benefits*, including unemployment benefits, are tested. And lastly, a dummy indicating whether the household earns *income from self-employment* is checked. The intuition behind this is given by a paper by Hurst et al. (2006). It gives theoretical and empirical arguments for distinguishing between business and non-business owners. Their most prominent arguments include that the pension expectations differ significantly for business owners when compared to non-business owners and that they display different preferences in terms of risk and patience. Further, business owners face high income uncertainty and, contrary to employed people, their income may be mis-measured more easily (Hurst et al., 2006).

The set of variables must be scaled down to the most informative ones. The variables of interest are the income uncertainty measures. All three dependent variables are used in

separate steps of the procedure subsequently described. Specifically, post-double selection is applied, which consists of two stages. Firstly, the variable of interest, i.e., income uncertainty, and, secondly, the dependent variable is regressed on the potential control variables. The control variables mentioned above are passed on, importantly, in different forms; for instance, income was passed on in logs in one instance, and in another instance as income quintile dummies. Post-double selection tends to select a less parsimonious model, i.e., chooses long regressions, and thus facilitates the estimates to have the correct distribution and the confidence intervals to have the correct coverage. Especially in smaller sample sizes, post double selection significantly decreases the possibility of an omitted variable bias, which is what I find necessary with such a large range of potential controls (Belloni et al., 2021).

The controls selected by post-double selection are:

$$\begin{aligned} X \quad = \quad & log(netincome) + age + age^2 + gender + household\_size \\ & + tenure\_status + tenure\_status\_mortgage \\ & + tertiary\_education + log\_financial\_wealth \end{aligned}$$

The variable of interest, the income uncertainty measure d, can either be *affected_sector* or *income_expectation*. Note that the regressions presented in the following section restrict the sample to those households where the reference person is either employed or self-employed. This stems from the fact that the variable *affected sector*, by definition, is only relevant for those who work; and to make results more comparable, the same restricted sample is used when *income expectation* is utilized as income uncertainty variable. For the latter, the results have been replicated with the complete sample of households and can be reviewed in the appendix.

The following three models follow from the above:

$$Model \quad 1: \quad logit(sav\_dummy_i) \quad = \quad \alpha \quad + \quad d_i\gamma \quad + \quad X_i\beta \quad + \quad \epsilon_i$$

where in Model 1 the dependent variable is the dummy, indicating positive ($sav\_dummy = 1$) and no saving ($sav\_dummy = 0$).

$$Model \quad 2: \quad sav_i \quad = \quad \alpha \quad + \quad d_i\gamma \quad + \quad X_i\beta \quad + \quad \epsilon_i$$

where in Model 2 the dependent variable is the saving rate, whereas in this case the sample is additionally restricted to those households that can save, i.e., $sav > 0$.

$$Model \quad 3: \quad logit(purpose\_unexpected_i) \quad = \quad \alpha \quad + \quad d_i\gamma \quad + \quad X_i\beta \quad + \quad \epsilon_i$$

where in Model 3 the dependent variable is a dummy, specifying whether the reference person indicates saving for unexpected events ($purpose\_unexpected = 1$) or not ($purpose\_unexpected = 0$).

The controls X are in line with economic literature, unsurprising to the reader experienced in the field of saving behaviour. Nonetheless, post double selection supports the decision on the set of controls from a statistical viewpoint, and should thus be seen as an addition to theoretical arguments of determining them, rather than a replacement. In the following, the results of the regressions are analysed and connected to the literature.

6.2 General results of the econometric analysis

In Model 1, the dependent variable, the *dummy for saving rates*, takes the value 1 if the household displays positive saving rates, 0 otherwise. The regressions are run with the income uncertainty variables *affected sector* and *income expectation* separately. In each instance, this is done for the year 2017 and 2020, to uncover potential differences.

As can be seen in Table 2, households with larger *net income* are more likely to save. Similarly, having a *mortgage on the main residence* significantly increases the probability to save, which is a circumstance already discussed in subsection 5.3. Again, this stems from the fact that debt repayments enter the saving rate positively. What also refers to section subsection 5.3, is the sign of the coefficient for *age*; the older the reference person, the less likely the household is to save in the year 2017. The data and econometric analysis thus support the life-cycle hypothesis, and accordingly endorses the negative sign of the coefficient. In the year 2020, on the other hand, this relationship could not be detected - which is a peculiar circumstance. Yet the year 2020 was an extraordinary year in many dimensions. Referring again to the statistical findings of this thesis, recall Table 1; median saving rates across age groups tend to decrease substantially with age in the year 2017, however, this decline is less pronounced for the year 2020, where consumption patterns have changed significantly following the outbreak of the pandemic and related measures.

Further, the *household size* decreases the probability to save/the saving rate on average on a statistically significant level. Substituting the household size by the *number of dependent children* led to an almost identical result in terms of magnitude and significance of the coefficient. Lastly, it is found that, holding everything else constant, the odds of saving increased by 57% for female household heads compared to male household heads in the year 2020, where no statistically significant effect in the year 2017 could be recovered.

The variable of interest, the income uncertainty variables, do not have a statistically significant effect on the odds to save. Thus, the *precautionary saving theory* is not supported in this instance. Potentially, one of the other variables described in the Appendix may be a better measure for income uncertainty. Especially interesting is the *general*

	affected sector		income expectation	
	2017	2020	2017	2020
(Intercept)	−12.487***	−19.815***	−12.935***	−19.575***
	(3.150)	(4.042)	(3.116)	(3.989)
affected_sector_all	−0.263	0.308		
	(0.212)	(0.211)		
age	−0.267**	−0.080	−0.259**	−0.073
	(0.109)	(0.084)	(0.107)	(0.086)
age_squared	0.002**	0.000	0.002*	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
log_DI2000netmonthly	2.777***	3.195***	2.811***	3.174***
	(0.328)	(0.424)	(0.328)	(0.417)
hh_size	−0.691***	−0.643***	−0.692***	−0.649***
	(0.097)	(0.083)	(0.099)	(0.085)
education_tertiary	0.343	−0.023	0.369*	−0.058
	(0.210)	(0.197)	(0.210)	(0.200)
tenure_status	−0.464	0.055	−0.430	0.020
	(0.335)	(0.279)	(0.337)	(0.281)
tenure_status_mortage	1.203***	0.564**	1.171***	0.581**
	(0.250)	(0.281)	(0.246)	(0.283)
log_financial_wealth	−0.063	−0.089**	−0.067	−0.091**
	(0.045)	(0.038)	(0.045)	(0.038)
gender	0.119	0.459**	0.117	0.449**
	(0.214)	(0.194)	(0.213)	(0.194)
income_expectation			−0.122	−0.246
			(0.185)	(0.270)
R2	0.222	0.198	0.221	0.196
Nobs	1054	1031	1054	1031

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Note: household sample is restricted to those where reference person works.

Table 2: Model 1 with $y = sav\_dummy$

personal financial situation expectation. Since potential answers are on an ordinary scale, ranging from expecting the general personal financial situation to be significantly better (1) to significantly worse (5), this could be a refinement for the uncertainty measure.

Contrary to the previous model, Model 2 uses the continuum of saving rates as the dependent variable. To recall, as opposed to Table 2, now only households that are able to save ($sav > 0$) are included in the sample.

As can be seen in Table 3, again, higher *net income* increase the saving rate on average on a statistically significant level. Also, having completed *tertiary education* increases the saving rate of a household by 5 percentage points on average - a statistically significant effect in the year 2017, while this effect could not be detected for the year 2020. Further, *having mortgage on the main residence* increases saving rates by almost 20 percentage points on average. Similarly, as for the logit regression, *age* tends to decrease saving rates in the year 2017, while there is no significant effect in the year 2020. Interestingly, being *female* does not influence the saving rate in any direction, while in the logit regression, being female significantly increased the probability to save in the year 2020. As in Model 1, the income uncertainty variables, *affected sector* and *income expectation*, have no significant effect on the dependent variable in Model 2, the positive saving rates. Consequently, this, again, does not deliver support for the *precautionary saving motive*. Despite this, I do not find it appropriate to conclude that income uncertainty does not play a role when it comes to the decision to save. Likely, the specifications for income uncertainty may be flawed and as mentioned in the Appendix, other estimates may render significant effects on saving rates. While I cannot prove the hypothesis that income uncertainty affects saving rates due to restricted access to only preliminary data of the HFCS, empirical works often support his hypothesis (Deaton, 1991; Carroll, 1994; Hurst et al., 2006; Levenko, 2020; Dossche and Zlatanos, 2020; Ercolani et al., 2021; Miles, 1997). To dive a bit deeper into this matter, I therefore use another specification for the dependent variable.

For this, as mentioned earlier in section subsubsection 6.1.2, Model 3 is run. The dependent variable is again a dummy, now indicating whether a household *saves for unexpected events.* As can be seen in Table 4, *financial wealth* tends to increase the probability to save for unexpected events. However, one must take into account reverse causality; households that are able to save up in the form of financial wealth may specifically determine that a certain share of this is for the purpose of insuring themselves against unexpected events. Further, *owning the main residence* significantly increases the probability of indicating a precautionary saving motive in 2017, as possibly households that own their main residence, and therefore have less expenditures regarding rent, are able to set aside money for unforeseen situations.

When it comes to the income uncertainty variables, the following can be deducted from

	affected sector		income expectation	
	2017	2020	2017	2020
(Intercept)	−0.133	−1.015***	−0.173	−1.019***
	(0.452)	(0.239)	(0.438)	(0.237)
affected_sector_all	−0.021	−0.011		
	(0.023)	(0.023)		
age	−0.031***	−0.002	−0.031***	−0.002
	(0.010)	(0.007)	(0.010)	(0.007)
age_squared	0.000**	−0.000	0.000**	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
log_DI2000netmonthly	0.162***	0.209***	0.165***	0.208***
	(0.049)	(0.024)	(0.048)	(0.024)
hh_size	−0.059***	−0.055***	−0.059***	−0.055***
	(0.009)	(0.011)	(0.008)	(0.011)
education_tertiary	0.057***	0.038	0.060***	0.036
	(0.018)	(0.027)	(0.018)	(0.027)
tenure_status	−0.048	−0.043	−0.050	−0.043
	(0.034)	(0.026)	(0.033)	(0.027)
tenure_status_mortage	0.189***	0.167***	0.191***	0.168***
	(0.022)	(0.027)	(0.022)	(0.027)
log_financial_wealth	0.007	−0.008*	0.007	−0.007*
	(0.010)	(0.004)	(0.010)	(0.004)
gender	−0.011	−0.015	−0.011	−0.016
	(0.029)	(0.019)	(0.030)	(0.019)
income_expectation			0.029	−0.021
			(0.028)	(0.018)
R2	0.245	0.209	0.241	0.211
Nobs	715	777	715	777

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Note: household sample is restricted to those where reference person works and where saving is positive.

Table 3: Model 2 with $y = sav$

	affected sector		income expectation	
	2017	2020	2017	2020
(Intercept)	−6.043***	−0.410	−6.010***	−0.152
	(2.063)	(1.789)	(2.058)	(1.882)
affected_sector_all	0.089	0.516*		
	(0.207)	(0.272)		
age	−0.000	0.118*	−0.007	0.115*
	(0.081)	(0.063)	(0.082)	(0.064)
age_squared	−0.000	−0.001**	−0.000	−0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
log_DI2000netmonthly	0.463**	−0.346*	0.467**	−0.347
	(0.200)	(0.205)	(0.199)	(0.212)
hh_size	−0.227***	−0.087	−0.227***	−0.095
	(0.068)	(0.059)	(0.067)	(0.059)
education_tertiary	0.082	−0.014	0.086	−0.005
	(0.184)	(0.199)	(0.183)	(0.201)
tenure_status	0.663**	0.193	0.640**	0.214
	(0.286)	(0.217)	(0.280)	(0.219)
tenure_status_mortage	−0.147	−0.070	−0.125	−0.074
	(0.270)	(0.185)	(0.259)	(0.187)
log_financial_wealth	0.254***	0.136***	0.257***	0.118***
	(0.091)	(0.043)	(0.091)	(0.040)
gender	−0.037	0.361*	−0.044	0.363*
	(0.147)	(0.191)	(0.148)	(0.192)
income_expectation			0.226	0.320**
			(0.178)	(0.152)
R2	0.068	0.029	0.069	0.032
Nobs	1054	1031	1054	1031

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Note: household sample is restricted to those where reference person works.

Table 4: Model 3 with $y = purpose\_unexpected$

the output table: the coefficient for *affected sector* is positive for the year 2020, a result which is statistically significant on the 10% level. The coefficient for *income expectation* is statistically significant on a 5% level and positive for the year 2020. This indicates that when a household expects income to increase less than prices in the future, they are 37% more likely to save for unexpected events. This number is even more pronounced when taking all households into account, rather than only the working population; then, a household that expects its income to increase less than prices is 52% more likely to save for unexpected events, an effect that is significant on the 1% level (as can be seen in the Appendix).

The models were also evaluated with additional control variables, such as dummies for *incurring income from self-employment*, *receiving social benefits including unemployment benefits*, or dummies on whether you *expect to have* or *have actually had a credit denied*, among others. These variables were not selected by the post-double selection as relevant information source and thus their inclusion serves as a robustness check. The results described above are robust in terms of significance and magnitude when including the additional explanatory variables. In favour of a more parsimonious model and since the fit did not improve substantially upon the inclusion, the final decision on the models corresponds to the selection presented in subsubsection 6.1.3.

6.3 Discussion on findings regarding uncertainty and related literature

To sum up the results briefly, one significant parameter that increases both the probability to save (Model 1) and the saving rate for those that can save (Model 2) is *net income*. Further, having *mortgage on the main residence* also has a positive, statistically significant effect on either; this is not too surprising, as debt repayments enter saving positively, and as seen in the findings for the life-cycle hypothesis in subsection 5.3, especially the age groups repaying mortgage are the groups displaying high saving rates. In addition, the coefficient for *age* is negative and statistically significant on the 1% level for both models, where *age squared* is equally significant and positive - but only for the year 2017. Therefore, the life-cycle hypothesis is supported for the year 2017, in the sense that this is in accordance with a hump-shaped saving rate across age. Support for the year 2020 is not found.

Further, the *household size* significantly decreases both the probability to save (Model 1) and positive saving rates (Model 2) on average. Being *female* is positive and significant only in Model 1 and only for the year 2020; hence, while being female tends to increase the probability to save in the year 2020, it does not have a significant effect on saving rates once the sample is restricted to those households that are able to save.

Finally, the income uncertainty measures, *affected sector* and *income expectation*, have

no significant effect in neither Model 1 nor Model 2. However, since a number of studies find significant, positive effects of income uncertainty on saving (Deaton, 1991; Carroll, 1994; Hurst et al., 2006; Levenko, 2020; Dossche and Zlatanos, 2020; Ercolani et al., 2021; Miles, 1997), I analyse whether the proposed income uncertainty variables have an effect on the purpose of saving (Model 3). The variables selected as income uncertainty measures deviate from the literature, as I do not have panel data at hand. Nonetheless, the HFCS is still rich in terms of variables, yet since I am working with the preliminary data, I am not able to use all the measures I originally envisioned to utilize.

In Model 3, where the dependent variable is a dummy indicating whether a household specifies saving for unexpected events, the variables *affected sector* and *income uncertainty* have a positive effect on the probability to save for unexpected events on a 10% and 5% level; but only so for the year 2020. The conclusion for these findings suggests the following: firstly, *working in an economic sector that was heavily affected by restrictions* increased the probability to provide for unexpected events on average (Model 3). This is true for the year 2020; for the year 2017, these sectors did not influence this decision, which suggests that the uncertainty that came with the restrictions may have partly influenced the decisions whether to provide for uncertainty in the future or not in 2020. A similar finding is reported in a study by Bachas et al. (2020) for the US. They find that overall, spending declined, where the decrease was significantly stronger for those households, whose members worked in a sector that was strongly affected by restrictions, such as non-essential sectors like tourism. Accordingly, they report significant increases in saving for those households (Bachas et al., 2020). Similarly, a study by Chetty et al. (2020) comes to very comparable results, namely that individuals who held face-to-face jobs during the COVID-19 pandemic, which were also typically the jobs most affected by restrictions, strongly decreased their spending (Chetty et al., 2020). While they find this effect explicitly for consumption and saving, it supports the findings of my analysis in the sense that working in such a sector indeed affects financial attitude to some degree, in the case of this thesis the desire to provide for unexpected events. Secondly, as for *future income expectations*, several studies find that income uncertainty plays a significant role for financial decision making of households (Adams-Prassl et al., 2020; Dossche and Zlatanos, 2020; Ercolani et al., 2021; Deaton, 1991; Carroll, 1994; Levenko, 2020), as stated earlier. Consequently, this, too, supports the implications for Model 3, namely that households that expect their *income to increase less than prices next year*, are more likely to indicate saving for unexpected events. Again, this holds true for the year 2020 only, where uncertainty may have been perceived differently as opposed to before the pandemic.

To conclude, the empirical literature supports the finding that the income uncertainty measures, *affected sector* and *income expectation*, affect the financial decision making of households, especially in the year 2020. While I could find no significant effect on the probability to save or the saving rate of those households that are able to save, I indeed

find positive, statistically significant effects on the probability of households indicating to provide for unexpected events in the year 2020. Notably, while other studies find that these type of uncertainty variables also affect spending and saving, an implication that I could not prove, many of the studies mentioned above are carried out for the US. European labour markets typically differ from the labour markets in the US, and thus the Belgian households may have been less prone to labour market uncertainty. The study by Carroll (1997) argues that employees in Germany have been significantly less affected by lay-offs or cuts in income than in the US or the United Kingdom. Possibly, Belgium was also better equipped to buffer labour market shocks and uncertainty, consequently avoiding part of the spending cuts, that many households in the two Anglo-Saxon countries have experienced (Carroll, 1997). This, however, is something that would have to be analysed in a separate study.

7 Conclusion

This Master´s thesis tackles questions regarding the saving behaviour of households in Belgium using the third and fourth wave of the *Household Finance and Consumption Survey*, covering the years 2017 and 2020. The main research questions include what characteristics affect the saving rate before (2017) and during (2020) the COVID-19 pandemic and whether uncertainty influences the financial attitude of households.

The thesis faces limitations that need to be addressed. Firstly, the fourth wave of the HFCS for Belgium was only available in its preliminary version at the time the research for this thesis started. Consequently, potentially interesting variables, either directly inquiring about the household-specific consequences of COVID-19 or related sentiments influencing financial attitude, were not available at that moment in time, and neither was the day or month specifying when the interview took place. While this is inherent to the preliminary version of the data, this limitation also gives the chance to further extend this work, by analysing how households´ financial position and expectations have shifted because of the pandemic, potentially unveiling interesting relationships with uncertainty. Further, definitions of net income, consumption and saving vary in the economic literature. While *net income* is calculated following the approach by Boone et al. (2019) and Kuypers et al. (2020), *total consumption* is derived as suggested by ECB (2020) and Browning et al. (2002) and the definition for saving rests on the study by Fessler and Schürz (2017), the results of this work may be evaluated with alternative concepts as a robustness check. Nonetheless, the resulting median values are in accordance with the empirical literature, as referred to throughout this work. Lastly, the number of variables in the HFCS is outstanding; making it, on the one hand, an extraordinarily rich information source for studies about euro area countries, but, on the other hand, harbouring the possibility to disregard important variables. To decrease the probability of including an omitted variable bias in the econometric analysis, I decided to incorporate post-double selection. As already described, the selected control variables support the set of controls in the economic literature and can thus be comprehended as a statistical complement to the theoretical selection process, rather than a substitute.

Through the analysis of this thesis, valuable information on the financial situation and attitude of Belgian households was found. *Consumption* has dropped significantly, both voluntarily and involuntarily (Sola Perea and Belle,2022), and saving rates have mostly increased (Basselier and Minne, 2021). These changes in median values are not equally pronounced for households with different socio-economic characteristics (Baker et al., 2020; Bachas et al., 2020; Cox et al., 2020; Hacıoğlu-Hoke et al., 2021; Carvalho et al., 2020); more precisely, high-income households have decreased their consumption more pronouncedly, and households in the lowest two income quintiles and those with a reference person that is unemployed or out of the labour force were neither able to save in the year 2017, nor 2020, which is important to narrate when considering the effects

of crises. In total, 38% of Belgian households could not save in the year 2020. While the Belgian government put employment and business protection schemes into place to cushion the consequences of the COVID-19 pandemic and its accompanying restrictions, uncertainty still played an essential role. While in the year 2017 about 33% of households indicated saving specifically for unexpected events, this number rose to 57% in 2020. This leads directly to one of the most important findings of this thesis: working or having a business in a sector that was strongly affected by COVID-19 related restrictions or expecting the household´s income to increase less than prices in the next two years, significantly increased the probability to save for unexpected events in the year 2020. This result could not be found for 2017, suggesting that income uncertainty has influenced the financial attitude of Belgian households especially in the year 2020, which was characterized by many unprecedented peculiarities.

Uncertainty about the general economic and personal financial situation was at an all times high in many countries during the COVID-19 pandemic (Ercolani et al., 2021; Levenko, 2020; Dossche and Zlatanos, 2020). Households differ in terms of income, marginal propensity to consume and save, and other socio-economic characteristics. It is essential to acknowledge these differences, as households may react very differently to government interventions, such as tax rebates. Therefore, especially in times of crises, it is highly relevant for economists that conduct research on both the micro- and macro-level, as well as for governments and politicians to take heterogeneity of households into account for well-targeted, efficient policy making.

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List of Figures

List of Tables

A Appendix

A.1 Complementary remarks

Detailed data description

The datasets that are employed throughout the thesis were shortly introduced in subsection 4.1. In the following, the *Household Finance and Consumption Survey*, the *OECD consumer price index*, the *Household Budget Survey*, and the data utilizing the *EUROMOD system* are described.

The *HFCS*, short for *Household Finance and Consumption Survey*, is a survey conducted by the National Banks of the participating countries, mostly euro area countries, and is administered and published by the European Central Bank. It collects information on households´ finances and consumption. With over 1,000 variables it gives the possibility to analyse which socio-economic characteristics affect financial behaviour of households. To realistically represent the entire population of each country, a complex system of weights is established by each National Bank, as mentioned earlier. While this makes calculations time-consuming, it gives precise insights into many financial dimensions, making it optimal for policy makers to visualize the current economic situation while taking the stark differences between households into account.

Three waves are fully accessible[7], while the 2020 wave was only available for five countries as of June 26^{th} 2023. Among them is Belgium, which is the country I analyse for my thesis. The interviews for Belgium took place between June 2020 and July 2021, and variables such as income typically refer to the last 12 months. Thus, the research questions do not aim at investigating the causal effect of the COVID-19 pandemic, but rather analyse what affects saving rates in the year 2020, which was characterized by a high degree of uncertainty. To provide the reader with the entire information, the data for all countries has been released on July 20^{th} 2023. Subsequently, this gives the possibility to use the empirical strategy of this thesis and compare the results with the findings for other countries, as households differ quite substantially across Europe.

All prices are inflation-adjusted to the year 2020, as this is the year of interest in this thesis. Therefore, all levels for total consumption, net income and saving are expressed in terms of 2020 prices (OECD, 2023). Naturally, this data is also available for all other countries contained in the HFCS, facilitating the analysis for other countries when using the empirical strategy of this thesis.

Further, the Household Budget Survey (HBS) is conducted in all EU countries and some additional European countries, again, supporting the opportunity to repeat the anal-

7. The three earliest waves cover the years 2010, 2014 and 2017, respectively.

ysis for another country. It collects very precise information about consumption, reaching as far as inquiring about the amount spend on bread each month (Eurostat, 2023). A thorough description of how the information from this dataset is used to derive total consumption, is described in subsection 5.1.

Lastly, to derive net disposable income, another data source is necessary, as solely gross disposable income is available in the HFCS. For this, I follow the approach by Kuypers et al. (2020) and Boone et al. (2019). They hand over input data from the HFCS to EUROMOD, a micro-simulation-model, which includes tax related information for European countries. Subsequently, shares of net to gross income for each income percentile are derived as output data. Merging this with the percentiles for gross income in the HFCS dataset, I estimate net disposable income for each household.

Additional uncertainty measures

The preliminary data for the fourth wave of the HFCS was released in February 2023, where a substantial number of variables was not available yet. The final, complete sample, published on July 20^{th} contains further information, enabling future studies to utilize other potential income uncertainty measures as described below.

Probability of losing a job, where the reference person is asked on a scale from 0 to 100 how likely they think they will lose their job over the course of the next year.

Expected worsening of job conditions in the next two years, which includes potential answers "Yes, lose a job" and "Yes, have to work shorter hours". Especially the latter may be highly relevant for the year 2020 because of short-term work, which often comes hand in hand with a reduction in net income.

General economic situation expectation, which is a subjective assessment on whether the general economic situation of the country will get a lot better (1) or a lot worse (5) in the next 12 months. While this somewhat captures uncertainty, it may be the case that while the household expects the country´s economic situation to be significantly worse, it also expects its own financial situation to be significantly better in the future. Therefore, this candidate must be handled with caution.

General personal financial situation expectation, which is again a subjective assessment on whether the reference person thinks that the financial situation of the household will get a lot better (1) or a lot worse (5) in the next 12 months.

A.2 Supplementary tables, figures and regression outputs

Tables and figures

	income quintile 1	income quintile 2	income quintile 3	income quintile 4	income quintile 5
food at home	15.63%	16.2%	14.78%	15.33%	15.48%
food outside home	3.25%	4.23%	3.95%	4.5%	5.33%
utilities	9.3%	9.21%	8.25%	7.43%	6.45%
trips and holidays	2.52%	4.34%	4.86%	7.27%	9.71%
alimony	0.61%	1.48%	1.54%	1.14%	1.19%
rent: part. owned	0%	0.04%	0%	0%	0%
rent	12.55%	6.86%	3.47%	1.98%	0.69%
leasing	0.03%	0.17%	0.16%	0.61%	0.32%
other	56.1%	57.47%	62.99%	61.74%	60.84%

average weighted share of expenses for consumption bundles

Table 5: Consumption decomposition - across income quintiles in the year 2017

	income quintile 1	income quintile 2	income quintile 3	income quintile 4	income quintile 5
food at home	17.86%	17.93%	17.44%	17.53%	17.62%
food outside home	3.22%	4.36%	4.89%	4.64%	4.64%
utilities	10.48%	9.35%	9.37%	7.48%	6.73%
trips and holidays	0.28%	0.38%	0.48%	0.56%	0.72%
alimony	1.35%	1.77%	2.25%	1.3%	1.86%
rent: part. owned	0%	0.03%	0.01%	0%	0.03%
rent	11.15%	7.74%	5.11%	2.32%	1.1%
leasing	0.12%	0.55%	0.83%	0.4%	0.65%
other	55.55%	57.89%	59.62%	65.77%	66.64%

average weighted share of expenses for consumption bundles

Table 6: Consumption decomposition - across income quintiles in the year 2020

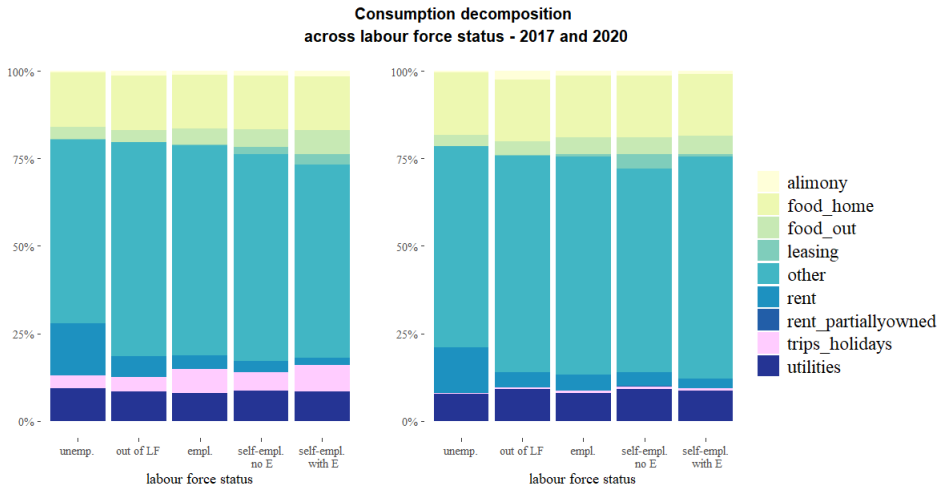

Figure 7: Consumption decomposition across labour force status - 2017 and 2020

	unemp.	out of LF	empl.	self-empl. no E	self-empl. with E
food at home	15.53%	15.53%	15.34%	15.4%	15.33%
food outside home	3.5%	3.54%	4.56%	5.07%	6.84%
utilities	9.22%	8.37%	7.85%	8.54%	8.36%
trips and holidays	3.65%	4.11%	6.86%	5.4%	7.57%
alimony	0.42%	1.26%	1.17%	1.31%	1.52%
rent: part. owned	0%	0%	0.01%	0%	0%
rent	14.89%	5.97%	4.02%	3.19%	2.12%
leasing	0.11%	0.04%	0.18%	1.94%	3.15%
other	52.66%	61.17%	60%	59.15%	55.11%

average weighted share of expenses for consumption bundles

Table 7: Consumption decomposition - across labour force status in the year 2017

	unemp.	out of LF	empl.	self-empl. no E	self-empl. with E
food at home	17.86%	17.74%	17.54%	17.63%	17.64%
food outside home	3.11%	3.97%	4.9%	4.76%	5.28%
utilities	7.66%	9.04%	8.02%	9.14%	8.72%
trips and holidays	0.27%	0.46%	0.56%	0.66%	0.54%
alimony	0.48%	2.35%	1.38%	1.28%	0.9%
rent: part. owned	0%	0%	0.01%	0.25%	0%
rent	13%	4.41%	4.61%	3.81%	2.84%
leasing	0.11%	0.11%	0.73%	4.12%	0.69%
other	57.51%	61.93%	62.25%	58.36%	63.38%

average weighted share of expenses for consumption bundles

Table 8: Consumption decomposition - across labour force status in the year 2020

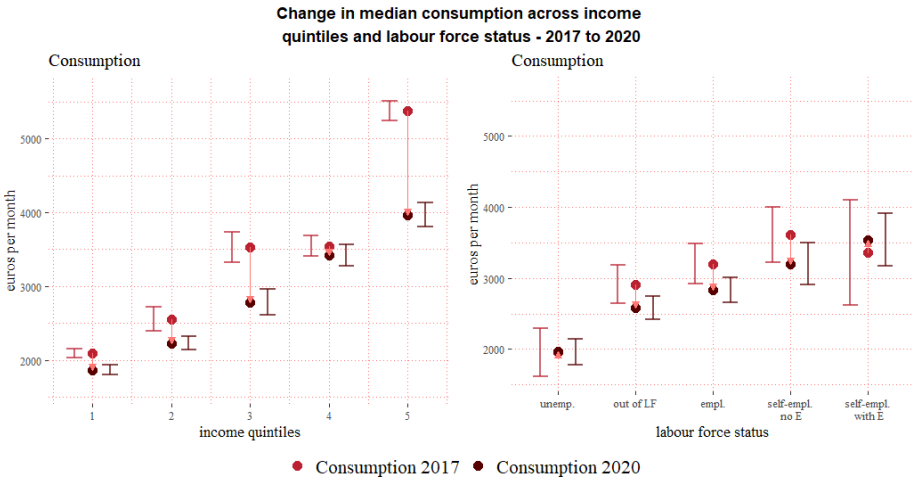

Figure 8: Median consumption and its changes, with standard deviations - 2017 to 2020

	median - 2017	mean - 2017	sd - 2017	median - 2020	mean - 2020	sd - 2020
income quintile 1	2,095.56	2,442.93	59.10	1,868.97	2,031.35	64.61
income quintile 2	2,557.20	2,880.16	166.75	2,229.32	2,614.65	87.94
income quintile 3	3,530.46	3,743.63	207.21	2,786.65	2,989.54	171.14
income quintile 4	3,545.82	4,046.08	141.57	3,424.25	3,778.89	146.72
income quintile 5	5,373.96	5,254.50	130.74	3,969.53	4,388.65	164.60
unemployed	1,952.39	2,444.66	338.13	1,966.55	2,349.45	183.26
out of LF	2,914.33	3,247.65	268.05	2,584.08	2,872.64	161.78
employed	3,202.07	3,691.23	285.74	2,835.38	3,296.27	179.05
self-empl. without employees	3,607.27	3,798.99	388.53	3,199.50	3,383.27	295.18
self-empl. with employees	3,358.72	3,723.23	742.10	3,541.97	3,550.76	372.77
all	2,928.58	3,387.02	238.74	2,786.65	3,452.75	279.02

CPI adjusted using CPI of 2020 from OECD database; median and mean in € per month

Table 9: Consumption - statistics

	median - change	median - % change	mean - change	mean - % change
income quintile 1	-226.6	-10.81%	-411.58	-16.85%
income quintile 2	-327.88	-12.82%	-265.51	-9.22%
income quintile 3	-743.81	-21.07%	-754.08	-20.14%
income quintile 4	-121.57	-3.43%	-267.19	-6.6%
income quintile 5	-1404.43	-26.13%	-865.85	-16.48%
unemployed	+14.16	0.73%	-95.21	-3.89%
out of LF	-330.25	-11.33%	-375.01	-11.55%
employed	-366.69	-11.45%	-394.95	-10.7%
self-empl. without employees	-407.77	-11.3%	-415.72	-10.94%
self-empl. with employees	+183.25	5.46%	-172.48	-4.63%
all	-141.94	-4.85%	+65.73	1.94%

CPI adjusted using CPI of 2020 from OECD database; changes in absolute (€) and relative terms

Table 10: Changes in consumption - statistics

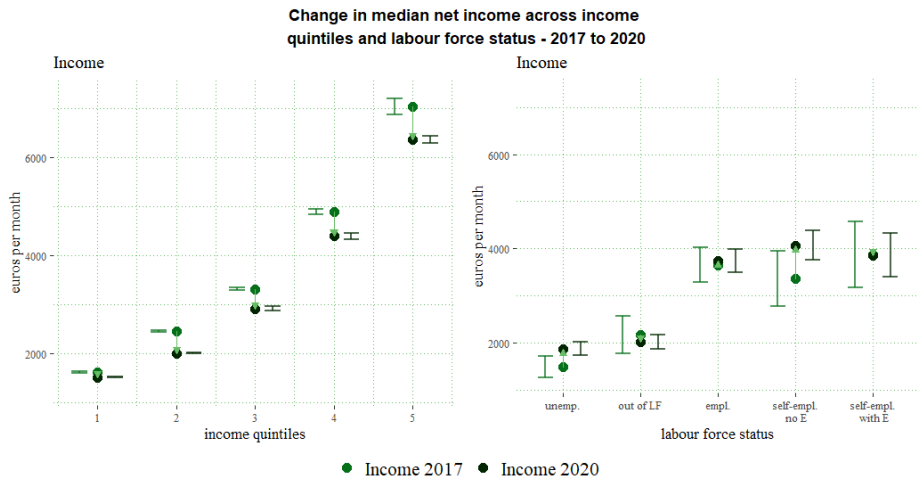

Figure 9: Median net income and its changes, with standard deviations - 2017 to 2020

	median - 2017	mean - 2017	sd - 2017	median - 2020	mean - 2020	sd - 2020
income quintile 1	1,611.61	1,580.98	19.45	1,514.40	1,485.37	10.98
income quintile 2	2,452.37	2,451.51	16.68	2,003.02	2,035.07	9.71
income quintile 3	3,315.94	3,369.68	26.80	2,914.13	2,995.72	49.69
income quintile 4	4,889.07	4,995.60	52.63	4,396.56	4,393.40	63.46
income quintile 5	7,036.59	7,390.65	163.26	6,358.25	6,745.38	71.69
unemployed	1,493.53	1,923.19	232.99	1,870.73	2,093.89	143.75
out of LF	2,179.84	2,560.27	397.68	2,025.91	2,588.38	148.18
employed	3,653.67	4,096.04	370.49	3,735.33	3,990.81	245.75
self-empl. without employees	3,361.47	3,815.23	587.00	4,065.84	4,253.89	311.37
self-empl. with employees	3,865.49	4,171.39	699.08	3,859.99	4,341.45	465.83
all	2,857.00	3,343.53	371.15	2,802.29	3,313.50	146.32

CPI adjusted using CPI of 2020 from OECD database; median and mean in € per month

Table 11: Net income - statistics

	median - change	median - % change	mean - change	mean - % change
income quintile 1	-97.21	-6.03%	-95.61	-6.05%
income quintile 2	-449.35	-18.32%	-416.43	-16.99%
income quintile 3	-401.81	-12.12%	-373.95	-11.1%
income quintile 4	-492.52	-10.07%	-602.19	-12.05%
income quintile 5	-678.34	-9.64%	-645.27	-8.73%
unemployed	+377.2	25.26%	+170.7	8.88%
out of LF	-153.94	-7.06%	+28.11	1.1%
employed	+81.66	2.24%	-105.23	-2.57%
self-empl. without employees	+704.38	20.95%	+438.66	11.5%
self-empl. with employees	-5.5	-0.14%	+170.06	4.08%
all	-54.71	-1.91%	-30.03	-0.9%

CPI adjusted using CPI of 2020 from OECD database; changes in absolute (€) and relative terms

Table 12: Changes in net income - statistics

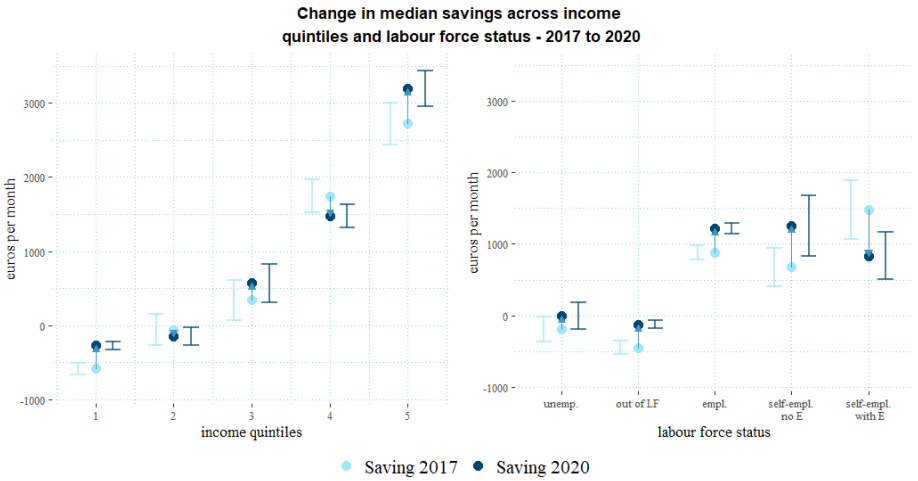

Figure 10: Median saving and its changes, with standard deviations - 2017 to 2020

	median - 2017	mean - 2017	sd - 2017	median - 2020	mean - 2020	sd - 2020
income quintile 1	-585.20	-736.67	80.79	-273.78	-457.82	56.47
income quintile 2	-59.66	-141.64	212.02	-148.61	-296.94	116.19
income quintile 3	340.73	178.26	269.25	567.43	375.33	257.73
income quintile 4	1,743.20	1,584.67	223.91	1,479.85	1,243.56	157.13
income quintile 5	2,720.81	2,712.49	283.87	3,194.57	2,953.69	244.40
unemployed	-192.50	-324.40	174.88	-3.36	-174.24	188.67
out of LF	-451.13	-483.95	92.92	-126.07	-158.58	54.12
employed	878.59	1,055.30	97.48	1,215.81	1,287.50	71.69
self-empl. without employees	675.52	476.94	265.37	1,254.56	1,535.63	420.79
self-empl. with employees	1,480.01	1,746.94	407.49	836.27	1,525.56	327.14
all	193.95	336.97	60.12	433.06	608.82	70.39

CPI adjusted using CPI of 2020 from OECD database; median and mean in € per month

Table 13: Saving - statistics

	median - change	median - % change	mean - change	mean - % change
income quintile 1	+311.42	-53.22%	+278.86	-37.85%
income quintile 2	-88.96	149.12%	-155.3	109.64%
income quintile 3	+226.7	66.53%	+197.07	110.55%
income quintile 4	-263.35	-15.11%	-341.1	-21.53%
income quintile 5	+473.76	17.41%	+241.2	8.89%
unemployed	+189.14	-98.25%	+150.16	-46.29%
out of LF	+325.06	-72.05%	+325.36	-67.23%
employed	+337.22	38.38%	+232.2	22%
self-empl. without employees	+579.04	85.72%	+1058.69	221.97%
self-empl. with employees	-643.74	-43.5%	-221.38	-12.67%
all	+239.11	123.28%	+271.85	80.67%

CPI adjusted using CPI of 2020 from OECD database; changes in absolute (€) and relative terms

Table 14: Changes in saving - statistics

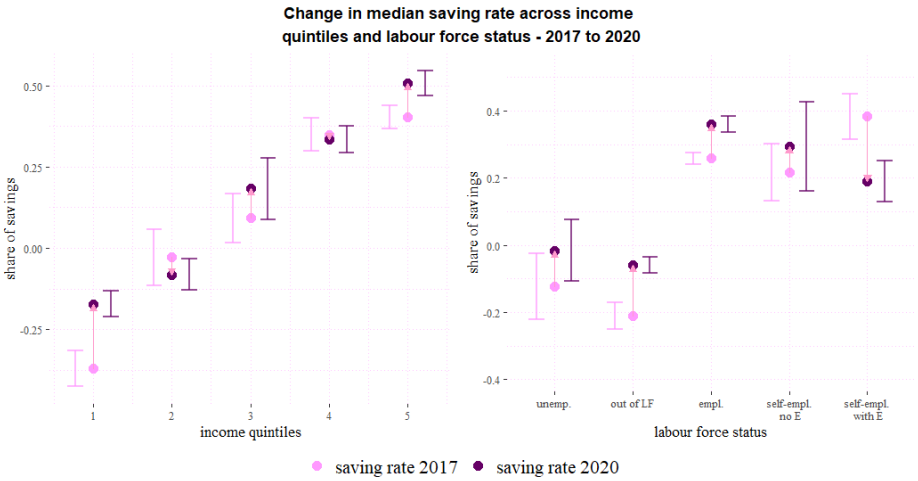

Figure 11: Median saving rate and its changes, with standard deviations - 2017 to 2020

	median - 2017	mean - 2017	sd - 2017	median - 2020	mean - 2020	sd - 2020
income quintile 1	-0.3695	-0.4912	0.0558	-0.1722	-0.3011	0.0398
income quintile 2	-0.0283	-0.0899	0.0870	-0.0808	-0.1993	0.0490
income quintile 3	0.0920	0.0192	0.0752	0.1828	0.0780	0.0941
income quintile 4	0.3488	0.2852	0.0504	0.3338	0.2637	0.0406
income quintile 5	0.4031	0.3627	0.0355	0.5059	0.4096	0.0382
unemployed	-0.1228	-0.2785	0.0971	-0.0156	-0.1953	0.0912
out of LF	-0.2098	-0.3320	0.0399	-0.0602	-0.2012	0.0236
employed	0.2582	0.1699	0.0177	0.3604	0.2504	0.0237
self-empl. without employees	0.2164	0.0331	0.0845	0.2933	0.1302	0.1334
self-empl. with employees	0.3835	0.2813	0.0678	0.1909	0.2217	0.0606
all	0.0627	-0.0642	0.0169	0.1655	0.0319	0.0313

CPI adjusted using CPI of 2020 from OECD database; median and mean in € per month

Table 15: Saving rate - statistics

	median - change	mean - change
income quintile 1	+19.73 Pp	+19.01 Pp
income quintile 2	-5.25 Pp	-10.94 Pp
income quintile 3	+9.08 Pp	+5.88 Pp
income quintile 4	-1.5 Pp	-2.15 Pp
income quintile 5	+10.28 Pp	+4.69 Pp
unemployed	+10.72 Pp	+8.32 Pp
out of LF	+14.96 Pp	+13.08 Pp
employed	+10.22 Pp	+8.05 Pp
self-empl. without employees	+7.69 Pp	+9.71 Pp
self-empl. with employees	-19.26 Pp	-5.96 Pp
all	+10.28 Pp	+9.61 Pp

CPI adjusted using CPI of 2020 from OECD database; changes in percentage points

Table 16: Changes in saving rate - statistics

Regression outputs

	Specification 1		Specification 2	
	2017	2020	2017	2020
(Intercept)	−6.210***	−0.562	−2.141***	−0.118
	(1.211)	(0.763)	(0.446)	(0.311)
income_expectation	0.238	0.418***	0.218	0.421***
	(0.145)	(0.104)	(0.141)	(0.107)
log_DI2000netmonthly	0.626***	0.097		
	(0.141)	(0.084)		
age	−0.019	−0.025	−0.018***	−0.011***
	(0.026)	(0.031)	(0.004)	(0.004)
age_squared	0.000	0.000		
	(0.000)	(0.000)		
hh_size	−0.261***	−0.099**	−0.100	−0.080**
	(0.076)	(0.045)	(0.073)	(0.035)
education_tertiary	−0.042	−0.129		
	(0.131)	(0.127)		
tenure_status	0.643***	0.161		
	(0.188)	(0.150)		
tenure_status_mortage	−0.071	0.017		
	(0.182)	(0.179)		
log_financial_wealth	0.167***	0.095***	0.262***	0.102***
	(0.059)	(0.023)	(0.059)	(0.027)
gender	−0.041	0.251		
	(0.114)	(0.194)		
R2	0.072	0.027	0.045	0.020
Nobs	2329	2130	2329	2130

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Note: the table above, as opposed to Table 4, includes the complete sample of households.

Table 17: Model 3 with y = *purpose_unexpected*. Entire sample.

	Model 1	Model 2	Model 3
	sav	sav_dummy	purpose_unexpected
(Intercept)	−12.63471***	−0.14271	−5.52994***
	(3.08222)	(0.44492)	(2.13191)
prob_losejob	−0.00523	−0.00020	−0.00693*
	(0.00358)	(0.00043)	(0.00403)
age	−0.25536**	−0.03090***	0.00994
	(0.10627)	(0.00985)	(0.07890)
age_squared	0.00220*	0.00028**	−0.00038
	(0.00114)	(0.00011)	(0.00085)
log_DI2000netmonthly	2.77211***	0.16162***	0.38625*
	(0.32808)	(0.04842)	(0.20545)
hh_size	−0.69448***	−0.05946***	−0.22792***
	(0.09953)	(0.00866)	(0.06940)
education_tertiary	0.37703*	0.05942***	0.07889
	(0.20783)	(0.01816)	(0.18398)
tenure_status	−0.47302	−0.04748	0.61255**
	(0.33460)	(0.03415)	(0.27972)
tenure_status_mortage	1.19001***	0.18812***	−0.12331
	(0.25038)	(0.02182)	(0.26015)
log_financial_wealth	−0.06595	0.00677	0.25877***
	(0.04513)	(0.00988)	(0.09366)
gender	0.10293	−0.01111	−0.05097
	(0.20950)	(0.02954)	(0.14788)
R2	0.22251	0.24438	0.07002
Nobs	1054	715	1054

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Note: household sample is restricted to those where reference person works.

Table 18: Model 1, 2 and 3 with *probability to lose a job* as uncertainty measure - 2017