Giving with a warm hand: evidence on estate planning and Inter-Vivos transfers

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Giving with a warm hand

SUMMARY

In this study, we examine the importance of estate planning and inter-vivos transfers towards the end of life. To that end, we use administrative data on all deaths taking place in the Netherlands between 2006 and 2013. We link these to wealth and income tax records and the hospital discharge register. Employing these unique data, we distinguish between sudden and non-sudden deaths and study how they compare in terms of wealth at death. Our results show that non-sudden deaths are associated with significantly less financial wealth at the time of death. We interpret this difference as the result of inter-vivos transfers that result from estate planning towards the end of life. We find significant effects not only at the top of the wealth distribution but along the entire upper half of the distribution. Diseases with a relatively low survival rate that do not affect cognitive abilities appear as the most likely to trigger estate planning. These results have important implication for gift and inheritance tax schedules that allow for tax avoidance via exemptions and the progressivity of the tax rate.

Keywords: Saving, Inter-vivos Transfers, Estate Planning, Sudden Deaths
JEL codes: D10, D14, D15, D31

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1. INTRODUCTION

Current demographic trends in Western countries have sparked a widespread policy debate concerning the reform of pension systems and other social programmes designed to support older individuals. Within this context, it is crucial to study individual preferences regarding the use of wealth towards the end of life. This subject has been

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the focus of a large body of economic literature that explores the evolution of wealth and consumption during retirement. A relevant and recurrent finding is that older individuals, especially those with high lifetime incomes, often appear to decumulate their wealth less than the stripped-down version of the life-cycle model predicts.[1]

The literature has proposed three main explanations for this stylized fact: precautionary saving due to longevity risk (De Nardi *et al.*, 2009; Post and Hanewald, 2013), precautionary saving due to uncertain out-of-pocket medical expenditures (Coile and Milligan, 2009; De Nardi *et al.*, 2010) and saving for inter-vivos wealth transfers and bequests (Kopczuk and Lupton, 2007; McGarry, 2013). In the present study, we contribute to this literature by empirically studying preferences for estate planning and inter-vivos transfers towards the end of life. This particular issue is even more relevant in the current context of increasing prevalence and importance of intergenerational transfers (Piketty and Zucman, 2015; Palomino *et al.*, 2022).

Our empirical strategy consists of comparing wealth at the end of life between individuals who experience sudden and non-sudden deaths. Building on previous work by Kopczuk (2007), we hypothesize that differences in wealth at the end of life between these two groups reflect the presence of estate planning and inter-vivos transfers. This is because individuals experiencing non-sudden deaths are more likely to predict their own time of death. Therefore, conditional on a preference for estate planning and inter-vivos giving, they are more likely to engage in these activities than comparable individuals who die suddenly. Based on this argument, our hypothesis is that individuals experiencing non-sudden deaths will die with less wealth compared to similar individuals who suffer a sudden death.

To carry out this strategy and test our hypothesis, we use very rich Dutch administrative data on cause of death, hospital admissions, household income and household wealth for all individuals who died in the Netherlands between 2006 and 2013, totalling over one million observations. Importantly, we have also access to information for the children of the deceased in our data. Following Andersen and Nielsen (2010, 2016), we use a definition of sudden death based on the medical literature. This definition considers sudden deaths as those that occur instantaneously or within a few hours of an abrupt change in a person's clinical state, following a cardiovascular event, an accident or an act of violence. Using this definition, we regress household wealth at the end of life on a dummy variable indicating a non-sudden death, while controlling for age, gender, household structure and permanent income. Following our hypothesis, we expect that the non-sudden death dummy will have a negative effect on wealth at the end of life.

Our data and institutional context allow us to overcome three potential shortcomings of this strategy. First, it may be that individuals who do not experience a sudden death

1 The stripped-down version of the life-cycle model predicts that individuals will save during working life, and fully dissave during retirement. For thorough literature surveys and evidence on the evolution of wealth during retirement, see van Ooijen *et al.* (2015), De Nardi *et al.* (2016) and Suari-Andreu *et al.* (2019).

die with lower wealth due to higher medical expenditures. According with the literature, these expenditures may be especially high in the last year of life. [2] However, the Dutch institutional context prevents these expenditures from playing any major role due to widespread insurance coverage. Bakx *et al.* (2016) describe the Dutch healthcare system and show that out-of-pocket medical expenditures are very minimal in the Netherlands and are largely attributable to limited deductibles and co-payments. This is partly due to the Netherlands being one of the few countries in the world having a comprehensive public long-term care system (Eggink *et al.*, 2017).

The only study providing an estimation of out-of-pocket medical expenditures in the Netherlands during the last year of life is Penders et al. (2017). Using European survey data from 2005 to 2012, they find that 57% of individuals in the Netherlands incur above zero out-of-pocket healthcare costs in the last year of life. Within this group, the estimated median expenditure is 461 euros. As the literature indicates that individuals living in nursing homes are often those with highest out-of-pocket medical expenditures, we test the robustness of our results to their exclusion from the sample.

Second, it may be that individuals who do not experience sudden death incur higher non-medical expenditures at the end of life. Non-medical expenditures refer to costs unrelated to medical care, such as those associated with food, clothing, or holidays. However, using a representative Dutch longitudinal survey, van Ooijen *et al.* (2018) show that transitions into poor health appear to have a negative effect on non-medical expenditures.[3] These results are in line with a large strand of literature that has repeatedly shown that poor health decreases the marginal utility of non-medical consumption.[4] This suggests that, if individuals who do not suffer a sudden death experience worse health at the end of life, their wealth will tend to increase due to less consumption. If that is the case, any estimate of the presence and size of inter-vivos transfers based on our strategy will reflect a lower bound.

Third, differences in wealth at the time of death may be attributed to the differential incidence of health-related income shocks for sudden and non-sudden deaths.[5] Using the same Dutch administrative data that we employ, García-Gómez *et al.* (2013) find

2 The literature studying medical expenditures at the end of life both in the Netherlands and in other countries includes Polder *et al.* (2006), De Meijer *et al.* (2011), Wong *et al.* (2011), Kaspers *et al.* (2013), Rolden *et al.* (2014), Bakx *et al.* (2016), Hussem *et al.* (2016), French *et al.* (2017), Orlovic *et al.* (2017), Penders et al. (2017), Rice *et al.* (2018), Bakx *et al.* (2020) and French *et al.* (2021) among others.

3 Controlling for time invariant individual heterogeneity, they find that transitions into poor general health lead to a 3% reduction in non-medical expenditures. For transitions into functional disabilities and severe chronic illnesses they find a reduction of 4.9% and 7.3%, respectively.

4 Examples of relevant studies in this literature include Viscusi and Evans (1990), Finkelstein *et al.* (2009), Brown *et al.* (2013), Finkelstein *et al.* (2013), Brown *et al.* (2016), Babiarz and Yilmazer (2017), Gyrd-Hansen (2017), Meyer and Mok (2019), Blundell *et al.* (2020), Simonsen and Kjær (2021) and Rohwedder *et al.* (2022) among others.

5 This argument is true as long as health shocks translate into substantial income shocks. The Dutch disability insurance system ensures to a large extent that health shocks do not translate into sizeable income drops. For details on the Dutch disability insurance system, see García-Gómez *et al.* (2013) and Koning and Lindeboom (2015).

that unexpected hospitalizations result on average in a 5% reduction in yearly income. Even though this effect is small, it could have an influence on wealth at the end of life and potentially impact our results. Therefore, we rerun our baseline analysis excluding individuals who had at least one hospital admission before retirement.

Our results show that people who suffer a non-sudden death die with significantly less net wealth compared to individuals who suffer a sudden death. The estimated effect is −7.3% for singles and −4.5% for couples. We find stronger effects when using net financial wealth as a dependent variable, i.e. −11.6% for singles and −10.6% for couples. When we exclude individuals with hospital admissions before retirement, the results for singles are nearly unaltered, while the results for couples become statistically insignificant. This is in line with health-related income shocks playing a small but non-negligible role in explaining wealth differences at the end of life. Finding statistically insignificant results for individuals who die within a couple is in line with a preference to leave wealth to the surviving partner. That is because we do not capture any transfer between partners since we observe wealth at the household level. Importantly, in absolute terms our estimates are always between 4,500 and 12,000 euros. Thus they are unlikely to be explained by conditional median out-of-pocket medical expenditures at the end of life amounting to 461 euros, as reported by Penders et al. (2017).

Observing the entire wealth distribution allows us to test for differential effects across wealth levels using unconditional quantile regression. Our results show that the estimated effects increase in absolute terms as we move up the distribution, while relative effects decrease. This indicates that estate planning is not only limited to wealthy individuals but is a relevant phenomenon for the entire top half of the wealth distribution. Additionally, we find stronger negative effects for people who die of cancer compared to cardiovascular diseases, but non-significant effects for mental illnesses. This suggests that diseases with a low survival rate, not affecting cognitive abilities, are most likely to lead to estate planning. Given the richness of our administrative data and the adequacy of the Dutch context for our study, we argue that our results provide solid evidence on the importance of estate planning and inter-vivos transfers. The presence of these transfers indicates a general revealed preference for giving alongside other potential uses of wealth towards the end of life.

Our study contributes the literature in several ways. More specifically, we extend the work by Kopczuk (2007) who applies a similar strategy using data on wealthy US individuals (i.e. with wealth above $360K). An important data limitation of Kopczuk's study is that it only covers the top 6% of the wealth distribution. In addition, Kopczuk (2007) has no information on cause of death and is able to use only limited information on length of illness. Most importantly, the US context does not easily allow ruling out the potential role of (non-)medical expenditures in explaining wealth differences between sudden and non-sudden death. As mentioned above, the Dutch context is significantly more adequate for the application of the described strategy. Furthermore, we observe the whole wealth distribution, and we apply a refined definition of sudden death that builds on and improves the operationalisation by Andersen and Nielsen (2010, 2016).

Regarding the exact motive behind inter-vivos transfers, the literature recognises several potential motives that can trigger these transfers between households. First, these transfers may respond to pure joy of giving which could be combined with the desire to have control over how heirs spend or invest the estate (McGarry, 2013; McGarry, 2016). Second, inter-vivos transfers may also respond to an exchange whereby the receiver(s) of the transfers reciprocates by providing some type of service, such as informal care (Norton *et al.*, 2013; Alessie *et al.*, 2014). Third, individuals may transfer wealth while alive to avoid paying inheritance taxes (Kopczuk, 2010; McGarry, 2013).

Although we cannot easily disentangle the three motives as they are not mutually exclusive, it is important to note that, as we explain in Section 2 below, the Dutch gift and inheritance tax system does provide a tax advantage to those giving while alive. This means that even if transfers respond to an exchange or joy of giving, individuals might still have the incentive to maximize the size of their inheritance by avoiding taxes. Therefore, regardless of the exact motive behind the transfers, an important policy implication of this study is that a reform of the gift and inheritance tax schedule is necessary if the government wants to prevent tax avoidance and maximise revenue. For instance, a possible measure would be to increase the current look-back period of 6 months. In the Netherlands, only transfers that take place up to 6 months previous to death are considered as part of the inheritance for tax purposes. Compared to other countries, this is a very short period and extending it would give individuals less room for tax avoidance using inter-vivos transfers. Additionally, a possible measure could be to limit the number of times individuals can use the yearly tax exemptions on inter-vivos transfers.

The rest of the paper proceeds as follows. Section 2 explains the gift and inheritance tax schedule in the Netherlands. Section 3 presents our data and provides summary statistics for the most relevant variables. Section 4 describes the empirical method. Section 5 provides the results, and Section 6 concludes.

2. THE GIFT AND INHERITANCE TAX SCHEDULE IN THE NETHERLANDS

In the Netherlands, the gift and inheritance tax schedule, which was reformed in 2010, provides clear incentives for individuals to avoid taxes via inter-vivos giving. Tables 1–4 show the gift and inheritance tax schedule and the corresponding tax exemptions, both before and after the 2010 reform. This reform simplified the tax schedule and made it less progressive. For smaller estates the tax rate became higher and for larger estates the tax rate became lower. Note, however, that for most estate sizes the tax rate changes only a few percentage points. Only for the very large estates is the reduction in the tax rate relatively significant. Most importantly, Tables 1–4 show that, both before and after the 2010 reform, the tax schedule allows individuals to avoid taxes by apportioning their estate and using the yearly tax exemptions for gifts. These exemptions allow giving 5,000 euros (4,500 before 2010) to each child tax free once a year. The same exemption for recipients other than children is 2,000 euros (3,000 before 2010). In addition, there

Table 1. Gift and inheritance tax rates before 1 January 2010

Brackets (1000 €)	Partners and children (%)	Grandchildren (%)	Siblings and parents (%)	Non-relatives (%)
0–22	5	8	26	41
22–45	8	13	30	45
45–90	12	19	35	50
90–180	15	24	39	54
180–360	19	30	44	59
365–900	23	37	48	63
Above 900	27	43	53	68

Notes: Both before and after the 2010 reform, gifts are not considered as part of the inheritance as long as they take place six months before death.

Table 2. Exemptions for gift and inheritance taxes before 1 January 2010

Exemptions for gifts (in thousands of euros)	
Children	4.5
Children 18–35 years	23 (one-time)
Others	3
Exemptions for inheritances (in thousands of euros)	
Partner (married)	530
Partner (not married)	100–530, depending on length of cohabitation
Children ≥23 years	10 provided that inheritance <27
Children <23 years	4.5 per year below 23, with a minimum of 10
Handicapped children	4.5 per year below 23, with a minimum of 14; 10 if children older than 23 years
Parents	45
Grandchildren	10 provided that inheritance <10
Others	2

are extra one-time exemptions for children that go up to 50,000 euros if the gift is used for home purchase or study fees (the maximum before 2010 is 23,000 euros).

These tax exemptions for gifts enable individuals to apportion their estate and transfer several amounts over the years while still alive, allowing them to avoid paying taxes for a substantially larger share of their overall estate than permitted by the inheritance tax exemptions alone. In addition to using the tax exemptions, individuals can also target a lower bracket of the tax schedule by strategically reducing the size of their final inheritance using inter-vivos transfers. This additional way of reducing the tax burden is possible due to progressive nature of the tax schedule. Note that the tax schedule is specially progressive before the 2010 reform. Tables 1 and 3 also show that tax rates for gifts to parents, siblings, and others are substantially higher than those for children. While exemptions are smaller, there is in this cases a stronger incentive to make use of them and/or to apportion the estate into separate inter-vivos transfers to take advantage of the progressive tax structure.

Table 3. Gift and inheritance tax rates (after 1 January 2010)

Brackets (1000 €)	Partners and children (%)	Grandchildren (%)	Others (%)
0–118	10	18	30
Above 118	20	36	40

Notes: Both before and after the 2010 reform, gifts are not considered as part of the inheritance as long as they take place six months before death.

Table 4. Exemptions for gift and inheritance taxes before 1 January 2010

Exemptions for gifts (in thousands of euros)	
Children	5
Children 18–35 years	24 (one-time)
Children 18–35 years	50 (one-time, if used for home purchase or studies)
Others	2
Exemptions for inheritances (in thousands of euros)	
Partner	600
Children and grandchildren	19
Handicapped children	57
Parents	45
Others	2

What is very important to note here is that all gifts made within 6 months prior to death are counted as part of the inheritance for tax purposes. Therefore, gifts taking place 6 months before death are taxed separately, which allows using the tax exemptions to avoid taxes as mentioned above. This provides a significant advantage compared to other Western countries that also have an inheritance tax schedule as, in most cases, the look-back period is considerably longer. For instance, in the UK the look-back period is 7 years. This distinctive feature of the Dutch gift and inheritance tax schedule provides significantly better opportunities to apportion estates and avoid taxes via inter-vivos transfers.[6] It is also relevant to note that, in the Netherlands, there are no direct disincentives for providing inter-vivos transfers to children. This differs from the US, for example, where transferring wealth to children reduces their eligibility for college aid.

Even if the Dutch tax system provides a clear incentive to give while alive, it is not straightforward to separate the tax motive from the above-mentioned joy-of-giving and exchange motives. However, even if transfers respond to an exchange or joy of giving, individuals might still have the incentive to maximize the size of their inheritance by avoiding taxes. Given the complications that separating these motives entails, in the present study we focus on investigating the presence of transfers related to estate planning.

6 For further international comparisons, see Ernst&Young (2017).

However, we do elaborate on the policy implications for the tax schedule, which are relevant regardless of the exact motive behind the transfers.

3. DATA

We employ data from Dutch administrative records from different sources that can be linked with each other at the individual level using an encrypted social security number. All data are provided to us by Statistics Netherlands. We select our sample from the cause of death register, which provides the date of death and the underlying cause of death for all deaths taking place in the Netherlands between 2006 and 2013, totalling 1,079,126 observations. We link the information on a person's date and cause of death with demographic characteristics from the municipal population records, income and wealth at the household level from tax records, and information on hospital admissions from the hospital discharge register. In addition, we are able to link each decedent in our dataset with information on his/her children.

After linking all the different datasets, we are left with a final dataset of individual deaths that contains the following information for each decedent: date of death, cause of death, age, gender, marital status, household structure, household net worth at the end of the year prior to death, yearly household disposable income from 2003 until the year prior to death, hospital admissions from 1995 until the time of death, and presence and characteristics of children.

Due to missing data on wealth and income for 5,844 observations, we end up with a final sample of 1,073,282 observations. Table A.1 provides definitions for all variables employed in the analysis. Tables A.2 and A.3 provide summary statistics for singles and couples separately.

3.1. Wealth at the end of life

The data on wealth we employ come from administrative tax records. Dutch legislation mandates that all banks and financial institutions report end-of-year (December 31st) account holdings of their clients to the tax authorities. Tax-authorities use this information to provide pre-completed tax returns to all Dutch households. As a result, we have very accurate information on wealth at the household level. Importantly, we do not directly observe wealth at death. Therefore, a relevant concern is that we cannot capture inter-vivos transfers that take place very close to death when individuals die later in the year. In Section 4.2 below we explain at length how we deal with this limitation.

We distinguish between two wealth measures: net worth and net financial wealth. Net worth is defined as total assets minus total liabilities. Assets include financial assets (deposits, saving accounts, stocks and bonds) and non-financial assets (real estate and business assets). Liabilities include mortgage debt and other debt. Net financial wealth is defined as financial assets minus other debt. It is therefore more liquid than net worth

Table 5. Wealth at the end of life (thousands of euros)

	Mean	p10	p25	p50	p75	p90	p95	p99	Obs.
Net worth									
Single females	132	1	5	21	127	366	569	1,336	409,816
Single males	152	0	3	23	167	410	629	1,463	213,223
Married females	236	1	14	91	288	534	786	1,921	146,115
Married males	253	2	16	104	309	573	841	2,037	304,128
All	184	1	7	32	223	466	698	1,638	1,073,282
Net financial wealth									
Single females	62	0	4	16	42	140	255	749	409,816
Single males	67	0	2	15	46	147	270	791	213,223
Married females	90	1	6	24	68	179	314	1,049	146,115
Married males	97	1	8	25	72	186	330	1,143	304,128
All	77	0	4	20	54	162	287	896	1,073,282

which also includes net housing wealth and business assets. We make this distinction because liquid wealth is arguably the most likely to be passed on via inter-vivos transfers.

Table 5 shows how both net worth and net financial wealth at the end of life are distributed by gender and marital status of the decedent. The first thing to note is that, as the literature on retirement savings indicates,[7] individuals retain considerable amounts of wealth at the very end of their life. However, this observation does not say anything about whether wealth holdings at the end of life are accidental or intentional. Males generally die with more wealth than females, and net worth is considerably higher than net financial wealth. A second aspect to note is that, as expected, wealth shows a high degree of positive skewness. Grouping all demographic categories together, the table shows that for net worth the average is 5.75 times higher than the median, while for net financial wealth it is 3.85 times higher.

3.2. Sudden deaths

To measure sudden deaths, we use a refined version of the definition provided by Andersen and Nielsen (2010, 2016) which they borrow from the medical literature. We operationalize this definition using data on the primary cause of death and on the primary diagnosis related to hospital admissions. In our dataset, both cause of death and hospital admissions are classified according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), as assembled by the World Health Organization (WHO, 2016). The data on hospitalization contain date and diagnosis for each admission.

Andersen and Nielsen (2010, 2016) use the ICD-10 codes to distinguish between sudden and non-sudden deaths. As sudden deaths, they consider acute myocardial infarction (ICD-10: I21-I22), cardiac arrest (I46), congestive heart failure (I50), stroke

7 See e.g. van Ooijen *et al.* (2015) and Suari-Andreu *et al.* (2019) for the Netherlands.

(I60-I68), sudden deaths from unknown causes (R95-R96), transport accidents (V00-V99) and deaths caused by other accidents and violence (W00-W99, X00-X59, X85-X99, Y00-Y84). Deaths by suicide are excluded.

Given the size and the richness of our dataset, we can go further than Andersen and Nielsen (2010, 2016) in refining the definition of sudden death. We do so by excluding from the sudden death category those deaths that are caused by a cardiovascular event and that are preceded by at least one hospital admission related to a cardiovascular disease taking place before the wealth measurement. Using this definition, we are left with 141,655 sudden deaths, which are 13.20% of all deaths in our dataset. Table A.4 shows the prevalence of sudden deaths for each specific subcategory. This measure represents a substantial improvement relative to the measure employed by Kopczuk (2007), since the latter can only distinguish three categories, that is, deaths preceded by no terminal illness, deaths preceded by a condition that started hours, days or weeks before death, and deaths preceded by a condition that started months or years before death.

Table 6 shows the average and the median of each variable used in our analysis for the sudden and non-sudden death groups. Most values are similar for the two groups,

Table 6. Summary statistics by (non-)sudden death

	Sudden deaths		Non-sudden deaths	
Variable	Mean	Median	Mean	Median
Permanent income	18,932	16,491	19,337	16,910
Household income at death-1	19,400	16,783	20,237	17,310
Household income at death-2	19,191	16,703	20,052	17,165
Household income at death-3	19,033	16,510	19,827	16,946
Household income at death-4	18,900	16,409	19,688	16,808
Household income at death-5	18,945	16,236	19,554	16,619
Net worth	181,381	29,228	184,845	32,863
Net financial wealth	79,041	19,900	76,661	19,584
Female	0.51	–	0.56	–
Age	77.42	82	76.46	79
Retired	0.75	–	0.77	–
Number of children	2.20	2	2.27	2
Marital status				
Married	0.34	–	0.43	–
Divorced	0.08	–	0.08	–
Widowed	0.23	–	0.21	–
Never married	0.35	–	0.27	–
Household structure				
One person household	0.36	–	0.31	–
Single parent	0.03	–	0.03	–
Couple without children	0.27	–	0.36	–
Couple with children	0.06	–	0.06	–
Multiperson household	0.05	–	0.04	–
Institutionalized household	0.23	–	0.20	–

Notes: Multiperson household refers to households with any of the other possible structures (except *institutionalized household*) plus at least one additional member who is not a child or a spouse. A household is considered institutionalized if at least one member lives in a nursing home or other institution. The dataset is composed of 141,655 sudden deaths (13.20%) and 931,627 non-sudden deaths (86.80%).

Table 7. Net financial wealth by (non-)sudden death and marital status

	Single		Married	
	Mean	Median	Mean	Median
Sudden death	67,890	16,721	100,733	25,362
Non-sudden death	63,266	15,296	94,298	24,472

Table 8. Share of sudden deaths by age, gender, and marital status

	Single				Married			
	Females		Males		Females		Males	
Age category	Share (%)	Observation (%)	Share (%)	Observation (%)	Share (%)	Observation (%)	Share (%)	Observation (%)
<50	14.21	2.49	24.88	8.06	11.43	6.69	21.59	3.16
50–59	10.53	3.29	16.35	9.82	8.09	13.88	14.31	8.14
60–69	9.99	6.39	13.02	14.78	7.84	23.18	9.78	20.05
70–79	12.38	16.39	11.13	22.60	11.01	29.32	8.72	33.49
80–89	15.84	44.54	12.44	32.43	14.57	24.20	10.22	30.69
≥90	18.59	27.15	16.26	12.31	17.91	2.74	14.59	4.47
All	15.45	100	14.09	100	10.95	100	10.51	100

but there are some small differences. Individuals who suffer a sudden death die at a slightly older age and include slightly more males than females. In addition, they are less likely to be married and have slightly lower net worth and permanent income. However, individuals who suffer a sudden death do have slightly higher net financial wealth at time of death compared to those who do not suffer a sudden death. Table 7 shows that this difference in net financial wealth holds for both individuals who die being single and individuals who die within a couple. However, in relative terms the difference is larger for singles than for couples.

Table 8 shows the share of sudden deaths by gender, marital status, and age category. The most noticeable features are that younger males are the most likely to suffer a sudden death as a share of age-specific total deaths, and that the relationship between the share of sudden deaths and age is U-shaped: the former decreases up to the 60–69 age category and then increases again for older age categories. It is these differences across age groups that seem to drive the higher share of sudden deaths among single individuals. This evidence shows that sudden deaths are not purely random and that we have to control at least for age, gender, and marital status.

3.3. Permanent income

Besides the demographic variables, it is important to control for permanent income. That is because permanent income might correlate with both wealth and health status at the end of life (Attanasio and Emmerson, 2003).[8] To measure permanent income, we apply the following strategy. If the main source of income for the household during the year prior to death is pension income, we use then equivalized household income in that year as a proxy for permanent income. Knoef *et al.* (2013) show that the variance of income is smaller for retirees than for working individuals and argue that pension income is a specially good proxy for permanent income.

If the main source of income in the year prior to death is not pension income, we take the average of equivalized household income between 2003 and the year prior to death. We equivalize household income by dividing yearly income by the square root of the number of members in the household in that year. We apply this transformation because household structure can change during the years prior to death. To account for these two different measures of permanent income, we generate a dummy variable indicating which methodology is used for each decedent and include it in our regressions.[9]

Given that we observe deaths between 2006 and 2013, using the yearly average of household income back to 2003 means that we use periods of different lengths for different households to compute this average. To account for this, we re-estimate the baseline results using a fixed number of years to measure permanent income. To that end, we use the three years prior to death, since this is the maximum period length that we observe can observe for all individual. In addition, we also re-estimate the baseline results excluding households that experience changes in household structure during the period that we observe.

4. EMPIRICAL STRATEGY

4.1. Baseline specification

To study the presence of estate planning and inter vivos-transfers, we regress wealth at the end of life on a dummy variable indicating sudden deaths using a cross-section of deaths that occurred between 2006 and 2013. The regression equation we estimate is the following

$$WEALTH_i = \beta_0 + NON-SUDDEN_i\beta_1 + \mathbf{X}_i'\boldsymbol{\beta}_2 + \boldsymbol{CHILD}_i'\boldsymbol{\beta}_3 + \boldsymbol{t}_i'\boldsymbol{\beta}_4 + \varepsilon_i, \qquad (1)$$

where $WEALTH_i$ stands for either household net worth or net financial wealth at the end of life for individual i; $NON-SUDDEN_i$ is a dummy variable that takes value one in case a death is classified as non-sudden; $\mathbf{X}_i$ is a vector of controls including age dummies for the same age groups as in Table 8, household structure, and permanent

8 To measure permanent income, Kopczuk (2007) uses as a proxy personal labour income observed for a single period, which may be from five to ten years before death. In our study, we observe yearly total income at the household level for the period between 2003 and the year prior to death.

9 Pension income is used in 77.06% out of all cases.

income; $\boldsymbol{CHILD}_i$ is a vector of children characteristics, $\boldsymbol{t}_i$ contains a set of dummies controlling for the year of death, and ε_i is the individual-specific error term. Since we control for both age and year of death, we indirectly control for cohort effects as well since the combination of age and time of death perfectly correlates with year of birth. Note, however, that we cannot neatly separate the effects of cohort and age, meaning that the age variable will also be capturing differences across cohorts. Nevertheless, this ensures that cohort effects are not captured by the error term and thus do not interfere with the estimation of the parameter of interest β_1. We expect the latter to be negative reflecting inter-vivos transfers related to estate planning by those who do not suffer a sudden death.

We assume the individual-specific error term to be independent across observations. However, it is unlikely that ε_i is homoskedastic. We therefore use heteroskedasticity-robust standard errors in all our estimations. Since we observe the whole universe of deaths that occurred between 2006 and 2013 in the Netherlands, and thus there is no sampling error, it is not straightforward what the interpretation of the standard errors should be. In that regard, we follow Abadie *et al.* (2014) and think of our study in a potential outcome framework. The standard errors then tell us how representative the outcome that we observe is of all potential outcomes.

In the baseline analysis, we estimate Equation (1) separately for singles and couples to account for the fact that the incentives and motivations behind the life cycle decisions of these two types of household are intrinsically different from each other. Therefore, if both individuals within a couple die between 2006 and 2013, the first death will be included in the couples regression while the second one will be included in the singles regression. For the singles regressions we include marital status as an additional control (we do so by means of dummies indicating whether an individual is widowed, divorced, or never married), which accounts for whether a decedent already went through any prior estate planning related to the death of his/her spouse.

Even though we have access to longitudinal data on wealth, we do not exploit that dimension of the data in our analysis for three main reasons. First, we only have wealth data from 2005 onwards, which means we have limited information on lagged wealth depending on the year of death. Second, we do not have accurate information on changes in health status or subjective life expectancy that would trigger the transfers that we want to capture. Therefore, we do not know when the estate planning behaviour begins and we cannot measure anticipation effects. Third, wealth trajectories at the end of life may be non-linear and/or non-monotonic due to the mutually offsetting effects of estate planning on the one side, and reduced consumption due to old age and/or returns to accumulated wealth on the other side.

Using just a cross-section of wealth at time of death, like we do by following Kopczuk (2007), has the advantage that the event that triggers the transfers has already taken place for sure at the time of death. This allows us to easily compare wealth levels *ex post* while using all the years in the sample. Furthermore, due to their largely unpredictable nature, sudden deaths have a relevant random component thus individuals who suffer a sudden death should not be fundamentally different from those who do not, especially after controlling for permanent income and other observables described in Sections 3 and 4.

A possibility that the data do offer is to substitute the dummy for non-sudden deaths in Equation (1) for a variable indicating the number of years since the first cause-of-death-related hospital intake and the time of death. This is interesting because hospital intakes provide some information on health status and thus may help capture anticipatory effects of death. However, the problem with this strategy is that, as already argued by García-Gómez *et al.* (2013), hospital intakes do not perfectly correlate with actual health status and subjective life expectancy and it is not possible to know the direction and size of the measurement error. Nevertheless, for completeness we also estimate Equation (1) using this measure of length of illness based on previous hospital intakes as explanatory variable and provide the results in Appendix B. This measure takes values above zero only for individuals who do not suffer a sudden death. For those with length of illness above 10 years we create a separate dummy variable since we do not observe hospital intakes before 1995.

4.2. Delay in wealth measurement

As we point out in Section 3.1, the dependent variable in Equation (1) is measured using household wealth of individual i on the 31st of December of the year previous to death. As a result of this, the estimate of β_1 will only capture the effect of transfers that occur before that date. Therefore, the illness that triggers inter-vivos has to be sufficiently long to have its effect captured by the December 31st measure. In case there is a significant amount of transfers occurring after the wealth measurement, then β_1 will be biased towards zero.

We address this limitation in several ways. First, we measure the delay in the wealth measurement, i.e. the number of days between the date of death and the 31st of December of the previous year, and include it in our set of controls $\mathbf{X}_i$ for all estimations. Second, we interact $NON-SUDDEN_i$ with a set of dummies indicating the trimester of death. In case the wealth measure is partially not capturing wealth transfers because these take place too shortly before death, then the estimate of β_1 should get closer to zero the later in the year a particular death takes place. [10]

Third, to increase the chances of capturing transfers, we add to our baseline analysis the estimation of Equation (1) restricting non-sudden deaths to those preceded by at least one cause-of-death-related hospital admission taking place before the wealth measurement.[11] In this way we ensure that non-sudden deaths are more likely to be

10 We use trimesters for the interaction since changes in wealth by week or day appear to be too small. Results are similar if we use months instead of trimesters.

11 We consider a hospital admission to be related to cause of death if the reason for the admission falls under the same disease category as the cause of death.

expected and therefore to trigger inter-vivos transfers earlier on. The data on hospital admissions show that out of all individuals in the sample who suffer a non-sudden death almost half of them (46%) had at least one hospital admission related to their cause of death before the wealth measurement. In addition it shows that in most cases, several years went by between the first hospital admission and the wealth measurement.[12] This indicates that illnesses that precede non-sudden death are often long enough for end-of-life inter-vivos transfers to be captured by our 31st of December measure.

4.3. Heterogenous effects

The large sample size of our dataset allows us to study the heterogeneity of the main effect across gender, age, cause of death, and (the number of) children. Regarding gender, it may be that males and females have differential preferences for inter-vivos giving.[13] In addition, there is a large body of literature on differences in terms of financial literacy, and, arguably, a certain degree of literacy is necessary to engage in estate planning.[14] Regarding heterogeneity of the effect across age groups, younger individuals might not engage in estate planning because they have a higher expectation of survival upon contracting an illness, while older individuals may start engaging in estate planning regardless of their health condition simply because they have already outlived the general life expectancy. For that reason we redefine the age-of-death groups used in the baseline analysis and divide the sample into young (age$<$70), middle aged (70$\leq$age$<$85), and old (age$\geq$85) deaths, and we interact dummy variables for each group with our main explanatory variable.[15]

Regarding heterogeneity of the effect across disease groups, certain diseases may be more likely than others to trigger estate planning type of behaviour. The most likely to stimulate estate planning would be diseases that are well known to have low survival rates and that do not affect the cognitive abilities of the potential estate planner. Since we do not have information on prognoses, our approach here is to take the most common causes of death (i.e. those causing at least 5% of all deaths) and to generate a dummy variable for each of them.

12 Conditional on there being at least one hospital admission related to cause of death that takes place before the wealth measurement, we observe on average 3.6 admissions per individual and a period of 5.5 years between the first cause-of-death-related admission and the wealth measurement. This is an indication that illnesses preceding death are often long. However, it does not provide an accurate measurement of length of illness, since hospital admissions do not necessarily capture the exact timing and severity of an illness.

13 Several studies point at gender differences in preferences for charitable giving, for example, Mesch *et al*. (2011).

14 For a review of the literature on gender and financial literacy, see Lusardi and Mitchell (2008).

15 For the age heterogeneity analysis we redefine the age groups for the sake of simplicity. The results are qualitatively the same if we employ the age categories used in the baseline estimates, that is, those in Table 9.

Table A.5 shows all deaths classified using the ICD-10 general categories for diseases and conditions. The categories that each generate at least 5% of deaths are: neoplasms, that is, cancers (31.57%), diseases of the circulatory system, that is, cardiovascular diseases (29.18%), diseases of the respiratory system (9.98%) and mental and behavioural disorders (5.73%). We generate a dummy for each of these causes of death and an additional dummy that takes value one if the cause of death is not one of the four mentioned here. The effect of these dummies is estimated using sudden deaths as a reference group. Regarding heterogeneity within deaths caused by cancer, Table A.6 shows that the most common types of cancer are lung (23.57% of cancer deaths), colon (9.00%), breast (7.64%), prostate (5.85%) and pancreas (5.61%).[16]

In addition to the above-mentioned differential effects, observing the entire wealth distribution allows us to test for differential effects across wealth levels using quantile regression. As mentioned in the introduction, this is an important advantage with respect to Kopczuk (2007), who only observes the top 6% of the wealth distribution and cannot investigate whether the effect differs across quantiles. Estimating quantile regressions is relevant since, given the high degree of positive skewness in the distribution of wealth, the average is not very representative of the full distribution and the effect can easily differ across quantiles. Furthermore, to fully capture the importance of inter-vivos transfers in society, it is important to check whether transfers take place at the different quantiles of the wealth distribution rather than just assuming that they are only relevant for the wealthiest households, which is what the literature usually does by assuming that bequests are a luxury good (Suari-Andreu *et al.*, 2019).

5. RESULTS

5.1. Baseline

We first estimate Equation (1) separately for singles and for couples without controlling for children characteristics.[17] We do so using both net worth and net financial wealth as dependent variables. Panel (a) in Table 9 shows that the estimates of β_1 are negative as expected.[18] When assessed as a percentage of average wealth, the estimated effects are larger for singles than for couples and for net financial wealth compared to net worth.

16 Siegel *et al.* (2017) show, using data for the United States, that the 5-year survival rates for these types of cancer range from 8% for pancreas to 99% for prostate, with lung (18%), colon (65%) and breast (90%) having values in between these two extremes. Note, however, that in our analysis we use a selection of cancer diagnoses that eventually all led to death. Therefore, we are almost certainly looking at a selection of diagnoses that had a below-average probability of survival.

17 Given the large number of observations in the sample, we change the standard significance thresholds for 5% (one star), 1% (two stars), and 0.1% (three stars).

18 Tables B.1 and B.2 show that results are robust to the two alternative permanent income measures mentioned in Section 3.3. The first measure keeps fixed to three the number of years we use to compute permanent income, while the second one uses a fixed adjustment based on household structure three years before death. Table B.16 provides the full regression results.

Table 9. Results – baseline

	Net worth		Net financial wealth	
(a)				
Singles	−7,643.79***	−5.49%	−4,446.95***	−6.94%
	(1,642.00)	(1.18%)	(1,278.34)	(2.00%)
Couples	−11,374.39**	−4.60%	−7,797.85*	−8.22%
	(3,635.17)	(1.47%)	(3,175.98)	(3.35%)
(b)				
Singles	−10,106.52***	−7.26%	−7,284.17***	−11.63%
	(1,819.19)	(1.31%)	(1,441.29)	(2.30%)
Couples	−11,413.14**	−4.54%	−10,010.55**	−10.57%
	(3,848.61)	(1.53%)	(3,315.01)	(3.50%)

Notes: Each cell provides an estimate of β_1 in Equation (1). Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 623,039 observations, while couples regressions include 450,243 observations. In Panel (b), singles regressions include 296,744 observations, while couples regressions include 245,849 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

The estimates for couples are less statistically significant. In addition, Panel (b) shows the same results as in Panel (a) but restricting non-sudden deaths to those preceded with at least one hospital admission related to cause of death before the wealth measurement. In that way, we make sure that those deaths that are not sudden are expected to a higher degree and thus are more likely to be preceded by estate planning. As we would expect, stronger effects are estimated when applying this restriction.

The findings reported in Table 9 are in line with estate planning type of behaviour resulting in wealth transfers. That is because, on the one hand, these transfers are arguably more likely to be made in liquid forms of wealth, while, on the other hand, individuals who die within a couple are likely to have a strong bequest motive towards their partner, which we do not capture because we observe wealth at the household level. Following this reasoning, it makes sense that the smallest effect (i.e. −4.54%) is estimated for the net worth of couples, while the largest effect (i.e. −11.63%) is estimated for the net financial wealth of singles.[19]

Regarding the influence of the time delay in the measurement of wealth, the stronger effects in Panel (b) of Table 9 suggest that we still capture declines in wealth at the end of life regardless of that delay. However, it could still be that there is a significant amount of transfers taking place after our wealth measurement. As mentioned in Section 4.2, if that is the case the effect should be closer to zero for deaths occurring later in the year. Table 10 provides the results in Panel (b) of Table 9 but by trimester

19 Percentage effects are calculated by dividing the estimated coefficients by the average of the dependent variable in the estimation sample.

Table 10. Results – effects by trimester of death

	Net worth		Net financial wealth	
Singles				
T1	−10,831.83***	−7.78%	−4,324,28*	−6.90%
	(3,174.79)	(2.28%)	(2,006.72)	(3.20%)
T2	−4,785,46	−3.44%	−5,055.57*	−8.07%
	(2,998.30)	(2.15%)	(2,276.11)	(3.63%)
T3	−15,297.18***	−10.99%	−11,908.74***	−19.01%
	(3,716.83)	(2.67%)	(3,052.12)	(4.87%)
T4	−9,826.97*	−7.06%	−8,541.60*	−13.64%
	(4,275.52)	(3.07%)	(3,716.14)	(5.93%)
Couples				
T1	−12,842.59	−9.22%	−14,082.87*	−22.48%
	(7,950.73)	(5.71%)	(6,884.04)	(10.99%)
T2	1,161.44	0.83%	2,576.84	4.11%
	(5,359.62)	(3.85%)	(3,941.74)	(6.29%)
T3	−24,746.89***	−17.77%	−17,905.04**	−28.58%
	(6,475.511)	(4.65%)	(5,330.43)	(8.51%)
T4	−9,854.89	−7.08%	−10,597.41	−16.92%
	(9,130.33)	(6.56%)	(8,190.19)	(13.07%)

Notes: Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. As shown in Panel (b) of Table 9, estimates are conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. Singles regressions include 296,744 observations, while couples regressions include 245,849 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

of death. It shows that the effect does not decline with the trimester of death. In fact, the differences between the coefficient estimates for each trimester are not statistically significant. This indicates that we are still able to estimate the effect we are after regardless of the wealth measurement delay. Furthermore, even if this delay is still causing a bias towards zero, we can affirm that we are estimating an effect despite of that bias. Meaning that the actual effect would be stronger than what we estimate in case there was such a bias.

Besides the influence of timing of the wealth measurement, the results in Table 9 could also be partly driven by negative income shocks due to poor health and disability suffered by individuals with a non-sudden death.[20] Once individuals are retired, this is no longer an issue since then health shocks do not translate into drops in pension income. For that reason, we rerun the same estimations but excluding non-sudden deaths of individuals whose first cause-of-death-related hospital admission took place at age 65 or younger. For comparability purposes, we also exclude from this estimation sample all deaths that occurred at age 65 or younger.

20 García-Gómez *et al.* (2013) show that an unexpected hospital admission leads to a drop in yearly income of 5%. This effect would be larger without the generous disability benefit system in the Netherlands. However, it could still partially explain the results.

Table 11. Results – income shocks excluded

	Net worth		Net financial wealth	
(a)				
Singles	−9,087.48***	−6.20%	−4,647.89***	−6.76%
	(1,677.29)	(1.14%)	(1,252.62)	(1.82%)
Couples	−11,431.89*	−4.50%	−7,604.85	−7.47%
	(4,445.03)	(1.75%)	(3,930.79)	(3.86%)
(b)				
Singles	−10,158.91***	−6.88%	−6,905.82***	−10.15%
	(1,846.52)	(1.25%)	(1,425.67)	(2.10%)
Couples	−8,260.69	−3.19%	−8,688.47*	−8.42%
	(4,730.20)	(1.82%)	(4,042.83)	(3.92%)

Notes: Each cell provides an estimate of β_1 in Equation (1). Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parentheses. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 503,165 observations, while couples regressions include 317,843 observations. In Panel (b), singles regressions include 243,252 observations, while couples regressions include 164,729 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table 11 shows that, when we exclude individuals with hospital admissions before retirement, and thus limit the possibility of income shocks that would explain our results, the effect for singles is reduced but nearly unaltered, while the effect for couples become considerably less significant. This suggests that the effects for couples as found in the baseline results in Table 9 are mostly due to income loss due to poor health. The estimated effects for singles are still significant at the 0.1% level even though the effects are slightly smaller compared the baseline estimates. This analysis suggests that income loss due to poor health does have some effect on wealth at the end of life. However, this effect is not strong enough to explain the baseline results for singles.

Regarding the strategy mentioned in Section 4.1 consisting of using the difference in years between the first hospital intake related to cause of death and the actual time of death as explanatory variable, its results are provided in Tables B.3 and B.4. Regardless of the problems with this strategy already mentioned in Section 4.1, results are to some extent in line with those in Tables 9 and 11 since all estimates are negative and of a reasonable size. For instance, Panel (b) of Table B.4 shows that for the net financial wealth of singles, when using only non-sudden deaths with previous hospital intakes and controlling for income shocks, an additional year in length of illness leads to a decrease in wealth of around 533 euros (i.e. 0.78% of average financial wealth in the sample), and having more than 10 years in length of illness leads to a reduction in wealth of about 6.6%. However, as already mentioned in Section 4.1, this measure is problematic since it is not possible to know how hospital intakes correlate with changes in health status and subjective life expectancy. Thus, these estimations are influenced by a measurement error of which the size and direction are unknown.

Even though out-of-pocket medical expenditures are generally low in the Netherlands (see Bakx *et al.*, 2016), they could also be partially explaining our baseline results. To exclude this possibility, we rely on the results by van Ooijen *et al.* (2018), who show that transitions into poor health by Dutch individuals lead to a decrease in non-medical expenditures and a slight increase in medical expenditures. However, the increase in medical expenditures does not compensate for the decrease in non-medical expenditures, implying a negative net effect of poor health on total expenditures. That means that the effects we present in Tables 9 and 11 are likely to be a lower bound since they could be stronger if we were able to exclude the increase in wealth due to the decrease in total expenditures.[21]

Furthermore, in absolute terms the results reported in Tables 9 and 11 are always between 4,500 and 12,000 euros, which means they are unlikely to be explained by the findings reported by Penders et al. (2017). As mentioned in the introduction, the latter find that, conditional on out-of-pocket medical expenditures being positive, the median amount spent in the last year of life is 461 euros. To further check for the possible influence of out-of-pocket medical expenditures, we re-estimate the results in Tables 9 and 11 excluding individuals who live in a nursing home.[22] We do this since the literature on health expenditures mentioned in the introduction often shows that individuals living in nursing homes tend to incur higher out-of-pocket medical expenditures.[23] That is the case because, on the one hand, nursing homes often imply a co-payment while, on the other hand, individuals who move to a nursing home are usually in poorer health than those who do not. Tables B.5 and B.6 show that when we exclude nursing homes the results for singles remain nearly unchanged while those for couples become even less significant.

Further credibility to the interpretation of our results is given by the fact that, besides the above-mentioned result by van Ooijen *et al.* (2018), the latter also show that transitions into poor health lead to stronger declines in consumption for singles, for whom we find a stronger effect, and that they lead to decrease in money spent on vacations. This latter result suggests individuals are unlikely to increase expenditures in anticipation of a near death. In addition, van Ooijen *et al.* (2018) show that transitions into poor health significantly increase the share of expenditures on gifts. Given the estimates provided in Tables 9–11, and the complementarity of our analysis with those by Bakx *et al.* (2016), Penders et al. (2017) and van Ooijen *et al.* (2018), we argue that the results we present are in line with those by Kopczuk (2007), and we thus interpret them as reflecting estate planning by individuals who did not suffer a sudden death.

21 Increases in medical expenditures due to poor health observed by van Ooijen *et al.* (2018) mostly take place after 2015. In that year, institutional changes meant that public financing of long-term in the Netherlands care became slightly less generous. This period falls out of our estimation sample, thus giving us an additional reason not to be concerned about the influence of medical expenditures.

22 As shown in Table 6, in our data we are able to distinguish institutionalized households. This category captures households that live in a nursing home or in another type of institution.

23 See Footnote 2.

Our interpretation of the results relies on the assumption that, conditional on observables, those who die a sudden death would have the same wealth at death, in the absence of this 'treatment', as those who die a non-sudden death. This assumption cannot be tested directly. However, we perform stress-testing by using the subsample of deaths that take place during the second half of the sample to regress wealth in 2006 on ultimate type of death. Tables B.7–B.10 show the results we obtain when using the net worth and financial wealth of singles and couples in 2006 as a dependent variable for different subsamples formed by those who die in the periods 2010–2013, 2011–2013, 2012–2013, and 2013, respectively. Similarly to Tables 9 and 11, we provide results with and without conditionality on previous hospital admissions related to cause of death and with and without the correction for income shocks.

Focusing on net financial wealth of singles, Table B.8 shows that when using the 2010–2013 sample the differences between sudden and non-sudden deaths are still somewhat significant. However, once the year 2010 is removed the results become statistically insignificant. Even though the sign of the estimates is still negative, the standard errors become rather large. These results indicate that there are no clearly significant differences in wealth holdings in 2006 between sudden and non-sudden deaths that took place from 2011 onwards. This result is in line with the assumption of comparability between those who die suddenly and those who do not. The statistical significance when including the deaths in 2010 indicates the possibility of anticipation effects. These interpretations are strengthened by the fact that results are more significant when conditioning on previous hospital admissions, in which case anticipation effects are more likely. As mentioned in Section 4.1, anticipation effects cannot be tested with the data at hand due to the lack of information on health status and subjective life expectancy.

We focus mostly on the net financial wealth of singles because that is where we find the strongest baseline effects and, as explained above, where we are the most likely to capture estate planning behaviour. When looking at the net worth of singles (Table B.7), we find results comparable to those in Table B.8. That is, we find an effect that becomes less significant once the year 2010 is excluded and that is stronger once we condition on previous hospital admissions. In any case, the effect for net worth is a bit more difficult to interpret since it includes housing wealth which is unlikely to be part of the inter-vivos transfers we aim to capture. For couples (Tables B.9 and B.10), we find no significant effects for all the subsamples that we analyse. These results, together with the results showing stronger effects when conditioning on previous hospital admissions and the results showing the relevance of longer illnesses (Tables B.3 and B.4), indicate the presence of strong anticipation effects.[24]

This interpretation is strengthened by the fact that Tables 6 and 8 do not indicate the presence of strong fundamental differences between sudden and non-sudden deaths

24 Summary statistics provided in Suari-Andreu (2018) suggest that there is a substantial share of non-sudden deaths preceded by a lengthy illness often longer than 10 years. This indicates the presence of a long time-window within which estate planning can take place.

that could explain our results. This argument is in line with a strand of the medical literature that provides evidence showing that risk factors associated to cardiovascular disease (which we consider as a sudden death), such as smoking, obesity, poor diet, and inactivity, are also related to the incidence of cancer (which we consider as a non-sudden death). See for instance Johnson *et al.* (2016) and Vincent *et al.* (2019).

Regarding the tax motive mentioned in the introduction, Appendix B shows how the 2010 reform simplified the tax rates making them somewhat less progressive. It also slightly raised the exemption thresholds for both gifts and inheritances, while creating a new exemption for gifts intended for home purchase or study payments. To briefly test whether the change in the tax schedule had any effect on inter-vivos transfer related to estate planning, we re-estimate our baseline results separately for the periods before and after 2010. These estimations yield no significant differences between the two periods, which does not provide support for the tax motive but does not rule it out.[25] However, as mentioned in the introduction, the present study has the goal of investigating the presence of inter-vivos transfers related to estate planning. Identifying the tax motive and separating it from other possible motives is left for future work.

5.2. Heterogenous effects

As argued in Section 4, the effect of interest may be heterogeneous across different characteristics, that is, gender, age and cause of death. Testing these heterogeneities can help attribute the effect we estimate to estate planning. In this section, we focus the analysis on the singles subsample as there is where we find the most interesting results and the same extended analyses for couples do not provide additional insights. In addition, as in Panel (b) of Table 9, we focus on results conditional on non-sudden deaths having at least one cause-of-death-related hospital admission before the wealth measurement.

Results in Table 12 show the effects for males and females. Even though the point estimates are somewhat apart from each other, the results for both groups do not appear to be significantly different from each other. Regarding heterogeneity of the effect across age groups, Table 12 shows that the effect for the younger group (age$<$70) does not significantly differ from zero, while for the middle-aged (70$\leq$age$<$85) and older groups (age$\geq$85) the effects are even statistically significant at the 0.1% significance level and not significantly different from each other. The effect for the younger group is only significantly different from the effect for the older groups (at the 1% level of significance) when using net worth as a dependent variable. Table B.13 shows that the results do not qualitatively change when we consider finer age categories, i.e. five-year age groups.[26]

25 Results are provided in Tables B.11 and B.12.
26 Results convey the same message when we consider even more detailed age categories.

Table 12. Results – gender, age and cause of death interaction (singles)

	Net worth		Net financial wealth	
Gender				
Male	−13,093.50***	−9.40%	−10,755.56***	−17.17%
	(4,026.41)	(2.89%)	(3,320.14)	(5.30%)
Female	−8,063.29***	−5.79%	−5,537.17***	−8.84%
	(1,869.75)	(1.34%)	(1,413.30)	(2.26%)
Age				
Age<70	12,032.03*	11.40%	772.48	1.96%
	(5,539.12)	(5.25%)	(4,552.97)	(11.60%)
70≤Age<85	−11,824.46***	−8.09%	−7,885.22***	−12.81%
	(2,645.28)	(1.81%)	(1,893.43)	(3.08%)
Age≥85	−12,290.44***	−8.26%	−8,389.79***	−11.21%
	(2,593.88)	(1.74%)	(2,140.38)	(2.86%)
Cause of death				
Cancer	−11,211.26***	−7.45%	−14,621.90***	−24.38%
	(2,705.91)	(1.80%)	(2,221.24)	(3.70%)
Cardiovascular	−9,879.29***	−7.22%	−5,917.48***	−9.56%
	(2,144.11)	(1.57%)	(1,738.42)	(2.81%)
Respiratory	−12,420.47***	−11.48%	−1,365.10	−2.79%
	(3,035.52)	(2.81%)	(2,236.58)	(4.57%)
Mental	2,456.52	1.60%	6,597.09	7.88%
	(8,672.35)	(5.61%)	(8,108.70)	(9.69%)

Notes: Each cell provides an estimate of the main effect for each gender, age or cause of death group. Percentage effects are presented next to each coefficient estimate. Estimates are obtained by interacting $NON-SUDDEN_i$ in Equation (1) with gender, age and cause of death dummies. Heteroskedasticity-robust standard errors are provided in parentheses. All estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. Regressions include 296,744 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

It shows that we estimate significant results only for ages above 70, and that the effects for the different ages are not clearly different from each other in statistical sense.

Since life expectancy at a particular age may be quite different between males and females, we also provide in Table 13 a triple interaction between age, gender, and our main explanatory variable. The latter shows that we estimate a specially strong effect for older males. However, all differences between males and females within age groups are not statistically significant at any of the significance levels that we consider.

Regarding heterogeneity across causes of death, Table 12 shows that there are strong significant effects for both cancer and cardiovascular diseases. However, when using net worth, the estimates do not significantly differ across all cause-of-death categories at the 99% confidence level. When using net financial wealth as a dependent variable, we find a very strong and significant effect for deaths resulting from cancer and a less strong effect, but still highly significant, for deaths resulting from cardiovascular diseases. The effect for deaths resulting from cancer is significantly different from the effect for respiratory diseases, but not significantly different from the effect for mental disorders. That is because the latter effect is estimated with a large degree of uncertainty.

Table 13. Results – gender–age interaction (singles)

		Net worth		Net financial wealth	
Age<70	Male	8,181.77	5.88%	5,099.92	8.14%
		(7,419.05)	(5.33%)	(6,574.09)	(10.50%)
	Female	−6,907.75	−4.96%	−9,699.41**	−15.48%
		(7,329.00)	(5.26%)	(3,188.83)	(5.09%)
70≤Age<85	Male	−17,557.47***	−12.61%	−11,642.14***	−18.59%
		(5,179.66)	(3.72%)	(3,612.70)	(5.77%)
	Female	−9,539.18***	6.85%	−6,316.18**	−10.08%
		(2,999.29)	(2.15%)	(2,200.95)	(3.51%)
Age≥85	Male	−25,411.83**	−18.25%	−21,455.63**	−34.25%
		(8,432.09)	(6.06%)	(6,908.85)	(11.03%)
	Female	−8,925.50***	−6.41%	−4,789.82*	−7.65%
		(2,484.32)	(1.78%)	(2,081.46)	(3.32%)

Notes: Each cell provides an estimate of the main effect for each gender–age group. Percentage effects are presented next to each coefficient estimate. Estimates are obtained by means of a triple interaction between $NON-SUDDEN_i$, a gender dummy and a set of age dummies. Heteroskedasticity-robust standard errors are provided in parentheses. All estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. Regressions include 296,744 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

These results point at relevant effects for deaths resulting from cancer and cardiovascular diseases, which is not the case for deaths resulting from respiratory diseases and mental disorders. Given the reduced cognitive abilities of individuals with mental disorders, it is reasonable to assume that the effect can be equal or close to zero, reflecting absence of estate planning. If we break down deaths by type of cancer and look at the net financial wealth of singles, we find strong and highly significant effects (at the 0.1% level) for each type of cancer, ranging from −30% for pancreatic cancer to −23% for breast cancer. The estimated relative effects tend to be higher the lower is the survival rate for each type of cancer as reported by Siegel *et al.* (2017). However, the estimates do not significantly differ from each other.[27]

When introducing children variables in our analysis (i.e. number of children outside of the household, average permanent income of children, and average age of children) without including any interaction term, the change in the estimated coefficients is negligible. That is what we would expect since, even though the presence, income, and age of children do have an effect on wealth at death, there is no obvious reason to expect that these variables would correlate with the incidence of sudden deaths.

When comparing individuals with and without children outside of the household, Table 14 shows that we estimate a stronger effect for households without children when using net financial wealth as dependent variable, while the effects differ very little when using net worth. However, in both cases, these differences are not significant at the 5% level. Table 14 shows also that the results are similar if we consider individuals with and

27 Results are reported in Table B.14.

Table 14. Results – presence of children and grandchildren (singles)

	Net worth		Net financial wealth	
Presence of children				
With	−9,006.83***	−6.47%	−3,990.66*	−6.37%
	(2,232.13)	(1.60%)	(1,791.61)	(2.86%)
Without	−8,479.87**	−6.09%	−10,535.86***	−16.82%
	(3,147.06)	(2.26%)	(2,492.27)	(3.98%)
Presence of grandchildren				
With	−4,696.66	3.37%	−3,238.29	−5.17%
	(3,203.49)	(2.30%)	(2,159.70)	(3.45%)
Without	−10,436.25***	−7.50%	−7,034.65***	−11.23%
	(2,203.69)	(1.58%)	(1,814.54)	(2.90%)

Notes: Each cell provides an estimate of the main effect for each subgroup. Percentage effects are presented next to each coefficient estimate. Estimates are obtained by interacting $NON\!-\!SUDDEN_i$ in Equation (1) with dummies indicating presence of children outside of the household and of grandchildren. Heteroskedasticity-robust standard errors are provided in parentheses. All estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. Regressions include 296,744 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

without grandchildren. The only relevant difference is that the point estimates are further apart from each other when using net worth. However, also in this case the differences between having and not having grandchildren are not significant at the 5% level. To further investigate the importance of having children and what does it say about the potential transfer motives mentioned in the introduction, we also estimate the main effect separately for each quartile of the distribution of the permanent income of children. Results show no significant differences by quartile.[28]

The finding of no statistically significant differences between households with and without (grand)children is in line with some of the most relevant contributions in the literature on intergenerational transfers and bequests (i.e. Hurd, 1989; Kopczuk and Lupton, 2007; Lockwood, 2012). Both Hurd (1989) and Lockwood (2012) find very weak evidence of a bequest motive when estimating it based on the assumption that individuals without children do not have a bequest motive.

In our dataset, only 30.03% of single individuals and 16.49% of married individuals die without children. Following our results and those provided by the literature on intergenerational transfers and bequests, it is reasonable to assume that these individuals also have a preference towards giving, and thus engage in estate planning.[29] In addition, it is

28 If individuals transfer wealth because they care about their children's financial situation and/or transfers are part of an intergenerational exchange, one would expect to find a negative correlation between transfers and permanent income of children. Results are provided in Table B.15 in Appendix B.

29 Both Lockwood (2012), using the Health and Retirement Study (HRS) for the US, and Suari-Andreu *et al.* (2019), using the Dutch National Bank Household Survey, find that individuals with children are more likely to consider it important to save for a bequest. However, the share of individuals

important to note here that individuals without children are likely to give inter-vivos specially because the tax incentive is even stronger for them. Tables 1 and 3 show that tax rates for gifts to parents, siblings and others are substantially higher than those for children. Exemptions are smaller these cases, but there is stronger incentive to use them and/or to apportion the estate into separate inter-vivos transfers to benefit from the progressive tax structure.

5.3. Quantile regression

Table 15 shows the results of the re-estimation of the baseline analysis for different percentiles of the unconditional wealth distribution at and above the median.[30] To obtain these results we use recentred influence function unconditional quantile regression.[31] For both net worth and net financial wealth, we estimate significant effects along the

Table 15. Results – unconditional quantile regression (singles)

	Net worth		Net financial wealth	
p50	−2,451.84***	−11.34%	−1,848.05***	−12.27%
	(170.45)	(0.79%)	(130.60)	(0.87%)
p75	−16,745.15***	−11.41%	−5,486.03***	−13.16%
	(1,942.47)	(1.32%)	(464.26)	(1.11%)
p90	−21,430.21***	−5.60%	−18,042.73***	−13.08%
	(2,968.58)	(0.78%)	(1,626.15)	(1.18%)
p95	−19,138.57***	−3.25%	−26,043.58***	−10.35%
	(5,342.79)	(0.91%)	(3,149.32)	(1.25%)
p99	−68,226.20*	−4.99%	−105,507.24***	−14,28%
	(30,467.35)	(2.23%)	(23,157.35)	(3.13%)

Notes: Each cell provides an estimate of the main effect for each percentile using Recentred Influence Function (RIF) unconditional quantile regressions. Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parentheses. All estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. Regressions include 296,744 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

without children that consider it important to save for a bequest is certainly non-negligible as it is reported to be above 50% in both studies. In line with these results, Hurd and Smith (2002) use the HRS exit interviews and find that the wealth of single individuals without children is mostly bequeathed to siblings (39%) and other relatives (45%), followed by friends (10%) and charity (6%). Hurd and Smith (2002) report as well that if single individuals have children they bequeath 92% of their wealth to them. In addition, they report that married individuals bequeath 80% of their wealth to the surviving spouse. The latter result is in line with what we report in Table 11, which shows no effect for individuals who die within a couple.

30 Individuals below the median have very little or no wealth.

31 For a detailed description of this estimation method, see Firpo *et al.* (2009).

upper half of the distribution. In both cases, absolute effects increase as we move up the distribution, while relative effects either decrease or stay relatively stable.

Comparing the different percentiles, we see that for financial wealth the effects at the top of the distribution differ significantly, at the 99% level of confidence, from those at the median and at the 75th percentile. This implies that effects estimated using OLS are not fully representative of what happens around the median. Kopczuk (2007) reports only average effects estimated using a sample of rich individuals in the US. Our results suggest that the results in that study would have differed, i.e. the absolute effects would have been significantly smaller, in case there had been a possibility to run median regressions.

If estate planning is triggered mostly by the motivation to avoid taxes, it makes sense that individuals at the top of the distribution show smaller or similar relative effects compared to the median, even when absolute effects are clearly larger. That is because the Dutch estate tax schedule limits the amount of yearly tax exemptions for inter-vivos transfers, thus not allowing the very rich to avoid most of their tax obligation in this way. It may be that individuals at the top of the distribution find other ways within the law to avoid paying taxes, so that transfers related to estate planning become relatively less important for them.

These results are relevant for two reasons. First, they show that the estimated effects differ across the wealth distribution, which is something that Kopczuk (2007) cannot show since he observes only the top 6% of observations. Second, they show that the effects are substantial from the median onwards, which means that estate planning and inter-vivos gifts are not only relevant for those at the top of the wealth distribution. This is in contrast with the common assumption in the literature stating that bequests are a luxury good and that are thus only relevant for those at the top of the distribution.[32]

6. CONCLUSION

In the present study we provide evidence on estate planning and inter-vivos transfers. To do so, we use a comprehensive administrative dataset, including all deaths that occurred in the Netherlands between 2006 and 2013. We regress wealth at time of death on a dummy variable indicating sudden deaths while controlling for gender, age, marital status, household structure, permanent income, and children characteristics. We find that individuals who do not suffer a sudden death die with less wealth compared to individuals who suffer a sudden death. The baseline effects are significant at the 1% level for couples and at the 0.1% level for singles. They range from −4.54% for the net worth of couples to −11.63% for the net financial wealth of singles. When controlling for the possibility of income shocks explaining our results, we find that the effect for couples becomes less significant, while the effect for singles stays strong and significant.

32 For a review of the literature on the bequest motive, see Suari-Andreu *et al.* (2019).

In addition, we find that the effect is somewhat stronger at older ages, and that it is especially strong when we focus on singles who die of cancer.

Following Kopczuk (2007), we interpret these results as capturing estate planning towards the end of life. Given the Dutch institutional context, where, as explained by Bakx *et al.* (2016) health and long-term care expenditures are insured to a very large extent, the results are unlikely to be explained by increased out-of-pocket medical expenditures among individuals who suffer a non-sudden death. This is supported by the results provided by Penders et al. (2017), who show that out-of-pocket medical expenditures during the last year of life in the Netherlands are far from being large enough to be able to explain our results. Our interpretation is also supported by the fact that our baseline results do not change significantly once we exclude from the sample individuals who reside in nursing homes.

The results are also unlikely to be explained by differential non-medical consumption patterns between individuals who suffer a sudden death and individuals who do not. That is because van Ooijen *et al.* (2018) find, using a representative Dutch survey covering the years in our sample, that transitions into poor health have a negative effect on non-medical consumption. This is in line with a large body of literature that has repeatedly shown that poor health has a negative effect on the marginal utility of consumption. In addition, van Ooijen *et al.* (2018) show that the decrease in non-medical expenditures is not compensated by an increase in medical expenditures. Therefore, if individuals who do not suffer a sudden death experience worse health prior to death, any negative relation between non-sudden death and wealth at the end of life will reflect a lower bound because of the increase in wealth due to reduced consumption. Finally, van Ooijen *et al.* (2018) find as well that poor health leads to a stronger decline in consumption for singles, increases expenditures on gifts, and decreases expenditures on vacations. This is all very much in line with our interpretation of the results we obtain.

The fact that we find the strongest effects when using net financial wealth for singles as a dependent variable points as well in the direction that we are indeed capturing estate planning type of behaviour. That is because, on the one hand, transfers are arguably more likely to take place in the form of liquid wealth while, on the other hand, married individuals are likely to have a bequest motive towards their partner, which we do not capture since we observe wealth at the household level. Given these results, the richness of our data, and the adequacy of the Dutch context, our study provides additional credibility to the strategy by Kopczuk (2007) to capture the presence of estate planning and inter-vivos transfers.

Finding a significant effect even if we measure wealth only at the end of the year previous to death indicates that the inter-vivos transfers we capture may take place over a relatively long period of time. This is in line with the fact that many individuals in our sample experienced hospital admissions related to the cause of death already several years before death. There are several reasons why these transfers could take place over several years. First, it may simply be because individuals are never perfectly certain about their remaining lifetime. Second, if transfers occur for tax purposes it is beneficial to transfer the tax-exempt amount every year, and in any case to transfer wealth at least six months before death. Third, if the transfers respond to a pure giving motive, individuals may prefer smoothing transfers over time, or at least providing them with enough time, such that the utility derived from giving can be maximised. A similar argument applies in the case of transfers being provided in exchange for informal care. Future work is needed to measure the relative importance of these different motives.

Given our results and the tax incentives embedded in the Dutch system, it is very likely that, at least partially, inter-vivos transfers are motived by tax avoidance. However, it is difficult to separately identify the tax motive from exchange and/or the joy of giving as these motives are not necessarily mutually exclusive. As an addition to our results, we test whether the change in the gift and inheritance tax schedule that took place in 2010 has an effect on our results and find no significant impact. This does not provide support for the tax motive but does not rule it out. Future work is required to investigate the effect of changes in the inheritance tax schedule and to separately identify the tax motive.

Nevertheless, regardless of the exact motive, the presence of inter-vivos transfers indicates that the gift and inheritance tax schedule could be reformed to prevent tax avoidance and maximize revenue. This could be done in at least two different ways. First, by increasing the current look-back period of 6 months. In the Netherlands, only transfers that take place up to 6 months previous to death are considered as part of the inheritance for tax purposes. This is a rather short period compared to other countries and extending it would give individuals less room for tax avoidance. Second, by limiting the number of times individuals can use the yearly exemptions on inter-vivos transfers. Currently, the basic yearly exemption can be used once a year per child. Given that our results show that inter-vivos transfers related to estate planning potentially take place over several years, it may be useful to cap the number of times these exemptions can be used.

Further work is needed to explore the broader implications of inter-vivos transfers at the end of life for the understanding of the saving and consumption behaviour of individuals over the life cycle. On the one hand, it may be that the preference for giving is triggered only towards the end of life. On the other hand, this preference may also influence individuals' decisions earlier in the life cycle. This would be in line with the results in Kopczuk and Lupton (2007) and Lockwood (2012, 2018), who study the presence and intensity of the bequest motive using structural models.

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REFERENCES

Abadie, A., S. Athey, G. Imbens and J. Wooldridge (2014). 'Finite population causal standard errors', NBER Working Paper, 20325, Cambridge, MA.

Alessie, R., V. Angelini and G. Pasini (2014). 'Is it true love? Altruism versus exchange in time and money transfers', *De Economist*, 162, 193–213.

Andersen, S. and K. M. Nielsen (2010). 'Participation constraints in the stock market: evidence from unexpected inheritance due to sudden death', *The Review of Financial Studies*, 24, 1667–97.

Andersen, S. and K.M. Nielsen (2016). 'Fire sales and house prices: evidence from estate sales due to sudden death', *Management Science*, 63, 201–12.

Attanasio, O. and C. Emmerson (2003). 'Mortality, health status, and wealth', *Journal of the European Economic Association*, 1, 821–50.

Babiarz, P. and T. Yilmazer (2017). 'The impact of adverse health events on consumption: understanding the mediating effect of income transfers, wealth, and health insurance', *Health Economics*, 26, 1743–58.

Bakx, P., B. Wouterse, E. Van Doorslaer and A. Wong (2020). 'Better off at home? Effects of nursing home eligibility on costs, hospitalizations and survival', *Journal of Health Economics*, 73, 102354.

Bakx, P., O. O'Donnell and E. Doorslaer (2016). 'Spending on health care in the Netherlands: not going so Dutch', *Fiscal Studies*, 37, 593–625.

Blundell, R., M. Borella, J. Commault and M.D. Nardi (2020). 'Why does consumption fluctuate in old age and how should the government insure it?', NBER Working Paper, 27348 Cambridge, MA.

Brown, J., G. Shah Goda and K. McGarry (2013). 'State-dependent utility and insurance purchase decisions', NBER Working Paper, RRC NB13-06, Cambridge, MA.

—— (2016). 'Heterogeneity in state-dependent utility: evidence from strategic surveys', *Economic Inquiry*, 54, 847–61.

Coile, C. and K. Milligan (2009). 'How household portfolios evolve after retirement: the effect of aging and health shocks', *Review of Income and Wealth*, 55, 226–48.

De Meijer, C., M. Koopmanschap, T.B. d'Uva and E. Van Doorslaer (2011). 'Determinants of long-term care spending: age, time to death or disability?', *Journal of Health Economics*, 30, 425–38.

De Nardi, M., E. French and J. Jones (2009). 'Life expectancy and old age savings', *The American Economic Review*, 99, 110–5.

—— (2010). 'Why do the elderly save? The role of medical expenses', *Journal of Political Economy*, 118, 39–75.

—— (2016). 'Savings after retirement: a survey', *Annual Review of Economics*, 8, 177–204.

Eggink, E., M. Ras and I. Woittiez (2017). 'Dutch long-term care use in an ageing population', *The Journal of the Economics of Ageing*, 9, 63–70.

Ernst&Young (2017). 'Worldwide estate and inheritance tax guide', Ernst&Young.

Finkelstein, A., E. Luttmer and M. Notowidigdo (2009). 'Approaches to estimating the health state dependence of the utility function', *The American Economic Review*, 99, 116–21.

—— (2013). 'What good is wealth without health? The effect of health on the marginal utility of consumption', *Journal of the European Economic Association*, 11, 221–58.

Firpo, S., N. Fortin and T. Lemieux (2009). 'Unconditional quantile regressions', *Econometrica*, 77, 953–73.

French, E., J. McCauley, M. Aragon, P. Bakx, M. Chalkley, S. Chen, B. Christensen, H. Chuang, A. Côté-Sergent, M. De Nardi, E. Fan, D. Échevin, P.-Y. Geoffard, C. Gastaldi-Ménager, M. Gørtz, Y. Ibuka, J.B. Jones, M. Kallestrup-Lamb, M. Karlsson, T.J. Klein, G. de Lagasnerie, P.C. Michaud, O. O'Donnell, N. Rice, J.S. Skinner, E. van Doorslaer, N.R. Ziebarth, and E. Kelly. (2017). 'End-of-life medical spending in last twelve months of life is lower than previously reported', *Health Affairs*, 36, 1211–7.

French, E., J.B. Jones, E. Kelly and J. McCauley (2021) 'End-of-life medical expenses', in K. Ferraro and D. Carr (eds), *Handbook of Aging and the Social Sciences*, 393–410. Academic Press.

García-Gómez, P., H. van Kippersluis, O. O'Donnell and E. van Doorslaer (2013). 'Long-term and spillover effects of health shocks on employment and income', *Journal of Human Resources*, 48, 873–909.

Gyrd-Hansen, D. (2017). 'A stated preference approach to assess whether health status impacts on marginal utility of consumption', *Health Economics*, 26, 1224–33.
Hurd, M. (1989). 'Mortality risk and bequests', *Econometrica*, 57, 779–813.
Hurd, M., and J. Smith (2002). 'Expected bequests and their distribution', NBER Working Paper, 9142, Cambridge, MA.
Hussem, A., C. Van Ewijk, H. Ter Rele and A. Wong (2016). 'The ability to pay for long-term care in the netherlands: a life-cycle perspective', *De Economist*, 164, 209–34.
Johnson, C., M. Davis, A. Law and J. Sulpher (2016). 'Shared risk factors for cardiovascular disease and cancer: implications for preventive health and clinical care in oncology patients', *Canadian Journal of Cardiology*, 32, 900–7.
Kaspers, P., R. Pasman, B. Onwuteaka-Philipsen and D. Deeg (2013). 'Changes over a decade in end-of-life care and transfers during the last three months of life: a repeated survey among proxies of deceased older people', *Palliative Medicine*, 27, 544–52.
Knoef, M., R. Alessie and A. Kalwij (2013). 'Changes in the income distribution of the Dutch elderly between 1989 and 2020: a dynamic microsimulation', *Review of Income and Wealth*, 59, 460–85.
Koning, P. and M. Lindeboom (2015). 'The rise and fall of disability insurance enrollment in the Netherlands', *Journal of Economic Perspectives*, 29, 151–72.
Kopczuk, W. (2007). 'Bequest and tax planning: evidence from estate tax returns', *The Quarterly Journal of Economics*, 122, 1801–54.
—— (2010). 'Economics of estate taxation: a brief review of theory and evidence', NBER Working Paper, 15741, Cambridge, MA
Kopczuk, W., and J. Lupton (2007). 'To leave or not to leave: the distribution of bequest motives', *The Review of Economic Studies*, 74, 207–35.
Lockwood, L. (2012). 'Bequest motives and the annuity puzzle', *Review of Economic Dynamics*, 15, 226–43.
—— (2018). 'Incidental bequests and the choice to self-insure late-life risks', *The American Economic Review*, 108, 2513–50.
Lusardi, A. and O. Mitchell (2008). 'Planning and financial literacy: how do women fare?', *The American Economic Review*, 98, 413–7.
McGarry, K. (2013). 'The estate tax and inter vivos transfers over time', *The American Economic Review*, 103, 478–83.
—— (2016). 'Dynamic aspects of family transfers', *Journal of Public Economics*, 137, 1–13.
Mesch, D., M. Brown, Z. Moore and A.D. Hayat (2011). 'Gender differences in charitable giving', *International Journal of Nonprofit and Voluntary Sector Marketing*, 16, 342–55.
Meyer, B. and W. Mok (2019). 'Disability, earnings, income and consumption', *Journal of Public Economics*, 171, 51–69.
Norton, E., L. Nicholas and S. S.-H. Huang (2013). 'Informal care and inter-vivos transfers: results from the national longitudinal survey of mature women', *The BE Journal of Economic Analysis & Policy*, 14, 377–400.
Orlovic, M., J. Marti, and E. Mossialos.(2017). 'Analysis of End-of-Life care, Out-of-Pocket Spending, and Place of Death in 16 European Countries and Israel',.*Health Affairs*, 36, 1201–10.
Palomino, J., G. Marrero, B. Nolan and J. Rodríguez (2022). 'Wealth inequality, intergenerational transfers, and family background', *Oxford Economic Papers*, 74, 643–70.
Penders, Y., J. Rietjens, G. Albers, S. Croezen and L. Van den Block (2017). 'Differences in out-of-pocket costs of healthcare in the last year of life of older people in 13 European countries', *Palliative Medicine*, 31, 42–52.
Piketty, T., and G. Zucman (2015). 'Wealth and inheritance in the long run', in A.B. Atkinson and F. Bourguignon (eds.), *Handbook of Income Distribution*, Vol. 2, 1303–68. Amsterdam: Elsevier.
Polder, J., J. Barendregt and H. van Oers (2006). 'Health care costs in the last year of life: the dutch experience', *Social Science & Medicine*, 63, 1720–31.
Post, T., and K. Hanewald.(2013). 'Longevity Risk, Subjective Survival Expectations, and Individual Saving Behavior',.*Journal of Economic Behavior & Organization*, 86, 200–20.
Rice, T., W. Quentin, A. Anell, A. Barnes, P. Rosenau, L. Unruh and E. Van Ginneken (2018). 'Revisiting out-of-pocket requirements: trends in spending, financial access barriers, and policy in ten high-income countries', *BMC Health Services Research*, 18, 1–18.

Rohwedder, S., M. Hurd and P. Hudomiet (2022). 'Explanations for the decline in spending at older ages', NBER Working Paper, 30460, Cambridge, MA.
Rolden, H., D. van Bodegom and R. Westendorp (2014). 'Variation in the costs of dying and the role of different health services, socio-demographic characteristics, and preceding health care expenses', *Social Science & Medicine*, 120, 110–7.
Siegel, R., K. Miller and A. Jemal (2017). 'Cancer statistics, 2017', *CA: A Cancer Journal for Clinicians*, 67, 7–30.
Simonsen, N. and T. Kjær (2021). 'New evidence of health state dependent utility of consumption: a combined survey and register study', DaCHE Discussion Paper, 2/2021, Odense, Denmark.
Suari-Andreu, E. (2018). 'Housing, savings and bequests over the life cycle', PhD Thesis, University of Groningen.
Suari-Andreu, E., R. Alessie and V. Angelini (2019). 'The retirement-savings puzzle reviewed: the role of housing and bequests', *Journal of Economic Surveys*, 33, 195–225.
van Ooijen, R., J. de Bresser and M. Knoef (2018). 'Health and household expenditures', Netspar Design Paper, 103, Tilburg, the Netherlands.
van Ooijen, R., R. Alessie and A. Kalwij (2015). 'Saving Behavior and Portfolio Choice After Retirement', *De Economist*, 163, 353–404.
Vincent, L., D. Leedy, S. C. Masri and R. Cheng (2019). 'Cardiovascular disease and cancer: is there increasing overlap?', *Current Oncology Reports*, 21, 1–13.
Viscusi, K. and W. Evans (1990). 'Utility functions that depend on health status: estimates and economic implications', *The American Economic Review*, 80, 353–74.
WHO. (2016). *International Classification of Diseases and Related Health Problems. 10th Revision. Volume 2: Instruction Manual*, WHO Press, Geneva.
Wong, A., P. van Baal, H. Boshuizen and J. Polder (2011). 'Exploring the influence of proximity to death on disease-specific hospital expenditures: a carpaccio of red herrings', *Health Economics*, 20, 379–400.

APPENDICES

A. VARIABLE DEFINITIONS AND SUMMARY STATISTICS

Table A.1. Variable definitions

Variable	Definition
Net worth	Total assets minus total liabilities at the household level. Measured as of December 31 of the year prior to death.
Net financial wealth	Sum of deposits, savings accounts, stocks and bonds, minus non-mortgage debt at the household level. Measured as of December 31 of the year prior to death.
Sudden death	Dummy variable indicating unexpected deaths that occur instantaneously or within a few hours of an abrupt change in a person's clinical state. Operationalized using the ICD-10 categories for myocardial infarction, cardiac arrest, congestive heart failure, stroke, sudden death from unknown causes, transport accidents, and death caused by other accidents and violence. Individuals with one or more hospital admissions due to cardiovascular disease are excluded from the sudden death category if their death resulted from one of the cardiovascular causes mentioned here.
Marital status	Marital status of single decedents. 1: Never married; 2: Divorced or separated; 3: Widowed.
Household structure	Demographic structure of the household. 1: One-person household; 2: Single parent; 3: Couple without children; 4: Couple with children; 5: Multiperson household; 6: Institutionalized household.

(*continued*)

Table A.1. Continued

Variable	Definition
Age	The age groups for the baseline analysis are: age<50, 50–59, 50–69, 70–79, 80–89, age≥90. The age groups for the heterogeneity analysis are: age<70; 70–84; age≥85.
Permanent income	If the main source of income in the year prior to death is not pension income: average of yearly equivalized household income between 2003 and the year prior to death. If the main source of income the year prior to death is pension income: equivalized household income in the year prior to death. Income is equivalized by diving it by the square root of the number of members in the household.
Delay	Measure in days of the delay between wealth measurement and time of death. Wealth measurement corresponds to December 31 of the year prior to death.
Children outside	Presence of children outside the household.
Average age of children	Average age of the children of the decedent.
Average permanent income of children	Average permanent income of the children of the decedent. Permanent income is computed using the same method as for the permanent income of the decedent.

Notes: ICD-10 stands for the International Statistical Classification of Diseases and Related Health Problems assembled by the World Health Organization.

Table A.2. Summary statistics – singles

Variable	Mean	Median	Std. Dev.	Min.	Max.
Net worth	139,193.80	22,073	487,880.70	−2.06e + 07	6.69e + 07
Net financial wealth	64,047.77	15,759	361,415.90	−2.06e + 07	6.59e + 07
Sudden death	0.16	–	–	–	–
Female	0.52	–	–	–	–
Marital status					
Never married	0.48	–	–	–	–
Divorced or separated	0.15	–	–	–	–
Widowed	0.35	–	–	–	–
Household structure					
One person household	0.58	–	–	–	–
Single parent	0.05	–	–	–	–
Multiperson household	0.06	–	–	–	–
Institutionalized household	0.31	–	–	–	–
Age					
<70	0.13	–	–	–	–
70–85	0.24	–	–	–	–
>85	0.63	–	–	–	–
Permanent income	18,364.87	16,100	9,573.88	−353,553.40	670,258.80
Retired	0.81	–	–	–	–
Delay	177.63	174	107.72	0	365
Presence of children outside	0.71	–	–	–	–
Average age of children	52.10	53.50	10.18	0	89
Average permanent income of children	23,802.62	22,074.25	10,669.25	−139,308.30	766,374.40

Note: All summary statistics are based on the number of observations in the singles regressions of Panel (a) in Table 9, that is, 623,039.

Table A.3. Summary statistics – couples

Variable	Mean	Median	Std. Dev.	Min	Max.
Net worth	247,456.60	100,122	847,030.50	−1.42e + 07	2.58e + 08
Net financial wealth	94,809.91	24,821	701,322.9	−6.96e + 07	2.53e + 08
Sudden death	0.11	–	–	–	–
Female	0.33	–	–	–	–
Household structure					
Couple without kids	0.79	–	–	–	–
Couple with kids	0.09	–	–	–	–
Multiperson household	0.03	–	–	–	–
Institutionalized household	0.07	–	–	–	–
Age					
<70	0.35	–	–	–	–
70–85	0.50	–	–	–	–
>85	0.15	–	–	–	–
Permanent income	20,523.30	17,937.18	11,046.35	−353,553.40	707,106.80
Retired	0.74	–	–	–	–
Delay	181.09	179	107.31	0	365
Presence of children outside	0.84	–	–	–	–
Average age of children	44.23	45	9.21	0	86
Average permanent income of children	23,109.44	21,593.64	9,744.10	−183,785.50	506,818

Note: All summary statistics are based on the number of observations in the couples regressions of Panel (a) in Table 9, that is, 450,243.

Table A.4. Sudden death categories ICD-10

Category	Frequency	Percentage
Acute myocardial infarction	34,578	24.41
Cardiac arrest	13,520	9.54
Congestive heart failure	23,533	16.61
Stroke	38,729	27.34
Transport accidents	4,670	3.30
Other accidents and violence	23,468	16.57
Sudden deaths from unknown causes	3,157	2.23
Total	141,655	100

Note: Causes of death are classified according to the ICD-10. For further information, see WHO (2016).

Table A.5. Cause of death categories ICD-10

Category	Frequency	Percentage
Infectious diseases	17,133	1.60
Neoplasms	338,811	31.57
Blood diseases	3,608	0.34
Endocrine, nutritional, and metabolic diseases	30,453	2.84
Mental and behavioural disorders	61,544	5.73
Diseases of the nervous system	37,382	3.48
Diseases of the ear and mastoid process	123	0.01
Diseases of the circulatory system	313,222	29.18
Diseases of the respiratory system	107,154	9.98
Diseases of the digestive system	41,170	3.84

(*continued*)

Table A.5. Continued

Category	Frequency	Percentage
Diseases of the skin	2,888	0.27
Diseases of the musculoskeletal system	6,909	0.64
Diseases of the genito-urinary system	26,194	2.44
Pregnancy, childbirth, and puerperium	57	0.01
Conditions originating in the perinatal period	3	0.00
Congenital malformations	1,703	0.16
Ill-defined conditions	41,942	3.91
External causes of morbidity and mortality	42,986	4.01
Total	1,073,282	100

Notes: Causes of death are classified according to the ICD-10. For further information, see WHO (2016).

Table A.6. Cancer deaths by type of cancer ICD-10

Category	Frequency	Percentage
Lung	79,836	23.56
Colon	30,501	9.00
Breast	25,897	7.64
Prostate	19,814	5.85
Pancreas	18,992	5.61
Oesophagus	12,652	3.73
Stomach	11,278	3.33
Other	139,841	41.27
Total	338,811	100

Note: Causes of death are classified according to the ICD-10. For further information, see WHO (2016).

B. ADDITIONAL RESULTS

Table B.1. Results – alternative permanent income

	Net worth		Net financial wealth	
(a)				
Singles	−7,780.86***	5.59%	−4,256.28***	7.07%
	(1,627.69)	(1.17%)	(1,269.56)	(2.11%)
Couples	−11.976.62**	4.84%	−8,195.25*	8.64%
	(3,635.44)	(1.47%)	(3,173.97)	(3.35%)
(b)				
Singles	−9,865.01***	7.08%	−7,094.43***	11.32%
	(1,802.32)	(1.29%)	(1,427.20)	(2.28%)
Couples	−12,027.96**	4.79%	−10,337.16**	10.91%
	(3,830.92)	(1.53%)	(3,305.47)	(3.49%)

Notes: Each cell provides an estimate of β_1 in Equation (1). Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 623,039 observations, while couples regressions include 450,243 observations. In Panel (b), singles regressions include 296,744 observations, while couples regressions include 245,849 observations.

*Significant at the 5% level.

**Significant at the 1% level.

***Significant at the 0.1% level.

Table B.2. Results – constant household structure

	Net worth		Net financial wealth	
(a)				
Singles	−7,686.98***	5.51%	−4,398.68***	6.84%
	(1,664.72)	(1.19%)	(1,296.74)	(2.02%)
Couples	−8.821.78**	3.56%	−5,295.59	5.59%
	(3,378.81)	(1.36%)	(2,832.78)	(2.99%)
(b)				
Singles	−9,689.02***	6.94%	−6,965.91***	11.08%
	(1,830.57)	(1.31%)	(1,445.38)	(2.30%)
Couples	−8,655.97*	3.45%	−7,246.44*	7.67%
	(3,535.30)	(1.41%)	(2,915.88)	(3.09%)

Notes: Each cell provides an estimate of β_1 in Equation (1). Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 623,039 observations, while couples regressions include 450,243 observations. In Panel (b), singles regressions include 296,744 observations, while couples regressions include 245,849 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.3. Results – by years since first hospital intake

		Net worth		Net financial wealth	
(a)					
Singles	Years	−693.39**	−0.50%	−593.95**	−0.93%
	since intake	(223.88)	(0.16%)	(180.61)	(0.28%)
	10+	−8,667.41***	−6.23%	−3,039.28	−4.75%
		(1,979.98)	(1.42%)	(1,679.09)	(2.62%)
Couples	Years	244.38	0.10%	−354.89	0.37%
	since intake	(489.54)	(0.20%)	(405.67)	(0.43%)
	10+	−10,013.24**	−4.05%	−3,271.77	−3.46%
		(3,253.60)	(1.31%)	(2,658.75)	(2.80%)
(b)					
Singles	Years	−1,107.77***	−0.80%	−506.80*	−0.81%
	since intake	(269.36)	(0.19%)	(218.83)	(0.35%)
	10+	−11,944.18***	−8.58%	−3,031.79	−4.84%
		(2,262.09)	(1.62%)	(1,915.22)	(3.06%)
Couples	Years	−269.21	−0.11%	−139.97	−0.15%
	since intake	(546.81)	(0.22%)	(448.59)	(0.47%)
	10+	−13,881.25***	−5.53%	−2,701.48	−2.85%
		(3,788.84)	(1.51%)	(3,099.49)	(3.27%)

Notes: Each cell provides results obtained when substituting the main explanatory variable in Equation (1) by a variable indicating the years since the first hospital intake related to the cause of death (taking values from 0 to 10) and a dummy variable indicating whether the first intake took place more than 10 years before death. Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 623,039 observations, while couples regressions include 450,243 observations. In Panel (b), singles regressions include 296,744 observations, while couples regressions include 245,849 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.4. Results – by years since first hospital intake (income shocks excluded)

		Net worth		Net financial wealth	
(a)					
Singles	Years since intake	−609.05*	−0.42%	−560.07**	−0.81%
		(243.49)	(0.17%)	(194.47)	(0.28%)
	10+	−9,812.16***	−6.69%	−4,145.40*	−6.03%
		(2,175.49)	(1.48%)	(1,839.40)	(2.67%)
Couples	Years since intake	519.62	0.20%	−311.61	−0.31%
		(609.60)	(0.24%)	(490.55)	(0.48%)
	10+	−4,145.69	−1.63%	1,680.09	1.65%
		(4,308.96)	(1.69%)	(3,702.51)	(3.64%)
(b)					
Singles	Years since intake	−1,223.64***	−0.83%	−533.445*	−0.78%
		(286.48)	(0.19%)	(231.12)	(0.34%)
	10+	−14,126.24***	−9.56%	−4,462.86*	−6.56%
		(2,463.17)	(1.67%)	(2,072.66)	(3.05%)
Couples	Years since intake	113.43	0.04%	−133.21	−0.13%
		(685.31)	(0.26%)	(535.59)	(0.52%)
	10+	−6,504.13	−2.51%	2,571.19	2.49%
		(5,007.93)	(1.93%)	(4,294.59)	(4.16%)

Notes: Each cell provides results obtained when substituting the main explanatory variable in Equation (1) by a variable indicating the years since the first hospital intake related to the cause of death (taking values from 0 to 10) and a dummy variable indicating whether the first intake took place more than 10 years before death. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 503,165 observations, while couples regressions include 317,843 observations. In Panel (b), singles regressions include 243,252 observations, while couples regressions include 164,729 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.5. Results – nursing homes excluded

	Net worth		Net financial wealth	
(a)				
Singles	−8,561.32***	−5.08%	−4,711.01**	−6.68%
	(2,257.55)	(1.34%)	(1,791.06)	(2.54%)
Couples	−11,533.73**	−4.52%	−7,618.09*	−7.86%
	(3,894.29)	(1.53%)	(3,411.09)	(3.52%)
(b)				
Singles	−11,679.87***	−7.12%	−8,138.47***	−11.96%
	(2,450.35)	(1.49%)	(1,965.30)	(2.89%)
Couples	−10,583.49*	4.21%	−9,554.68**	−9.92%
	(4,096.22)	(1.63%)	(3,534.73)	(3.67%)

Notes: Each cell provides an estimate of β_1 in Equation (1). Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In all regressions provided in this table, the number of observations are the same as in Table 9 except for the exclusion of institutionalized households. The share of institutionalized households is provided in Table 6.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.6. Results – nursing homes and income shocks excluded

	Net worth		Net financial wealth	
(a)				
Singles	−10,580.53***	−5.77%	−4,937.79**	−6.32%
	(2,394.40)	(1.31%)	(1,827.85)	(2.34%)
Couples	−12,121.28*	4.57%	−7,790.43	−7.41%
	(4,862.54)	(1.83%)	(4,311.83)	(4.10%)
(b)				
Singles	−12,052.73***	−6.69%	−7,814.64***	−10.24%
	(2,571.90)	(1.43%)	(2,012.92)	(2.64%)
Couples	−7,204.26	−2.68%	−8,351.24	−7.87%
	(5,142.63)	(1.91%)	(4,404.88)	(4.15%)

Notes: Each cell provides an estimate of β_1 in Equation (1). Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In all regressions provided in this table, the number of observations are the same as in Table 11 except for the exclusion of institutionalized households. The share of institutionalized households is provided in Table 6.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.7. Results – stress testing (net worth of singles)

	Without income shock correction		With income shock correction	
2010–2013				
Unconditional on hospital admissions	−12,433.24***	−8.08%	−14.063,52***	−8.64%
	(3,112.28)	(2.02%)	(3,440.57)	(2.11%)
Conditional on hospital admissions	−14,252.96***	−9.66%	−15.155,57***	−9.03%
	(3,632.67)	(2.46%)	(3,921.12)	(2.34%)
2011–2013				
Unconditional on hospital admissions	−12,700.64**	−8.67%	−15,011.51**	−9.63%
	(4,449.12)	(3.04%)	(5,189.09)	(3.33%)
Conditional on hospital admissions	−15,128.40**	−10.14%	−15.093,58*	−9.38%
	(4,702.96)	(3.15%)	(5,936.85)	(3.69%)
2012–2013				
Unconditional on hospital admissions	−11,149.69*	−7.57%	−12,237.77*	−8.18%
	(4,448.95)	(3.02%)	(5,201.76)	(3.48%)
Conditional on hospital admissions	−12,600.46*	−8.01%	−11,696.44	7.14%
	(5,234.20)	(3.33%)	(6,700.76)	(4.09%)
2013				
Unconditional on hospital admissions	−18,238.45*	12.43%	−23.221,70**	−14.81%
	(8,771.88)	(5.98%)	(7,208.69)	(4.60%)
Conditional on hospital admissions	−18.205,33*	−12.08%	−21.094,57*	−12.88%
	(7.542,11)	(5.00%)	(8,050.60)	(4.92%)

Notes: Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. The number of observations included in the regressions provided in this table go from 254,037 (top left) to 25,019 (bottom right).
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.8. Results – stress testing (financial wealth of singles)

	Without income shock correction		With income shock correction	
2010–2013				
Unconditional on hospital admissions	−7,699.82*	−11.85%	−8,749.54*	−12.49%
	(3,004.43)	(4.62%)	(3,531.54)	(5,04%)
Conditional on hospital admissions	−10,335.58**	−15.80%	−10,674.10**	−14.93%
	(3,195.91)	(4.88%)	(3,958.85)	(5.54%)
2011–2013				
Unconditional on hospital admissions	−7,093.16	−10.73%	−7,557.43	−10.58%
	(4,010.42)	(6.07%)	(4,765.63)	(6.67%)
Conditional on hospital admissions	−10,310.32*	−15.57 %	−9,491.34	−13.02%
	(4,224.51)	(6.38%)	(5,490.11)	(7.53%)
2012–2013				
Unconditional on hospital admissions	−5,114.08	−7.72%	−4,317.02	−6.00%
	(4,002.79)	(6.04%)	(4,897.89)	(6.81%)
Conditional on hospital admissions	−7,784.98	−11.59 %	−5,946.50	−8.02%
	(4,751.67)	(7.07%)	(6,366.15)	(8.59%)
2013				
Unconditional on hospital admissions	−9,666.94	−14.95%	−10,529.56	−15.18%
	(5,902.11)	(9.13%)	(6,591.41)	(9.50%)
Conditional on hospital admissions	−10,740.86	−16.40%	−11,303.33	−15.88%
	(6,646.70)	(10.15%)	(7,374.24)	(10.36%)

Notes: Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. The number of observations included in the regressions provided in this table go from 254,037 (top left) to 25,019 (bottom right).
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.9. Results – stress testing (net worth of couples)

	Without income shock correction		With income shock correction	
2010–2013				
Unconditional on hospital admissions	−7.499,38	−2.86 %	−4,825.78	−1.76%
	(6.280,68)	(2.40%)	(7,399.45)	(2.70%)
Conditional on hospital admissions	−8.469,32	−3.22%	−219.06	−0.08%
	(6,968.45)	(2.65%)	(9,389.10)	(3.43%)
2011–2013				
Unconditional on hospital admissions	−12,134.56	−4.98%	−8,177.50	−2.94%
	(8,059.65)	(3.31%)	(9,489.96)	(3.41%)
Conditional on hospital admissions	−13,956.25	−5.27%	−4,050.98	1.44%
	(8,999.77)	(3.40%)	(11,748.24)	(4.18%)
2012–2013				
Unconditional on hospital admissions	−16,774.22	6.35%	−12,718.38	−4.57%
	(11,060.51)	(4.19%)	(12,443.48)	(4.47%)
Conditional on hospital admissions	−18,907.72	7.14%	−11,233.48	−3.98%
	(11,420.65)	(4.31%)	(10,392.05)	(3.68%)
2013				
Unconditional on hospital admissions	−34,949.26	−13.03%	−28.572,96	−10.10%
	(21,435.99)	(7.99%)	(23.585,90)	(8.34%)

(*continued*)

Table B.9. Continued

	Without income shock correction		With income shock correction	
Conditional on hospital admissions	−34,996.53 (22,116.85)	−12.94% (8.18%)	−22,552.99 (19,908.94)	−7.82% (6.90%)

Notes: Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. The number of observations included in the regressions provided in this table go from 263,588 (top left) to 28,727 (bottom right).
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.10. Results – stress testing (financial wealth of couples)

	Without income shock correction		With income shock correction	
2010–2013				
Unconditional on hospital admissions	−3,309.71 (5,591.14)	−3.28% (5.54%)	−789.06 (6,309.74)	−0.73% (5.84%)
Conditional on hospital admissions	−7,062.60 (5,840.85)	−7.20% (5.95%)	−3,230.07 (5,333.92)	−3.00% (4.95%)
2011–2013				
Unconditional on hospital admissions	−8,807.14 (7,278.87)	−8.75% (7.23%)	−5,192.04 (8,246.06)	−4.73% (7.51%)
Conditional on hospital admissions	−12,485.64 (7,609.05)	−12.71% (7.75%)	−8,715.99 (6,677.62)	−8.07% (6.18%)
2012–2013				
Unconditional on hospital admissions	−10,585.14 (10.469,16)	−10.45% (10.34%)	−6,942.87 (11,747.29)	−6.30% (10.66%)
Conditional on hospital admissions	−13,743.26 (10,775.10)	−13.74% (10.77%)	−8,322.04 (9,355.93)	−7.51% (8.44%)
2013				
Unconditional on hospital admissions	−26,146.24 (20.677,93)	−25.27% (19.98%)	−26,484.72 (21,342.39)	−25.44% (20.50%)
Conditional on hospital admissions	−20.001,35 (22,701.61)	−17.90% (20.32%)	−16.107,07 (18,608.81)	−14.07% (16.25%)

Notes: Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. The number of observations included in the regressions provided in this table go from 263,588 (top left) to 28,727 (bottom right).
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.11. Results – before and after tax reform

		Net worth		Net financial wealth	
(a)					
Singles	*Year* < *2010*	−4,198.12*	−3.06%	−2,915.10*	−4.64%
		(1,932.54)	(1.41%)	(1,308.87)	(2.08%)
	Year ≥ *2010*	−12,009.72***	−8.51%	−6,681.47**	−10.24%
		(2,700.32)	(1.91%)	(2,259.31)	(3.46%)
Couples	*Year* < *2010*	−11,676.07**	−4.66%	−8,370.51*	−8.84%
		(4,443.82)	(1.77%)	(3,590.10)	(3.79%)
	Year ≥ *2010*	−12,856.97*	−5.26%	−8,838.48	−9.31%
		(5,813.55)	(2.38%)	(5,347.48)	(5.64%)
(b)					
Singles	*Year* < *2010*	−7,210.56**	−5.29%	−6,660.33***	−11.01%
		(2,169.02)	(1.59%)	(1,464.76)	(2.42%)
	Year ≥ *2010*	−13,769.74***	−9.69%	−8,558.52**	−13.24%
		(2,809.74)	(1.98%)	(2,474.75)	(3.83%)
Couples	*Year* < *2010*	−11,350.95*	−4.47%	−10,642.17**	−11.26%
		(4,696.52)	(1.85%)	(3,678.54)	(3.89%)
	Year ≥ *2010*	−13,070.96*	−5.27%	−10,843.94	−11.43%
		(6,083.57)	(2.45%)	(5,550.77)	(5.85%)

Notes: Each cell provides results of interacting the main explanatory variable in Equation (1) with a dummy taking value one for the years after 2009. Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 623,039 observations, while couples regressions include 450,243 observations. In Panel (b), singles regressions include 296,744 observations, while couples regressions include 245,849 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.12. Results – before and after tax reform (income shocks excluded)

		Net worth		Net financial wealth	
(a)					
Singles	*Year* < *2010*	−6,385.91**	−4.43%	−3,378.84*	−4.97%
		(2,006.01)	(1.39%)	(1,339.58)	(1.97%)
	Year ≥ *2010*	−12,633.02***	−8.49%	−6,651.43**	−9.56%
		(2,735.43)	(1.84%)	(2,176.95)	(3.13%)
Couples	*Year* < *2010*	−13,561.42*	−5.33%	−10,547.33*	−10.29%
		(5,486.00)	(2.16%)	(4,516.47)	(4.41%)
	Year ≥ *2010*	−10,960.45	−4.33%	−6,264.56	−6.20%
		(6,952.76)	(2.75%)	(6,446.69)	(6.38%)
(b)					
Singles	*Year* < *2010*	−8,203.78***	−5.68%	−6,443.14***	−9.69%
		(2,273.32)	(1.57%)	(1,548.18)	(2.33%)
	Year ≥ *2010*	−12,831.75***	−8.51%	−8,075.41**	−11.62%
		(2,948.28)	(1.95%)	(2,400.36)	(3.45%)
Couples	*Year* < *2010*	−12,215.00*	−4.72%	−12,343.84**	−11.89%
		(5,760.78)	(2.23%)	(4,575.84)	(4.41%)

(*continued*)

Table B.12. Continued

	Net worth		Net financial wealth	
Year ≥ 2010	−5,546.16	−2.14%	−6,373.03	−6.21%
	(7,372.42)	(2.85%)	(6,668.21)	(6.50%)

Notes: Each cell provides results of interacting the main explanatory variable in Equation (1) with a dummy taking value one for the years after 2009. Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Panel (b) provides the same estimates as Panel (a) conditional on non-sudden deaths having at least one hospital admission related to cause of death before the wealth measurement. In Panel (a), singles regressions include 503,165 observations, while couples regressions include 317,843 observations. In Panel (b), singles regressions include 243,252 observations, while couples regressions include 164,729 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.13. Results – age interaction (singles)

	Net worth		Net financial wealth	
Age<55	4,553.49	3.27%	−6,108.77	−9.75%
	(6,894.91)	(4.95%)	(5,237.66)	(8.36%)
55≤Age<60	7,141.92	5.13%	−1,787.34	−2.85%
	(6,407.44)	(4.60%)	(4,824.48)	(7.70%)
60≤Age<65	−17,562.64	−12.61%	−12,378.3	−19.76%
	(17,355.03)	(12.47%)	(16,852.4)	(26.90%)
65≤Age<70	−16,026.4	−11.51%	−4,264.2	−6.81%
	(11,297.56)	(8.11%)	(4,914.26)	(7.85%)
70≤Age<75	−18,468.49*	−13.26%	−14,047.78**	−22.43%
	(7,913.8)	(5.68%)	(5,779.3)	(9.23%)
75≤Age<80	−9,868.43*	−7.09%	−8,302.09**	−13.25%
	(4,235.29)	(3.04%)	(2,701.59)	(4.31%)
80≤Age<85	−9,218.78*	−6.62%	−4,380.72	−6.99%
	(3,645.94)	(2.62%)	(2,740.4)	(4.37%)
85≤Age<90	−8,237.06**	−5.92%	−7,739.25***	−12.36%
	(3027.02)	(2.17%)	(2214.27)	(3.53%)
Age>95	−14,231.11**	−10.22%	−7,298.4*	−11.65%
	(4,142.44)	(2.98%)	(3,618.34)	(5.78%)

Notes: Each cell provides an estimate of the main effect for each age group. Percentage effects are presented next to each coefficient estimate. Estimates are obtained by interacting $NON-SUDDEN_i$ in Equation (1) with age dummies. Heteroskedasticity-robust standard errors are provided in parentheses. All estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. Regressions include 296,744 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.14. Results – type of cancer (singles)

	Net worth		Net financial wealth	
Lung	−22,593.42***	−19.02%	−13,458.96***	−29.98%
	(3,860.92)	(3.25%)	(2,585.02)	(5.76%)
Colon	−11,231.83*	−6.80%	−18,376.86***	−27.81%
	(5,049.69)	(3.06%)	(3,575.05)	(5.41%)
Breast	−7,512.25	−4.94%	−14,946.51***	−23.89%
	(4,464.04)	(2.94%)	(3,673.49)	(5.87%)
Prostate	−9,283.70	−4.71%	−20,251.44***	−25.17%
	(7,683.50)	(3.90%)	(5,296.22)	(6.58%)
Pancreas	−11,474.55	−6.83%	−19,759.75***	−30.02%
	(7,008.99)	(4.17%)	(5,449.64)	(8.28%)

Notes: Each cell provides an estimate of the main effect for each age or cause of death group. Percentage effects are presented next to each coefficient estimate. Estimates are obtained by interacting $NON{-}SUDDEN_i$ in Equation (1) with type of cancer dummies. Heteroskedasticity-robust standard errors are provided in parentheses. All estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. Regressions include 296,744 observations.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.15. Results – by permanent income of children (singles)

	Net worth		Net financial wealth	
Q1	−14,225.75**	−10.22%	−6,488.93	−10.36%
	(5,477.32)	(3.93%)	(4,212.77)	(6.73%)
Q2	−4,938.05	−3.55%	−1,593.46	−2.54%
	(2,733.39)	(1.96%)	(2,090.23)	(3.34%)
Q3	−9,718.90***	−6.98%	−3,635.86*	−5.80%
	(2,962.91)	(2.13%)	(1,710.85)	(2.73%)
Q4	−7,443.05	−5.35%	−4,431.69	−7.07%
	(5,465.02)	(3.93%)	(4,727.34)	(7.55%)

Notes: Estimates are obtained by interacting $NON{-}SUDDEN_i$ in Equation (1) with dummies indicating the quartile within the distribution of the average permanent income of children. Percentage effects are presented next to each coefficient estimate. Heteroskedasticity-robust standard errors are provided in parenthesis. Only individuals with children are included in the sample. The regression equations include the number of children living outside of the household and their average age. Estimates are conditional on non-sudden deaths having at least one previous hospital admission related to cause of death before the wealth measurement. The number of observations is 296,665.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 0.1% level.

Table B.16. Full regression results (baseline)

	Net worth		Net financial wealth	
	Singles (1)	Couples (2)	Singles (3)	Couples (4)
Non-sudden death	−7.64***	−11.37**	−4.45***	−7.80*
	(1.64)	(3.64)	(1.28)	(3.18)
Female	11.41***	11.48***	16.33***	12.67***
	(2.00)	(2.42)	(1.85)	(1.99)
Divorced	−40.55***		−12.81***	
	(2.11)		(1.72)	
Widowed	−3.72		−13.54***	
	(1.51)		(1.33)	
Single parent	−1.56		−23.73***	
	(5.43)		(4.99)	
Couple with kids		−28.15		−44.33***
		(20.23)		(12.51)
Multiperson household	18.60	−68.57	4.61	−75.55***
	(9.76)	(44.66)	(6.62)	(13.42)
Institutionalized household	−11.85***	−2.10	26.38***	33.99***
	(2.82)	(8.91)	(2.71)	(7.41)
Age 50–59	28.28***	−32.93***	−0.22	−65.49***
	(3.40)	(8.17)	(2.57)	(7.13)
Age 60–69	141.93***	148.23***	59.05***	31.83***
	(5.39)	(8.13)	(4.41)	(6.57)
Age 70–79	210.66***	263.94***	102.85***	114.88***
	(6.48)	(7.98)	(5.11)	(6.15)
Age 80–89	215.55***	284.82***	108.73***	144.42***
	(6.73)	(8.30)	(5.45)	(6.49)
Age ≥90	220.52***	302.79***	114.48***	173.79***
	(7.36)	(10.23)	(5.97)	(8.10)
Permanent income	22.18***	29.42***	16.32***	21.34***
	(1.08)	(1.57)	(1.10)	(1.51)
Retired	−193.22***	−172.36***	−122.38***	−91.74***
	(5.20)	(8.30)	(3.59)	(6.51)
Delay	−5.45	−21.88	−2.66	−16.07
	(5.38)	(13.10)	(4.00)	(11.47)
R^2	0.23	0.16	0.20	0.12
Observations	623,039	450,243	623,039	450,243

Notes: Heteroskedasticity-robust standard errors are provided in parentheses. All coefficients are given in thousands of euros except for *permanent income* and *delay*. The category *one-person household* is used as a reference category for the household structure of single households, while the category *couple without kids* is used for married households. All regressions include dummy variables indicating year of death.
*Significant at the 1% level.
**Significant at the 0.5% level.
***Significant at the 0.1% level.

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