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Consequences of Retirement on Income

The Case of the Netherlands

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Master Thesis

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Abstract

This thesis intends to describe the financial consequences of retirement on income at the household level. Moreover, the emphasis is on discovering the factors that lead to variation in the magnitude of the retirement effect on income for individuals and households with different characteristics. Panel data from the Income Panel Survey (IPO) provided by Statistics Netherlands was exploited to conduct analysis of retirement effects on income. Data obtained from the IPO contains tax records and demographic characteristics of individuals who were followed during the period 2000-2009.

Descriptive analysis provided evidence of increasing inequality among individuals who retired during the period 2000-2009 in comparison to the non-retired adults and workers. The effect of retirement seemed to be conditional on age at retirement based on descriptive analysis which was derived from absolute mean vales. Decreases in income were most considerable for individuals in the lowest percentile of the income distribution. Income composition of retirees has remained stable through the panel years.

Empirical analysis provided an indication of negative standardized household income for individuals whose income source was mainly labour earnings. For those individuals who were dependent on disability benefit or unemployment benefits, income decreased at a lower rate compared to wage workers. However, income after retirement increases for individuals who relied on social security transfers. Households with two earners faced lower income changes relative to households with one earner. When making distinction between principal bread winners and other members of the household, there was no significant difference between retiring of the principal bread winner and the other member.

There was no significant difference in after-retirement income change between men and women. Post retirement income changes however, were conditional on marital status. Unmarried retirees experienced larger standardized household income declines, compared to married individuals.

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1. Introduction

At the present time, over the life cycle, many individuals will experience a phase in their lives that they will not be capable of sustaining themselves through labour. Many reasons may account for this lack of ability to earn income: sickness, unemployment, disability and old age. There is an increasing trend in aging of the population in all western societies, including the Netherlands, as life expectancy increases. This rise in longevity increases the share of individuals who reach retirement age. This thesis is concerned with the effect of retirement on the income path of households.

A noteworthy question is therefore whether the increasing number of retired individuals in the Netherlands will face a decrease in their living standards. Changes in income due to retirement are not similar for different groups within the population. Investigating the effect of retirement may depend on the definition of retirement and the exit routs individuals take to retirement. The empirical analysis of this paper exploits features that are available in the Dutch Income Panel survey (Inkomens Panel Onderzoek) that is provided by Statistics Netherlands in analyzing income changes around the point of retirement. Previous studies on retirement income distribution of Dutch retirees have shown that Dutch pensioners experienced higher income in the past decade in comparison to elderly in 1990's (Knoef, Allessie and Kalwij, 2009). However, they did not specify on trends due to reaching retirement.

The main goal of this paper is to point out the factors that contribute to the effect of retirement. As will be discussed in the literature review, factors such as household composition, marital status, sources of income and number of earners in the household

affect income patterns after retirement and consequently income in later life. Analysis of the effect of retirement on income helps to assess trends in patterns in future. Distinguishing between households based on the number of earners in the household can help to redirect the governmental resources to assist elderly in poverty. Noting that the number of two earner households is rising, the future generation of retirees will likely be placed at a higher income position in comparison to those who retire at the current time (Knoef, Allessie and Kalwij, 2009).

Changes in income as a measure of well-being after retirement will be analysed by comparing income in the year before with income immediately after retirement. Preliminary analysis of the panel data confirms that retired people stand in lower economic position compared to the rest of the population. However, over the period 2000-2009 the income position of retirees improved in comparison to the rest of the population. This was not exclusively due to younger, wealthier, recent retirees joining the group of older retirees, but also due to a real increase in income of all retired people relative to the rest of the population. This finding was in accordance with research conducted by Knoef, Allessie and Kalwij (2009).

The longitudinal analysis suggests that retirement is significantly associated with changes in income patterns after retirement. If income is considered to be a measure of well-being and standard of living (Disney and Whitehouse, 2001), retirement leads to a decline in well-being of retirees compared to the rest of the population not only for the year that the retirement occurred, but also for the years around the event of the retirement. Thus, retirement may be described as a "process" rather than a discrete change in status at one point in time, unlike demographic events. The consequences of retirement on income and

on the financial standing of households and individuals may differ based on gender or vary according to the labour-market history of the individuals before retirement. Different exit routs to retirement generate different effects in terms of household income. For instance, being retired may lead to a more significant change in income for those men who worked full time and whose main income component was earnings from labour.

In order to assist the reader in differentiating between different sources of income and their relevance to consequences of retirement on household income in the Netherlands, there is a short overview of different income components and sources of the sample population which can be generalized to the whole Dutch population. Noting that retirement income depends on many other factors in addition to the labour market status and history of the individual, it is essential to look into the differences among subgroups in the sample data that enter retirement with different labour market histories. The fact that in the Netherlands, there are mainly two main sources of retirement income -namely State and occupational pension- simplifies the analysis of post-retirement income variance.

This paper is structured as follows. Section 2 describes literature on the effect of retirement and income distribution of retirees. Section 3 covers definitions applied during the research in addition to data and the data selection procedure. Section 4 contains a description of the Dutch pension system. Section 5 describes historical trends in retirement income for different groups based on various demographic and socio-economic features. Section 6 introduces the empirical model and includes final findings and section 7 includes the conclusions and recommendations for future research.

2. Literature Review

It has been shown that the socio-economic position of individuals is affected by dynamic processes and can be better captured at the household rather than at the individual level of analysis. Changes in labour market status of household members may have large effects on household income and transition to retirement is of no exception.

Sørensen (1994) stated that it is reasonable to assume that the family's standard of living highly depends on the socio-economic position of the main adult bread winner with higher occupational status within the household. He concluded that occupational status is sufficient to measure a household's economic position by clarifying the link between permanent income and occupational status. Income across households is influenced by changes in labor market conditions, household composition and institutional environment.

McManus and DiPrete (2001) investigated the influence of household composition on household income. They argued that factors such as the employment situation of household members, changes in the household composition in terms of number of individuals making up the household and the number of earners in the household can have large potential effects on the income of households and consequently of the household members.

Assuming a household is able to sustain the same level of income in real terms through time, a change in the number of individuals making up the household will necessarily have an effect on the household members' living standards. For example, if one more individual is added to the household, this will generally lead to a decline in living standards. In

contrast, one person less in the household leads to a higher standard of living, assuming a constant real terms income (Manting and Bouman, 2006).

Yamada and Casey (2002) conducted a comparative study on the effects of retirement in nine countries including Canada, Finland, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States. They argued that by focusing on individual rather than household income they were able to observe and control for interfamilial transfers. They found that although income for the elderly drops after the event of retirement, their work-related expenses decrease and this should be taken into consideration when studying the effect of retirement on the well-being and income position of individuals. The composition of income among middle and higher income deciles are more diversified and income components of lower levels is homogenous across different countries for the past decade. The authors did not find a clear relationship between the effect of changes in household structure and evolution of retirement income.

Some argue that investigating distribution of life time consumption gives a better perspective on dynamics of permanent income (Blundell and Preston, 1998). By analysing the pattern of consumption of households and its variances through the lifecycle, it would be possible to estimate for real sufficient income for households to sustain themselves. The relevance of this idea lies in the fact that, taking into account consumption levels of the household, government policy makers can make effective decision to help households in lower socio-economic positions. However, conducting research on life time consumption generally faces the obstacle of gathering proper data. As a result, effects on income are being studied.

A large body of literature exists in the Netherlands about retirement. The existing research and studies which have used longitudinal perspective have mainly concentrated on other topics involved in retirement studies, for instance documenting labour force transition to retirement or retirement behaviour of Dutch Elderly (Mastrogiacomo, Alessie and Lindeboom, 2002). Van Rooij, Lusardi and Alessie and (2011) investigated the relationship between financial literacy and retirement preparation.

Examining the patterns of inequality is of importance in welfare studies. Lise and Seits (2007) reported an increase in both household earnings and inequality for the elderly for the past decade in the UK. In contrast to the situation in the US (Pencavel, 2006) and UK, inequality among the elderly in the Netherlands remained rather stable between 1989 and 2004 (Knoef, Allessie and Kalwij, 2009). Development of inequality among retirees relative to the rest of the population is subject to investigation in descriptive analysis.

Whilst looking into the effect life events on income, one must take into consideration age effect, period effect and cohort effect. Period effect constitutes for effects on income that is originated from economic conditions such as economic growth or increase in inflation. Therefore, one cohort can be better off as result of better economic climate. Age effect derives from the variances in income as an individual gets older. Kalmijn and Alessie (2008) found that after age 50 up to age 62, variances in income within cohort groups are not homogenous. In other words, changes in income differ within different sub-groups. Their findings suggested an income peak in mid 50's and decline after that. Timing of the retirement is also not the same for different individuals. Some workers retire early or some decide to retire through disability insurance to retirement.

Kalmijn and Alessie (2008) stated that income variances decrease after the official statutory retirement age, 65 in the Netherlands. Furthermore, old age is associated with homogenized patterns in economic terms, these authors found. Their results suggested that this heterogeneity is due to the diversity of routes that individuals take to retirement.

Knoef, Allessie and Kalwij (2009) took notice of the cohort effect as an explanation in differences in income distribution between younger and elder pensioners. Cohort effect basically explains the difference in income between different generations and is used to describe and compare economic positions of individuals in different generations. Their findings suggested that income variances in old age can be explained by the cohort effect. They achieved so by comparing cohorts by birth. Since their study contained more years of panel they could witness the changes in income as individuals' age.

Taking different routes to retirement leads to different retirement income outcomes. If the main household income source is earnings from labour income, rates of change of retirement income may be different than income changes after retirement for households relying on unemployment benefits of a household member who retires.

Patterns in labour market exit routes of elderly Dutch workers have been investigated in the Dutch health care sector (Euwals and van Vuuren, 2010). The findings reported that previous reforms in early retirement schemes and disability insurance in the Netherlands have affected the incentives of workers to continue working and decreased substitution between early retirement and disability. Their findings proposed that substitute pathways into retirement seem less relevant today since their empirical findings confirmed that in the Dutch health care sector disability insurance is closed off as an early retirement exit route.

Exit routs to retirement also can be possibly indication of position of retirees in income distribution after retirement. The effect of retirement on income of individuals with different income source is subject to investigation in this thesis. Noting that pre-retirement income composition of elderly will most likely stay the same till their retirement, Knoef, Allessie and Kalwij (2009) found that in lower percentiles of income position disability benefits, unemployment and social transfers are the main sources of income. As the income percentiles increases, labour income becomes more important.

Noting that taking different routes to retirement leads to different outcomes for retirement income, it is worthwhile to mention the existence of heterogeneity in retirement behaviour which is addressed directly in the academic literature. Mastrogiacomo, Alessie and Lindeboom (2002) stated that in the past three decades there has been a substantial decline in labour force participation for older workers in the Netherlands for both genders. Despite the decreasing trend on average, the researchers found considerable heterogeneity in retirement behaviour for different demographic groups. Participation rates for single males are lower than married males. Differences exist between married men with working partners and men with non-working partners. They also found that there is a disparity between the retirement behaviour of the divorced and widowers and other single male workers. Their findings suggest that there may be also differences in income changes after retirement. For women, participation rates in the labour force remained constant for the past decade (Euwals, Knoef, and Van Vuuren, 2007).

3. Data and definitions

The data applied in this paper are obtained from the Dutch Income Panel (IPO). This section gives an overview of definitions applied in the analysis. Next, information about IPO will be provided. IPO is utilized to estimate the effect of retirement on income. Construction of panel and description of raw data such as household demographics that affect income are also provided in this section.

3.1. Definitions

In order to examine the effect and consequences of retirement on income, it is important to base the analysis on a definition of retirement that covers all aspects and is practical to conduct the analysis with. A clear definition of retirement helps to make comparisons of patterns in retirement trends among different groups of the population and also in different time periods. On the other hand, the definition of retirement proposed in this paper needs to be complementary to the social security and pension system of the Netherlands. There are many concepts and measures of retirement available in the academic literature. Discussing these different definitions and concepts in a profound way is out of scope of this research.

Borland (2005) put an emphasis on defining retirement as a transition from career employment to retirement. Such definitions, characterize retirement mostly as a reduction in labour-market participation gradually or sharply, where this leads withdrawal from labour market that leads to retirement. Based on this explanation, individuals with lower levels of labour market participation are also considered to be retired. This is due to the reason that, by lowering their labour participation, their labour earnings will decline and consequently their main source of income will be directed to income from pension.

The definition of retirement that is on the basis of labour market participation can be regarded as follows: an individual is considered to be retired when he/she no longer participates in the labour-force (Arkani & Gough, 2007). Another definition that relies on labour market participation is proposed by Blekesaune & Solem (2005). They described retirement as a reduction in hours which is helpful to describe trends in gradual retirement. For the sake of limitations on data availability I exclude the definitions of such that relate to self-assessed retirement (Schellenberg & Silver, 2004) or definitions that focused on employee leaving the main employer (Asch, Haider & Zissimopoulos, 2005).

The main shortcoming of retirement definitions that put more stress on labour market participation is the exclusion of sub-groups of the population, for instance women who have spent short periods in the labour market (McDonald, 2006 and need a Dutch reference). I would like to cover all groups in the population no matter what their labour market participation. The definition that relies on receiving pension income fits the purpose of this research more properly. Therefore, an individual is deemed to be retired when he or she is in receipt of pension income even if that individual still has some labour participation. This means that being retired refers to a person who is older than the age of 55 and whose main source earnings are pension income. Pension income definition is also important. Consequently, there will be a brief explanation of the different income components of Dutch population to point out the factors that may affect the income due to retirement.

Changes of income are evaluated on a household level. An individual's income position does not solely depend on his/her personal investments in human capital. Moreover, it

depends on the household that he/she lives in and characteristics of the household and other members of it in a sense that they share resources with other members of the household. Therefore financial resources of elderly cannot be sufficiently addressed by individual or benefit-unit only (Kalmijn and Alessie, 2008).

By income I refer to standardized household income. Standardized household income is defined as disposable household income divided by "equivalence of scale". Disposable income equals to gross income minus current transfers paid, income insurance premiums, health insurance premiums and taxes on income and wealth and by dividing disposable income by the equivalence factor, income is adjusted to household composition and size. Disposable household income which is considered to be net household income is more suitable over gross income for the reason that resources of elderly can be better evaluated by their after tax and post social transfers over gross income.

Equivalence of scale accounts for the number of household members and economies of scale and is applied to make a distinction between adult members versus children present in the household. Equivalence takes into account the number of adults, the number of young children, the age of the oldest child, and the age of the person in the household who earns the largest part of the income in the household. By considering income adjusted to equivalence factor instead of total household income, it is possible to automatically correct for changes in household composition from one year to another.

Statistics Netherlands calculated an equivalence factor that accounts for one person household, equivalence factor is 1. If one more individual who is over 18 years old is

added to the household, the equivalence of scale equals only 0.38. For each child under 18 years the factor lies between 0.15 and 0.30, depending on age and birth order.

In this research standardized income is deflated to CPI (consumer price index), taking year 2009 as the base year. The consumer price index takes into consideration the changes in price of packaged goods and services that are consumed by Dutch households on average, adjusted to fiscal inflation. The package of goods and services consists of food, durable goods, utility costs and costs of a number of government services. CPI also includes tax on motor vehicles and municipal tax. Obligatory basic health care insurance premiums are not part of CPI, however, supplementary insurance such as dental or liability insurance is accounted for in CPI

3.2. Data

By taking advantage of administrative panel data which was provided by Statistics Netherlands for the period of 2000-2009, we aimed to explore the consequences of retirement on income of the Dutch households. The data that is used for this paper is obtained from Dutch Income Panel survey (Inkomens Panel Onderzoek).

Individuals in sample data which are called “key persons” were followed through time. In order to cover all the groups of the Dutch population, individuals who enter the Netherlands are also included. There is no exit route for individuals out of the sample data other than emigration or death. IPO includes data on demographic characteristics and income position of members of households in sample data. I corrected for households with negative income and households without income. I have excluded household with missing income and only key persons who live in private households are included.

In order to make sure that the same individuals are followed over time, I selected the key persons who remain as an "active key person". The number of observations is 49529 per year. The total number of observations for "retirement" added up to 7134. In other words, 7134 key persons retired during the period of 2000-2009. Table 1 presents the changes of different household characteristics over time. Age, gender and marital status reflect the characteristics of key persons in the household who retired through the period of 2000-2009. Table 2 summarizes data on income of retirees and non-retired adult and active key persons in the sample. It contains figures on the mean, standard deviation from the mean, bottom and top percentile of standardized household income of retirees and non-retired adult and workers.

variable		2001		2002		2003		2004		2005		2006		2007		2008		2009	
		Retired	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired	Not Retired
Gender	Men	346	25246	326	24899	369	24919	408	24876	433	24838	457	24813	389	24856	429	24816	422	24822
	Women	345	23592	341	23963	400	23841	387	23858	422	23836	505	23754	355	23929	376	23908	424	23861
	Total	691	48838	667	48862	769	48760	795	48734	855	48674	962	48567	744	48785	805	48724	846	48683
Marital Status	Married	630	30789	625	31309	701	31641	738	31954	791	32185	888	32364	692	32792	736	33017	758	33141
	Unmarried	61	18049	42	17553	68	17119	57	16780	64	16489	74	16203	52	15993	69	15707	88	15542
	Total	691	48838	667	48862	769	48760	795	48734	855	48674	962	48567	744	48785	805	48724	846	48683
Age Groups	55-60	276	3269	275	3691	336	4121	295	4415	355	4508	399	4580	224	4510	200	4357	222	4269
	61-65	275	2322	259	2520	305	2600	334	2778	334	2946	395	3055	370	3498	411	3926	423	4188
	66-70	106	1600	103	1782	101	1929	123	2103	123	2273	125	2472	113	2666	132	2773	147	2965
	71-75	24	1011	20	1166	18	1335	22	1424	22	1563	24	1682	29	1856	44	1986	37	2189
	76-80	7	394	7	468	5	595	11	724	11	875	14	1021	6	1180	12	1341	12	1434
	81-85	3	61	3	111	3	156	9	221	9	313	4	397	1	474	6	594	5	730
	86-95	0	10	0	14	1	22	1	32	1	48	1	72	1	125	0	178	0	258

Tabel 1: descriptive data on key persons who experienced the transition to retirement in comparison to other individuals in the sample data. **Source:** IPO, from own computation.

Mean	2001	2002	2003	2004	2005	2006	2007	2008	2009
Retirees									
Mean	22041	23235	23094	23691	24322	24786	24483	26769	25785
St.dev.	9305,9	11302	10744	13189	13481	13122	11378	14156	16758
P10	13135	13697	13755	13781	13868	14123	14517	15102	14840
P90	32210	36139	35269	36635	37354	37087	39302	42516	39152
N	691	667	769	795	855	962	744	805	846
Active Population									
Mean	24440	24409	24111	24473	24528	25280	27113	26858	26983
St.dev.	14216	13455	12876	13583	13691	14100	18728	14879	14680
P10	13667	13845	13714	13889	14033	14603	15090	15300	15364
P90	36678	36453	36137	36500	36786	37729	40089	40098	40326
N	48838	48862	48760	48734	48674	48567	48785	48724	48683

Table 2: Descriptive equivalised household income, for key persons who retired in the period of 2000-2009 compared to the rest of population. **Source:** IPO, from own computation. In this paper income is always inflated/deflated to 2009 euro's.

4. Institutions in the Netherlands

To understand and investigate the retirement income trends and to quantify the importance of the different retirement income components, it is worthwhile to give a brief overview of the Dutch pension system. The Dutch pension system was established based on a three pillars system: 1) a public old age pension that is paid to all Dutch residents aged 65 years and older, 2) an occupational pension, and 3) voluntary private pension plans. The public old age pension, (AOW) is a "pay-as-you-go" system. This system, financed by income taxes collected by government and by current contributions from tax on income of Dutch tax payers, is used to finance the current payments to the Dutch elderly.

Occupational or firm pensions are "defined-benefit" pension plans and act as the second pillar of the pension system. Participation in these pension plans is obligatory for Dutch employees by law and it aims to guarantee that individuals save enough for their retirement. The third pillar is based on voluntarily participation and is generally offered by private insurance companies. Retirement before the statutory age (65) is only possible through second and third pillar pension plans, as AOW cannot be collected until that age.

Van Duijn,Lindeboom, Lundborg, and Mastrogiacomo (2009) reported that almost 77% of Dutch workers, for whom participation in defined benefit schemes is mandatory, second pillar pension income is based on life-time average earnings. For 10% of these workers, second pillar pension income is calculated based on the final salary and for the rest of the participants occupational pension income is calculated based on a mixture of final salary and earning history.

Conditions of early retirement plans through the second pillar are generally settled between the labour unions and employers. For the public sector pension, both employers and employees contribute. The exit route from the labour market by early retirement has become more difficult since 2006. Until 2006, early retirement was supported by the government through preferential tax treatment. In 2006, reform in the Dutch pension system led to abolishment of governmental tax treatments of early retirement for all employees born in 1950 or afterwards. The new system still permits early retirement before the age of 65. Dutch pension funds allow for retirement before the statutory age at age 63, however, the pension benefit is adjusted to about 70% of the average wage at age 63.

I took into consideration the different transfer funds from the government and insurance. Income composition of Dutch households mainly consists of labour income, capital income, income from insurance and pension benefits and social security transfers. Capital income includes income from financial assets and property. Insurance benefits include benefits from all kinds of insurance such as unemployment or disability insurance. It also covers the benefits paid to individuals such as the state pension and income designated to widows younger than 65 (ANW). Widows become entitled to state pension (AOW) when they turn 65. Income from occupational pension is also included as income from insurance benefits which is sub-grouped as insurance benefits based on the CBS definition. The income component from social security transfer includes funds transferred from government as social security income which is paid to households below the poverty threshold. I include each income component individually. In the empirical section I included widowhood benefits as social security transfers. In the Netherlands, the third pillar is not very well developed. This is due to the fact that the second pillar has extensive

provisions; therefore income from the third pillar is not included separately. However, income from capital includes income from financial assets.

5. Descriptive analysis

This section is devoted to descriptive analysis of income position, income changes and income components of key persons who retired between years 2000-2009. By referring to income changes, I address standardized household income that is adjusted to CPI taking year 2009 as base year for adjustment.

Figure 1 represents the average age at retirement for men and women for the period of 2001-2009. The vertical axis corresponds to the average age that individuals retired in this panel and the horizontal axis shows year in which transition to retirement took place. There is an increasing trend in retirement age for both genders and there is a parallel movement, most significantly for females. This also means that women continued to work longer on average in comparisons to the trends in the past. This difference in age of retirement between men and women can be explained by the fact that a significant fraction of households consist of married couples which have a working head and a non-working partner. When the principal bread winner retires, partners tend to show higher transition rates out of work to retirement and on average women are younger than their partners (Mastrogiacomo, Alessie and Lindeboom, 2004).

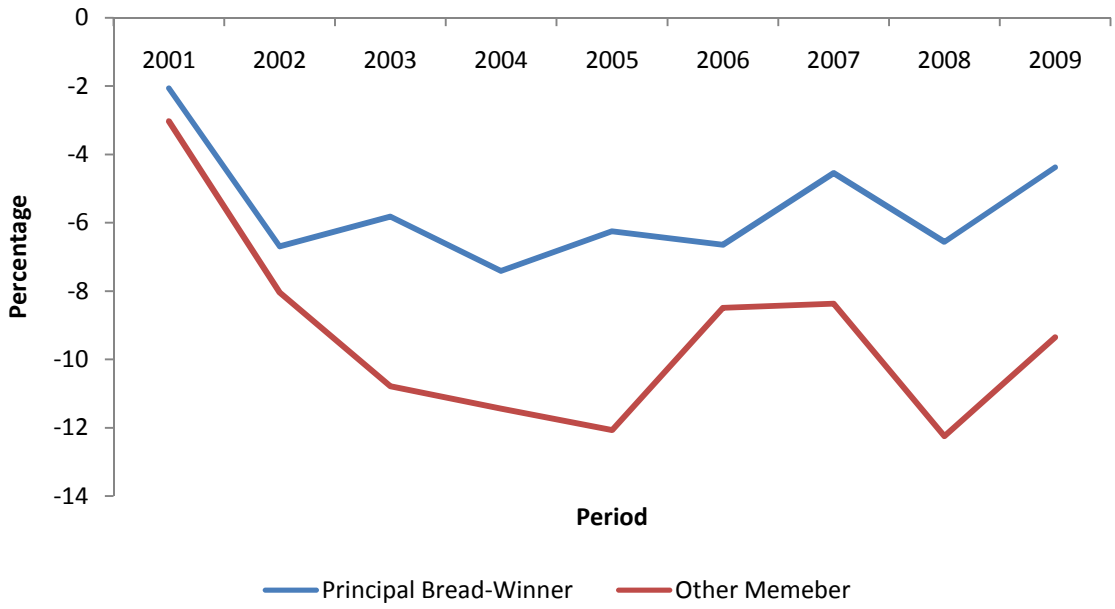

Figure 1: Average age at retirement for men and women for the period of 2001-2009

Figure 2 illustrates the income changes after retirement for men and women. The graph sets out income as a function of years in which retirement for key persons in the sample data took place. A preliminary cross-sectional comparison shows that there is a decreasing trend in income after retirement which is similar for both genders. Whether there is a difference between effects of retirement on women's versus men's income will be further investigated by the empirical model. As mentioned earlier, female labour participation has increased substantially. Euwals, Knoef, and Van Vuuren (2007) found that growth in female labor participation was due to changes in trends of combining paid work and children. They suggested that for future generations in the Netherlands, increases in the number of female workers will also lead to a higher number of two earner couples who both are entitled to occupational pension income and this trend will change the income distribution of retirees in future.

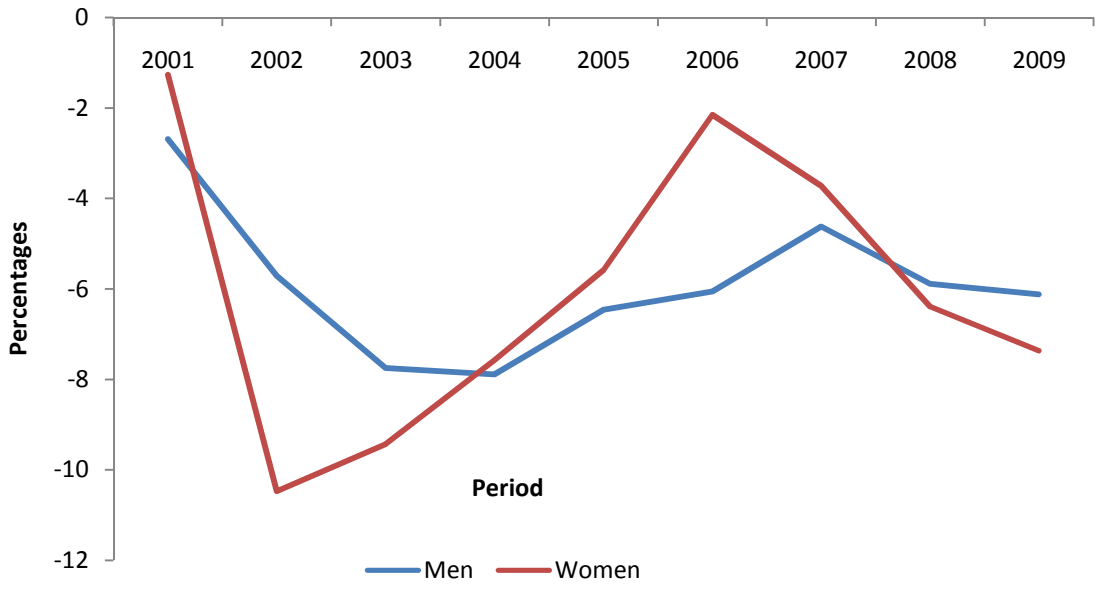

Figure 2: Income changes after retirement for men and women in the period 2001-2009.

Trends of income changes after retirement are not homogenous among retirees with a different marital status. On average, income decreases after retirement, however, due to social security provisions and allowances, some may face an increase in their income due to retirement. Figure 3 and Figure 4 represent the changes in income for two genders based on their marital status.

Figure 3: Income changes in percentages for female retirees categorized based on marital status.

Figure 4: Income changes in percentages for male retirees categorized based on marital status.

The effect of retirement on income may differ depending on whether the key person who retires is the principal bread winner or not. Figure 5 illustrates the changes in standardised household income for households based on the status of the earners. Earners are categorized to "principal bread winner" and "other household members". One may assume that changes in income for households where the principal bread winner retires should be more significant. It can be seen that indeed the decrease in income after retirement for main bread winners are on average higher. However, there is a similar decreasing pattern in income due to retirement when any member of the household enters retirement. The vertical axis in the following graph presents the changes in income in percentages due to retirement and horizontal corresponds to the period in which retirement occurred.

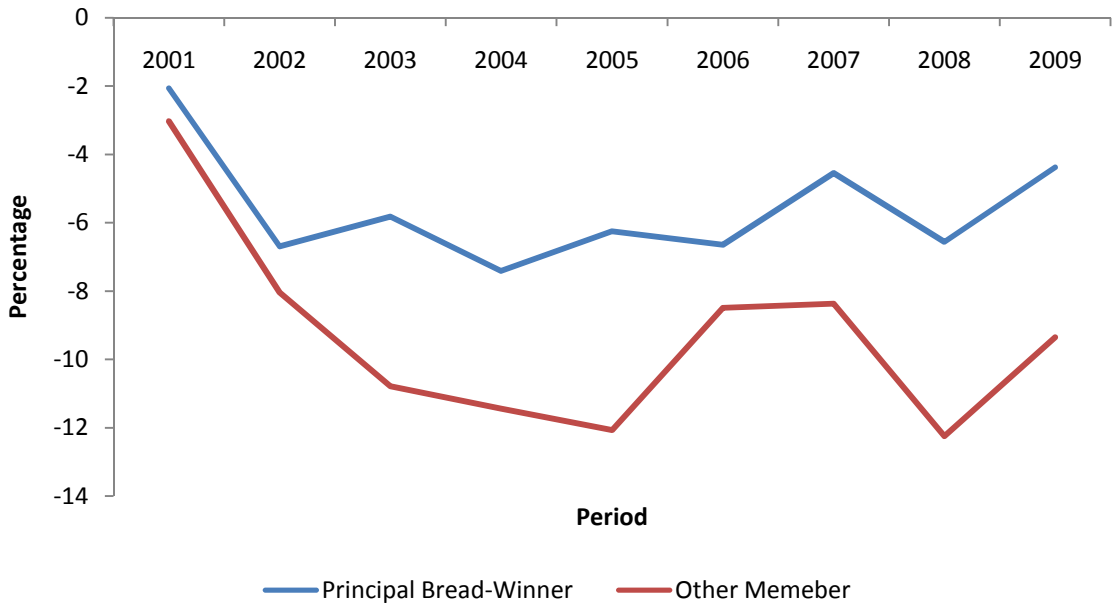

Figure 5: Income changes after retirement in percentages for Principal bread winner and other members.

The distribution of income varies across populations and also changes over time. Studies such as Disney and Whitehouse (2001) measured inequality among the elderly by examining the proportion of retirees who are in the bottom percentile. The aim of comparisons of this kind is to grasp an idea of the living standards of the retirees and elderly compared to the national average. In this paper "replacement rate" is defined as the ratio of income of retired individuals to income of the rest of the population. This definition of replacement rate does not address the individual replacement rates which are calculated against the income before retirement income of each individual pensioner. Therefore, replacement of 100% would suggest that retirees enjoy the same living standards as the rest of the population.

Figure 6 shows the ratio of standardised household income for key persons who retired each year to the standardised household income of the non-retired adults and workers of the population. The Vertical axis addresses the replacement rate in percentage terms and

the horizontal axis refers to the years at retirement. Retirees approximately have a replacement rate of almost 95% in the Netherlands. This can be interpreted as the retirees in the Netherlands enjoying on average 95% of living standards of the rest of the population.

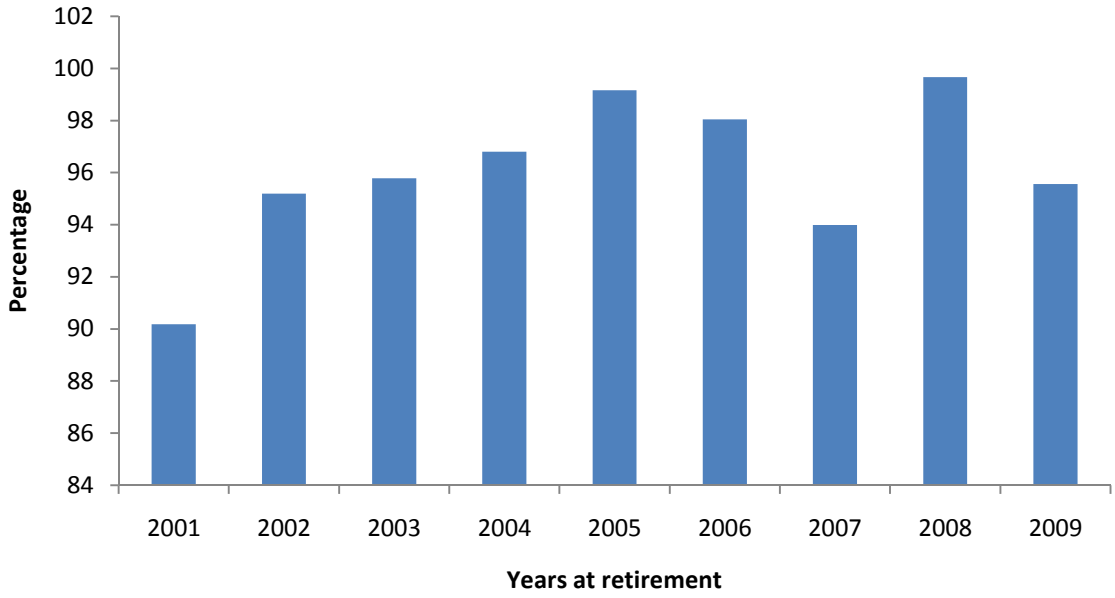

Figure 6: Ratio of mean income of retirees to the mean income of non-retired adults and workers.

As mentioned previously, the definition of retirement here relies on transition from any source of income to pension income, better capturing the notion of retirement. Figure 7 illustrates the standardized household income position of the individuals who retired above age 55 relative to the income position of individuals in age group of 50-55.This is simplistic method to illustrate cohort effect on income and investigate the effect of retirement on different cohorts. On the horizontal axis the years at retirement are given, on the vertical axis the income ratios of the different age groups to base age group of 50-55 are given in percentage terms. It can be seen that income is not evenly distributed. The retirees in age group 55-60 have the same income level of the base group. However, standardized income of pensioners' households with heads over age 60 is approximately 85% of the base group. Mean income for age groups older than 70 is the lowest in

comparison to the base group. Pensioners' income tends to decrease with age. This can be due to the comprehensive earnings replacement. Therefore, this decline in replacement rate for older pensioners can be due to the cohort effect. In the Netherlands, when individuals reach the pension age, their occupational pension benefits are settled based on their past earnings, which will be higher for younger cohorts. Currently, pension schemes in the Netherlands index the benefits to the prices rather than the wages and wages increase by a higher rate than the prices. This leads to increases in pension entitlement of younger retirees in comparison to the older retirees.

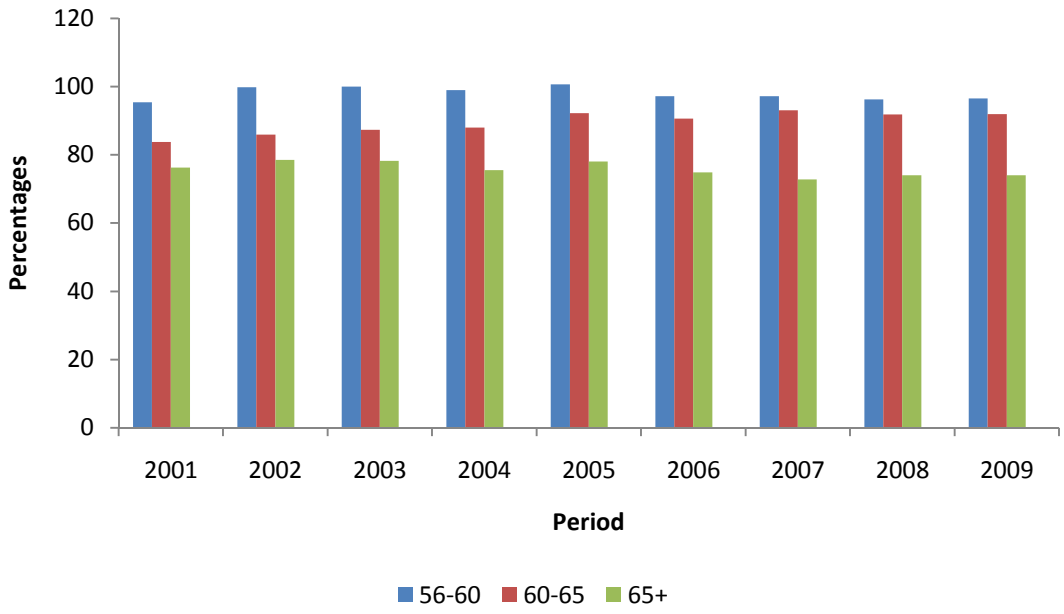

Figure 7: Ratio of standardized household income of retirees in three age categories compared to non- retired adults and workers in age group 50-55.

Figure 7 represents a rather basic measure of income inequality among retirees and non-retired adults and workers in the Netherlands. This simple measure is composed of the ratio of 90th percentile of income distribution to the 10th percentile. In the following figure, on the horizontal axis the years at retirement are given and on the vertical axis, the 90/10 income ratios of retirees and non-retired adults is presented. For the households with key

persons who retired, income inequality increased by 8%. In contrary to key persons who retired during the period of the panel, 90/10 ratio remained somewhat stable for the non-retired adults and workers in the population. The increase in 90/10 ratio refers to an increase in the dispersion in income distribution and a rise in income inequality within the distribution of income across the population of retirees. This finding is in accordance with projected rise in inequality by Knoef, Allessie and Kalwij (2009).

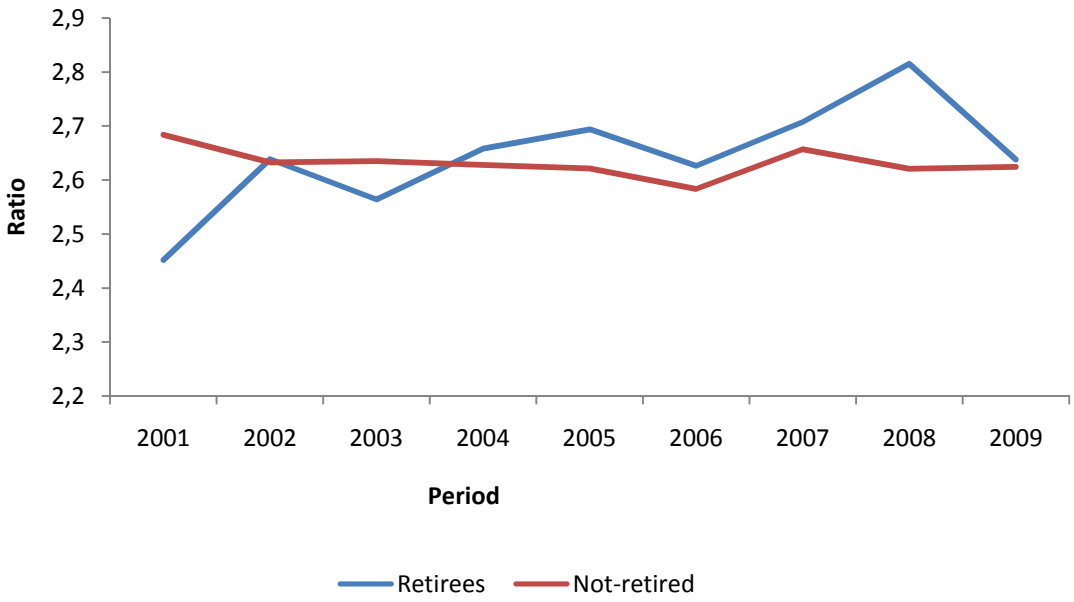

Figure 8: Pensioner income inequality which constitutes to the ratio of 90th percentile of pension income to the10th percentile.

It is important to observe to what extent the income of the elderly changes after retirement and whether this change in income differs among the key persons in different retirement income distributions. The following figure represents the changes of income in percentage terms after retirement, for the mean, median, top and bottom percentile of income distributions for different age groups of retirees. The vertical axis corresponds to changes

in income for retired key persons in top and bottom income percentiles and in addition to that, the vertical axis presents the average and median income changes at different ages of retirement. The horizontal axis shows age at retirement of the retired key persons. The pattern in income variance after retirement is stable for key person who retire in their late 50's and in their early 60's before the statutory retirement age of 65 in any income percentile. However, as individuals become older and postpone retirement, changes in income become more drastically negative. Income after retirement decrease at a higher rate for individuals in the lowest percentile of income distribution and it decreases even more for individuals in low percentiles as they retire later than the age of 65. In contrast, decreases in income for the highest income percentile on average are less significant after retirement but remain rather stable after the age of 69. One must keep in mind the findings suggested here are not very conclusive in explaining the effect of timing of retirement on income changes after retirement.

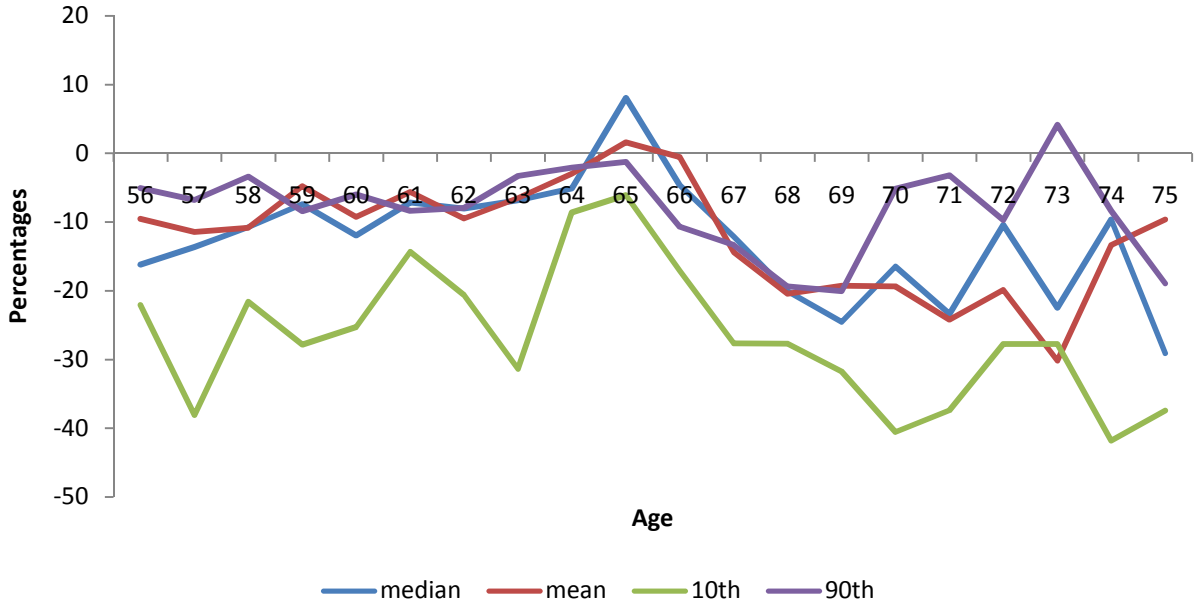

Figure 9: Income changes for retirees in lowest, median and highest percentile in income distribution in addition to mean and median income changes as function of age at retirement.

Figure 9 shows the income changes for individuals in the top and bottom income deciles in addition to median and mean values. The vertical axis shows the difference in income in terms of percentages, between the pre-retirement income and retirement income. The horizontal axis represents year at retirement. Decrease in income is the most severe for the poorest of pensioners who are placed in the bottom deciles. Retirees, who were in the top income deciles prior to their retirement, experienced a slight increase in their income.

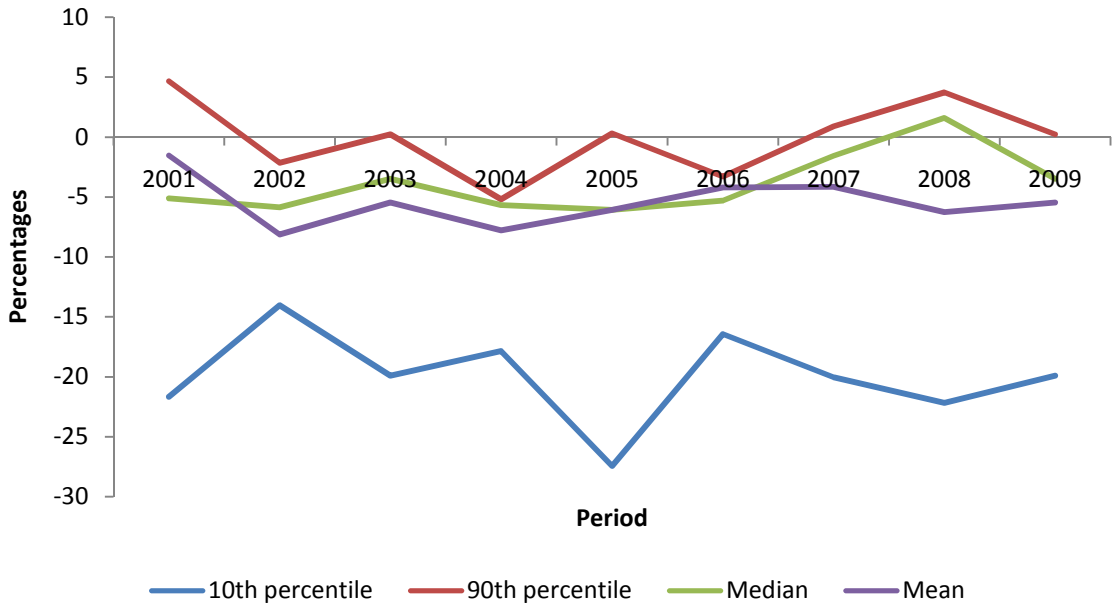

Figure 10: Income changes for retirees in lowest, median and highest income percentile in addition to mean income changes as function of year at retirement.

Trends in income composition of retirees were previously investigated for the Dutch population. De Vos (2007) found that for the period between 1994 and 2003, the share of social security pension (AOW) decreased in comparison to the occupational pension. He argues that this change in income pattern for individuals entering retirement is due to the fact that in the 1990's the state pension was not indexed to inflation. In contrast, occupational pension was adjusted to wage inflation. Figure 8 illustrates the income

component for retirees. This figure is in accordance with findings of De Vos (2007). The share of state pension and occupational pension as a percentage of overall retirement income is more significant than the other income elements. The authors found that since 2004, fewer households relied on social security transfer in comparison to number of household being covered by social security 1989. For the age group older than 65, the state pension (AOW) and occupational pension is the most significant source of income. The income component of the retirees before the retirement is more or less similar to the rest of the population. Composition of retirement income remains somewhat stable throughout the period of this study between 2000 and 2009. Noting this stability, I can apply findings of Knoef, Allessie and Kalwij (2009) to analyse the relationship between income changes and income recourses prior to retirement. This comparison is possible due to that the very same panel data IPO has been applied.

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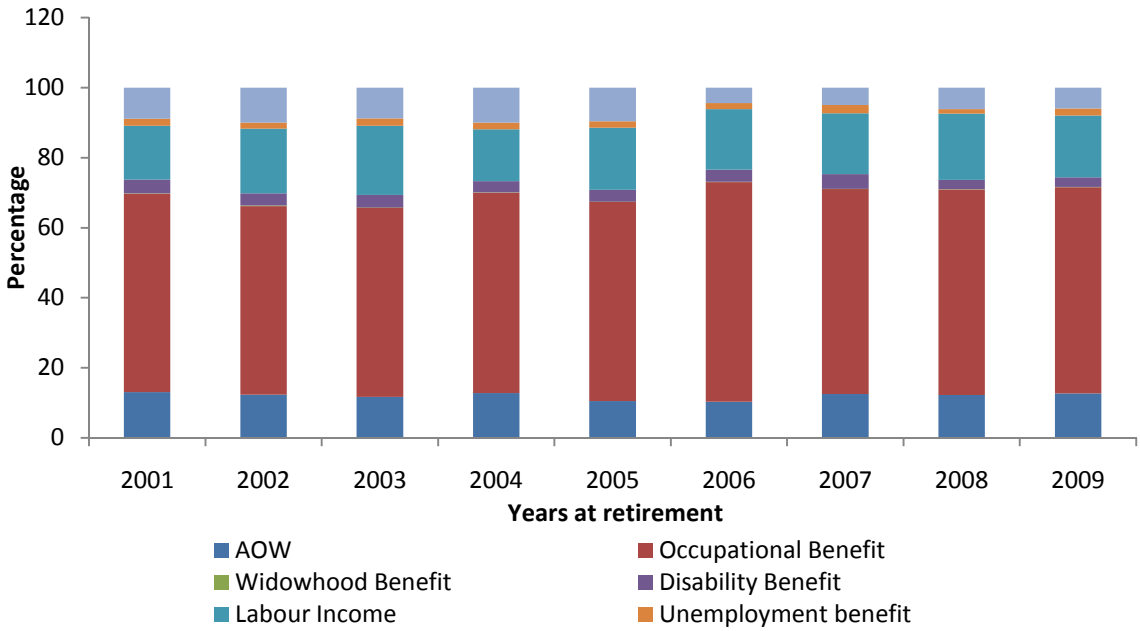

Figure 11: Income components after retirement for individuals retired.

6. Empirical Analysis

6.1. Empirical Method

This section on descriptive analysis suggested that income changes after retirement differ among the retirees and that these changes do not follow a homogenous pattern. In order to distinguish between different factors contributing to income changes for individuals who retire, I apply the fixed effect model. This model allows to control for any existing unobserved heterogeneities. For example, education is a very important factor that affects the income of an individual. Higher educated individuals generally have a higher income and as a result higher retirement income; with fixed effect analysis this problem can be solved. This section will first outline the econometric specification of the fixed effect model and will end by presenting the results for effects of retirement on different sub-groups.

There are two fixed effect approaches that are generally used for the panel data analysis. The first approach is the within transformation or within group fixed effect approach and the second approach is described as the first-difference method. In both methods, the model is manipulated in such a way that unobserved heterogeneity is eliminated. Most of the standard fixed effect models allow for time-varying covariates that are correlated with unobserved heterogeneity (Wooldridge, 2009).

There is an important extension to the standard fixed effect model with the additive unobserved method that is called the random trend model (Heckman and Hotz, 1989).Wooldridge (2005) suggested that the random trend model can be addressed as a special case of usual unobserved effect model that can be estimated by fixed effects. Based

on this model, fixed effect estimators eliminate the individual-specific trends in income as well as the level effects that may be due to lump sum transfers prior to retirement.

Based on Wooldridge (2005), the random trend fixed effect (OLS) model can be estimated in two steps. The first step is to eliminate the so called additive effect with first differencing which is constant over time and in the second step is to eliminate the random trend that is individual-specific by demeaning via the fixed effect within the transformation method. Due to the presence of serial correlation, first differencing is more attractive and by applying within transformation the model will meet the conditions for consistency. By doing so, problems with consistency and serial correlation are dealt with.

In summary, I account for unobserved heterogeneity by using balanced panel data in addition to applying the fixed effect model to estimate the effect of retirement on household income, once the individual in the sample switches to retirement. Furthermore, I would like to study how the income changes after retirement due to differences in marital status, gender, and income resources. Individual-specific unobservable s may change over time. In the case of this study, unobserved effect can be due to income shocks as a result of inheritance that leads to income mobility, for instance.

Intitally it is needed to check for joint significance of variables via pooled OLS regression. To prepare the proper panel data for pooled OLS regression, I included all observations for households with income. In this panel data each key person over the years is treated as an independent observation ignoring the time period each observation belongs to. I created a dummy variable that distinguishes between retired and the rest of the population. Age and period effect are controlled for by means of dummy variables.

Kalmijn and Alessie (2008) differentiated between stage and age effect in the sense that demographic events have an effect on income. They suggested that one must control for age effect in order to avoid overestimation of the stage effect. Age and period effect are difficult to disentangel. This is due to the fact that calender time is equal to the birth year added to age. To avoid the dummy variable trap which causes perfect collinearity, I included age dummies and year dummies but excluded two of the year dummies for year 2000 and 2009. To control for calender year effect which consitutes for changes in income due to macroeconomic conditions and business cycles, income is adjusted to CPI, taking year 2009 as the base year.

I included different group dummies which are the same as pooled regression to control for average differences in observation across the panel, in any observable and unobservable predictors, such as differences in effect of socio-economic status that can be captured by including income resources.

Secondly, I included marital status and gender of the key person. If this variable proves to be statistically significant in the pooled model, there may be a signficant difference in changes of income for observations with male and female key persons in the fixed effect model. The final step will be to control for differences in household composition and sources of income prior to retirement. I can control for the number of earners in the household or whether the individual who retired was the principal bread winner. Only variables that proved to be jointly significant through the F-test were included in the fixed effect model.

In this fixed effects approach, by applying the first-differences method, the unobserved effect is eliminated by subtracting the observation for the previous time period from the observation for the current time period, for all time periods. Equation (1) illustrates the income equation in natural logarithm, where Y_{it} denotes the natural logarithm of standardized household income in period *t*, α_i denotes individual-specific variable and δ is an individual time trend variable. Explanatory variable X_{jit} refers to the characteristics of the household or gender of the key persons. These variables are defined as dummy variables, e.g. gender dummy equals zero for men and equals one for women. As mentioned earlier, year and age dummies are also included in the pooled model and will also be included in the fixed effect model.

$$Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta X_{jit} + \alpha_i + \delta t + \varepsilon_{it} \quad (1)$$

$$Y_{it-1} = \beta_1 + \sum_{j=2}^{k} \beta X_{jit-1} + \alpha_i + \delta(t-1) + \varepsilon_{it-1} \quad (2)$$

By subtracting equation (2) from the first, we can see that the unobserved heterogeneity α_i has disappeared and we arrive to equation (3).

$$Y_{it} - Y_{it-1} = \sum_{j=2}^{k} \beta (X_{jit} - X_{jit-1}) + \delta + \varepsilon_{it-1} \quad (3)$$

$$\Delta Y_{it} = \sum_{j=2}^{k} \beta \Delta X_{jit} + \delta + \varepsilon_{it} - \varepsilon_{it-1} \quad (4)$$

Equation (4) can be rewritten as :

$$Y_{it}^{*} = \sum_{j=2}^{k} \beta X_{jit}^{*} + \delta^{*} + \varepsilon_{it}^{*} \qquad t=1,....,9 \quad (5)$$

In other words, ΔY_{it} is estimated by accounting for the difference in log income between periods of ***t*** and ***t-1***, noting that retirement occurred at time ***t***. ΔY_{it} also constitutes for the difference between income on fiscal year before retirement and one year after the retirement to control for lump sum or other transfers that would decrease the magnitude of

the changes in income due to transition to retirement. By doing so, the real effect of retirement can be accounted for; however, the model loses the retirement events for year 2009.

As mentioned in section for literature review, Knoef, Allessie and Kalwij (2009) found that importance of labour income for elderly increases with as percentile in income distribution increases and that presence of different transfers are visible in lower income percentiles. Therefore, by including income resources, it is possible to also conclude whether income of individuals who are at risk of poverty will decline even to a lower level.

By demeaning equation (5), in a similar fashion to the process of the standard within transformation fixed effect method, it is possible to eliminate the individual specific in addition to level effects.

This can be illustrated through the following equation which will estimate the effect of retirement on income in household level, once the key person retired.

$$Y_{it}{}^{*} - \ddot{Y}_{it}{}^{*} = \sum_{j=2}^{k} \beta X_{jit}{}^{*} - \ddot{X}^{*}{}_{jit} \quad + \varepsilon^{*} - \ddot{\varepsilon}_{it}{}^{*} \qquad (5)$$

In the equation above, $\ddot{Y}_{it}{}^{*}$ stands for the mean value of changes being subtracted from the differenced value of $Y_{it}{}^{*}$ and the very same applied to explanatory variables. In other words, after first differencing the income values for individuals in the panel, the changes' mean value is substracted to remove the individual specific trends that initially were not eliminated by first differencing.

This model estimates the change in income that individuals experience after transition to retirement, and compares these observations to those who did not experience this transition. One of the minor complications of working with IPO rises from the fact that records on income are collected on a fiscal basis, however, one individual may retire in the middle of the year. Therefore, his/her status will be changed in the following year. In order to overcome this problem, I distinguished between the income of the transition year and the year after. As a result, a change in income, which is the dependent variable, equals the difference in income between one year before retirement and one year after retirement.

One question may be posed as why age at retirement is not included instead of soley controling for age. While only keeping age at retirement in the model, the age at retirement dummies were not jointly significant. This could imply that it was not possible to dinstinguish whether, incpome decline is due to age effect or due to retirement. Therefore, findings of descriptive analysis deem t overestimate the age at retirement effect which can be also attributed to age effect rather than soley to timing of retirement.

6.2. Empirical Results

First I solely included the year dummy, age dummy and retirement variable to present the general fixed effect model.Table 3 represents the fixed effect estimates. The effect of retirement on income is on average 4.8 %, ignoring any individual differences. Income changes also vary with age and on annual basis. However, as described in the descriptive analysis section, income changes after retirement did not differ significantly through years. It is worth mentioning again that the period effect is controlled for via year dummies and group age dummies.

Estimators	Estimate	Std. Error
Year2001	-4.995***	(0.013)
Year2002	-5.006***	(0.012)
Year2003	-5.021***	(0.012)
Year2004	-5.036***	(0.012)
Year2005	-5.052***	(0.012)
Year2006	-5.070***	(0.012
Year2007	-5.086***	(0.012)
Year2008	-5.105***	(0.012)
age 17_26	-0.485***	(0.013)
age 27_36	0.099***	(0.012)
age 37_46	-0.247***	(0.010)
age 47_56	-0.293***	(0.010)
age 57_66	-0.502***	(0.011)
age 67_76	-0.654***	(0.014)
age 77_86	-1.138***	(0.024)
age 87_97	-1.949***	(0.099)
age 97_103	-2.839	(0.795)
Retirement	-0.048***	(0.007)

Table 3: This table shows the estimated coefficient with the standard error between brackets. * significant at a 0.10 level, ** significant at a 0.05 level, *** significant at a 0.01 level.

Table 4 presents all the variables that were jointly significant in the pooled OLS and were included in the fixed effect analysis. The effect of retirement is not conditional on gender. On average the effect of retirement on women and men is not significantly different.

Married key persons experience less changes in income in comparison to unmarried key persons. Individuals who are included as unmarried can be both divorced andwidowed as well as single. I did not differentiate between widowhood or individuals being divorced for the sake of limitation in the number of observations for each conditional group. However, less significant changes in income for households with married key persons can be attributed to the fact that there is a higher chance that a married household contains two earners, noting that the size of the married population is larger than that of the unmarried population. The income of unmarried retirees decreases at a higher rate compared to married key persons.

Income resources prior to retirement seem to have a remarkably large influence on retirement-induced changes in income. Retirees whose main source of income was earnings from labour experience a high rate of decline in income Theestimated effect of retirement on income for those individuals is approximately 8.3% which is statistically significant at 5% level.

As suggested in the literature review, the source of income prior to retirement is an important factor that contributes to post-retirement changes in income. Key persons, with labour income as their main source of income, experienced the most significant drop in their income as a result of retirement. Those who relied on labour income prior to retirement experienced an income decline of about 8.3%, post-retirement. Income changes for those who relied on capital income did not change significantly upon transition to retirement. Transition to retirement leads to a decrease in income of 4.9% for key persons who were covered by disability insurance as their main income source before retirement. For those key persons who were unemployed prior to retirement and were covered by unemployment benefit, the effect of retirement on income was estimate to be 4%. Surprisingly, income for those who relied on social security transfers such as social security benefits increase as the key person enters retirement. This might be due to state pension starting at the age of 65 and depends on the numbers of the years the individual has resided in the Netherlands.

Retirement for key persons who are the sole earner in the household, leads to a higher drop in income relative to households with two earners. Income is estimated to reduce by 2.3% for these households.

The consequence of retirement on income for households with two earners, once the key person from that household retires (ignoring whether he was the main principal bread winner), is estimated to be 1.1%. For households with two earners, in a situation that the key person is the principal bread winner, retirement does not experience statistically different income changes in comparison to a situation where the non-principal earner retires.

The effect of retirement on income for households with no earner was associated with a 2.7% decline in income. Households with no-earners can be classified as households that mostly rely on governmental transfers such as social security. However, as mentioned earlier, income for those who are dependent on social security transfers as a source of income prior to retirement increased. This can be considered to be at odds with findings related to households categorized based on the number of earners in the household. However, one may keep in mind that individuals still can be entitled to governmental social security transfers and have entitlements to other pensions and by reaching retirement age, they can access their pension reserves and state pension.

Estimators	Estimate	Std. Error
Gender		
Women	-0.045***	0.006
Men	-0.051***	0.007
Marital Status		
Married	-0.003	0.002
Unmarried	-0.014***	0.001
Income resources		
Capital Income	-0.001	0.009
Labour Income	-0.083***	0.001
Disability Benefit	-0.049***	0.005
Unemoloyment Benefit	-0.040***	0.007
Social security transfers	0.013***	0.001
Number of Earners		
one earners	-0.023***	0.001
two earners	-0.011**	0.006
No earners	-0.027***	0.001
main bread winner	-0.002	0.007

Table 4: Fixed effects estimates and interaction terms. Table above represents the estimated coefficient and their standard errors (between brackets) of the effect of retirement for each sub-group. * Significant at a 0.10 level, ** significant at a 0.05 level, *** significant at a 0.01 level.

7. Conclusion

This paper aimed to quantify changes in income at the household level as a result of retirement. Retiring in a certain year does not contribute to the magnitude of retirement effect for key persons who retire later. Patterns in income composition remained somewhat stable. Occupational pensions have become a more important income component.It was noted that increasing occupational pensions can convey improvement in income prospects of elderly, noting that the probability of elderly relying on social trasnfers declines.

In general, retirement for different genders does not imply different effect on income. This can be due to an increasing trend in female labour participation. Another explanation could be

that a larger number of individuals are occupational pension participants and in case of loss of partner, the surviving partner is still entitled to the pension rights of the deceased spouse. This notion can partially explain the lack of significant difference between men and women after retirement in terms of retirement-induced changes in income.

Based on the findings of the emperical analysis, the consequences of retirement on household income is significantly influenced by the key person's marital status. Indeed, unmarried individuals were estimated to be worse off upon retirement.

The effect of retirement was more evident from cross sectional analysis for key persons in the lower income percentile. This brings up policy concerns, such aswhether with the present trend of an aging population, larger number of retirees are at risk of falling into poverty. However, the empirical analysis pointed out that those who rely on labour earnings face the highest income drop as a result of retirement in comparison to those who rely on government assistance. This can be interpreted as effectiveness of govermental policies aimed at assuring a sufficient level of income and living standards for individuals upon their transition to retirement.

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