LUND UNIVERSITY
School of Economics and Management

Master's Programme in Economic Growth, Population and Development

Wealthy and Healthy?

An Exploration of the Relationship between Pension Income, Healthcare Expenditure and the Health Status of the Elderly – A Study on Hungary

by

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Abstract: This paper examines the relationship between pension income and health consumption expenditure on the household level with a supporting analysis of the realtionship between individual pension income and health status. A relationship that becomes increasingly as health expenditures increase with ageing populations and changing pension systems. Using individual and household data from Hungary in 5 years over the span of 1999 to 2015, two multivariable regression analyses are carried out. The household and personal level are investigated seperately. The study finds that household pension income is significant for and positively associated with household health expenditure. On the individual leve, pension income is significantly and negatively associated with an individual health status regardless of gender.

Keywords: health consumption expenditure, pension income, ageing, Hungary, household, individual, health status, children, partner

EKHS01
Master's Thesis (15 credits ECTS)
May 2023
Supervisor: Jonas Helgertz
Examiner: Martin Dribe
Word Count: 15 012

Acknowledgements

I want to thank my supervisor, Jonas Helgertz, for his constant support and guidance in the thesis writing process. I also would like to thank my friends for their company and support during the whole thesis writing time. Lastly, I want to thank my parents for their ongoing support and advice.

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1 Introduction

When the rapid population growth experienced by most of the developed world throughout the last centuries comes to an end, population ageing is inevitable. It is an inescapable consequence of the population arithmetic (Goldstein, 2009; United Nations, 2015). The average ages across countries are increasing, as well as the imbalance between elderly people and the labour force (Demeny, 2003). The consequences of this phenomenon for the economy and society of a country are essential to policy decisions, productivity changes, and health and healthcare providers (Goldstein, 2009). The health status of an individual deteriorates with age, causing the concern that more people spend extended periods of their lives in an impaired state. This is a pressing issue, as the healthcare costs for these individuals are higher, as the illnesses and ailments become increasingly serious and the individuals require hospice or hospital care (Hashimoto, 1974). Many elderly individuals prefer hospice care in their own homes as opposed to formal care in care facilities, in most OECD countries (Kavsek & Bogataj, 2016; Rodrigues et al., 2012).

The purpose of this thesis is to investigate the relationship between pension income, at both the household and individual level, healthcare expenditure and health status in Hungary. The case of Hungary is interesting, as the country is facing a rapid ageing problem while being among the highest-ranking countries in Europe for risky health behaviours (European Commission, 2021). Furthermore, this Central European country is characterised by large life expectancy inequalities across income groups and genders. Hungary experienced rapid economic and social change since the early 1990s, which has been mediated by changes in the factors determining health and in the distribution of income (Hertzman & Siddiqi, 2000). A specific focus is placed on the elderly population. Utilising past research and theories, an analytical framework is constructed and examined. This thesis seeks to investigate the complex interplay between pension income and health and connected factors. The analysis employs a multi-disciplinary approach by incorporating both economic and political insights, as well as the fields of public health and sociology. It contributes to the academic literature on the issues of population ageing and seeks to offer valuable insights for policymakers and healthcare practitioners.

The analysis discovers that the healthcare expenditures of households have increased over time. For both genders, the health status of an elderly individual is shown to be significantly negatively associated with their pension income. Men experience a larger negative relationship between their pension income and health status than women. Age on the other hand is positively associated with health status. The findings show that household pension income is significant and positively associated with the amount of health consumption expenditure, however, the size of this effect is dependent on the household size.

1.1 Research Problem

This thesis analyses the following research questions to investigate the relationship between pension income and healthcare expenditure and status. This is done on a household level, analysing the household consumption spending on healthcare and supported by a supplementary individual-level analysis. Here, the study looks at the relationship between pension income and health status to see if this relation supports the findings of the household level and to shed light on the possible explanations of the earlier results regarding the possibility of explanations for the evolution of healthcare expenditure in the context of theories such as the compression of morbidity. To investigate these circumstances, the following research questions are posed.

Research Question 1. How has healthcare expenditure among Hungarian households changed between 1999 and 2015?

Research Question 2. What is the relationship between individual pension income and health status in Hungary?

Research Question 3. How are healthcare expenditures of elderly households in Hungary connected to the pension income of the household?

1.2 Aim and Scope

This thesis aims to contribute to the discussion of healthcare consumption and costs in ageing societies and how these are associated with a household´s income from pensions. This is done while simultaneously accounting for a range of other factors, such as the size of a household, gender, number of possible caretakers, partners and age. In analysing this, important implications for the future and organisation of pension and healthcare systems can be derived. The investigation focuses on Hungary, using survey data from 5 years between 1999 to 2015. The datasets are comprised of small subsections of the country's population.

1.3 Outline of the Thesis

This thesis will first describe the context of the situation of ageing and health in Hungary. Then it goes on to discuss previous research and literature on the topics of pension systems, healthcare systems, expenditures and health status and lastly moves on to social factors determining the health status of an individual in old age. After this the data and methodology will be described, followed by an empirical analysis of the findings of this thesis. This is followed by a discussion, setting these findings into the context of previous literature. Lastly, follow conclusions based on the findings and their limitations.

2 Context

The population of Hungary faces a drastic ageing problem, as 20 per cent of their population is over the age of 65 and their fertility rate is at 1.6 (European Commission, 2021), significantly lower than the replacement level of 2.1 (Sobotka, 2017). However, Hungary also has one of the lowest life expectancies in the EU, though it is steadily increasing. This steady increase is at risk of health shocks, as past large-scale health issues, such as the Covid-19 pandemic, have caused drastic decreases in life expectancy. Life expectancy is vastly different for men and women, with one of the biggest gaps in the EU, as women have a life expectancy at birth of 79.1 and men of 72.3 in 2020. The gaps in life expectancy are also present within genders between education levels, as more educated individuals have significantly higher life expectancy than the less educated (European Commission, 2021). In the same year, 2020, Hungary´s life expectancy at age 65 was 14 years for men while being 17.9 years for women (OECD, 2023a).

Approximately 50 per cent of deaths in Hungary are caused by behavioural risk factors, such as excessive alcohol consumption, obesity, and smoking (European Commission, 2021; World Health Organisation, 2018, 2019). Overall, Hungary performs worse than most other EU countries in the majority of risky health behaviours. The country faces high mortality rates from preventable and treatable causes which indicates issues in the quality of healthcare services (Organisation for Economic Development and Co-Operation, 2021[OECD]). Nevertheless, surveys find low levels of unmet medical needs in Hungary´s population. Health spending is continuously lower than the EU average, while still increasing over time. The total cost of healthcare spending is two-thirds publicly funded with the rest being personal healthcare consumption expenditures. With this, Hungary is below the EU average of 80 per cent of the total healthcare spending being publicly funded, showcasing Hungary´s high levels of out-of-pocket spending for health (European Commission, 2021).

Studies have found that less than 60 per cent of Hungarian adults report being in good health in 2019. Here, individuals with higher incomes are more likely to report good health than those with coming from lower incomes. This is combined with socioeconomic inequalities, such as

many previously mentioned behavioural being more prevalent in individuals with lower education and/or income. These differences also contribute to the disparities in health status and life expectancy that are found between socioeconomic statuses (European Commission, 2021).

Between 1999 and 2015, Hungary was affected by a multitude of shocks, such as the global financial crisis of 2008 and the refugee crisis in 2015. The country was strongly impacted by the financial crisis in 2008 and 2009, which lead to financially restrictive policies by the government and central bank, as well as a tightening of private households. Furthermore, the crisis led to drops in income, resulting in less spending and a slowing of the Hungarian economy (Scharle & Szikra, 2015). The country was also affected by the refugee crisis in 2015 when the government followed an anti-refugee policy course (Juhász et al., 2015).

3 Theory and Previous Research

3.1 Ageing and Pensions

3.1.1 Demographic Changes and Ageing Population Trends

From 2015 onwards over the following four decades, the world population above the age of 60 will increase from 10 per cent to 22 per cent. The cohorts entering these older ages are healthier today than in previous generations, which is a trend likely to continue with increasing life expectancy. Despite this, the increased proportion of individuals aged 60 plus to the rest of the population causes changes in labour and capital markets, retirement policies and pensions, and the organisation and financing of healthcare systems. There are two views on the problems and changes posed by population ageing. On one side, old-age individuals can be seen as a reserve of human capital through their level of education and work experience. On the other side, they could pursue longer working lives due to the extension of healthy life expectancy together with the rise in life expectancy and average population age (Bloom et al., 2015).

Elderly individuals encounter higher health and long-term care needs than younger people. This leads to increases in healthcare expenditures and poses a larger burden on health and long-term care systems, especially in high-income countries. However, there is substantial heterogeneity in healthcare spending in old age between individuals and also between countries. This largely depends on the caretaking practices in a country. While high-income countries often utilise formal caretakers, low- and middle-income countries often have weak formal long-term care and the care burden then falls to the family. This leads to older people and their families often facing a high risk to encounter catastrophic out-of-pocket health expenditures. This system is becoming increasingly problematic as the capabilities of families to provide care and companionship for their elderly members diminish as the family sizes decrease due to a rise in women's labour force participation and generally increased geographical mobility (Bloom et al., 2015).

Social and demographic behaviours change cyclically depending on the cohort size. Individuals born in large birth cohorts face fewer economic opportunities and income when compared to smaller cohorts (Botev, 2012). This effect is increased by large gender differences in life expectancy and mortality (Botev, 2012; Wilmoth, 2000). Furthermore, life expectancy has been increasing continuously, so that each subsequent cohort lives longer than the one before (Bengtsson & Van Poppel, 2011). The best practice healthy life expectancy of men increases faster than that of women, as well as life expectancy itself. However, the life expectancies of women are higher than men for both. Additionally, this continuous increase in both healthy and general life expectancy shows that successive cohorts continuously get healthier. Mortality declines faster than morbidity, coming back to the compression versus expansion of morbidity theory. There is an observable increase in the years of life spend with a disability, though the lag of healthy life expectancy behind life expectancy creates an argument for the expansion of morbidity (Lee, 2003; Permanyer et al., 2021). Within this morbidity, the diseases and disabilities are different today, compared to in the past. Differences are also found between men and women, as women are more likely to suffer from disability in old age. This contrast between genders in healthy and general life expectancy is the so-called female-male health-survival paradox (Van Oyen et al., 2013).

3.1.2 Pension Systems and Policies

The decrease in the size of the labour force caused by population ageing constitutes a danger to the fiscal integrity of public and private pension systems. Oftentimes, pension systems are dominated by expensive and reform-resistant civil service schemes. Many countries have or had incentives for early retirement in place, which led to a premature decrease in the labour force, whose effect was amplified once population ageing accelerated and more individuals reached the age to retire early. Therefore, a common policy to battle the economic repercussions of population ageing is increasing the retirement ages. However, these increases in the retirement age are not proportional to the increases in life expectancy, as currently increases in life expectancy of up to nine years were followed by a lagged increase of one year in the retirement age. Furthermore, decreasing or eliminating incentives for early retirement that are still present in many middle- and high-income countries. There are two ways to deal with this mismatch, the first is to increase the retirement age proportionally to the increases in life expectancy. This method relies on the life expectancy increases to be accompanied by

proportional increases in healthy life span. Another way is to connect the pension benefits to a life expectancy divider. This decreases the pension benefits received by individuals for each year but not overall. The majority of pensioners do not work not because of poor health but because of unrelated reasons, implying that both of these methods could be effective as retirement is not caused by bad health. Another action is to remove tax disincentives to work longer than the legal retirement age (Bloom et al., 2015).

Prolonging the work life is one of the methods of the theory of Active Ageing, the policies of which have been pursued in Europe since the late 1990s in an attempt to reverse the ageing trend before the increase in pension costs was first encountered. The policy solutions under this umbrella are connected to the concept that later life is characterised by well-being and elderly people have the right to remain healthy, and in employment for longer, while simultaneously continuing to participate in community and political life. Policies pursued to facilitate active ageing have been focused on increasing productivity and extending working life. They emphasize the active roles elderly individuals play in society and the need for activities designed to ensure the protection, dignity and care of and for older people. However, they therefore also rely on healthy life expectancy increasing proportionally to life expectancy (Foster & Walker, 2015). Policies included the promotion of lifelong learning, flexible working arrangements, improving incentives to work and social protection policies, supporting research on ageing and developing policies against workplace-based discrimination and social exclusion of older individuals. Most of the pursued policies are focused on the employed and ignore the unemployed population. These policies promote increasing retirement ages to extend working life (Bloom et al., 2015; Foster & Walker, 2015).

3.1.3 Hungary´s Pension System and its Reforms

The following section gives a detailed description of the Hungarian pension system to show the source of the pension income which acts as the income source in the following analysis. It is important to analyse the sources of pension income, as this is the main source of income for most elderly individuals in Eastern and Central Europe. Furthermore, the pension system has three pillars that contribute to the pension benefits of an individual. The first of these is the main pillar and aims to replace the labour income portion of household income with the pension income (Kiss & Dudas, 2009). It, therefore, is the main source of funds an individual and household can spend on healthcare.

Up until 1998, the Hungarian pension system entirely took the form of a pay-as-you-go- system (PAYGO) with a small pillar of mutual benefit funds up to 1998, when the country underwent a large reform of the pension system (Gál, 1999). In a PAYGO system, the pension tax rate used to finance the pension system is proportionate to the ratio of pensioners to taxpayers. Here, the benefits paid out to pensioners are financed by the pension tax contributions of the current labour force. This system form leads to big strains on the labour force as it decreases due to population ageing (Goldstein, 2009). PAYGO systems require reforms to adjust to ageing populations and remain sustainable (Kruse, 2010). The reform in 1998 was instigated to deal with the growing old-age population and with the foresight of the increasingly ageing population in the future. It introduced a three-pillar system that consists of a mandatory funded scheme that combines the previous system´s components. It, therefore, did not fully transform the previous pension system but instead added onto it while also incorporating the PAYGO aspect and benefit funds (Gál, 1999).

The new pension system consists of three pillars: an earnings-related pension system (pillar one), a mandatory, privately managed funded system (pillar two) and voluntary mutual retirement savings (pillar three) (Simonovits, 1999). Pillar one is the new form of the predecessor system and remains dominant through being the only fully mandatory part of the pension system. Pillar two is partially mandatory, while pillar three is fully voluntary. Due to this, the majority of Hungarian citizens pay into pillars one and two and only a small minority use the additional pillar three. In addition to the three main pillars is pillar "zero", which serves as a guarantee of a minimum pension to the elderly (Müller, 1999).

The first pillar is the earnings-related pension system which is streamlined for individuals retiring after 2012. Those retiring before this have the choice between the new and the old system and if they remain in the old system, their pension accrual rates are adjusted. The employer´s contribution to the pension fund is paid into this pillar of the system (Simonovits, 1999). While reforming the old system in this pillar, it introduces incentives to extend the working life from 1997 onwards by changing the indexation of the pension from wage indexation to a mix of wage and price indexation (Müller, 1999; Simonovits, 1999). The main reform of this pillar is the tightening of the eligibility criteria. This is done through a reduction in the number of non-contributory years of service allowed and an increase of the retirement age for both men and women to 62 by 2008. Lastly, the reform includes the restructuring of the pension formula to introduce uniform accrual rates and remove the degressive weighting of

earnings remaining from the previous system, however, this reform was moved to 2013 to allow a full transition into the new system (Müller, 1999).

The second pillar is a mandatory and privately managed funded system in which every insured person must choose a privately managed pension fund. These funds invest their contributions in capital markets and return the yields to the contributors as life annuities upon their retirement. The pension contribution rate to this pillar is subject to change and employees' pension contribution rate goes into this pillar (Simonovits, 1999). The funds have to follow strict investment guidelines to ensure that no unnecessary risks are taken in the investments and are subject to tight government supervision despite existing separate from the government. Part of this supervision is rules regarding the minimum member number and internal reserves, a contribution to a centralised guarantee fund which backs a relative rate of return guarantee to the investments of the pension fund, and the submission of quarterly reports to a Supervising Agency (Müller, 1999). With these regulations, the government ensures that the pension funds yield a minimum return to guarantee that the poorest do not lose too much through investments. The sum of the pension resulting from this and the first pillar is measured against a threshold. If this minimum pension is not reached, the individual receives a government supplement to ensure a minimum pension is available to them (Simonovits, 1999).

The third pillar is the only fully voluntary component of the pension system and consists of voluntary mutual retirement savings. Here, employees and their employers are encouraged to save for their retirement. This is done through a 50 per cent tax deduction up to 200,000 Hungarian Forint in employee contributions which is equivalent to the annual minimum wage or average pension contribution. This money would have been paid to the government in the form of an income tax on the pension contribution and is instead moved to the pension fund in place of the government´s tax income (Simonovits, 1999).

This new system has been active since 30 June 1998, from then on individuals entering the labour market must enter this new pillar system and are no longer able to only use the previous PAYGO system. Through the possibility of employees choosing a pillar upon entering the labour force and combing or switching between them, the system offers both a purely public and a mixed pension option. It is possible to choose a mixed path and pay into pillars one and two simultaneously, however, individuals choosing this received a proportionally reduced part of the "normal" public pension from 2012 onwards. This additional facet was introduced to make the mixed pension most attractive to younger individuals who have not yet paid into the

previous PAYGO system in pillar one. Through this hurdle, the switch from the old to the new pension system was supposed to be facilitated at a slow speed to allow the government and pension budget the time to accrue the funds for the switch so that no enormous budget deficit would occur. However, this did not work out as planned and the switch to a mixed system was taken up by more individuals than anticipated, creating a much larger budget deficit than anticipated despite the government already anticipating a large deficit from the reform. Critics argue that there is a high overall contribution burden that provides disincentives to employment and contribution compliance. This burden was also shifted from employers to employees through the reform, as they are now more responsible in terms of saving and selecting a pension pillar (Müller, 1999).

In the current pension system, the average man receives approximately 94 per cent of their pre-pension income as pension benefits from the first two pillars. For women, this net pension replacement rate is on average 87.4 per cent in 2020 (OECD, 2023b). The average income in the same year for individuals aged 65 and above was 2 123 867 HUF for women and 2 329 934 HUF for men in the same year. In this year, the average labour income was 2 406 788 HUF for women and 2 470 126 HUF for men (Eurostat, 2023). The standard of living supported by this income, therefore, does not suffer large decreases after entering retirement.

3.2 Healthcare

3.2.1 Healthcare Systems and Policies

Healthcare systems function differently in most countries as healthcare policies differ among countries. Bloom et al. (2015) argue that the emphasis in healthcare policies should be placed on disease prevention to lower long-term healthcare spending. Furthermore, behaviour change campaigns and an increase in early screening and treatment interventions can decrease the vulnerability of individuals to diseases and disability and maintain the health of the elderly. Policies that address social determinants of disease, such as poverty, and the reforming of healthcare financing to enhance healthcare consumption fairness and sustainability across all socioeconomic classes. This can be done by improving the access of disadvantaged individuals to healthcare services and running campaigns to increase health awareness in older individuals. Often there is a scarcity of health awareness, available health services and generally low

treatment effectiveness with elderly individuals. In these situations, which are common in low- and middle-income countries, increasing health insurance coverage does not automatically lead to less disease or more disease control. In such countries, quality healthcare coverage is not provided for a large per centage of elderly people (Bloom et al., 2015). The continuous ageing of populations has sparked discussion about healthcare system reforms in many countries. Especially long-term care facilities and health interventions mainly targeting the foremost causes of morbidity have become increasingly important. If these interventions are successful, they could reduce the cost burden on the healthcare system by reducing the proportion of the old-age population in poor health (Lopreite & Mauro, 2017). Reforms of health insurance benefits and financing schemes are critical in the adapting of healthcare systems to ageing populations. However, these are difficult to implement, as they carry high welfare costs for the current population. Gradual reforms with intergenerational redistributions are therefore seen as more implementable (Hsu & Yamada, 2019).

3.2.2 Healthcare Utilisation and Expenditure

Healthcare expenditure is a function increasing with age; however, age is not the defining factor of healthcare expenditure, as it only explains a very small part of the rise in healthcare expenditure (Dormont et al., 2006; Felder, 2013). A competing variable to age is time-to-death, which is seen as the main predictor of healthcare expenditure. This variable is hard to measure and usually only available for individuals that have already passed (Felder, 2013). Instead, non-demographic factors, such as technology and innovation, secular increases in income, wrong incentives for providers and consumers of healthcare that are caused by government regulation and extensive social health insurance coverage are increasingly important in the growth in healthcare expenditure. Furthermore, there has been an upward drift in the age profile of average individual healthcare expenditures. All age groups aged 50+ have higher healthcare costs and these have also been increasing over time. In 2000, individual healthcare expenditures are higher for each age group than they were in 1992 in the United States (Dormont et al., 2006). This pattern has continued into new extremes in 2023 with the healthcare expenditures per capita all over the world (Felder, 2013), as per capita healthcare expenditures have nearly tripled in the United States for example (Centers of Medicare and Medicaid Services, 2023). This development is explained by multiple theories, such as the expansion and compression of morbidity, the healthy ageing hypothesis and the future elderly model. Morbidity refers to

conditions that impair the health of an individual, such as disability or chronic illness. Historically, decreases in morbidity have led to lower healthcare expenditures and changes in the healthcare practices have caused higher healthcare expenditures. Morbidity has several indicators, such as disability, death risk, number of illnesses, self-assessed health and further indicators of selected illnesses: diabetes, chronic obstructive pulmonary disease, heart disease, hypertension, arthritis and others (Dormont et al., 2006).

There is no difference in healthcare expenditure between different self-reported health statuses. According to the Red Herring Hypothesis, population ageing is neutral for the increase in healthcare expenditure and the ageing of populations is used as a distraction from other impacting factors. As they argue that it is the time-to-death that is the driving factor, in line with the concept of the compression of morbidity. Previous research has shown that hospital costs rise from fifteen years before death and that hospital costs are U-shaped across the lifespan, peaking at age 80 (Felder, 2013).

There are different types of healthcare expenditure, namely pharmaceutical, hospital, and physician costs, that are differently affected by factors such as technological progress. While physician costs are largely unaffected by technological progress, hospital and pharmaceutical costs are highly influenced by it. Many health insurance systems do not cover all of these expenditures, which can lead to a different uptake of specific healthcare services. Especially hospital expenditures have a large impact on these individual healthcare expenditures. Pharmaceutical healthcare expenditures on the other hand increase from birth on (Dormont et al., 2006). Healthcare expenditures are especially increasing for those that are receivers of long-term care, both informal and formal. So that the age profiles for nursing homes and home care are convex for individuals aged sixty and above. Additionally, the per centage of individuals requiring long-term care increases with population ageing which in turn raises healthcare expenditures. This increase in care needs could be a larger influence on healthcare expenditures than age itself. Prescription drugs on the other side have a decreasing age profile from age 65 onwards, as there is a continuous shift from acute to long-term care in old age. In line with these developments, population ageing will have a significant impact on the demand for long-term care while leaving the acute care sector unaffected. These age expenditure profiles evolve and become increasingly steep. These increases are significantly larger for individuals aged 65 and above, which is the age group that will rapidly grow in size in the coming decades as a consequence of demographic change (Felder, 2013).

The utilisation of healthcare services depends on the individual's health status, which is tightly connected to morbidity, and to their socioeconomic status (Dormont et al., 2006; Özkaya et al., 2021). Individuals self-reporting poor health have been found to encounter the highest healthcare expenditure compared to those reporting better health status (Johar et al., 2012). Variables such as age and income are important determinants of healthcare consumption, with children and the elderly having the highest healthcare expenditures. Studies have found conflicting results on the influence age, income and life expectancy have on healthcare expenditure. In developed countries, the age structure has been shown to have a significant positive effect on healthcare expenditure. Furthermore, gender differences are prevalent in ageing, health and mortality which leads to differences in healthcare usage and expenditure (Özkaya et al., 2021).

The utilisation of healthcare is connected to the economic development of a country, the more economically developed a country is, the higher its healthcare expenditures (Özkaya et al., 2021). High-income countries have a significantly higher share of GDP spent on health than low, lower-middle or even upper-middle-income countries. Additionally, the spending on healthcare has increased in all levels of income but the largest increases have been in high-income countries, where the expenditures were already the highest (World Health Organisation, 2023). With higher income, individuals experience higher welfare and with that increased healthcare consumption and expenditure in the form of both preventative treatments and those of illness. Healthcare expenditure increases with income to prolong life and consumption benefits. This result in a shift of optimal consumption away from other consumer goods to health, making the price of healthcare and the setup of the healthcare system the main determinants of healthcare expenditure, besides income (Özkaya et al., 2021). This health gradient associated with socioeconomic status shows that there is a graded association between socioeconomic status and health at all levels of income (Adler et al., 1994). Generally, the higher an individual´s socioeconomic status and income, the healthier they are. This influence of socioeconomic status on health acts through a multitude of paths, such as biological predispositions, psychological and behavioural patterns, the immediate social environment, the macroeconomic context and social factors (Adler & Ostrove, 1999).

Healthcare expenditure can be of two varieties, either it is a consumption good, when healthcare is consumed to cure an illness, or it is an investment good, in the form of disease and disability prevention or as an input into the production of human capital (Hashimoto & Tabata, 2010).

Because of these different reasons for utilising healthcare, the rise in healthcare expenditure with an older population is not solely because they require more care but is instead largely caused by an uptake in preventive treatments to prolong life expectancy and the quality of remaining life (Felder, 2013). Additionally, healthcare coverage and health status throughout life have a major impact on health and take-up of healthcare in old age (Dormont et al., 2006). The height of healthcare expenditure also depends on the set-up of the healthcare system and health insurance. The more services are covered by public health insurance, the lower the out-of-pocket healthcare costs of individuals and households. Increasing privatisation of the healthcare sector is associated with a rise in healthcare expenditure (Rahman, 2020).

3.2.3 Healthcare System and Policies in Hungary

The Hungarian healthcare system is organised with a plurality of actors that fulfil four functions, namely, stewardship and ownership, service delivery, financing and public health. This plurality of the health system stems from the 1990s when the government sought to decentralise the healthcare system. The actors have either hierarchical or contractual relationships. A contract model for the healthcare system was established between 1990 and 1994 by the first post-communist government. With the introduction of this model, the ownership of primary care surgeries, polyclinics, and hospitals moved from the national government to local governments. Furthermore, the reform added the so-called "Territorial Supply Obligation" which is the responsibility of local governments to ensure that their local population is supplied with healthcare services (Gaál et al., 2004; Gaál et al., 2011).

The plurality of the actors in the healthcare system is contrasted by a single health insurance (European Commission, 2021). Government transfers and compulsory contributions from employers and employees into the health insurance account for the majority of the financing behind the healthcare system. The share of government transfers into the health insurance fund has been continuously increasing and is funded by taxes (Szigeti et al., 2019). More specifically, a healthcare tax is collected by the tax office since 1999. A governmental office that is overseen by the Ministry of National Economy collects all social insurance contributions and health and pension insurance taxes. The National Health Insurance Fund Administration remains in the healthcare system as the only health insurance provider and administers the Health Insurance Fund. However, the National Health Insurance Fund Administration has no budgetary power. The Health Insurance Fund itself is the most important actor for recurring costs of health

services and finances certain cash benefits. Its budget is separate from the government budget and any budget shortfalls have to be covered by the government (Gaál et al., 2011).

The social health insurance system provides nearly universal healthcare coverage, where only individuals working abroad or without a permanent address are not covered. This is facilitated by making the social health insurance system mandatory for all citizens and foreign workers. As the benefits packages are decided at the national level, most hospital spending is publicly funded. However, the benefit packages have slim coverage of outpatient (ambulatory) care, outpatient pharmaceuticals, medical devices and dental care. This results in high out-of-pocket expenditures for these common healthcare types. The benefits package is broad, in that it covers a large range of services including all levels of healthcare and medicine. Yet, public health insurance benefits only cover a low proportion of the costs of care, particularly for outpatient medical care and pharmaceuticals (European Commission, 2021). This social health insurance model is insufficient in sustaining the national healthcare budget, as Hungary experiences significant healthcare deficits. Additionally, an informal healthcare economy developed, due to the structural problems of the healthcare system and its financing (Puscas & Curta, 2010).

Especially pharmaceuticals and medical devices make up a large share, nearly a third, of total healthcare expenditure. This is a significantly higher share than in most other EU countries. Nevertheless, the spending on long-term care remains significantly lower than the average within the EU. Generally, the healthcare system is highly used by the public, especially for hospital-based care. The usage ranks among the highest in the EU for doctor visits and the length of hospital stays. This would imply high expenditure on healthcare; however, the total healthcare expenditure is low when compared to the EU average (European Commission, 2021).

Furthermore, the attempts to decentralise the system have not been successful as the structure remains highly centralised (Gaál et al., 2011). Important facets, such as controlling the financing, determining benefit packages, issuing and enforcing regulations and setting the strategic direction are all duties of the National Ministry of Health. Beyond this national level, the decentralisation is in the division of the country into counties and municipalities and shifting the responsibility for planning and managing inpatient care from the national to the county level under national supervision. Despite this decentralisation, there are long waiting times in the public health sector, which lead to high usage of private healthcare services. Combining this with high co-payment rates for treatments due to the poor depth of social health insurance

results in high out-of-pocket spending on healthcare. This out-of-pocket health spending makes up approximately 28 per cent of total health spending in 2019 (European Commission, 2021). Within the initiative to decentralise the system, local governments´ can outsource primary and secondary care services to private care providers while retaining the ownership of the facilities, a process called functional privatisation. This outsourcing of the local governments territorial supply obligation is dominant in the provision of primary care and occurred within the healthcare system reform in 1990. To further reduce the strain on the healthcare system and increase its efficiency, a new system for capacity regulation was introduced in 2010, which allocates patients based on a health needs assessment. This led to a decrease in the length of waiting lists by 50 per cent (Gaál et al., 2011).

3.3 Household Income and Healthcare Spending

Health is vital to income as it impacts the ability of an individual to work and earn an income. If an individual experiences poor health, their inability to work reduces their income, causing a decrease in the disposable income available for healthcare spending. The health-living standard nexus acts as a spiral. Resulting from the increased healthcare expenditures caused by poor health, income available for food, education, transport and entertainment is reduced. The lower an individual´s income, the more likely they are to encounter catastrophic healthcare expenditure. This increases social inequality between income groups and the relationship has worsened over time (Callander et al., 2019). Because of this, Callander et al. (2019) argue that the allocation of healthcare services should be done according to the individual´s need for care.

The income elasticity of healthcare depends on the scale of analysis. While income is a key determinant of healthcare expenditure, the relationship is not strictly linear. Healthcare expenditure varies with income level. Within a country, healthcare expenditures are relatively income elastic for low-income groups and inelastic for those with high incomes. The income elasticity also depends on the level of economic development and the range of incomes in the region. In high-income countries, healthcare is a luxury good, while it is a necessity good in low-income countries. Large parts of the increases in healthcare expenditure are brought on by demographic and technological factors (Di Matteo, 2003). Furthermore, individuals with lower educational and income levels have been found to have higher healthcare expenditures and usage than those with higher educational and income. Depending on the age group, healthcare

spending is 50 to 150 per cent higher for low-income and low-educated individuals. Lower socioeconomic status is therefore associated with higher healthcare utilisation and expenditure (Loef et al., 2021).

3.4 Social Determinants of Health in Older Ages

Worldwide, informal care is the main source of care for elderly individuals. Due to this, a large per centage of healthcare costs are not officially recorded as such and are not included in official statistics. If this care is transitioned from informal to formal care, the amount of care provided might not change but the expenditure is only then recognised in national accounts for formal care (Bloom et al., 2015). Women take on the majority of informal caregiving within the family (Agree & Glaser, 2009). Approximately fifty per cent of spousal caregivers suffer from negative mental or physical health effects caused by their caregiving activities. However, the magnitude of negative health effects that can be attributed to caregiving varies substantially (Schulz et al., 1997). Similar negative health effects resulting were found for childbearing, as having a child is associated with a higher risk of disability in later life (Spence, 2008). Increasing shares of elderly live on their own or with a spouse, resulting from their birth cohorts experiencing low fertility. While women are significantly more likely to be caregivers for parents and spouses, however, in those living with a spouse, husbands are equally likely to care for a sick partner. Women often outlive their husbands, resulting in the wives taking on a caretaker role for the husband and then surviving them. This leads to women being less likely to have a husband to act as a caretaker in very old-age (Agree & Glaser, 2009). The socioeconomic status of an individual is also a key determinant of their health status, as risky health behaviours, such as smoking, excessive alcohol consumption, and unhealthy nutrition, are more prevalent in lower socioeconomic status groups (Hanson & Chen, 2007). In addition to many elderly individuals preferring to receive care in their own homes as found by Kavsek and Bogataj (2016) and Rodrigues et al. (2012), the ownership of these homes is also associated with an individual's health. Jackson et al. (2013) found that not owning the home an individual is living in is significantly associated with an increased risk of stroke through lifestyle and psychosocial factors. This shows that homeownership leads to better health outcomes (Jackson et al., 2013). The mental health status in retirement is also affected by the circumstances surrounding the

entry into retirement. Overall, studies have found negative effects on the mental health status of individuals following their retirement (Dave et al., 2008).

4 Hypotheses

Based on the reviewed literature, the following hypothesis are proposed and will be used as a guide through the analysis to answer the research questions. Bloom et al. (2015) argue that elderly people encounter higher healthcare and long-term care needs than younger individuals. This increase in care needs in old age is related to an increase in healthcare expenditure. However, the authors discuss that the evolution of health spending is closely related to the primary form of caregiving, formal or informal, and the income status of the country. Here, higher income is related to more formal care and therefore higher health expenditures (Bloom et al., 2015). Based on these findings and Hungary´s recent undergoing of the second demographic transition, hypothesis 1 is presented below.

Hypothesis 1. Healthcare expenditure has been increasing over time.

The association of higher-income countries spending more on healthcare of Bloom et al. (2015) has also been seen on the micro level in individuals´ labour incomes. As Özkaya et al. (2021) find that the utilisation of healthcare is dependent upon the individual´s socioeconomic status. The argument is that healthcare expenditures increase with income as the consumption of healthcare moves from being a treatment of illness to a preventive measurement (Felder, 2013; Hashimoto & Tabata, 2010). The movement from treatment good to preventive intervention is also seen in the typically better self-reported health status of high-income individuals compared to those from lower socioeconomic status backgrounds (Johar et al., 2012; Özkaya et al., 2021). This health gradient based on socioeconomic status has been found at all levels of socioeconomic status, with better health the higher the socioeconomic status (Adler et al., 1994; Adler & Ostrove, 1999). Following these previous findings are hypotheses 2 and 3.

Hypothesis 2. Higher pension income is associated with higher healthcare expenditure.

Hypothesis 3. Higher individual pension income is associated with better health status.

Both Dormont et al. (2006) and Felder (2013) find that healthcare expenditure increases with age. Furthermore, they find that there is a higher prevalence of morbidity in old age, which can

be measured through self-assessed health status, and is connected to worse health status and higher health spending (Dormont et al., 2006). Felder (2013) also argues that health status decreases and health spending, especially hospital costs, increase from 15 years before death (Felder, 2013). As Hungary has a life expectancy at age 65 of 14 years for men and 17.9 years for women in 2020, this age is approximately the timepoint from where onwards health status should start to decrease with age, leading to hypothesis 4.

Hypothesis 4. Higher age is associated with worse health status.

Lastly, partners are often the main caregivers in old age, more so women than men. In addition to having a partner available for caregiving, having children also provides a source of potential care. Both of these potential caregivers are part of informal caregiving, which is especially prevalent in middle- to low-income countries. As receiving care can have positive consequences for the individual receiving care (Agree & Glaser, 2009), hypothesis 5 below will be analysed.

Hypothesis 5. Living with a partner and/or children is associated with better health status.

5 Data

To study old-age health consumption expenditure and how this is related to income from pensions, I use the database of the Luxembourg Income Study (LIS). This database provides longitudinal data on income and consumption factors across multiple countries. The dataset collects their variables in waves and the completion of the surveys is country and time specific. The database harmonises the collected data to allow for cross-national comparisons and constitutes the largest collection of income microdata that is publicly available. The collection of and harmonisation of the data is done and overseen by multiple universities and it has been used for a multitude of studies and conferences.

I will examine Hungary, a country in Central Europe. This region was among the most recent in Europe to enter the so-called second demographic transition, as described by Van de Kaa (1987). Furthermore, the utilisation of their healthcare systems has been less analysed than in other regions, which makes it a very relevant analysis in light of the demographic and economic changes and their long-term effects.

I use the data of the Luxembourg Income Study (LIS) for Hungary for Waves IV to XI, using the years 1999, 2005, 2007, 2009, 2012 and 2015. The analysis is divided into two parts, first the household level where health consumption expenditure is analysed in relation to the household's income from pensions and a variety of additional explanatory variables. Second, the analysis moves to the individual level, still using the same database. In this individual-level analysis, the individuals that comprise the households in the household datasets are investigated more closely to establish grounds to back the results presented in the household analysis.

5.1 Source Material

The LIS cross-national database is the largest available database of harmonised income microdata, comprised of data on income and inequality. The data are internationally comparable

and available for 46 countries. Within this database, there is comparative data on income, inequality, employment, and expenditure at both the household and individual levels. Additionally, the individual-level datasets provide data on demographic characteristics, such as gender, age, immigration status, and others. Furthermore, the household disposable income is broken down into comparable sub-components which allows the filtering out of all pension incomes.

The database is used in many studies discussing income and inequality and is endorsed by the European University Institute which is funded by the European Union (Bourke, 2023). In addition, the data is collected and standardised by researchers from multiple universities, such as the City University of New York and the London School of Economics and Political Science (Luxembourg Income Study, 2023).

The database is an online portal, accessed remotely and with the statistical analysis tools, such as Stata used for this thesis, embedded in the online database. The user has to explicitly request a specific file and it is not possible to download datasets, only the outputs of the analysis can be downloaded. Due to this nature, it is necessary to inspect every possible dataset and its variables before choosing the time period or region for which the analysis is possible. Furthermore, the analysis is constrained by the codebook detailing the codes allowed to be used to work with the available data. This is largely constrained to ensure the privacy and data protection of the individuals in the database. The restrictions based on the coding add to the database allowing only one file to be opened at a time, forbidding the merging of datasets to allow for comparisons over time or regions in a pooled or panel regression analysis. This leads to the multitude of singular regressions presented in Appendix A and B, the results of which are discussed in the empirical analysis section.

6 Methodology

The model used to analyse the research question is divided into multiple layers. Presented first is the household level, where all variables are measured for the whole household. Following this is an individual-level analysis of the self-perceived level of health in relation to pension income and demographic factors to investigate whether the relationships of the household level are due likely to be caused by the health status of the individuals, the cost or the availability of the healthcare system. The different relations and explanations will be discussed in the Discussion section (6.2).

6.1 Household Level Analysis

Here, the first and second research questions will be analysed. Based on the literature review, the following hypothesis are stated, to deepen and specify the scope of the research questions.

Hypothesis 1. Healthcare expenditure has been increasing over time.

Hypothesis 2. Higher pension income is associated with higher healthcare expenditure.

To examine these hypotheses, the following regression model is applied to datasets from Hungary, with the timeframe of 1999 to 2015 so that potential medium-term trends in the relationship between ageing, pensions and healthcare consumption can be observed. Furthermore, this timespan helps in encompassing the ageing process from the beginning to the more advanced stages. Equation (1) describes the model used for this analysis. At the household level, the regression model uses the variable health consumption expenditure as the dependent variable to indicate how much the households have spent on health-related services. This variable includes the consumption of medical products, appliances and equipment, and hospital and outpatient services. It does not include payments for health insurance. The independent variables used are standardised household pension income, number of income earners in the household, number of household members above the age of 65, and whether and how the

household owns the living quarters. Both standardised pension income and health consumption expenditure are measured in the local currency, Hungarian Forint. I do not control whether the household lives rurally, as the majority of their landmass is considered rural for Hungary according to the rural development program of the European Commission (European Commission, 2022a, 2022b). Because of this, the variable rural available in the dataset is not informative. The variable own gives information about the ownership of the property the household lives in, which can be useful to identify the financial situation in terms of bills or rent to pay and gives an insight into the living situation of the household.

The household pension variable is given in the country's currency. Namely, the Hungarian forint. It is important to standardise the values to make them comparable across time. This is done by calculating the z-scores of the household pension for all households. This new variable Standardised Pension Income is then used for the following analysis. The same is done for the health consumption expenditure variable which becomes Standardised Health Consumption Expenditure. The analysis is constrained for each household size by limiting both the number of household members and the number of household members aged sixty-five and above. This way it is ensured that only households consisting exclusively of individuals at the pension age are included in the analysis. By constraining the household members in this way, the examination is divided into single- and two-person households.

Equation 1.

$$\begin{aligned} &Standardised\ Health\ Consumption\ Expenditure \\ &\quad = \alpha_i + \beta_1 Standardised\ Pension\ Income + \beta_2 Living\ with\ a\ Partner \\ &\quad + \beta_3 Number\ of\ Income\ Earners + \beta_4 Owning\ the\ Home + \varepsilon_i, \end{aligned}$$

6.2 Individual Level Analysis

The individual level focuses on research question three. Here, the following hypotheses will be used to focus the analysis, based on the findings of previous research and theories.

Hypothesis 3. Higher individual pension income is associated with better health status.

Hypothesis 4. Higher age is associated with worse health status.

Hypothesis 5. Living with a partner and/or children is associated with better health status.

For this level, the descriptive statistics and regression analysis focus on demographic indicators, such as age, gender (sex, is one for women and two for men), subjective health status as reported by the individual, including everything that the individual views as relevant to their health, mental, emotional or physical living with a partner, the number of children living in the household and the total pension income of the individual, measured in Hungarian Forint. This additional analysis gives insight into the household plane results, by indicating whether a certain health consumption expenditure is due to poor health or possibly due to an expensive healthcare system or other causes. This health aspect of this personal level analysis will be carried out for Hungary in the same subset of years (1999, 2005, 2007, 2009, 2012, 2015) as the household analysis. Furthermore, this level of analysis adds demographic background information without analysing the subjective health status of the induvial. For consistency and comparability, the pension income variable is standardized through z-scores of the personal pension income, becoming "standardised individual pension income", which is then used in further calculations. The previously listed variables are used in a linear multivariate regression analysis, as presented in Equation 2 below. The variable health status is used as the outcome variable to find how the health status of an individual is related to their pension income, age, living with a partner and children. This health status variable includes everything the individual considers important to their health status. Here, it is not possible in the analysis to distinguish between mental and physical health status.

Equation 2.

$$health\ status = \alpha_i + \beta_1 standardised\ individual\ pension\ income + \beta_2 age + \beta_3 partner + \beta_4 number\ of\ children + \varepsilon_i,$$

The analysis is constrained by the age and divided by the sex of the individuals. The age from which individuals are included in the analysis differs between men and women by their retirement ages. As women have a legal retirement age of 62, every individual with a sex equal to one and an age higher than 61 is included in the analysis. For men, the age of retirement is 64, so individuals with a sex equalling two, are included from age 65 and up.

7 Empirical Analysis

7.1 Results

7.1.1 Descriptive Analysis of the Datasets

The following tables, Tables 1 and 2, depict descriptive statistics for the individuals used in the analysis. These statistics are at the personal level and give insight into the data and the nature of the variables. For both men and women, the majority of individuals live with a partner for most years and without children. However, there is considerable variation in the number of individuals living with a partner or without. This variation between the years explains the fluctuations in the coefficient of the children variable in the individual-level analysis. The majority of women and men, over ninety per cent, have no children living in their household in all years of the analysis. More detailed explorations of the distributions within the categorical and binary variables are given in Appendix B.

Variable	**Obs.**	**Mean**	**St. Dev.**	**Min.**	**Max.**
1999					
Health Status	326	2.779141	.9545005	1	4
Stand. Pension Income	326	1.804089	.8342354	-.6062906	6.122814
Age	326	70.77301	6.795293	62	93
Partner	326	.8496933	.3579212	0	1
Number of Children	326	.0889571	.3254358	0	3

Variable	Obs.	Mean	St. Dev.	Min.	Max.
2007					
Health Status	366	2.639344	.9280905	1	4
Stand. Pension Income	366	1.469212	.7179231	-.6165165	4.212914
Age	366	70.90164	6.76746	62	93
Partner	366	.8060109	.3959617	0	1
Number of Children	366	.1229508	.4036383	0	2
2009					
Health Status	433	2.734411	.8798901	1	4
Stand. Pension Income	433	1.493877	.7697685	-.6844805	8.540715
Age	433	71.53349	6.903395	62	96
Partner	433	.7806005	.4143185	0	1
Number of Children	433	.1662818	.5528288	0	6
2012					
Health Status	372	2.594086	.8957928	1	4
Stand. Pension Income	372	1.507406	.9428895	-.6525713	5.429658
Age	372	70.83871	7.347061	62	92
Partner	372	.7365591	.4410927	0	1
Number of Children	372	.0672043	.2905515	0	2
2015					
Health Status	548	2.6751821	.8785297	1	4
Stand. Pension Income	548	1.194523	.9103898	-.6299278	5.144728
Age	548	70.79197	6.499091	62	921
Partner	548	.7244526	.4471979	0	1
Number of Children	548	.0729927	.3449301	0	4

Table 1. Descriptive Summary Statistics Women

Variable	Obs.	Mean	St. Dev.	Min.	Max.
1999					
Health Status	367	3.06349	.8939544	1	4
Stand. Pension Income	367	1.221647	.6621765	-.6062906	3.700336
Age	367	73.26158	5.941631	65	92
Partner	367	.4168937	.4937181	0	1
Number of Children	367	.0245232	.1548778	0	1
2007					
Health Status	464	2.924569	.859906	1	4
Stand. Pension Income	464	1.076263	.5571981	-.6165165	3.32052
Age	464	73.53664	6.170258	65	95
Partner	464	.3900862	.4882958	0	1
Number of Children	464	.0905172	.3357667	0	2
2009					
Health Status	539	2.849722	.8346888	1	4
Stand. Pension Income	539	1.1124906	.665247	-.6844805	9.232605
Age	539	73.90909	6.09841	65	96
Partner	539	.3654917	.4820151	0	1
Number of Children	539	.0983302	.3549661	0	3
2012					
Health Status	453	2.801325	.8648996	1	4
Stand. Pension Income	453	1.255394	.7338117	-.6525713	5.349554
Age	453	74.42826	7.065891	65	100
Partner	453	.3487859	.477113	0	1
Number of Children	453	.0066225	.0811986	0	1

Variable	Obs.	Mean	St. Dev.	Min.	Max.
2015					
Health Status	722	2.811634	.8280638	1	4
Stand. Pension Income	722	1.103493	.8644448	-.6299278	12.56508
Age	722	73.46814	6.536547	65	96
Partner	722	.3822715	.4862793	0	1
Number of Children	722	.0055402	.0742773	0	1

Table 2. Descriptive Summary Statistics Men

7.1.2 Household Health Consumption Expenditure over Time

The health consumption expenditures of households have followed an increasing pattern over time. However, the speed of the expenditures increasing has slowed down. In the last year of the analysis, 2015, the health consumption expenditure decreased slightly. The health consumption expenditure depicted by the variable seen in Figure 1 below, measures the out-of-pocket health expenditures of households, meaning every health expenditure not covered by insurance. The possible reasons for this increase will be further discussed in section 6.2.1.

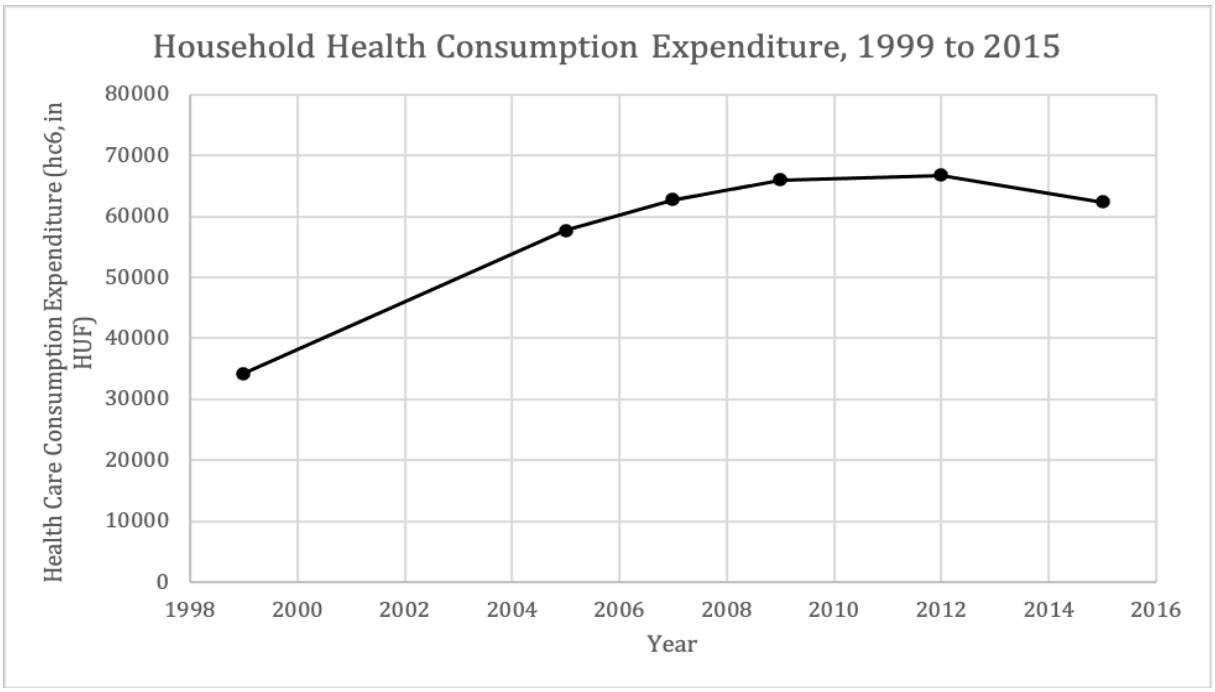

Figure 1. Household Health Consumption Expenditure, 1999 to 2015.
Data retrieved from Luxembourg Income Study Database.

7.1.3 Household Level Analysis

Detailed descriptive statistics and the complete regression outcomes of all household-level analyses can be found in Appendix A.

One-Person Households

In the year 1999, a single-person household experienced no statistically significant association from household pension income, the number of income earners or whether they are homeowners or not. The model has an R-squared of 0.0105, which is low but not unexpected for a model dealing with individual-level data standardised variables. Despite not being significant, it is interesting that the pension variable has a negative coefficient when the number of income earners has a positive coefficient. Furthermore, there is a minimal positive relationship between being in a higher category of the own variable and the height of health consumption expenditure. The higher the category, the further away the household from owning their home.

Single-person households in 2005, however, show a different picture. With a higher R-squared at 0.0309, this line has a better fit than for the same analysis in 1999 but still fits poorly. Here, household pension income is statistically significant at the 5 per cent level with a positive coefficient of 0.268. This means that every increase by one standard deviation in the standardized pension variable is associated with a 0.268 standard deviation increase in the standardized health consumption expenditure. The number of income earners in the household does not have a significant p-value but a positive coefficient of 0.327. The last variable for this household size is own, which is statistically significant at a 10 per cent level, with a p-value of 0.083. Having a higher category for own, meaning not owning the home, decreases the amount of health consumption expenditure by 0.002 standard deviations (SD). While this is statistically significant it is very small.

In 2007, single-person households had statistically significant associations for both pension income and owning their home with the height of the household's health consumption expenditure. Pension income is significant at the 5 per cent level with a p-value of 0.011 and a positive coefficient which implies that an increase in pension income by one SD will increase the household's health expenditure by 0.3 SDs. The number of income earners in the household, on the other hand, is not statistically significant and has a negative coefficient. The way the household owns their home is statistically significant at the 10 per cent level with a p-value of

0.075 and a negative coefficient. This implies that a higher category in the own variable has a small negative association with the health consumption expenditure of the household. The higher the category, the more removed the household from fully owning their home, as the higher categories describe rental agreements and other living situations.

The model for single-person households in 2009 has a low R-square that is not uncommon for micro-level data. In 2009, pension income is significant at the 1 per cent level (0.001) and a positive coefficient of 0.262. This implies that increases in household pension income will lead to an increase in household healthcare expenditure. Neither the number of income earners nor the ownership status of the home the household lives in are statistically significant in 2009, but both variables have negative coefficients.

Looking at 2012, pension income is statistically significant at all levels, with a p-value of 0.000, and a coefficient of 0.2967. This implies that a one SD increase in the pension income will raise the healthcare expenditure by 0.2967 SDs. Here, the number of income earners and the type of ownership are both statistically insignificant. While the number of income earners living in the household has a negative coefficient of -0.1378, the ownership relation has a positive coefficient of 0.0004.

Lastly, the R-squared in 2015 is lower than in all other years, besides 1999. Furthermore, pension income is statistically significant at the 5 per cent level, with a coefficient of 0.1720. This implies that an increase of one SD in household pension income will lead to an increase in household health expenditure by 0.1720 SDs. The number of income earners and owning a home are both not statistically significant. Additionally, they both have relatively small negative coefficients. All of these results are summarised in Table 3 below.

Table 3. Regression Output Summary Single-Person Households

SINGLE-PERSON HOUSEHOLDS

YEAR	Obs.	R^2	Standardised Pension Income	Number of Income Earners	Owning the Home
			Coef.	Coef.	Coef.
1999	247	0.0105	-0.0925 (.309)	0.1418 (.346)	0.0010 (.361)
2005	304	0.0309	0.2675** (.023)	0.3270 (.189)	-0.0022 (.083)
2007	293	0.0356	0.2999** (.011)	-0.1324 (.588)	-0.0020 (.075)
2009	354	0.0349	0.2621*** (.001)	-0.2453 (.338)	-0.0030 (.851)
2012	355	0.0363	0.2967*** (.000)	-0.1378 (.648)	0.0004 (.798)
2015	551	0.0113	0.1720** (.030)	-0.0774 (.840)	-0.0021 (.309)

** Significant at 10 per cent. ** Significant at 5 per cent. *** Significant at 1 per cent with p-values given in brackets below the estimated coefficient*

Two-Person Households

For two-person households, the results look different and are presented in Table 4 on the following page. In 1999, the model explains the largest part of the variation, namely 11.15 per cent and has the best fit. Here, household pension income, and the number of household members earning an income are both statistically significant in their association with health consumption expenditure. Pension income is significant at the five per cent level and has a coefficient of 0.2578. So that a one SD increase in pension income leads to an increase in spending on health by 0.2578 SDs. The number of household members earning income is significant at the one per cent level with a coefficient of 0.9976. A one SD increase in the number of income earners is related to an increase in health expenditure of 0.9976 SDs. Neither owning the home nor having a partner have statistically significant relationships with health expenditure. Though it is interesting that both variables have negative coefficients, negligibly small for owning the home (-0.0037) but large for living with a partner (-1.0723).

In 2005, the model´s fit is less good and it explains approximately 6 per cent of the variation in health consumption expenditure. The pension income of the household is significant at the five per cent level and has a coefficient of 0.4052. An increase of one SD in the standardised household income is related to a rise in health consumption expenditure of 0.4052 SDs. All other variables in the model are not statistically significant. However, both the number of children living in the household and living with a partner have switched the direction of their relationship when compared to the previous year.

From 2007 onwards, household pension income no longer has a significant association with household health consumption expenditure. Nevertheless, the relationship remains positive until 2015, when the coefficient has a negative sign but is relatively small. This could indicate that the cause of the sign switch is a data issue. The number of children in the household has a negative coefficient for 2007, 2009 and 2012 but is only significant in 2012. Here, the number of children living in the household is significant at the five per cent level, with a coefficient indicating that a one SD increase in the number of income earners in the household relates to a decrease in the household's health consumption expenditure by 0.894 SDs. The variables ownership type of the home and living with a partner remain insignificant overall years with own having very small coefficients. Living with a partner has coefficients that fluctuate in size and direction but all remain statistically insignificant.

Table 4. Regression Output Summary Two-Person Households.

TWO-PERSON HOUSEHOLDS

YEAR	Obs.	R^2	Standardised Pension Income	Number of Income Earners	Owning the Home	Living with a Partner
			Coef.	Coef.	Coef.	Coef.
1999	151	0.1115	0.2578** (.037)	0.9976*** (.001)	-0.0037 (.525)	-1.0723 (.176)
2005	206	0.0591	0.4052*** (.002)	-0.2448 (.266)	-0.0001 (.994)	0.4321 (.295)
2007	158	0.0056	0.1927 (.405)	-0.16 (.816)	-0.0012 (.885)	0.1437 (.845)
2009	191	0.0266	0.1251 (.347)	-0.5441 (.369)	0.0033 (.450)	0.7170 (.121)
2012	166	0.0343	0.0673 (.484)	-0.894** (.045)	0.0102 (.257)	0.1322 (.731)
2015	267	0.0085	-0.035 (.734)	0.334 (.351)	0.0055 (.399)	-0.457 (.449)

** Significant at 10 per cent. ** Significant at 5 per cent. *** Significant at 1 per cent with p-values given in brackets below the estimated coefficient*

7.1.4 Individual Level Analysis

Descriptive statistics are reported in section 7.1.1, with detailed tabulations of the categorical variables and the complete regression outcomes of all individual-level analyses to be found in Appendix B. Appendix C also includes an additional regression analysis with a dummy variable for a good health status replacing the variable health status and regression output summaries of the individual level regression with pension income as the sole independent variable. These serve the purpose of easily visualising the outcomes of the individual analysis.

Women

The results reported in Table 5 below, show that the individual pension income and age are significant in nearly all years for women. While pension income has a negative relation with

the health status of an individual, age has a positive association. The standardised pension income coefficient becomes increasingly negative between 1999 and 2009. After this, it is insignificant and much closer to zero in 2012 before becoming more negative again in 2015. In the last year of analysis, standardised pension income again has a statistically significant association with the self-reported health status of the individual, at the one per cent level, same as all of the previous significant years. The coefficient of the age of the individual is significant at the one per cent level in 1999 and then again from 2009 to 2015. In 2007 it is statistically significant at the five per cent level. However, the sign of the coefficient of age is negative in all years. This means that a one-unit increase in the age of an individual is associated with an increase in the health status of the individual between 0.018 and 0.032 units depending on the year. Whether the individual lives with a partner or children, however, has no significant association with the health status of an individual. Living with a partner is associated with at first an increase in the health status, in 1999 and 2007. After this, living with a partner is related to a decrease in the health status of the individual. The possible reasons for the change in this relationship over time will be discussed in more depth in the discussion, section 7.2.3. The number of children living with the individual woman is negatively associated with their health status. This is not the case in 2009, when the relationship has a positive nature. However, this switch could be caused by a data anomaly. Overall, the number of children in the household does not have a significant association with the health status of the individual elderly woman in any year.

Table 5. Individual Level Regression Output, Women

WOMEN (SEX = 1)

YEAR	Obs.	R^2	Standardised Pension Income	Age	Living with a Partner	Number of Children in Household
			Coef.	Coef.	Coef.	Coef.
1999	326	.0638	-.193** (.002)	.024** (.002)	.058 (.697)	-.239 (.137)
2005	0	-	-	-	-	-
2007	366	.0492	-.223*** (.001)	.018** (.012)	.156 (.203)	-.092 (.442)
2009	433	.0959	-.248*** (.000)	.029** * (.000)	-.138 (.160)	.101 (.175)
2012	372	.0488	-.025 (.616)	.025** * (.000)	-.089 (.395)	-.108 (.504)
2015	548	.0638	-.114* (.006)	.032** * (.000)	-.021 (.796)	-.069 (.528)

** Significant at 10 per cent. ** Significant at 5 per cent. *** Significant at 1 per cent*

Men

Table 6 below shows that for men, pension income and age are always significant determinants of their health status. Pension income has a negative relationship with health status, while age has a positive association. Compared to women, however, men experience statistically significant associations between the variables living with a partner, the number of children in the household in some years and their self-reported health status. In 2009 and 2012, having a partner is statistically significant at the one per cent level and having a partner versus not living with a partner is related to a decrease in the health status by 0.232 and 0.266 units respectively. In 2007, the variable partner is statistically significant at the ten per cent level with a coefficient of -0.159, so ´living with a partner is related to a decrease in the health status by 0.159 units. Lastly, the number of children living with a man is statistically significant at the ten per cent

level in 2007, where a one-unit increase in the number of children is associated with a better health status by 0.224 units.

Table 6. Individual Level Regression Output, Men

MEN (SEX = 2)

YEAR	Obs.	R^2	Standardised Pension Income	Age	Living with a Partner	Number of Children in Household
			Coef.	Coef.	Coef.	Coef.
1999	367	.0778	-.354*** (.000)	.016** (.044)	-.068 (.515)	.252 (.388)
2005	0	-	-	-	-	-
2007	464	.0672	-.362*** (.000)	.019*** (.005)	-.159* (.066)	.224* (.053)
2009	539	.0706	-.262*** (.000)	.022*** (.000)	-.232*** (.003)	-.009 (.925)
2012	453	.116	-.276*** (.000)	.020*** (.000)	-.266*** (.002)	-.313 (.510)
2015	722	.0403	-.065* (.067)	.023*** (.000)	-.047 (.486)	-.187 (.647)

** Significant at 10 per cent. ** Significant at 5 per cent. *** Significant at 1 per cent*

The results of this analysis for both genders underwent a robustness check by running the individual-level regression analyses without the standardised personal income variable. The result of this is minimal deviations in the coefficients of age, living with a partner and the number of children living in the household. There was no change in the significance or sign of

variables. The large variations across years are therefore likely caused by unobservable underlying characteristics or inconsistencies within the dataset.

7.2 Discussion

7.2.1 Evolution of Healthcare Expenditure

There has been a steady increase in household health consumption expenditure from 1999 to 2012, with a slight drop after this in 2015, as shown in Figure 1. This increase in the healthcare expenditure of households over time is in favour of hypothesis 1, which failed to be rejected based on these findings. The spending of households on health-related consumption rising over this period is likely caused by the prolonging of life expectancy. This would be in line with the predictions of Dormont et al. (2006) and Felder (2013), that spending on health and healthcare is an increasing function of age and other factors, such as income and innovation. Therefore, health spending would increase as the population ages, as is the case between 1999 and 2015.

The height of healthcare spending is related to the utilisation of health services. As this depends on an individual's health status, it is closely associated with morbidity and socioeconomic status. Furthermore, a large proportion of the increase is likely from healthcare as an investment good, to prolong life by preventing diseases and disability through early intervention and preventive treatments, as discussed by Felder (2013) and Hashimoto and Tabata (2010).

Hungary´s healthcare system also contributes to the rise in household health consumption expenditure, as the variable includes only those costs not covered by the universal health insurance of Hungary, meaning the direct spending of the household. As the Hungarian health insurance system covers a large variety of healthcare levels but is described by the European Commission (2021) to lack depth, the increase in health consumption expenditure of households could also be related to elderly individuals requiring more in-depth and long-term care. This increase in the demand for care is brought on by the extension of morbidity described by Lee (2003) and Permanyer et al. (2021).

Another factor influencing the rise of healthcare expenditure in Hungary over time could be the attempts to decentralise the healthcare system, by allowing the outsourcing of healthcare services at the regional level. This privatisation likely contributes to the rising healthcare

expenditures, as Rahman (2020) argues is usual when healthcare systems are increasingly privatised.

7.2.2 Household Pension Income and Household Healthcare Expenditure

The results of the regression analysis at the household level show that the relationship between the pension income of a household and its healthcare expenditure depends on the size of the household. In one-person households, pension income is the only statistically significant variable in this analysis between 2005 and 2015, with varying significance levels between one and five per cent. In 1999, neither of the employed variables, household pension income, number of household members earning income or the form of owning or not owning their home, have significant relationships with the size of the one-person household's health consumption expenditure. The variable own remains with a negative coefficient for most years for single-person households, though the sign of the coefficient changes every few years. For two-person households, this relationship is negative in the years 1999 to 2007 and positive from then on. The negative relationship is likely related to the way the variable is coded. The variable is categorical, and an increase to the next category implies a move away from the category "owned" towards the other extreme "illegal occupation". As the move up these categories implies a less wealthy living situation, a negative relationship between increases in this variable implies that a move away from self-sustained living leads to higher healthcare expenditures. This is in line with the argument of Loef et al. (2021), that lower socioeconomic status is associated with higher healthcare expenditure. Additionally, the findings of Jackson et al. (2013) suggest that homeownership is an indicator of lifestyle and psychosocial factors. Their finding that non-homeownership is associated with an increased risk of illnesses such as stroke represents an indicator of the negative relationship between non-homeownership and healthcare consumption expenditure found here (Jackson et al., 2013).

The coefficient of standardised household pension income in 1999, while not significant, is the only pension coefficient for this household size, that has a negative coefficient, implying a negative association with health consumption expenditure when pension income increases. This relation could be explained by the theory of Loef et al. (2021), which associates lower socioeconomic status with higher healthcare expenditure due to worse health behaviours and higher health risks related to lower socioeconomic status (Loef et al., 2021). From 2005 onwards, this relationship is significant and positive, meaning that an increase in pension

income is related to a rise in the health consumption expenditure of the household. Based on this result, Hypothesis 2 cannot be rejected. This result contributes to the previous research, done by Dormont et al. (2006) on the relationship between income and healthcare expenditure, which has found high income to be associated with higher healthcare expenditure and becoming increasingly important in determining healthcare expenditure. The above-presented results indicate that this relationship persists into retirement, where the main income the household relies on is the pension. This opposes the findings of Loef et al. (2021), as they found that lower socioeconomic status is associated with higher healthcare expenditure.

The persistence of the relationship into old age reflects the argument of Dormont et al. (2006) and Felder (2013), that healthcare spending increases with age, so that the income funding healthcare, here from pensions, becomes increasingly important. This relationship between pension income and healthcare expenditure follows that between income and healthcare expenditure. It also follows the argument of Özkaya et al. (2021), that healthcare expenditure is an increasing function of income. With rising income levels, healthcare moves from being a consumption good to an investment good (Özkaya et al., 2021), as described by Hashimoto and Tabata (2010). The relationship magnitude varies over the years but does not strictly increase. While the coefficient continuously increases from 1999 to 2007, it decreases slightly in 2009 before increasing again in 2012 and then dropping to the lowest level since 1999 in 2015. The slight drop in 2009 could be due to the financial crisis affecting savings and income and resulting in a tighter budget for many households, as such a relationship has been found by Scharle and Szikra (2015). The drop in 2015, however, is much larger than the one in 2009, with the coefficient decreasing for both single- and two-person households. This could be related to the refugee crisis impacting the country in 2015 (Juhász et al., 2015, p. 5), however, this is unlikely. Another explanation is that the relationship between income and healthcare expenditure is not strictly linear, as Di Matteo (2003) argues. Furthermore, the income elasticity of healthcare consumption depends on the economic development and income level of the region (Di Matteo, 2003).

7.2.3 Individual Pension Income and Health Status

Individual pension income is significant with a negative association with health status in nearly all years for both men and women. The only year, where this variable is not significant is 2012 for women. Therefore, Hypothesis 3 is rejected, with varying significance levels for the

different years. This relationship follows the findings of Loef et al. (2021) and Johar et al. (2012), who found that healthcare expenditures increase the lower an individual's socioeconomic status and subsequently their income. An increase in healthcare expenditures in lower socioeconomic statuses is related to worse health outcomes in these groups due to a multitude of reasons. Furthermore, this is likely due to less preventative care, causing higher treatment care costs (Loef et al., 2021). Additionally, individuals from lower socioeconomic status backgrounds are more susceptive to risky health behaviours, such as smoking, excessive drinking, bad nutrition, and others (European Commission, 2021; Hanson & Chen, 2007). While the relationship between personal pension income and health status is negative, the coefficient of this is only large when additional variables are considered. When running additional regression analyses with only the pension income as an independent variable, the pension income remains significant but the size and sign of the exhibit much larger fluctuations over time. In all years, but for women in 2012, is the relationship negative. The results of this are shown in Appendix C. The additional analyses highlight the robustness of the individual analysis. Overall, this shows that this relationship requires more attention and research.

The results are also in support of the health gradient of the socioeconomic status discussed by Adler et al. (1994) and Adler and Ostrove (1999), as the health status is significantly related to the pension income of the individual. Furthermore, the significance of pension income to the health status shows that there are differences in the health status between socioeconomic classes. The detailed associations of this go beyond the scope of this study. However, pension income is not the only variable with a significant influence on the health status of an individual. The individual´s age has a significant positive association with health status, in all years and for both genders. This association is never higher than an increase of the health status by 0.032 units (for women in 2015) for an additional year in age. Based on this, Hypothesis 4 is rejected at significance levels varying between one and five per cent. This is counterintuitive with regards to the findings and theory of Felder (2013), that healthcare expenditure, and therefore poor health status, increase up until age 80, where they peak. Additionally, the theory suggests that health expenditures increase from the point of 15 years to death (Felder, 2013), which is consistent with age 65 for women and 57 for men. Based on this, the age coefficient in the conducted analysis should have a negative sign, which is not what the results show.

Hypothesis 5 has mixed results, as the hypothesis is rejected for having a partner. Here, the results show that having a partner has a negative relationship with the health status of an

individual in the majority of years, except 1999 and 2005 for women. However, the relationship is significant only between 2007 and 2012 for men. Overall, the negative association of being in a relationship with health status could stem from a multitude of reasons. Having a partner can mean both being cared for and caring for the other individual. Previous studies, such as the one conducted by Agree and Glaser (2009), found that in individuals living with a spouse, men and women are equally likely to take on a caretaker role. However, as women outlive men, they are overall more expected to act as caretakers for longer periods (Agree & Glaser, 2009). The negative association between having a partner and health status could be connected to the individuals themselves assuming a caretaker role for their partner. Schulz et al. (1997) caretaking can take a toll on the mental and physical health of a caretaker, which could explain this negative relationship between having a partner and health status.

The results for the relationship between the number of children an individual has and their health status are inconclusive, as the coefficient changes its sign between years and is only significant for men in 2007. In 2007, men experience an increase in their health status by 0.224 units when having an additional child. This could be due to the high involvement of the fathers in their children´s care, which has been shown to positively influence the health outcomes of the fathers themselves (World Health Organization, 2007). However, for the majority of years, the coefficient is negative, implying a negative relationship between having one more child and an individual's health status. For women, this association is likely caused by childbirth, which can have negative consequences for both the physical and mental health of the mother in later life, as described by Spence (2008).

7.2.4 Pension Income, Individual Health Status and Household Health Spending

The separate arms of the analysis found that increases in individual pension income are associated with decreasing health status. When looking at this in combination with the results of the household-level analysis, higher household pensions are related to higher health consumption expenditure. This relationship reflects the one on the individual level, as they together show that higher pension income is associated with lower health status, as higher pension income is associated with higher health spending. The two are likely interconnected so that the lower health status associated with higher individual pension income is the factor that could lead to the higher health consumption expenditure associated with higher household

pension income. This relates to the findings of Johar et al. (2012), that individuals who rate their health as poor are those with the highest healthcare expenditure.

7.2.5 Limitations and Future Research

This study is limited by the scope of the data, as it covers only one country. Furthermore, the number of individuals within the datasets is relatively small, possibly constraining the applicability of the findings to the whole of the Hungarian elderly population. However, the similarities between Hungary and its neighbours facilitate the large applicability of the results. The nature of the database limits the conclusions that can be drawn, as it does not allow for the analysis of causality. This next step could be interesting for future research, as the causality between pension income and health status, as well as pension income and healthcare expenditure, are important for deciding on the appropriate policy and reform solutions. The effect of children and partners is constrained by these individuals living in the household. However, many children care for their elderly parents without living in the same household. This could not be analysed in this setting but it is interesting to see if and how the relationship found in this study changes when the informal caretakers outside the together living household are considered. Dormont et al. (2006) and Di Matteo (2003) argue that technology and innovation are increasingly important for the growth of healthcare expenditures, which is a factor this study is not able to account for. These factors have a large impact on hospital and pharmaceutical costs (Dormont et al., 2006), and are therefore likely important determinants of out-of-pocket healthcare expenditure. Furthermore, the study is limited by the anonymity of the data, which does not allow for assigning an individual's health status to their household's healthcare expenditure, so it is not possible to draw direct overarching conclusions from the data. This connection is interesting for future research, as the health status variable can help determine whether the increase in health spending is caused by preventative or treatment costs. This could be vital research to determine the course of action policymakers and individuals should take to deal with population ageing and the resulting increase in healthcare costs in the future. Being unable to further split the analysis by age, it could be interesting to see if an individual´s age´s relationship to health consumption reverses at age 80, as Felder (2013) suggests. Further research should be conducted on the relationship between personal pension income and health status, as this study found rather surprising results. This relationship is becoming increasingly important as populations age and should therefore receive in-depth

scholarly attention. Here, the dataset did not allow us to distinguish between mental and physical health. Looking separately at the effects on mental and physical health could be important to identify possible solutions and measurements to aid the health status of elderly individuals.

8 Conclusions

This thesis analyses three separate research questions that are all connected to health and pension income. By dividing the analysis into household and an individual level, more in-depth conclusions could be drawn about the intricate relationships between pension income, health status and health expenditure. The first research question is: "How has the healthcare expenditure in Hungary changed between 1999 and 2015?" The results show that the health expenditure of households has been continuously increasing from 1999 to 2012, with a slight decrease in 2015. This shows that Hungary is on a path of rising health expenditures and highlights that the government should take action to ensure that this high out-of-pocket health expenditure burden on households does not lead to the financial distress of large numbers of households or bad health to avoid high health expenditures. Actions should be taken to reduce the burden on private household budgets, as this increase is unlikely to slow down in the future with the continuous ageing of societies.

The second research question is: "What is the relationship between individual pension income and health status in Hungary?" Here, the analysis finds a negative relationship between personal pension income and health status regardless of gender. Additionally, an individual's age has a positive relationship with their health status. Social factors, such as partners or children are not significantly related to the health of women but are of importance for men in selected years. These results imply that ageing is not necessarily associated with poor health. Furthermore, a high pension income is not directly associated with good health.

The analysis of the third research question, "How are healthcare expenditures of elderly households in Hungary connected to the pension income of the household?", finds that household pension income has a statistically significant positive relationship to healthcare expenditure. This suggests that the healthcare expenditures of a household rise with the household's income from pensions. This contributes to extending the findings of previous research, that labour income is positively associated with healthcare expenditure, and shows that this relationship persists into retirement when labour income becomes pensions. Combining the findings of the second and third research questions, we find that increases in

pension income seem to be associated with lower health status and higher healthcare expenditure. As a lower health status implies a greater need for healthcare, these results are intuitive. Overall, this highlights the importance of restructuring pension systems and the determination of pension benefits to adapt to the increasing share of the elderly and secure stable pension incomes. The significance of pension income for health status highlights the complexity of factors determining an individual´s health.

Overall, the results show that not just labour income, but pension income are significant in determining the health status and the height of healthcare expenditures. Additionally, gender differences are evident in the relationship between pension income and health status but make little difference in the relationship between age and health status, despite the large differences in life expectancy. These results hold implications for the way policymakers approach the reform of healthcare and pension systems, concerning their financing, services, and benefits. Especially, if policymakers aim to aid active ageing and good health outcomes in old age. The significance of pension income for both healthcare expenditures and health status is especially interesting in the context of active ageing. The health status of an individual is essential for their ability to take part in their community and actively age, a process that is important for a functioning society. While this study finds that the relationship between personal pension income and health status is negative, the coefficient of this is small when considering that the health status in this study is measured as a categorical variable. Economic and social policies need to address the health challenges associated with retirement to ensure the well-being of the elderly population. It is becoming increasingly urgent for policymakers to address the rising burden on individual household budgets from out-of-pocket healthcare expenditures. As populations age and out-of-pocket health expenditures have been increasing. Collaboration is needed between multiple sectors, social and economic, to find solutions for the rising health expenditure burden on households and individuals. These solutions need to support economic growth while also meeting the needs of a growing ageing population.

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Appendix A

Appendix A.1
Descriptive Statistics for the Household Level Analysis

Table 7. Household Level Descriptive Statistics 1999, Single-Person Households

1999 SINGLE-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhipen	247	.2531958	.356704	-.9542677	1.599479
Zhc6	247	-.1342245	.5032584	-.639027	2.349831
Nearn	247	.048583	.2154312	0	1
Own	247	108.583	29.80997	100	220

Table 8. Household Level Descriptive Statistics 1999, Two-Person Households

1999 TWO-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhipen	151	1.348423	.7393036	.1071133	5.46921
Zhc6	151	.5015412	1.154724	-.639027	8.327548
Hpartner	151	.986755	.1147028	0	1
Nearn	151	.0662252	.2981918	0	2
Own	151	102.1854	15.40104	100	220

Table 9. Household Level Descriptive Statistics 2005, Single-Person Households

2005 SINGLE-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	304	.0267526	.7401154	-.7778322	2.779425
Zhipen	304	.2269352	.358389	-1.019836	1.316388
Nearn	304	.0296053	.1697752	0	1
Own	304	110.8553	33.51654	100	220

Table 10. Household Level Descriptive Statistics 2005, Two-Person Households

2005 TWO-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	206	.6539665	1.221774	-.7778322	5.689908
Zhipen	206	1.336465	.6805899	.1197852	3.916378
Hpartner	206	.9563107	.2049009	0	1
Nearn	206	.1213592	.394882	0	2
Own	206	101.6019	13.20963	100	220

Table 11. Household Level Descriptive Statistics 2007, Single-Person Households

2007 SINGLE-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	293	.0415986	.6422937	-.6884401	3.258726
Zhipen	293	.1836098	.3195018	-.9374332	1.892645
Nearn	293	.0238908	.1529702	0	1
Own	293	109.0444	31.07285	100	220

Table 12. Household Level Descriptive Statistics 2007, Two-Person Households

2007 TWO-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	158	.7222139	1.588088	-.6884401	12.46878
Zhipen	158	1.178631	.5575117	.1159849	3.307684
Hpartner	158	.9683544	.1756113	0	1
Nearn	158	.0379747	.1917428	0	1
Own	158	102.2152	15.9866	100	220

Table 13. Household Level Descriptive Statistics 2009, Single-Person Households

2009 SINGLE-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	354	.0820546	.6225984	-.6862299	2.433606
Zhipen	354	.2364286	.4128174	-1.005963	5.11162
Nearn	354	.0169492	.1292636	0	1
Own	354	103.8136	20.40328	100	220

Table 14. Household Level Descriptive Statistics 2009, Two-Person Households

2009 TWO-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	191	.6568787	1.193416	-.6862299	6.801377
Zhipen	191	1.260081	.6551404	-.1808008	3.404388
Hpartner	191	.9633508	.1883929	0	1
Nearn	191	.0209424	.1435679	0	1
Own	191	103.6126	20.13211	100	220

Table 15. Household Level Descriptive Statistics 2012, Single-Person Households

2012 SINGLE-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	355	.0969676	.6764339	-.7103334	3.54676
Zhipen	355	.2859222	.4337024	-.9449131	2.728098
Nearn	355	.0140845	.1180058	0	1
Own	355	104.9296	23.52263	100	220

Table 16. Household Level Descriptive Statistics 2012, Two-Person Households

2012 TWO-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	166	.6801042	1.065153	-.7103334	6.952205
Zhipen	166	1.502643	.8677393	-.0457845	4.182055
Hpartner	166	.9518072	.2148214	0	1
Nearn	166	.0361446	.1872146	0	1
Own	166	100.7229	9.313806	100	220

Table 17. Household Level Descriptive Statistics 2015, Single-Person Households

2015 SINGLE-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	551	.1987146	.9322938	-.8161396	7.038313
Zhipen	551	.284742	.5029231	-.8809167	6.878
Nearn	551	.0108893	.1938764	0	1
Own	551	114.0835	19.50814	110	220

Table 18. Household Level Descriptive Statistics 2015, Two-Person Households

2015 TWO-PERSON HOUSEHOLDS

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Zhc6	267	.7136057	1.45127	-.8161396	9.656465
Zhipen	267	1.308435	.8704565	-.3793302	8.583917
Hpartner	267	.9775281	.1484908	0	1
Nearn	267	.0599251	.25311	0	2
Own	267	112.1723	13.67453	100	210

Appendix A.2
Regression Outputs Single-Person Households

Table 19. Regression Output Single-Person Households, 1999

Source	SS	df	MS	Number of obs	=	247
Model	.651632256	3	.217210752	F(3, 243)	=	0.86
Residual	61.6525507	243	.253714201	Prob > F	=	0.4645
Total	62.304183	246	.253269037	R-squared	=	0.0105
				Adj R-squared	=	-0.0018
				Root MSE	=	.5037

zhc6	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zhipen	-.0924898	.0906687	-1.02	0.309	-.2710867	.0861071
nearn	.1418137	.1502547	0.94	0.346	-.1541541	.4377815
own	.0009884	.0010806	0.91	0.361	-.0011402	.0031171
_cons	-.2250246	.1252129	-1.80	0.074	-.4716656	.0216165

Table 20. Regression Output Single-Person Households, 2005

Source	SS	df	MS	Number of obs	=	304
Model	5.12363258	3	1.70787753	F(3, 300)	=	3.19
Residual	160.850912	300	.536169705	Prob > F	=	0.0242
Total	165.974544	303	.547770773	R-squared	=	0.0309
				Adj R-squared	=	0.0212
				Root MSE	=	.73224

zhc6	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zhipen	.2675332	.1173855	2.28	0.023	.0365299	.4985366
nearn	.326957	.2485086	1.32	0.189	-.1620837	.8159977
own	-.0021906	.0012589	-1.74	0.083	-.0046679	.0002868
_cons	.1991967	.1474805	1.35	0.178	-.0910306	.4894239

Table 21. Regression Output Single-Person Households, 2007

```
      Source |       SS           df       MS      Number of obs   =       293
-------------+----------------------------------   F(3, 289)       =      3.55
       Model |  4.28515807         3  1.42838602   Prob > F        =    0.0148
    Residual |  116.143129       289  .401879341   R-squared       =    0.0356
-------------+----------------------------------   Adj R-squared   =    0.0256
       Total |  120.428288       292  .412425642   Root MSE        =    .63394

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .2998924   .1168126     2.57   0.011     .0699811    .5298036
       nearn |  -.1323669   .2440995    -0.54   0.588    -.6128052    .3480714
         own |  -.0021372   .0011946    -1.79   0.075    -.0044885    .0002141
       _cons |   .2227488   .1373474     1.62   0.106    -.0475794    .4930769
------------------------------------------------------------------------------
```

Table 22. Regression Output Single-Person Households, 2009

```
      Source |       SS           df       MS      Number of obs   =       354
-------------+----------------------------------   F(3, 350)       =      4.22
       Model |  4.77212628         3  1.59070876   Prob > F        =    0.0060
    Residual |   132.06085       350  .377316715   R-squared       =    0.0349
-------------+----------------------------------   Adj R-squared   =    0.0266
       Total |  136.832977       353  .387628829   Root MSE        =    .61426

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .2621034   .0796328     3.29   0.001     .1054843    .4187225
       nearn |  -.2452911    .255422    -0.96   0.338     -.747646    .2570639
         own |   -.000302   .0016094    -0.19   0.851    -.0034674    .0028634
       _cons |   .0555921   .1710109     0.33   0.745    -.2807462    .3919304
------------------------------------------------------------------------------
```

Table 23. Regression Output Single-Person Households, 2012

```
      Source |       SS           df       MS      Number of obs   =       355
-------------+----------------------------------   F(3, 351)       =      4.40
       Model |  5.87306442         3  1.95768814   Prob > F        =    0.0047
    Residual |  156.104177       351  .444741244   R-squared       =    0.0363
-------------+----------------------------------   Adj R-squared   =    0.0280
       Total |  161.977241       354  .457562828   Root MSE        =    .66689

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .2967235   .0819202     3.62   0.000     .1356073    .4578396
       nearn |  -.1377658   .3011096    -0.46   0.648    -.7299717    .4544401
         own |   .0003868   .0015076     0.26   0.798    -.0025783    .0033518
       _cons |  -.0265156   .1643243    -0.16   0.872    -.3496996    .2966685
------------------------------------------------------------------------------
```

Table 24. Regression Output Single-Person Households, 2015

```
      Source |       SS           df       MS      Number of obs   =       551
-------------+----------------------------------   F(3, 547)       =      2.08
       Model |  5.39104934         3  1.79701645   Prob > F        =    0.1019
    Residual |  472.653446       547  .864083083   R-squared       =    0.0113
-------------+----------------------------------   Adj R-squared   =    0.0059
       Total |  478.044496       550   .86917181   Root MSE        =    .92956

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .1720137   .0792114     2.17   0.030      .016418    .3276095
       nearn |  -.0774037   .3824332    -0.20   0.840    -.8286211    .6738137
         own |  -.0020761    .002038    -1.02   0.309    -.0060794    .0019271
       _cons |   .3874293   .2387576     1.62   0.105    -.0815646    .8564233
------------------------------------------------------------------------------
```

Appendix A.3 Regression Outputs Two-Person Households

1999

Table 25. Regression Output Two-Person Households, 1999

```
      Source |       SS           df       MS      Number of obs   =       151
-------------+----------------------------------   F(4, 146)       =      4.58
       Model |  22.2962102         4  5.57405256   Prob > F        =    0.0016
    Residual |  177.711993       146  1.21720543   R-squared       =    0.1115
-------------+----------------------------------   Adj R-squared   =    0.0871
       Total |  200.008203       150  1.33338802   Root MSE        =    1.1033

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .2578129   .1226491     2.10   0.037     .0154159    .5002098
    hpartner |  -1.072281   .7886895    -1.36   0.176    -2.631004    .4864418
       nearn |   .9975501    .302539     3.30   0.001     .3996285    1.595472
         own |   -.003735   .0058673    -0.64   0.525    -.0153307    .0078607
       _cons |   1.527581   .9936361     1.54   0.126    -.4361873     3.49135
------------------------------------------------------------------------------
```

Table 26. Regression Output Two-Person Households, 2005

```
      Source |       SS           df       MS      Number of obs   =       206
-------------+----------------------------------   F(4, 201)       =      3.16
       Model |   18.079046         4  4.51976151   Prob > F        =    0.0152
    Residual |   287.93081       201  1.43249159   R-squared       =    0.0591
-------------+----------------------------------   Adj R-squared   =    0.0404
       Total |  306.009856       205  1.49273101   Root MSE        =    1.1969

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .4052436   .1266976     3.20   0.002     .1554167    .6550705
    hpartner |   .4321118   .4111816     1.05   0.295    -.3786711    1.242895
       nearn |  -.2447865   .2192991    -1.12   0.266    -.6772085    .1876355
         own |  -.0000498   .0064839    -0.01   0.994     -.012835    .0127354
       _cons |  -.2660951   .7858226    -0.34   0.735    -1.815609    1.283419
------------------------------------------------------------------------------
```

Table 27. Regression Output Two-Person Households, 2007

```
      Source |       SS           df       MS      Number of obs   =       158
-------------+----------------------------------   F(4, 153)       =      0.22
       Model |  2.23464128         4   .55866032   Prob > F        =    0.9286
    Residual |  393.723074       153  2.57335343   R-squared       =    0.0056
-------------+----------------------------------   Adj R-squared   =   -0.0204
       Total |  395.957716       157  2.52202367   Root MSE        =    1.6042

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .1927404   .2309582     0.83   0.405    -.2635385    .6490193
    hpartner |   .1437032   .7325032     0.20   0.845    -1.303423    1.590829
       nearn |  -.1600085   .6853399    -0.23   0.816    -1.513959    1.193942
         own |  -.0011904   .0082282    -0.14   0.885    -.0174459    .0150651
       _cons |   .4836429    1.12065     0.43   0.667    -1.730303    2.697589
------------------------------------------------------------------------------
```

Table 28. Regression Output Two-Person Households, 2009

```
      Source |       SS           df       MS      Number of obs   =       191
-------------+----------------------------------   F(4, 186)       =      1.27
       Model |  7.20471133         4  1.80117783   Prob > F        =    0.2826
    Residual |  263.401056       186  1.41613471   R-squared       =    0.0266
-------------+----------------------------------   Adj R-squared   =    0.0057
       Total |  270.605768       190  1.42424088   Root MSE        =      1.19

------------------------------------------------------------------------------
        zhc6 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zhipen |   .1250533   .1325077     0.94   0.347     -.136358    .3864645
    hpartner |   .7169943   .4597389     1.56   0.121    -.1899787    1.623967
       nearn |  -.5441044   .6038866    -0.90   0.369    -1.735452    .6472432
         own |   .0032508   .0042932     0.76   0.450    -.0052187    .0117203
       _cons |  -.5168448   .6387215    -0.81   0.419    -1.776915     .743225
------------------------------------------------------------------------------
```

Table 29. Regression Output Two-Person Households, 2012

Source	SS	df	MS	Number of obs	=	166
Model	6.4153889	4	1.60384722	F(4, 161)	=	1.43
Residual	180.785403	161	1.1228907	Prob > F	=	0.2269
Total	187.200792	165	1.13455025	R-squared	=	0.0343
				Adj R-squared	=	0.0103
				Root MSE	=	1.0597

zhc6	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zhipen	.0673309	.095884	0.70	0.484	-.1220217	.2566835
hpartner	.1322155	.3844529	0.34	0.731	-.6270052	.8914361
nearn	-.894444	.4419503	-2.02	0.045	-1.767211	-.0216769
own	.0101511	.0089179	1.14	0.257	-.00746	.0277622
_cons	-.5370354	.9921753	-0.54	0.589	-2.496391	1.42232

Table 30. Regression Output Two-Person Households, 2015

Source	SS	df	MS	Number of obs	=	267
Model	4.76521756	4	1.19130439	F(4, 262)	=	0.56
Residual	555.479555	262	2.12015097	Prob > F	=	0.6905
Total	560.244773	266	2.10618336	R-squared	=	0.0085
				Adj R-squared	=	-0.0066
				Root MSE	=	1.4561

zhc6	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zhipen	-.03543	.1040723	-0.34	0.734	-.2403546	.1694946
hpartner	-.457046	.6033949	-0.76	0.449	-1.645167	.7310747
nearn	.3338285	.3569566	0.94	0.351	-.3690403	1.036697
own	.0055275	.0065441	0.84	0.399	-.0073583	.0184133
_cons	.5667026	.958311	0.59	0.555	-1.320269	2.453674

Appendix B

Appendix B.1 Descriptive Statistics for Individual Level Analysis
Women

Table 31. Descriptive Statistics Binary and Categorical Variables, Women

Variable	Freq.	Per cent	Cum.
1999			
Living with a Partner			
[0] not living with partner	49	15.03	15.03
[1] living with partner	277	84.97	100.00
Total	326	100.00	
Good_health			
0	128	39.26	39.26
1	198	60.74	100.00
Total	326	100.00	
Own Children Living in Household			
0	300	92.02	92.02
1	24	7.36	99.39
2	1	0.31	99.69
3	1	0.31	100.00
Total	326	100.00	
2007			
Living with a Partner			
[0] not living with partner	71	19.40	19.40
[1] living with partner	295	80.60	100.00
Total	366	100.00	
Good_health			
0	173	47.27	47.27
1	193	52.73	100.00
Total	366	100.00	
Own Children Living in Household			
0	331	90.44	90.44
1	25	6.83	97.27
2	10	2.73	100.00
Total	366	100.00	
2009			
Living with a Partner			
[0] not living with partner	95	21.94	21.94
[1] living with partner	338	78.06	100.00
Total	433	100.00	
Good_health			
0	194	44.80	44.80
1	239	55.20	100.00
Total	433	100.00	

Variable	Freq.	Per cent	Cum.
Own Children Living in Household			
0	381	87.99	97.99
1	41	9.47	97.46
2	6	1.39	98.85
3	3	0.69	99.54
4	1	0.23	99.77
6	1	0.23	100.00
Total	433	100.00	
2012			
Living with a Partner			
[0] not living with partner	98	26.34	26.34
[1] living with partner	274	73.66	100.00
Total	372	100.00	
Good_health			
0	181	48.66	48.66
1	191	51.34	100.00
Total	372	100.00	
Own Children Living in Household			
0	351	94.35	94.35
1	17	4.57	98.92
2	4	1.08	100.00
Total	372	100.00	
2015			
Living with a Partner			
[0] not living with partner	151	27.55	27.55
[1] living with partner	397	72.45	100.00
Total	548	100.00	
Good_health			
0	263	47.99	47.99
1	285	52.01	100.00
Total	548	100.00	
Own Children Living in Household			
0	518	94.53	94.53
1	23	4.20	98.72
2	5	0.91	99.64
3	1	0.18	99.82
4	1	0.18	100.00
Total	548	100.00	

Men

Table 32. Descriptive Statistics Binary and Categorical Variables, Men

Variable	Freq.	Per cent	Cum.
1999			
Living with a Partner			
[0] not living with partner	214	58.31	58.31
[1] living with partner	153	41.69	100.00
Total	367	100.00	
Good_health			
0	105	28.61	28.61
1	262	71.39	100.00
Total	367	100.00	
Own Children Living in Household			
0	358	97.55	97.55
1	9	2.45	100.00
Total	367	100.00	
2007			
Living with a Partner			
[0] not living with partner	283	60.99	60.99
[1] living with partner	181	39.01	100.00
Total	464	100.00	
Good_health			
0	146	31.47	31.47
1	318	68.53	100.00
Total	464	100.00	
Own Children Living in Household			
0	429	92.46	92.46
1	28	6.03	98.49
2	7	1.51	100.00
Total	464	100.00	
2009			
Living with a Partner			
[0] not living with partner	342	63.45	63.45
[1] living with partner	197	36.55	100.00
Total	539	100.00	
Good_health			
0	184	34.14	34.14
1	355	65.86	100.00
Total	539	100.00	
Own Children Living in Household			
0	494	91.65	91.65
1	39	7.24	98.89
2	4	0.74	99.63
3	2	0.37	100.00
Total	539	100.00	

Variable	Freq.	Per cent	Cum.
2012			
Living with a Partner			
[0] not living with partner	295	65.12	65.12
[1] living with partner	158	34.88	100.00
Total	453	100.00	
Good_health			
0	177	39.07	39.07
1	276	60.93	100.00
Total	453	100.00	
Own Children Living in Household			
0	450	99.34	99.34
1	3	0,66	100.00
Total	453	100.00	
2015			
Living with a Partner			
[0] not living with partner	446	61.77	61.77
[1] living with partner	276	38.23	100.00
Total	722	100.00	
Good_health			
0	274	37.95	37.95
1	448	62.05	100.00
Total	722	100.00	
Own Children Living in Household			
0	718	99.45	99.45
1	4	0.55	100.00
Total	722	100.00	

Appendix B.2 Regression Outputs Women (Sex = 1 and Age > 61)

Table 33. Regression Output Women, 1999

Source	SS	df	MS	Number of obs	=	326
Model	18.889006	4	4.7222515	F(4, 321)	=	5.47
Residual	277.209154	321	.863579917	Prob > F	=	0.0003
Total	296.09816	325	.91107126	R-squared	=	0.0638
				Adj R-squared	=	0.0521
				Root MSE	=	.92929

health_c	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.1931706	.0620476	-3.11	0.002	-.3152419	-.0710993
age	.0242529	.0078633	3.08	0.002	.0087827	.039723
partner	.0575492	.1477225	0.39	0.697	-.2330773	.3481757
nchildren	-.2389309	.1600994	-1.49	0.137	-.5539075	.0760458
_cons	1.383544	.6051002	2.29	0.023	.1930805	2.574007

Table 34. Regression Output Women, 2007

Source	SS	df	MS	Number of obs	=	366
Model	15.4740082	4	3.86850206	F(4, 361)	=	4.67
Residual	298.919434	361	.828031674	Prob > F	=	0.0011
Total	314.393443	365	.861351898	R-squared	=	0.0492
				Adj R-squared	=	0.0387
				Root MSE	=	.90996

health_c	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.2226413	.0664686	-3.35	0.001	-.3533556	-.091927
age	.0181284	.0072203	2.51	0.012	.0039293	.0323275
partner	.1562608	.1225019	1.28	0.203	-.0846463	.3971679
nchildren	-.0923933	.1199695	-0.77	0.442	-.3283202	.1435336
_cons	1.566528	.5466112	2.87	0.004	.4915857	2.64147

Table 35. Regression Output Women, 2009

Source	SS	df	MS	Number of obs	=	433
Model	32.0707713	4	8.01769282	F(4, 428)	=	11.35
Residual	302.386504	428	.706510522	Prob > F	=	0.0000
Total	334.457275	432	.774206655	R-squared	=	0.0959
				Adj R-squared	=	0.0874
				Root MSE	=	.84054

health_c	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.2479688	.052795	-4.70	0.000	-.3517385	-.1441992
age	.0292675	.0059615	4.91	0.000	.01755	.040985
partner	-.1376061	.0977014	-1.41	0.160	-.3296404	.0544282
nchildren	.1006395	.0741513	1.36	0.175	-.0451066	.2463856
_cons	1.10192	.4398366	2.51	0.013	.237412	1.966429

Table 36. Regression Output Women, 2012

Source	SS	df	MS	Number of obs	=	372
Model	14.5182128	4	3.62955319	F(4, 367)	=	4.70
Residual	283.188776	367	.771631544	Prob > F	=	0.0010
Total	297.706989	371	.802444715	R-squared	=	0.0488
				Adj R-squared	=	0.0384
				Root MSE	=	.87843

health_c	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.0246226	.0491096	-0.50	0.616	-.1211941	.0719488
age	.0247196	.0063625	3.89	0.000	.0122082	.0372311
partner	-.0891565	.1046528	-0.85	0.395	-.2949509	.1166378
nchildren	-.1081522	.1615155	-0.67	0.504	-.4257641	.2094598
_cons	.9530348	.4698758	2.03	0.043	.0290479	1.877022

Table 37. Regression Output Women, 2015

```
      Source |       SS           df       MS      Number of obs   =       548
-------------+----------------------------------   F(4, 543)       =      9.26
       Model |  26.9559389         4  6.73898472   Prob > F        =    0.0000
    Residual |  395.226543       543  .727857353   R-squared       =    0.0638
-------------+----------------------------------   Adj R-squared   =    0.0570
       Total |  422.182482       547  .771814409   Root MSE        =    .85315

------------------------------------------------------------------------------
    health_c |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.1140024   .0410496    -2.78   0.006     -.194638   -.0333669
         age |   .0321025   .0058103     5.53   0.000     .0206891    .0435159
     partner |  -.0212913   .0822127    -0.26   0.796    -.1827851    .1402025
   nchildren |  -.0693389   .1097715    -0.63   0.528    -.2849677      .14629
       _cons |   .5592476   .4181304     1.34   0.182    -.2621038    1.380599
------------------------------------------------------------------------------
```

Appendix B.3 Regression Outputs Men (Sex = 2 and Age > 64)

Table 38. Regression Output Men, 1999

```
      Source |       SS           df       MS      Number of obs   =       367
-------------+----------------------------------   F(4, 362)       =      7.63
       Model |  22.7060423         4  5.67651058   Prob > F        =    0.0000
    Residual |  269.195865       362  .743634986   R-squared       =    0.0778
-------------+----------------------------------   Adj R-squared   =    0.0676
       Total |  291.901907       366  .797546195   Root MSE        =    .86234

------------------------------------------------------------------------------
    health_c |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.3535645   .0734689    -4.81   0.000    -.4980439    -.209085
         age |   .0163466   .0080764     2.02   0.044      .000464    .0322292
     partner |  -.0678702   .1041306    -0.65   0.515     -.272647    .1369065
   nchildren |   .2518948   .2914437     0.86   0.388    -.3212406    .8250303
       _cons |   2.272819   .6278672     3.62   0.000     1.038094    3.507544
------------------------------------------------------------------------------
```

Table 39. Regression Output Men, 2007

Source	SS	df	MS	Number of obs	=	464
Model	25.7618971	4	6.44047428	F(4, 459)	=	9.34
Residual	316.598017	459	.689756028	Prob > F	=	0.0000
Total	342.359914	463	.739438259	R-squared	=	0.0752
				Adj R-squared	=	0.0672
				Root MSE	=	.83052

health_c	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.362066	.0724328	-5.00	0.000	-.504407	-.2197251
age	.0186579	.0066161	2.82	0.005	.0056562	.0316596
partner	-.1592543	.0865223	-1.84	0.066	-.3292832	.0107747
nchildren	.2235122	.1154161	1.94	0.053	-.0032973	.4503216
_cons	1.9841	.504182	3.94	0.000	.9933085	2.974891

Table 40. Regression Output Men, 2009

Source	SS	df	MS	Number of obs	=	539
Model	29.0469712	4	7.2617428	F(4, 534)	=	11.21
Residual	345.780487	534	.647529002	Prob > F	=	0.0000
Total	374.827458	538	.696705313	R-squared	=	0.0775
				Adj R-squared	=	0.0706
				Root MSE	=	.80469

health_c	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.2621962	.0547688	-4.79	0.000	-.369785	-.1546075
age	.0223392	.0059554	3.75	0.000	.0106403	.034038
partner	-.2319831	.0787921	-2.94	0.003	-.3867636	-.0772027
nchildren	-.009262	.0982603	-0.09	0.925	-.2022861	.1837621
_cons	1.579298	.4563572	3.46	0.001	.6828222	2.475773

Table 41. Regression Output Men, 2012

```
      Source |       SS           df       MS      Number of obs   =       453
-------------+----------------------------------   F(4, 448)       =     14.73
       Model |  39.3058572         4  9.82646429   Prob > F        =    0.0000
    Residual |  298.813348       448  .666994081   R-squared       =    0.1162
-------------+----------------------------------   Adj R-squared   =    0.1084
       Total |  338.119205       452  .748051339   Root MSE        =     .8167

------------------------------------------------------------------------------
    health_c |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |   -.276014   .0531951    -5.19   0.000     -.380557    -.171471
         age |   .0202645   .0056946     3.56   0.000     .0090731    .0314559
     partner |  -.2664206   .0849102    -3.14   0.002    -.4332924   -.0995487
   nchildren |  -.3127189   .4741808    -0.66   0.510    -1.244614     .619176
       _cons |   1.734577   .4483339     3.87   0.000     .8534781    2.615675
------------------------------------------------------------------------------
```

Table 42. Regression Output Men, 2015

```
      Source |       SS           df       MS      Number of obs   =       722
-------------+----------------------------------   F(4, 717)       =      7.53
       Model |  19.9426278         4  4.98565696   Prob > F        =    0.0000
    Residual |  474.439644       717  .661701037   R-squared       =    0.0403
-------------+----------------------------------   Adj R-squared   =    0.0350
       Total |  494.382271       721  .685689697   Root MSE        =    .81345

------------------------------------------------------------------------------
    health_c |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.0649956     .03545    -1.83   0.067    -.1345937    .0046025
         age |   .0229832    .004944     4.65   0.000     .0132768    .0326897
     partner |   -.046763    .067026    -0.70   0.486    -.1783538    .0848277
   nchildren |  -.1873463   .4092812    -0.46   0.647     -.990879    .6161864
       _cons |   1.213735   .3772118     3.22   0.001     .4731638    1.954307
------------------------------------------------------------------------------
```

Appendix C

The Good_Health dummy is coded in accordance with the categories of the variable, so that categories 1 and 2 are considered as good health, so the dummy has the value 1. Categories 3 and 4 are considered not good health and the dummy then has the value 0.

Table 43. Health_C Coding

Coding Category	**Meaning/Name of Category**
1	Consistently good
2	Varies, but rather good
3	Varies, not satisfactory
4	Rather bad

Appendix C.1 Individual Level Regression Analysis with Health Status Dummy, Women

Table 44. Regression Output Individual Level Analysis with Good_Health Dummy Women, 1999

```
      Source |       SS           df       MS      Number of obs   =       326
-------------+----------------------------------   F(4, 321)       =      3.94
       Model |  3.63498812         4   .90874703   Prob > F        =    0.0039
    Residual |  74.1073432       321  .230863997   R-squared       =    0.0468
-------------+----------------------------------   Adj R-squared   =    0.0349
       Total |  77.7423313       325  .239207173   Root MSE        =    .48048

------------------------------------------------------------------------------
 good_health |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.0778723   .0320813    -2.43   0.016    -.1409884   -.0147561
         age |   .0103695   .0040657     2.55   0.011     .0023707    .0183682
     partner |   .0531189   .0763789     0.70   0.487    -.0971476    .2033853
   nchildren |  -.1347016   .0827783    -1.63   0.105    -.2975581     .028155
       _cons |   -.019181   .3128629    -0.06   0.951    -.6347018    .5963398
------------------------------------------------------------------------------
```

Table 45. Regression Output Individual Level Analysis with Good_Health Dummy Women, 2007

Source	SS	df	MS	Number of obs	=	366
Model	3.71421626	4	.928554065	F(4, 361)	=	3.83
Residual	87.5125597	361	.242417063	Prob > F	=	0.0046
Total	91.226776	365	.249936372	R-squared	=	0.0407
				Adj R-squared	=	0.0301
				Root MSE	=	.49236

good_health	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.1193666	.0359646	-3.32	0.001	-.1900929	-.0486402
age	.0058065	.0039067	1.49	0.138	-.0018763	.0134893
partner	.0256555	.0662828	0.39	0.699	-.1046935	.1560044
nchildren	-.0898737	.0649126	-1.38	0.167	-.2175281	.0377807
_cons	.2813801	.2957581	0.95	0.342	-.3002451	.8630052

Table 46. Regression Output Individual Level Analysis with Good_Health Dummy Women, 2009

Source	SS	df	MS	Number of obs	=	433
Model	7.4515725	4	1.86289312	F(4, 428)	=	8.00
Residual	99.6292589	428	.232778642	Prob > F	=	0.0000
Total	107.080831	432	.247872295	R-squared	=	0.0696
				Adj R-squared	=	0.0609
				Root MSE	=	.48247

good_health	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.1160581	.0303043	-3.83	0.000	-.175622	-.0564943
age	.0142151	.0034219	4.15	0.000	.0074893	.020941
partner	-.0814523	.0560807	-1.45	0.147	-.1916801	.0287755
nchildren	.040354	.0425629	0.95	0.344	-.0433043	.1240124
_cons	-.2346477	.2524664	-0.93	0.353	-.730876	.2615806

Table 47. Regression Output Individual Level Analysis with Good_Health Dummy Women, 2012

```
      Source |       SS           df       MS      Number of obs   =       372
-------------+----------------------------------   F(4, 367)       =      4.53
       Model |  4.37515166         4  1.09378792   Prob > F        =    0.0014
    Residual |   88.557644       367  .241301482   R-squared       =    0.0471
-------------+----------------------------------   Adj R-squared   =    0.0367
       Total |  92.9327957       371  .250492711   Root MSE        =    .49122

------------------------------------------------------------------------------
 good_health |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.0077425   .0274626    -0.28   0.778    -.0617462    .0462613
         age |    .010884    .003558     3.06   0.002     .0038874    .0178805
     partner |  -.0727658   .0585229    -1.24   0.215    -.1878481    .0423164
   nchildren |  -.1631249   .0903211    -1.81   0.072    -.3407367    .0144869
       _cons |  -.1813347   .2627593    -0.69   0.491    -.6980375    .3353681
------------------------------------------------------------------------------
```

Table 48. Regression Output Individual Level Analysis with Good_Health Dummy Women, 2015

```
      Source |       SS           df       MS      Number of obs   =       548
-------------+----------------------------------   F(4, 543)       =      9.00
       Model |  8.50688833         4  2.12672208   Prob > F        =    0.0000
    Residual |  128.272309       543   .23622893   R-squared       =    0.0622
-------------+----------------------------------   Adj R-squared   =    0.0553
       Total |  136.779197       547  .250053377   Root MSE        =    .48603

------------------------------------------------------------------------------
 good_health |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.0621004   .0233858    -2.66   0.008    -.1080381   -.0161626
         age |   .0175773   .0033101     5.31   0.000     .0110751    .0240794
     partner |    .003323   .0468362     0.07   0.943    -.0886794    .0953254
   nchildren |  -.0756048   .0625364    -1.21   0.227    -.1984477    .0472382
       _cons |  -.6469647   .2382074    -2.72   0.007    -1.114885   -.1790438
------------------------------------------------------------------------------
```

Appendix C.2 Individual Level Regression Analysis with Health Status Dummy, Men

Table 49. Regression Output Individual Level Analysis with Good_Health Dummy Men, 1999

```
      Source |       SS           df       MS      Number of obs   =       367
-------------+----------------------------------   F(4, 362)       =      4.34
       Model |  3.43220882         4  .858052206   Prob > F        =    0.0019
    Residual |  71.5269192       362  .197588175   R-squared       =    0.0458
-------------+----------------------------------   Adj R-squared   =    0.0352
       Total |  74.9591281       366  .204806361   Root MSE        =    .44451

------------------------------------------------------------------------------
 good_health |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.1506598   .0378708    -3.98   0.000    -.2251341   -.0761855
         age |   .0026244   .0041631     0.63   0.529    -.0055625    .0108113
     partner |  -.0426753   .0536758    -0.80   0.427    -.1482309    .0628804
   nchildren |   .0870615   .1502295     0.58   0.563    -.2083707    .3824937
       _cons |   .7213376   .3236446     2.23   0.026      .084878    1.357797
------------------------------------------------------------------------------
```

Table 50. Regression Output Individual Level Analysis with Good_Health Dummy Men, 2007

```
      Source |       SS           df       MS      Number of obs   =       464
-------------+----------------------------------   F(4, 459)       =      7.41
       Model |  6.06866617         4  1.51716654   Prob > F        =    0.0000
    Residual |  93.9916787       459  .204774899   R-squared       =    0.0607
-------------+----------------------------------   Adj R-squared   =    0.0525
       Total |  100.060345       463  .216113056   Root MSE        =    .45252

------------------------------------------------------------------------------
 good_health |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.1728007   .0394662    -4.38   0.000    -.2503576   -.0952438
         age |   .0081112   .0036049     2.25   0.025      .001027    .0151953
     partner |  -.0938994   .0471432    -1.99   0.047    -.1865426   -.0012562
   nchildren |   .1216168   .0628864     1.93   0.054    -.0019642    .2451978
       _cons |   .3004767   .2747122     1.09   0.275    -.2393728    .8403262
------------------------------------------------------------------------------
```

Table 51. Regression Output Individual Level Analysis with Good_Health Dummy Men, 2009

Source	SS	df	MS	Number of obs	=	539
Model	6.98099295	4	1.74524824	F(4, 534)	=	8.16
Residual	114.206391	534	.213869646	Prob > F	=	0.0000
Total	121.187384	538	.225255361	R-squared	=	0.0576
				Adj R-squared	=	0.0505
				Root MSE	=	.46246

good_health	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.136736	.0314759	-4.34	0.000	-.1985678	-.0749042
age	.0081609	.0034226	2.38	0.017	.0014375	.0148842
partner	-.1458561	.0452822	-3.22	0.001	-.2348092	-.056903
nchildren	-.0084135	.0564707	-0.15	0.882	-.1193454	.1025184
_cons	.263417	.2622708	1.00	0.316	-.251792	.778626

Table 52. Regression Output Individual Level Analysis with Good_Health Dummy Men, 2012

Source	SS	df	MS	Number of obs	=	453
Model	11.9683358	4	2.99208394	F(4, 448)	=	13.98
Residual	95.8727238	448	.214001616	Prob > F	=	0.0000
Total	107.84106	452	.238586415	R-squared	=	0.1110
				Adj R-squared	=	0.1030
				Root MSE	=	.4626

good_health	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zpipen	-.138426	.0301314	-4.59	0.000	-.1976424	-.0792095
age	.0108453	.0032256	3.36	0.001	.0045061	.0171844
partner	-.1783507	.0480959	-3.71	0.000	-.2728722	-.0838292
nchildren	-.1839605	.268591	-0.68	0.494	-.7118153	.3438943
_cons	.0392801	.2539505	0.15	0.877	-.459802	.5383623

Table 53. Regression Output Individual Level Analysis with Good_Health Dummy Men, 2015

```
      Source |       SS           df       MS      Number of obs   =       722
-------------+----------------------------------   F(4, 717)       =      6.45
       Model |  5.90276532         4  1.47569133   Prob > F        =    0.0000
    Residual |  164.113855       717  .228889617   R-squared       =    0.0347
-------------+----------------------------------   Adj R-squared   =    0.0293
       Total |   170.01662       721  .235806686   Root MSE        =    .47842

------------------------------------------------------------------------------
 good_health |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      zpipen |  -.0518953   .0208496    -2.49   0.013    -.0928289   -.0109617
         age |   .0116804   .0029078     4.02   0.000     .0059717    .0173892
     partner |  -.0200535   .0394208    -0.51   0.611    -.0974475    .0573406
   nchildren |  -.1828569   .2407154    -0.76   0.448    -.6554482    .2897343
       _cons |  -.1716962   .2218541    -0.77   0.439    -.6072574     .263865
------------------------------------------------------------------------------
```

Appendix C.3 Individual Level Regression Analysis Summary with only Pension Income

Table 54. Regression Output Summary with Pension Income as Independent Variable, Women

Year	ZPiPen Coeff.	Std. Err.	T	P> ∩t∩	[95% Confidence Interval]	
1999	-.1511273	.0589605	-2.56	.011	-.2670609	-.0351937
2007	-.2017116	.0639883	-3.15	.002	-.3275099	-.0759132
2009	-.2027357	.0520927	-3.89	.000	-.3050948	-.1003766
2012	.0207383	.0458974	0.45	.652	-.0694547	.1109313
2015	-.0801109	.0365139	-2.19	.029	-.1517961	-.0084256

Table 55. Regression Output Summary with Pension Income as Independent Variable, Men

Year	ZPiPen Coeff.	Std. Err.	T	P> ∩t∩	[95% Confidence Interval]	
1999	-.283024	.0615547	-4.60	.000	-.4039624	-.1620868
2007	-.3077825	.0654187	-4.70	.000	-.4362665	-.1792985
2009	-.2112513	.0504354	-4.19	.000	-.3102899	-.1122127
2012	-.2613364	.049726	-5.26	.000	-.3589895	-.1636833
2015	-.0508619	.0292506	-1.74	.082	-.108261	.0065371