Housing and Saving in Retirement Across Countries[*]

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Abstract

The so-called "retirement saving puzzle" is the phenomenon that many households in the U.S. have significant wealth late in life, contrary to the predictions of a deterministic life-cycle model. In this project, we collect facts on cross-country differences in saving behavior of retirees, in order to weigh in on the discussion of the puzzle. First, we find that countries in our sample vary noticeably in the extent of the puzzle: one group of countires, in South and Central Europe, look like the U.S., while in another group, in Northern Europe, retirees spend down their wealth much more rapidly. Second, we show that in order to understand the rates of dissaving across countries, one needs to understand differences in housing assets, as housing constitutes the majority of wealth for a median retiree in many countries, and dissaving in housing is highly correlated with overall dissaving. Finally, we examine institutional differences and differences in risks between countries, based on the literature as well as measurement from our data, where possible. These provide a number of promising explanations that should be examined in future research.

Keywords: housing, homeownership, saving, retirement, life cycle, retirement saving puzzle, cross-country variation.

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1   Introduction

In the United States, households have, on average, significant positive wealth late in life. In the Health and Retirement Study, median net worth of a household at age 90 was about \$75,000 in 2006. The large literature on the subject, sometimes referred to as the retirement saving puzzle, has studied a number of possible explanations for why retirees do not spend down wealth quickly, which have included longevity risk, bequest motives, precautionary motives and medical expense risk, and public care aversion.

Most authors in the literature study net worth of retirees. Instead, Nakajima and Telyukova (2013) show that housing plays a major role in saving patterns of retirees, and that once illiquidity of housing, relative to financial assets, is taken into account in a structural model of life-cycle saving, it changes previous conclusions about the relative roles of risk, bequests and other factors in explaining saving behavior late in life.[1] This result suggests that in order to understand the retirement saving puzzle fully, housing assets need to be studied separately from financial assets.[2]

In this paper, we summarize empirical facts on *cross-country* variation in saving in retirement, distinguishing housing from financial assets, in order to build on our previous findings based on richer data variation. Using household-level data from the U.S., U.K., and ten developed economies in continental Europe, we document cross-sectional age profiles for retirees age 65 and above of net worth, housing and financial assets, as well as homeownership rates and debt. We also review some of the many differences in institutions and risk characteristics of retirement in these countries, focusing in particular on the prevalence of out-of-pocket medical and long-term care expenses, as well as differences in housing and mortgage markets, and social safety nets.

More specifically, we use the U.S. Health and Retirement Study (HRS), the English Longitudinal Study of Ageing (ELSA), and the Survey of Health, Ageing and Retirement in Europe (SHARE). ELSA and SHARE were modeled after, and are harmonized with, the HRS, to characterize the saving behavior of retirees in the U.S., the U.K. and a number of continental European countries. The results of our analysis indicate a variation in the rate of net worth decumulation across countries. We organize the countries by rates of decumulation, and find that in the countries with lower decumulation rates, retirees of age 86-90 still hold on average 65% of the wealth they held at age 65-69; in the countries with high decumulation rates, this ratio is on average only 21%. We also find that the decumulation of net worth is highly correlated with decumulation of housing, and particularly, with the speed of decline of the homeownership rate with age. This suggests that in order to understand the retirement saving puzzle, researchers need to understand saving in housing late in life.

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[1] The role of housing had previously been studied empirically, e.g. by Venti and Wise (2004).

[2] In Nakajima and Telyukova (2013) , we also show the importance of housing price dynamics: the housing boom of 1996-2006 in the U.S. had a notable impact of flattening age profiles of housing assets in retirement.

Understanding how households finance their retirement is crucial at a time when policymakers in many countries face aging populations and issues of sustainability of social security policies. We point to some institutional differences, and differences in risk characteristics of retirement, that are likely to lead to differences in saving behavior, and that impact housing and financial assets differently. Since housing plays a key role in household portfolios of retirees, housing market policies are also important to consider. The contribution of this research is to provide a set of facts about saving in retirement across countries, and to propose some candidate explanations about the differences we observe, as a foundation for a research agenda. In a companion paper, Nakajima and Telyukova (2014a), we take the first step to study such an explanation formally, by focusing on the case of only U.S. and Sweden and out-of-pocket medical expense risk. We find that medical expense risk impacts financial saving more than it does housing saving. Thus, much more work remains to explain differences in housing late in life.

Our work is related to several strands of literature. The first is the aforementioned literature that provides explanations for the retirement saving puzzle using data on net worth in retirement. For example, Hurd (1989) studies the role of bequest motives and finds them to be small, Hubbard et al. (1995) find that government-provided social insurance should create a motive to dissave in retirement, Ameriks et al. (2011) study the relative importance of bequest motives and public care aversion for the related annuity puzzle, and De Nardi et al. (2010) emphasize the role of out-of-pocket medical expense risk in motivating the elderly to save, while finding bequest motives unimportant. Lockwood (2012) considers the low demand for long-term care insurance as evidence of the relative importance of bequest motives versus precautionary motives.

In addition, we contribute to the emerging body of work that considers cross-country evidence on household portfolios, particularly among older households. Examples are the volume by Guiso et al. (2002), Angelini et al. (2011), who characterize homeownership throughout the life cycle using the retrospective SHARELife survey, and Christelis et al. (forthcoming), who characterize differences in the composition of entire household portfolios in a previous wave of the data that we use, and decompose the reasons for these differences into influences of institutions versus household characteristics.

In section 2, we discuss the data and our methodology, while in section 3 we document a collection of empirical facts about saving in retirement across countries. Section 4 presents a further decomposition of assets that helps understand the relative role of financial and housing wealth in accounting for overall saving in retirement. Section 5 presents an overview of healthcare and long-term care provision in our sample countries, and touches on the housing markets and social security systems across countries. Section 6 concludes.

2 Data Sources and Methodology

We use three household surveys in our analysis. The first is the Health and Retirement Study (HRS), which incorporates a large sample from the Asset and Health Dynamics among the Oldest Old (AHEAD), and which covers the U.S. The second survey is the English Longitudinal Study of Ageing (ELSA), which covers the U.K. Finally, the Survey of Health, Aging and Retirement in Europe (SHARE) covers thirteen other countries, of which we use those that have a sufficient time dimension and sample size, namely Sweden, Denmark, Netherlands, Belgium, Germany, Austria, France, Spain, Italy and Greece.

All three surveys are biennial and longitudinal: the HRS covers the period 1992-2010, ELSA covers 2000-2010, while SHARE is the newest, and at the time of analysis had two waves, 2004 and 2006.[3] Because the panel dimension of SHARE is very short, at this point we cannot usefully construct life-cycle analyses of individuals or cohorts in it. Therefore, for easy comparison across countries, and unlike our previous work with the HRS in Nakajima and Telyukova (2013), we will study the 2006 *cross-sectional* age profiles of the desired variables, with awareness that inference will likely be affected by important composition and cohort effects.

We use the RAND versions of the surveys as the base for our analysis. RAND's versions of ELSA and SHARE are far less extensive than for the HRS. To augment the RAND data, we converted the latest wave of ELSA into RAND format, as well as added a significant amount of raw information from these surveys, incorporating them into a comparable data set. For the most part, a direct comparison of the data is possible, upon conversion of currencies into 2000 dollars using real exchange rates and PPP adjustment. Compared to the HRS, a weakness of both ELSA and SHARE is the insufficient documentation of respondents who are in nursing homes. Relative to outside data that we have, SHARE understates significantly the percentage of people in nursing homes, while ELSA did not interview respondents in institutions.

Partly for this reason, in constructing the age profiles, we stop at age 90. A second reason is that the SHARE data set has small country sample sizes, and unlike HRS, it does not oversample the oldest old. As a result, the sample sizes of the oldest retirees get too small to construct reliable moments. We will address these issues and their implications further below, where relevant.

In all surveys, we focus only on retirees, i.e. households that report being fully or partially retired. That is, we do not study here labor supply decisions later in life. To smooth noise in the data, in all the surveys, we put households into 5-year centered age bins. Thus, age-65 households are actually of ages 63-67. Thus, each household is categorized into five different age groups, of its actual age, as well as minus/plus two years. Once we restrict our sample according to retirement status, age, and some outlier

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[3]The third wave of SHARE, known as SHARELife, came out in 2008 and constructs life-cycle data from restrospective surveys; we do not use this wave, as it is quite different from the other two.
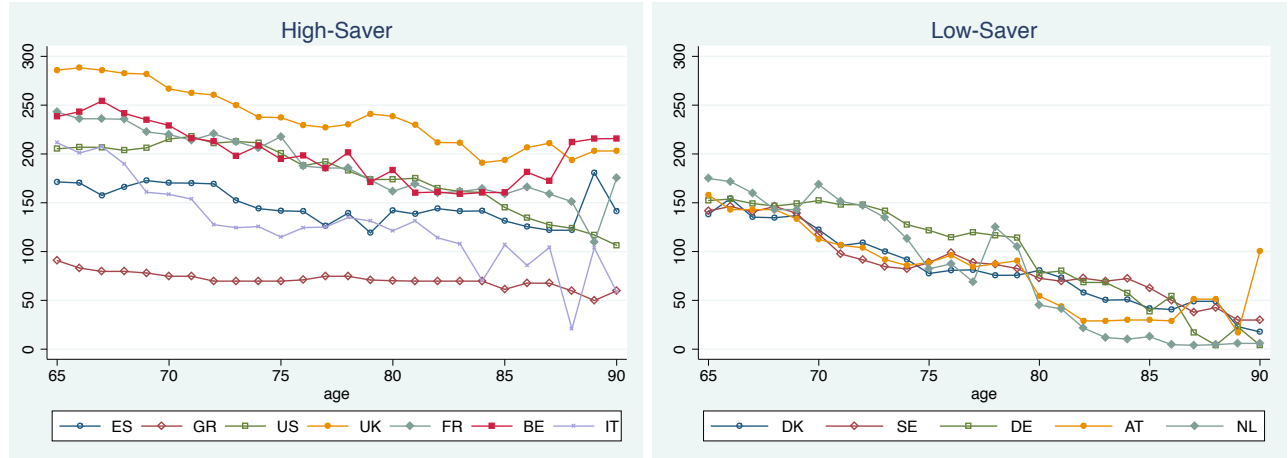
Figure 1: Median Net Worth. Thousands PPP-Adj. 2000 U.S. $.

control, the sample sizes range from 701 respondents in Austria between ages of 65 and 90, to over 1,400 respondents in Italy, nearly 4,000 in the U.K., and over 7,000 in the U.S. With binning, these numbers nearly quintuple, allowing for more reasonably-sized individual age groups.

We measure the retirees' net worth, housing and financial assets, homeownership rates, and the rates of secured and unsecured debt. We measure net worth as the value of all the assets net of all debts, both secured and unsecured. Housing is measured as the self-reported gross value of the primary, and if applicable, secondary residence. Financial assets are the sum of checking and savings accounts, retirement assets such as IRA's in the U.S. or their equivalents in other countries, and direct and indirect holdings of stocks and bonds. The measure of income that we use is all income in retirement; this includes pension and social security income and any government transfers, such as disability and welfare payments, if any. Labor income does not play a large part in this measure since the sample is of those in complete or partial retirement.

SHARE and ELSA present monetary values in local currencies. We convert currency amounts from all our surveys into 2000 PPP-adjusted dollars.

3 Facts on Saving in Retirement Across Countries

In this section, we collect data facts on saving in retirement across countries. In addition, we examine some evidence on the distribution of wealth across countries.

3.1 Median Net Worth

Figure 1 presents age profiles of median net worth in our sample. For ease of reading, we divide the countries into two groups In the left panel are countries where the age profiles of median net worth are relatively flat, indicating that retirees there are slow to spend down wealth. For example, in the U.S.,
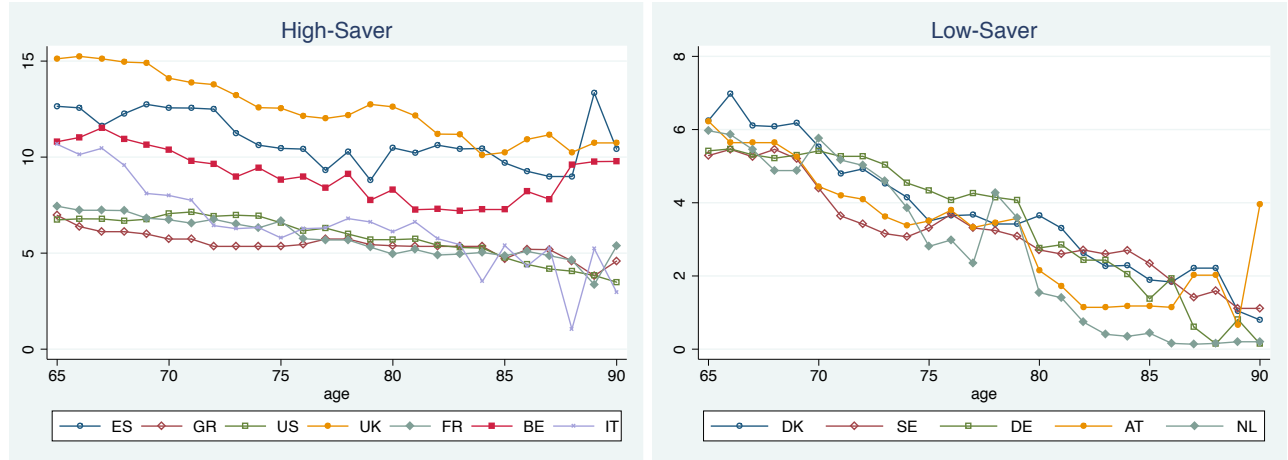
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Figure 2: Median Net Worth Normalized by Age-65 Income. Thousands PPP-Adj. 2000 U.S. $.

median net worth at age 90 is about $100,000, while it is around $200,000 for the UK and Belgium. The full group of countries includes the U.S. and the U.K., as well as Spain (ES), Greece (GR), France (FR), Belgium (BE) and Italy (IT). As shorthand, we term these countries "high-saver" countries, for the high saving rates of the retirees. In these countries, median net worth of retirees at age 86-90 is, on average, 65% of median net worth at age 65-69.

The right panel of figure 1 shows countries where in the median, net worth is spent down much more quickly with age. For example, in the Netherlands, Germany and Denmark, median net wealth declines to near zero in the median. The countries in the "low-saver" group are Denmark (DK), Sweden (SE), Germany (DE), Austria (AT) and the Netherlands (NL). The average ratio of median net worth at age 86-90 to median net worth at age 65-69 is just 21% in these countries.

In addition to the differing saving rates, there is also a noticeable difference between the two groups in the initial conditions at age 65. In the high-saver countries, there is wide cross-country dispersion in initial net worth at age 65. In the low-saver countries, this dispersion is much more narrow. One reason for these differences could be the cross-country dispersion of household income. In order to account for this, in figure 2 we present median net worth normalized by average after-tax income of the age-65 group. This exercise suggests that income dispersion is not the source of wealth dispersion per se, although this normalization does affect the ranking of countries in terms of highest wealth to income. The dispersion in the low-saver group of countries is not affected: initial median net worth is about six times the annual after-tax income at age 65 in all of the countries in the group. The high-saver group, on the other hand, still has high dispersion of wealth normalized to income. In the U.S., France and Greece, retirees have wealth-to-income ratios of about 5 at age 65, in the U.K. that ratio is nearly 15, while in Italy, Spain and Belgium the ratio is between 10 and 12. Since income dispersion does not itself account for wealth
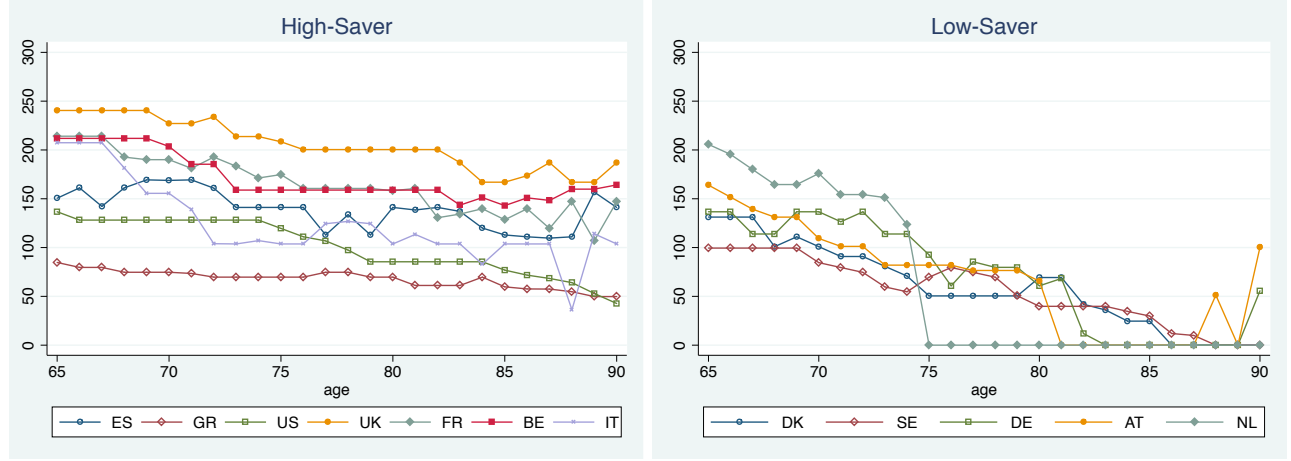
Figure 3: Median Unconditional Housing Assets. Thousands PPP-Adj. 2000 U.S.$.

dispersion, we proceed with the analysis of levels of wealth below.

3.2 Housing

We now break down household net worth into housing assets, and later financial assets. We begin by looking at age profiles of median unconditional housing wealth, constructed as the median for all retirees of each age, regardless of homeownership, in figure 3. The observations that stand out is that there is, again, heterogeneity in the levels of housing wealth, but the slopes of the housing profiles in the left panel, the high-saver group, are flatter than those on the right. For example, in the U.K., the top graph on the left, median housing wealth at age 65 is near $250,000, and it is still around or just under $200,000 at age 90, a relatively slow rate of dissaving. In Greece, the bottom graph on the left, the median amount of housing at age 65 is just under $100,000, and it is at $50,000 at age 90. Instead, the profiles in the right panel all decline from levels of $100,000 to $200,000 to zero. A zero median housing amount corresponds to the median person being a renter rather than a homeowner. Comparison of the two groups of countries suggests that the rate of decumulation of net worth is correlated with decumulation rate of housing.

There are two aspects of housing wealth: the extensive margin, i.e. the homeownership rate, and the intensive margin, i.e. the median value of the house among homeowners. Figure 4 shows the intensive margin: we create age profiles of conditional median housing by taking the median only for homeowners at each age. While housing levels are different across countries, these profiles have similar flat slopes in most countries, in contrast to the unconditional profiles, suggesting that it is not the intensive margin that is primarily driving decumulation of housing wealth. This observation points to the possibility that selling a house and buying a smaller house, known as downsizing, is not common among retirees in many countries. We have confirmed that previously for the U.S. (Nakajima and Telyukova (2013)), and Banks et al. (2010) have found it to be true for the U.K.
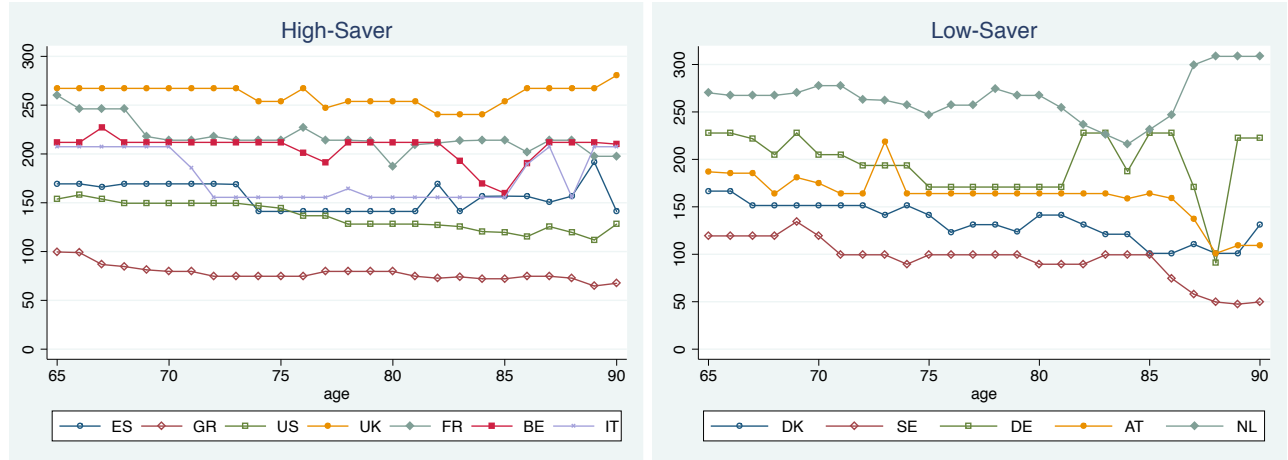
Figure 4: Median Housing Assets, Conditional on Ownership. Thousands PPP-Adj. 2000 U.S.$.
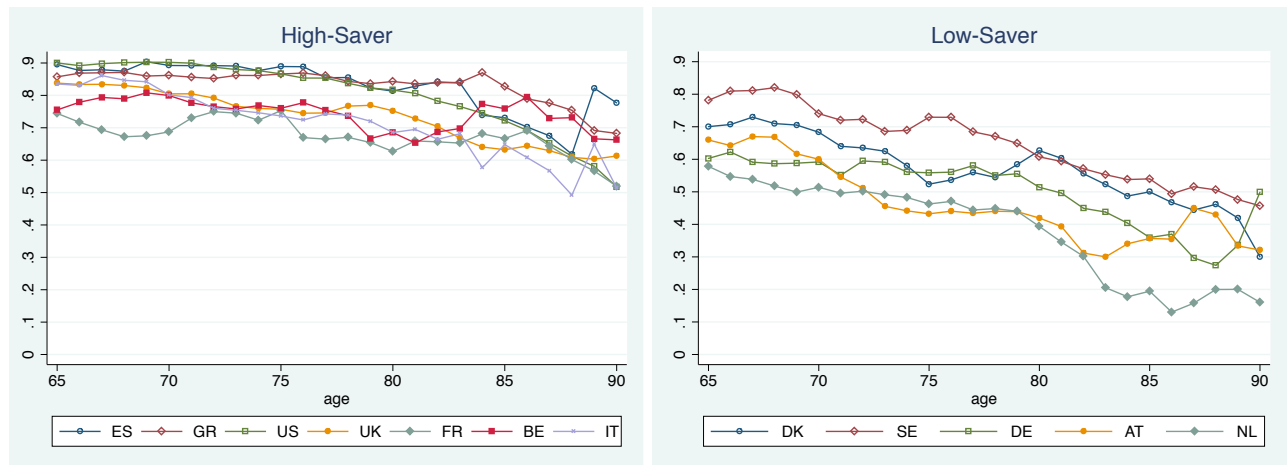

Figure 5: Homeownership Rates

In figure 5, we examine homeownership rates among retirees, defined as percent of retirees in the age group that own homes. In high-saver countries, homeownership rates are on average higher at age 65, and remain high until age 90, with the homeownership profiles relatively flat in age. The median retiree in these countries at age 90 is a homeowner. In low-saver countries, retirees start with a lower ownership rate, and in some countries sell houses at a faster rate. Partly due to lower ownership overall, the median age-90 retiree in these countries is a renter. For example, in the U.S. the homeownership rate is about 90% at age 65 and is still above 50% at age 90. In Sweden, the homeownership rate declines from just under 80% to about 45%. In the Netherlands, that decline is from near 60% to below 20%.

The homeownership profiles confirm our intuition: the change in homeownership rates with age appears mainly responsible for decumulation of housing wealth in retirement. We will return to this later. Notice again that initial conditions matter: there are significant cross-country differences of homeownership rates
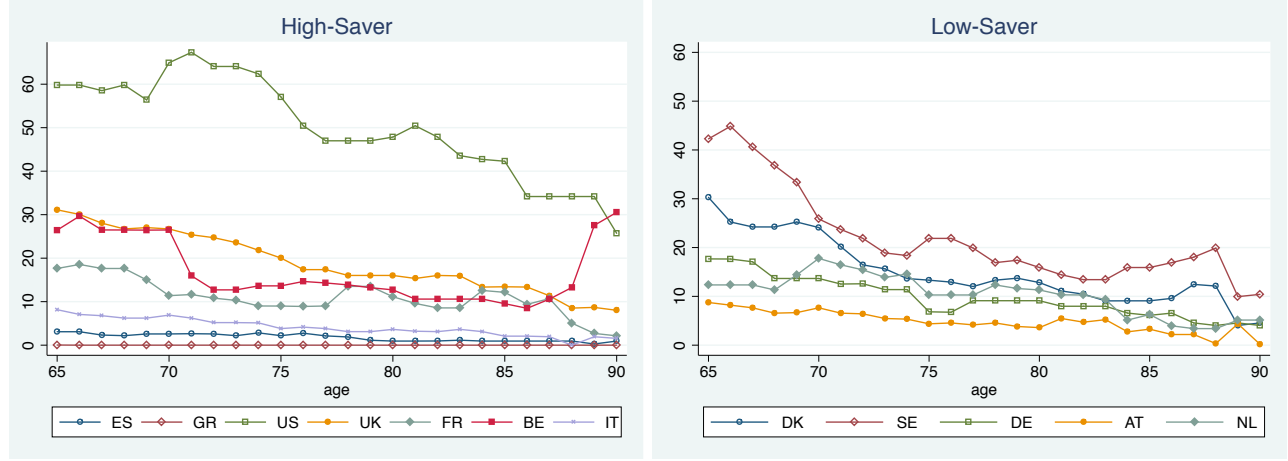
Figure 6: Median Financial Assets. Thousands PPP-Adj. 2000 U.S.$.

at age 65, with rates ranging from about 60 to 90%, which clearly affect homeownership rates at age 90.

3.3   Financial Assets

Figure 6 presents the age profiles of median financial wealth. The profiles of financial wealth are varied in terms of level and slope, and there appears to be less correlation between the rate of spend-down of financial wealth and net worth. Median financial wealth is also significantly lower than median housing wealth. It is notable that U.S. retirees hold by far the most financial wealth, both at the beginning and at the end of retirement, and median financial wealth is nearly 29% of median net worth, whereas in most European countries that share is much lower, ranging from near zero in Spain and Greece to 22% in Denmark. Only in Sweden is the share of financial assets at the onset of retirement similar to the U.S., at 30%.

3.4   Debt

Figure 7 presents the rate of secured indebtedness, that is, the percentage of retirees of every age group that have a mortgage, a home equity loan, or another form of equity debt. First, there is wide heterogeneity across countries at age 65, which does not obviously correlate with the rate of net worth decumulation. 40 to 50% of 65-year-old retirees in the U.S., Denmark, Netherlands and Sweden have secured debt. Table 1 gives the corresponding median amounts of debt at age 65, *conditional* on having debt. The median conditional amount of debt is $29,439, whereas it is at $50,000 and above for the other three countries with high debt rates. In other countries, only between 5 and 10% of retirees at age 65 have any secured debt; that number is 15% in the U.K. The median amounts of debt are also much lower, ranging between $6,000 and $15,000. A common theme is that in all countries, very few retirees have any secured debt by age 90, and the amount of debt also declines to zero. The lack of clear correlation of indebtedness rates to the rate of overall net worth decline suggests that mortgage markets may play a dominant role in determining
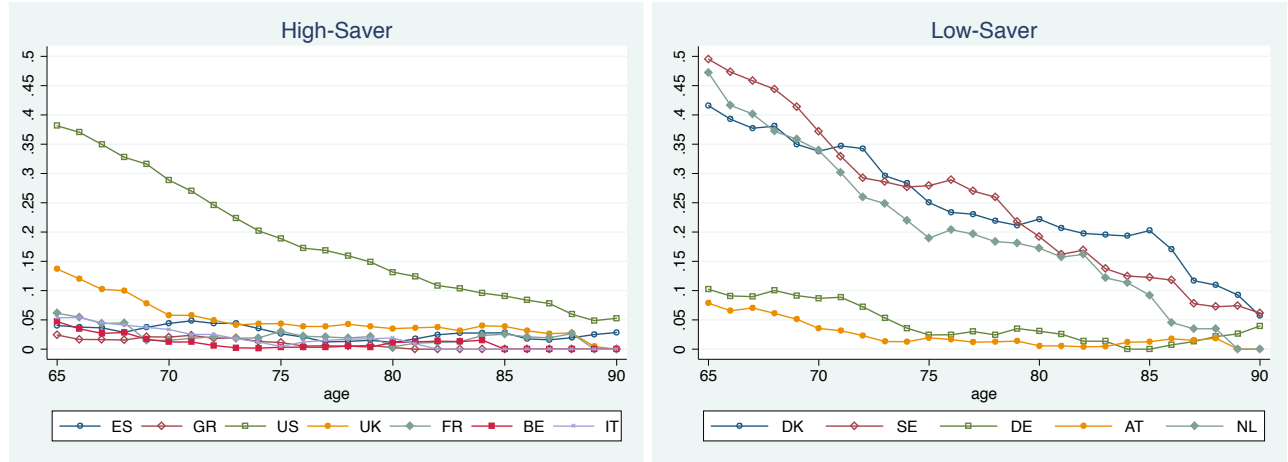
Figure 7: Age Profiles of Secured Debt Rates. Percent.
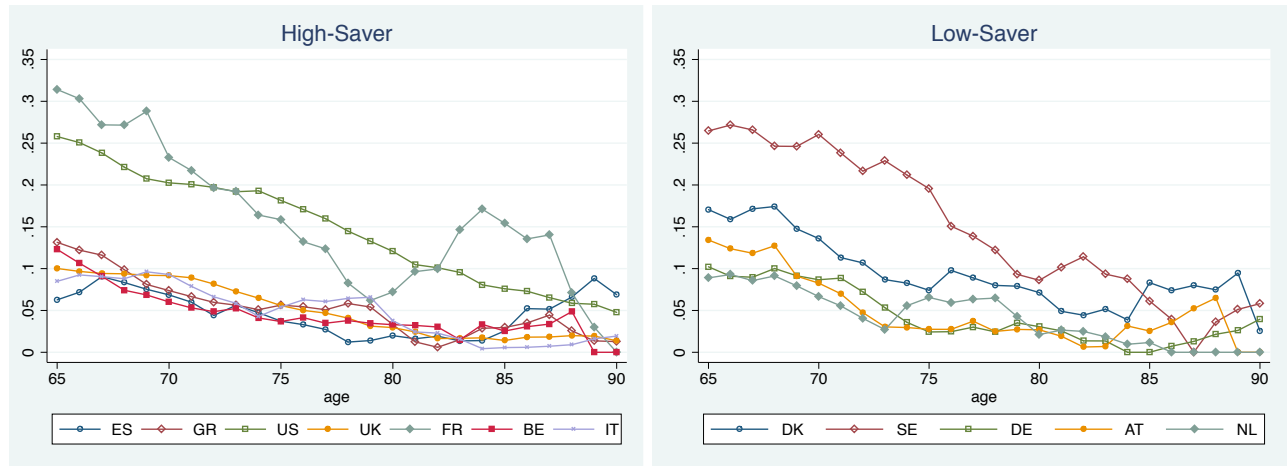
Figure 8: Age Profiles of Unsecured Debt Rates. Percent

indebtedness behavior of older households.

Figure 8 repeats the exercise for unsecured debt, defined as credit card debt and other unsecured consumer loans. Again, there is heterogeneity across countries, with variation in the share of retirees of unsecured debt between 10% and 30%. The median conditional amounts of unsecured debt are generally much smaller than secured debt (see table 1), ranging from 5% of the median secured debt amount, in the U.S. and the U.K., to 44% in Greece. Only in France, Belgium and Austria are the amounts of unsecured debt in the median comparable to amounts of secured debt; note that these are not countries with high debt rates.

Table 1: Median Conditional Secured and Unsecured Debt at Age 65

Country	Secured debt 2000 US$	Unsecured debt 2000 US$	Unsecured/ secured
Italy	31,111	4,667	0.15
France	8,766	6,423	0.73
Belgium	6,356	4,237	0.67
Greece	8,962	3,913	0.44
UK	14,694	802	0.05
US	51,259	2,563	0.05
Spain	18,817	3,179	0.17
Netherlands	69,944	4,114	0.06
Austria	8,745	10,932	1.25
Germany	34,165	11,388	0.33
Denmark	56,730	10,094	0.18
Sweden	29,439	11,935	0.41

US$ amounts are in PPP-adjusted 2000 dollars.

3.5 Distribution of Wealth

We conclude our presentation of data facts by addressing differences in wealth distribution across countries. Because of small samples, we confine ourselves to the comparison of means and medians, which is informative as a first step. We compare, graphically, age profiles of means and medians of net worth, housing assets, and financial assets.

Looking at the graphs of net worth, figure 9, a few observations stand out. First, the differences between means and medians are very different in different countries, signaling differences in the extent of wealth inequality. For example, in the U.S., at age 65, mean net worth is double the median. That factor is similar in the Netherlands, a bit smaller in Denmark and Sweden, smaller still in Belgium and Italy, and mean and median net worth are virtually indistinguishable in Greece. Second, the degree of dispersion diminishes with age in many countries, though not all. Finally, in some countries, outliers in the data matter for mean profiles; small sample sizes for older ages do have an impact in SHARE.

The conditional housing profiles in figure 10 are interesting because they suggest that in many countries, there is less inequality in housing wealth than there is in net worth. This conclusion is particularly noticeable for the countries with the highest mean-to-median ratios, like the U.S. and Netherlands.
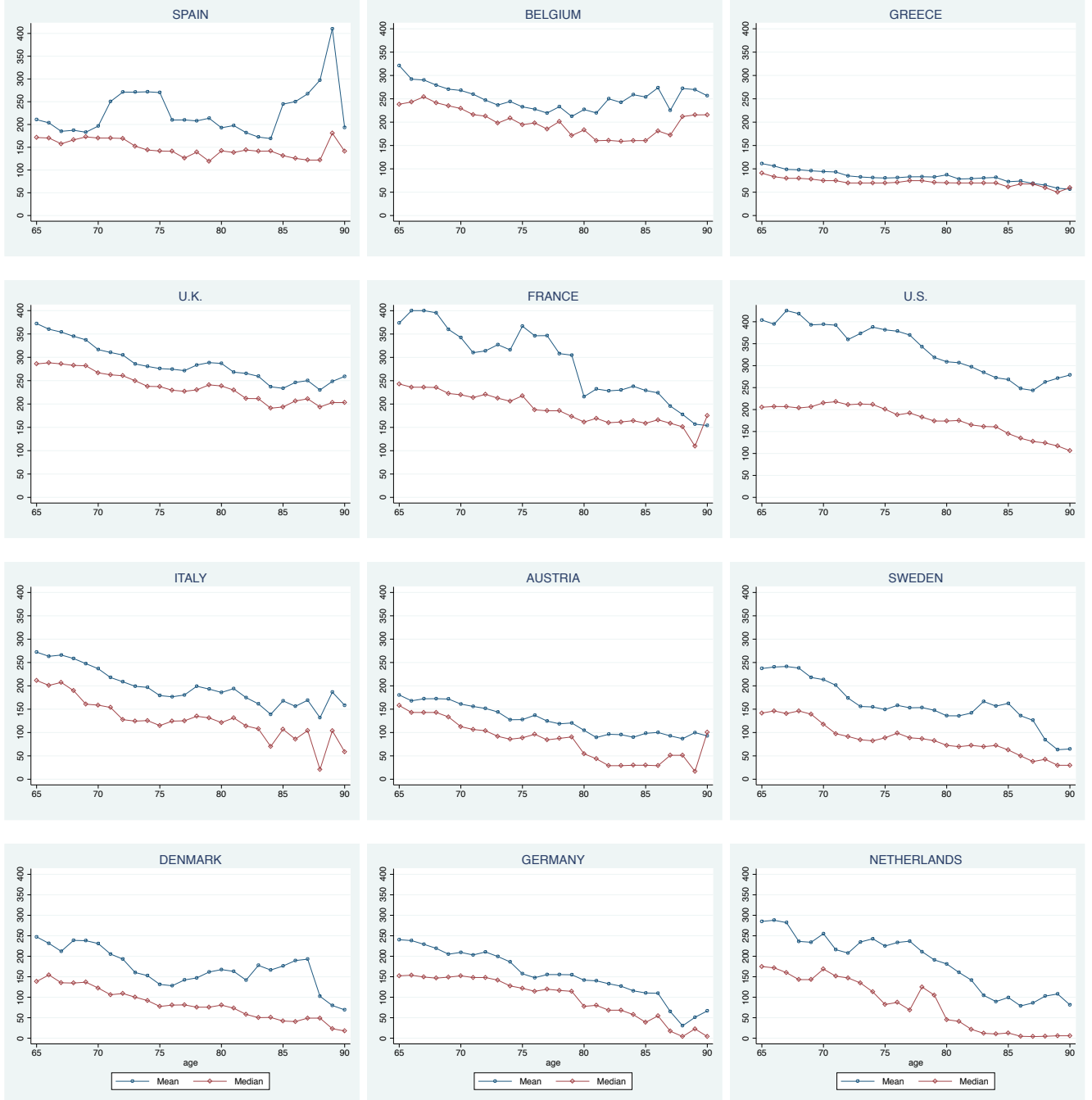
Figure 9: Mean and Median Net Worth

Finally, financial asset profiles in figure 11 reiterate, again, the wide heterogeneity across countries both in levels of financial wealth held, and the extent of inequality in financial wealth. In the U.S., the ratio of mean to median is nearly 4, by far the highest of the countries we observe. Financial wealth dispersion noticeably decreases with age. In some countries, like Greece, Italy, and Austria, the amount of financial wealth held in retirement is relatively small. Finally, median financial wealth is close to zero by age 85 to
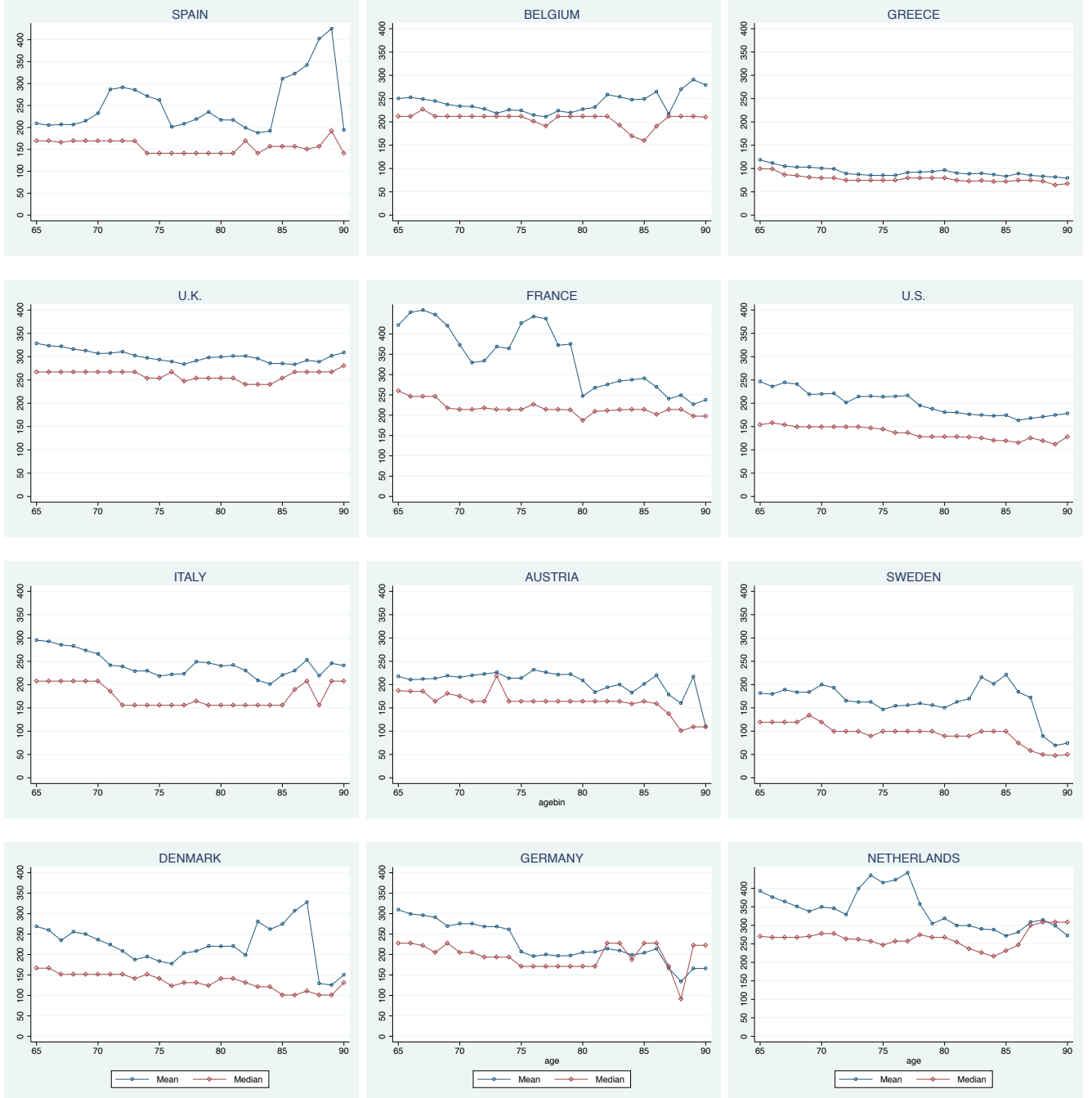
Figure 10: Mean and Median Conditional Housing Wealth

90 in nearly all countries.

The countries in these three graphs are in descending order in terms of the rate of net worth decumulation. In the top row – U.S., U.K. and Spain, there is least decumulation, while in Germany, Austria and Netherlands, there is the most. Thus, from these graphs, it does not appear that the degree of wealth dispersion is correlated in an obvious way with the rate of wealth dissaving in retirement.

Figure 11: Mean and Median Financial Wealth

3.6 Summary

So far, we have presented a set of facts regarding saving in retirement across countries. We find that countries vary in the rate of dissaving in retirement, and broadly categorize them into two groups: one where households spend down their wealth fairly rapidly, and another where household net worth stays
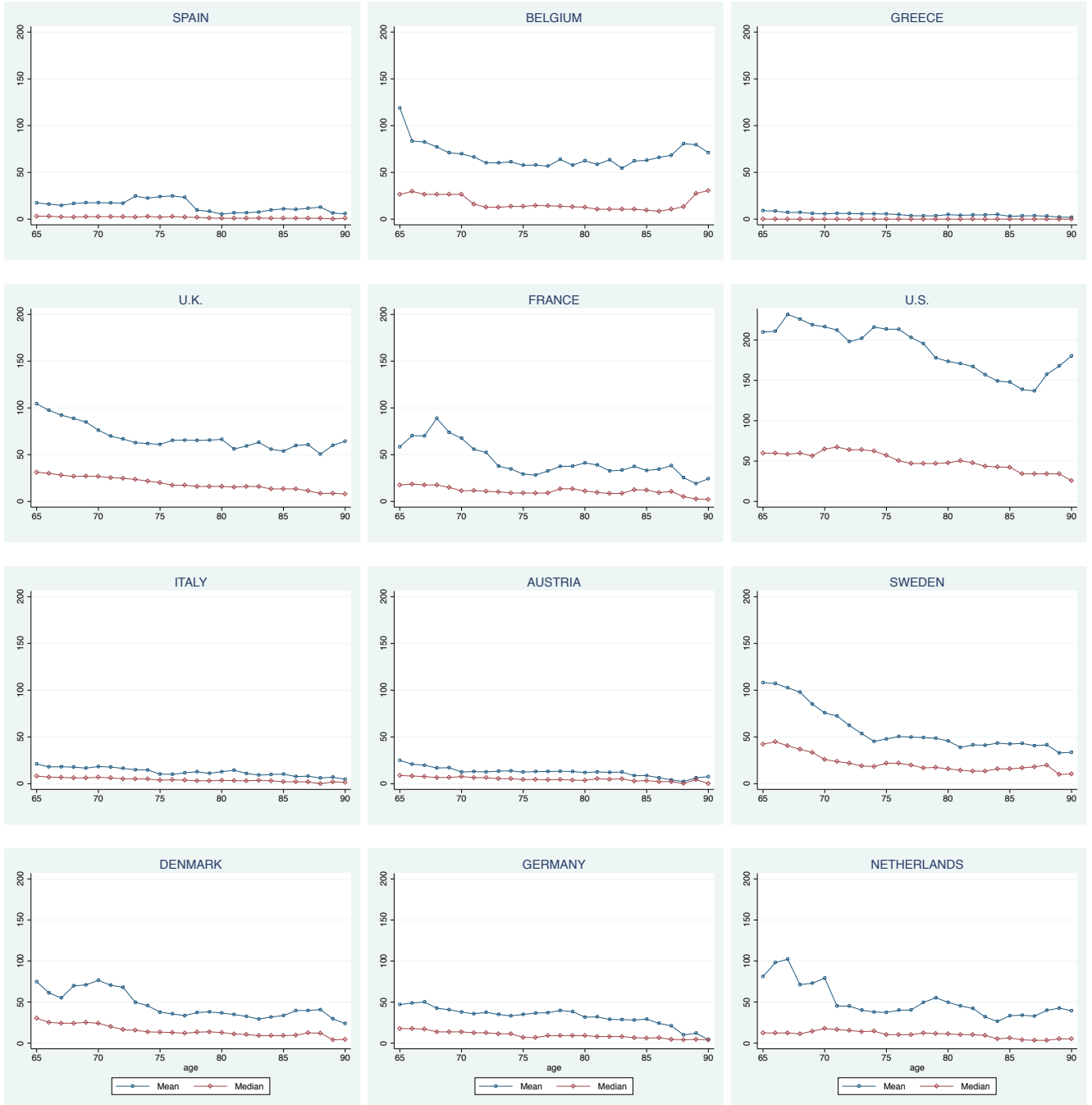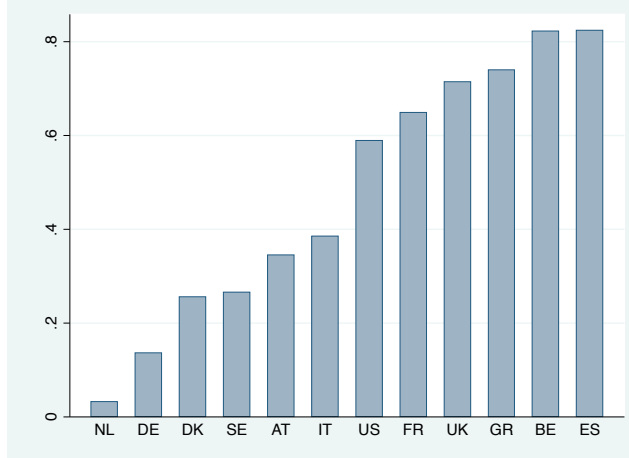
Figure 12: Ratio of Median Net Worth at Age 86-90 to Age 65-69, by Country

relatively flat, significant and positive, late in life. In decomposing net worth into housing and financial assets, we find that in the median, housing assets dominate household portfolios throughout retirement, and that housing is the key factor behind dissaving patterns of retirees. Further, we find that dissaving of housing in retirement is driven by the decline in homeownership rates, rather than by moving into smaller homes. In contrast, financial wealth is a relatively small percentage of median net worth in most countries and does not seem as strongly correlated to net worth dissaving overall.

Tied into this is the fact that in some countries, retirees arrive into retirement with significant home equity debt, whereas unsecured debt is comparatively smaller in most countries. Cross-country differences in financial wealth and particularly homeownership at the onset of retirement are also important to understand in accounting for saving behavior after retirement. Finally, there is significant heterogeneity in wealth dispersion that is important to consider.

In sum, in order to understand the (dis)saving behavior in retirement, it appears important to understand decisions of retirees with respect to whether or not to own a home. We highlight this further in the section below.

4 Dissaving in Retirement: Further Analysis

To formalize the observation that housing is an important component of understanding saving in retirement, we recast the facts we documented above in a slightly different light. First, in figure 12, we plot the *rate of dissaving* in each country. The measure we use is the ratio of median wealth at ages 86-90 over median wealth at ages 65-69 for each country.[4] Thus, the higher the ratio, the less dissaving occurs in the given country between ages of 65 and 90. We order the countries in the graph in descending order of dissaving

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[4]The spirit of the results is not sensitive to the ages we choose. For example, ratios of wealth at age 85 to age 65 are not dissimilar.

(a) Unconditional Housing

(b) Financial Assets

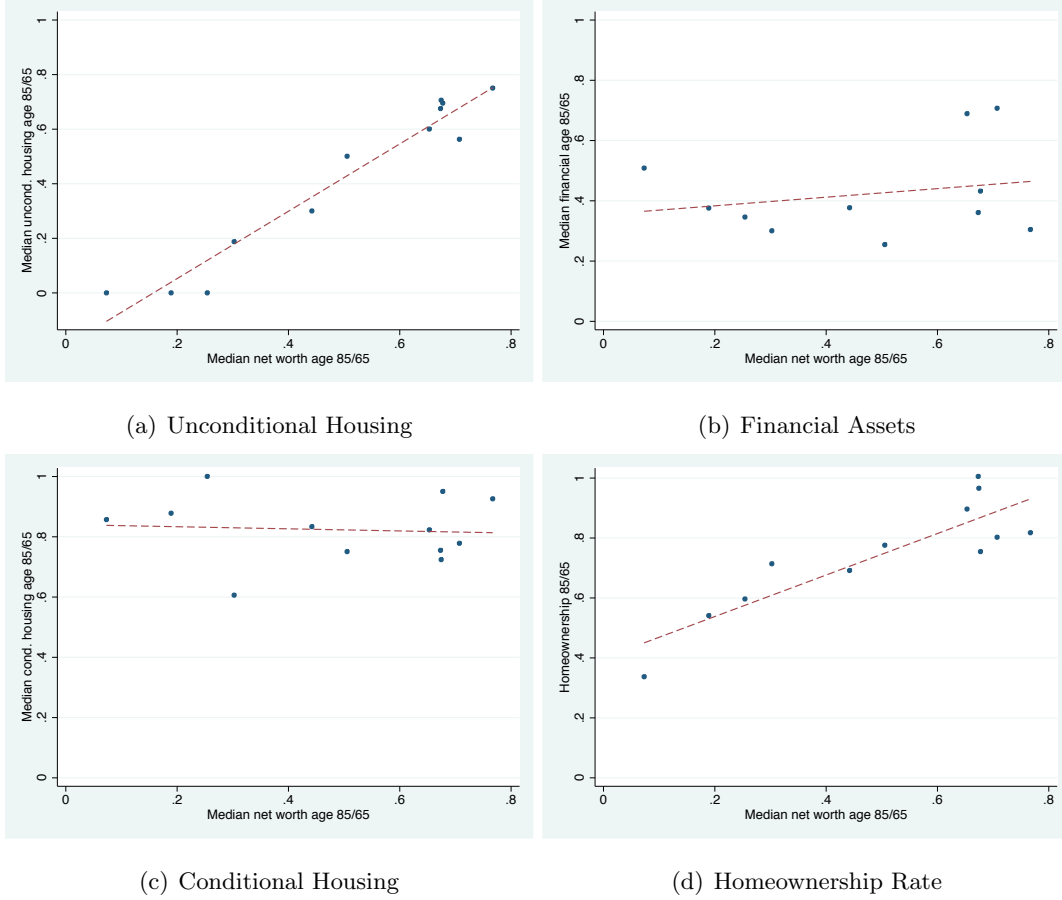(c) Conditional Housing

(d) Homeownership Rate

Figure 13: Components of Net Worth Change, Age 65 to 85

rates. As the figure shows, Netherlands is the country with the fastest spend-down of wealth in retirement: the median net worth at age 86-90 is at around 3% of median net worth at age 65-69. On the opposite end of the spectrum, this ratio is nearly 82% at Spain, followed closely by Belgium, Greece, U.K., France and the U.S. The seven tallest bars are in our "high-saver" group above.

Next, we plot the rate of dissaving in median net worth against the rate of change of housing assets, financial assets, housing assets conditional on homeownership, and the homeownership rate in figure 13. There is an obvious positive relationship between median housing assets and median net worth (panel (a)): the correlation coefficient of these variables is 0.97. Instead, the relationship between net worth and median financial wealth (panel (b)) is much weaker, with the correlation coefficient of just 0.22. Further, if we plot median net worth against housing assets *conditional* on homeownership, the line through the scatter plot has essentially zero slope, as panel (c) shows. In contrast, the plot of homeownership rate against net worth reveals again a strong positive relationship, with the slope of the plotted line of 0.7 and correlation of 0.87.

This analysis underscores our finding that housing wealth is important to consider, separately from

financial wealth, in order to understand dissaving in retirement, and further, that it is the change in homeownership rates, rather than the decline of housing wealth per se, that is important. These results echo our previous work in Nakajima and Telyukova (2013). In that study, we show in the context of the U.S. that a life-cycle model of retirement needs to account for homeownership and its change with age, in order to be successful in accounting for the retirement saving puzzle. In this paper, we have the additional benefit of cross-country variation in the data to add to that argument.

This set of facts opens a rich research agenda for understanding cross-country differences in retiree saving behavior, and indeed lifecycle saving behavior.[5] We briefly offer some candidate explanations for dissaving behavior in retirement by describing, next, cross-country variation in institutions that affect retirees' well-being.

5 Accounting for Differences in Dissaving in Retirement

5.1 Out-of-Pocket Medical and Long-Term Care Expenses

Previous work on saving in retirement has identified out-of-pocket (OOP) medical and long-term care expenses as a significant potential source of risk in retirement in the United States, which, in addition to longevity risk, may be capable of accounting for the patterns of saving in retirement in the U.S. (e.g. De Nardi et al. (2010)).[6] Unlike in the U.S., medical care across Europe tends to be insured by some combination of government-provided and mandatory private insurance (WHO, Allin et al. (2005)). There is wide variation in co-pay structures and the extent to which the population participates in private health insurance schemes, but it appears that out-of-pocket expenses are limited in all of the countries in our sample except for the U.S. We are able to measure OOP medical expenses in our sample and discuss this below. Details of healthcare coverage in our sample countries are in Appendix A.1.

As has been pointed out in the literature before (e.g. Brown and Finkelstein (2011)), there is a lot more variation in *long-term care* coverage, and many countries do not have universal coverage for long-term care in the same way that they do for healthcare. Based on our reading of the literature to date (e.g. OECD (2005)), we can classify European countries into three groups. Group (A) provides public coverage of long-term care, both in nursing homes and in-home care, and requires no means-testing and no OOP expenses. This group includes Sweden, Netherlands and Denmark. Group (B) provides significant public coverage of long-term care, but does require some OOP expenses, although these expenses are capped at a relatively low level. This group includes Austria and Germany. Finally, group (C) are countries where there is no or low public coverage of long-term care, with means testing and high OOP expenses. This group includes

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[5]For example, in order to understand the differences in homeownership rates at age 65, one needs to understand the homeownership decisions earlier in the life cycle.

[6]Nakajima and Telyukova (2013) find that once housing is distinguished from financial assets in retirement, medical expense risk are an expalatory factor, but only a partial one, even in the U.S.

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Spain, U.K. and the U.S. Notice that in groups (A) and (B), there is no dependence on assets in qualifying for long-term care benefits, while in group (C), such dependence exists. The details of coverage in these countries are in Appendix A.2. Dobrescu (2012) offers an insightful overview and analysis of long-term care arrangements in SHARE countries, noting that informal care by family members reduces the need for saving by the elderly in some countries.

In all of our data except ELSA, we can observe OOP medical and long-term care expenses directly (that is, OOP expenses on prescription drugs, doctor visits, hospital stays, nursing homes, home care, and the like). The HRS does the best job of measuring them, particularly for end-of-life expenses. SHARE, in contrast, may present measurement issues because the coverage of institutionalized population is not comprehensive, and because the oldest old are not oversampled, as discussed above. ELSA does not measure OOP medical expenses because the National Health System at present makes them zero for all participants, and ELSA does not interview respondents in nursing homes. Unlike the HRS, neither ELSA nor SHARE interview survivors of deceased respondents for medical expense information.

Nevertheless, based on the HRS and SHARE, we estimate, to the best of our ablity, expected mean medical expenses for all countries in our sample except the U.K. Specifically, we estimate the mean and standard deviation of medical expenses, as well as the probability of zero expenses, as a function of household size (single or couple), income, health status and age, as well as all the relevant interaction terms of these variables. Figure 14 shows one view of the result: estimated expected mean medical and nursing home expenses for a single person of median income by health status, for three countries – one from each group in terms of long-term care coverage, Sweden, Germany and the U.S. Notice that the vertical scales int the three graphs are very different.

As we would expect, in all three, people in worst health pay the most. However, the orders of magnitude of the expenses are markedly different at all ages. For example, at age 90, a person in the U.S., of median income and in poor health, might expect to spend about $12,000 on average in OOP medical expenses. A similar person in Sweden would spend, on average, less than one-tenth of that amount, and the expense level is about $2,300 in Germany.[7] Notice that the magnitude rises as we progress from group (A) to (B) to (C), i.e. from Sweden to Germany to the U.S.

Figure 15 presents, for the same countries, mean expected medical expenses for singles of good health by income quintile. The figure demonstrates that correlation between income and medical expenses becomes stronger as the extent of privatization of coverage rises. In Sweden, with universal public coverage of both health care and long-term care, everyone pays roughly similar amounts out of pocket, regardless of

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[7]We cannot reliably measure expenses for persons above age 90 in Europe because of small sample sizes, which raises a concern that we are underestimating expenses for the oldest old. While this is true, universal, or nearly, coverage of both health care and long-term care in these countries is a strong form of insurance that is certain to keep expenses below the U.S. level, say. However, future research incorporating OOP medical risk in Europe needs to take this into consideration.
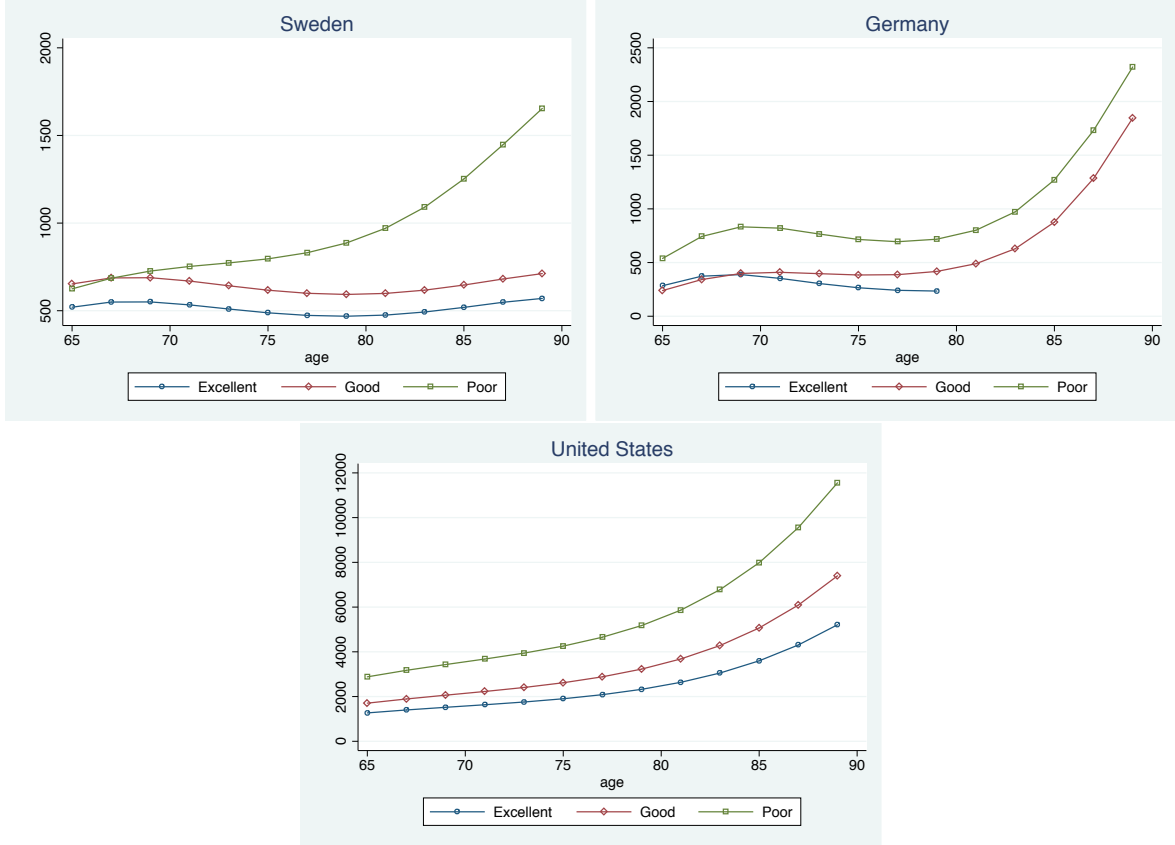
Figure 14: Expected Mean Medical Expenses by Health, Median-Income Singles

income. Even at age 90, the distribution ranges between $700 and $1,200, and is not monotone in income. In Germany, where there is more OOP spending on medical care and long-term care due to a degree of privatization in the system, the upper two quintiles spend most out of pocket. At age 90, the top two quintiles spend on average about $5,000 on medical care, compared to about $2,000-$3,000 for the lower three quintiles. Finally, medical expenses in the U.S. are strongly monotonic in income, with the highest quintile at age 90 spending about $5,000 more than the next quintile down, at about $15,000, and that difference is exacerbated further later in life. As an interesting and important aside, this figure also hints at the extent of cross-country differences in expense inequality.

What of the link between medical and long-term-care expense risk and the retirement saving puzzle? Notice that our low-saver countries are also in groups (A) and (B), which feature universal or near-universal insurance of medical and long-term care. In contrast, group (C) – the countries with least public insurance – is comprised of our high-saver countries. This correlation is certainly suggestive that out-of-pocket medical expense risk correlates with dissaving behavior in retirement. However, this is not the complete picture. In a companion paper, Nakajima and Telyukova (2014a), we find that in the case of U.S. and Sweden, the lack of medical expense risk accounts for much of the difference in retirees' *financial* saving
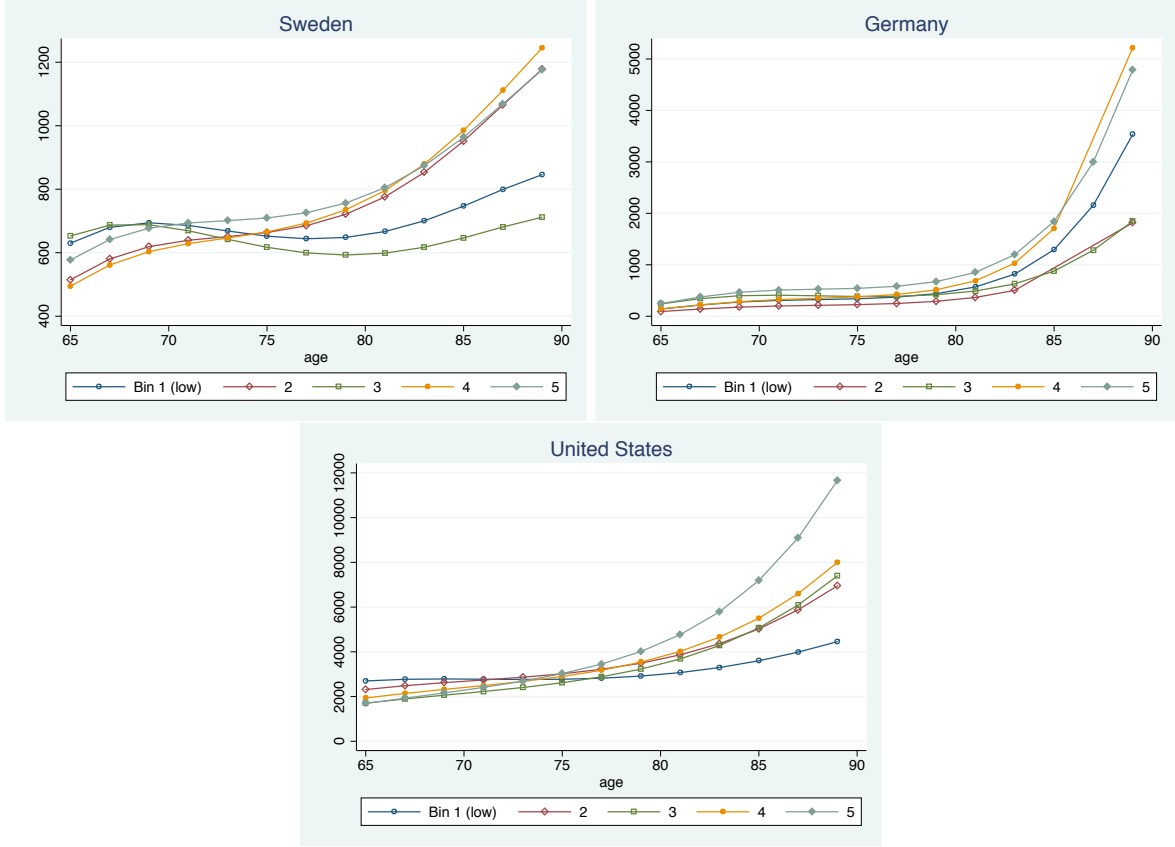
Figure 15: Expected Mean Medical Expenses by Income, Good Health Singles

between the two countries, but housing and homeownership are scarcely affected by medical expenses. This is also consistent with our previous work for the U.S. Thus, in order to understand non-financial saving in retirement, and homeownership in particular, one needs to consider other institutional factors in conjunction with medical and long-term care expenses.

Unlike medical and long-term care expenses, there are few other institutional details that we can measure directly in our data. For example, data in SHARE on government transfers are scarce and appear incomplete. Thus, in what follows we give a short description based on our reading of some literature on cross-country institutional comparisons, and hope to address these issues more in-depth in future research with direct measurement, where possible.

5.2 Housing Markets

There is wide variation in housing and mortgage markets across the countries in our sample, owing to differing regulations in the markets directly, and indirectly via tax policies, for example (ECB (2003)). There is variation in the extent of mortgage interest exemption, and in rental market policies, including public ownership of rental property (very high in the Netherlands, for example) and rent controls (e.g.

Sweden). There is significant variation in downpayment requirements at mortgage origination, ranging from minimum 40% in Germany to no regulated minimum in the Netherlands.

Notice that these factors are likely to contribute to the variation in the rate of homeownership at age 65 as well as during retirement. Because the cross-country differences of homeownership rates at the onset of retirement play a role in explaining the retirement saving puzzle, homeownership before age 65 is important to consider. In addition, differences in housing and mortgage markets targeting specifically the older population are also of importance. Here, variation in availability of home equity release products for the elderly (such as reverse mortgages in the U.S. and Denmark, among others) likely matter. Some details about housing and mortgage markets for the countries in our sample are in Appendix A.3.

Related to this, both regulation of capital gains and estate taxation are likely important in determining whether retirees stay homeowners late in life. In some countries, houses are exempt from estate taxation, while in others, financial and housing assets are taxed at different rates. These are clearly important factors to consider in studying cross-country differences in retirement saving behavior.

5.3 Social Security and Pensions

Erosa et al. (2012) review public pension and social security systems across countries, and study cross-country differences in labor supply late in the life-cycle, comparing the U.S. and European countries in SHARE. They find that the amount of social security benefits and how they are determined account for the bulk of the lower labor force participation in European countries. We do not cover the labor supply decision in this paper, but their results suggest that public provision of pension and social security benefits affect the level of wealth when households start their life in retirement, and impact the rate of dissaving during retirement.

5.4 Discussion

In this section, we only scratched the surface for the kind of institutional analysis that one needs to do in order to develop explanations for the cross-country differences in saving behavior of retirees. Nevertheless, many obvious candidate explanations present themselves. In addition to medical expenses, which our previous work shows to be only a partial explanation, some differences in housing and mortgage markets are likely to play a role. For example, in some countries, renting is made difficult by stringent rent controls or uneven availability of rental markets, which suggests that selling one's house late in life may not provide a retired household with a good alternative in the area of their choice. This could fuel the decision in some countries to stay a homeowner until the end of one's lifetime. Housing price dynamics are also important: an increase in house prices impacts the measure of net worth and makes it look flatter with age as we found in previous work for the U.S. Thus, retirees in countries that experienced recent housing market booms would see flatter housing and net worth age profiles than countries that did not.

Similarly, staying a homeowner may be facilitated by availability of equity reversion or reverse mortgage products, which allow an older homeowner to use her home equity to finance her expenses, while continuing to live in her house. To date, reverse mortgage markets in most countries are small (see e.g. Nakajima and Telyukova (2014b) for a quantitative analysis of U.S. reverse mortgages), but they may nevertheless be playing a role.

In countries with generous public or mandatory private pension systems, having most of one's wealth in a home may not affect one's financial well-being significantly, which could be another reason for staying a homeowner late in life, if one arrives at retirement owning a home.

Finally, there are other factors that we did not cover with data analysis, but that must play a role. These include, as we mentioned, estate and capital gains taxation, as well as bequest motives. The last is impacted by the degree of uncertainty that is faced not only by the retirees, but also by their heirs.

One difficulty in assessing rigorously these candidate explanations is that many of them are correlated. Countries with more generous public insurance schemes also have more generous pension systems, possibly a larger stock of public rental housing, and possibly higher tax rates on capital gains and estates. All of these factors could simultaneously impact low homeownership by retirees late in life. It is crucial for policy debates to understand these channels well. We leave this rich agenda for future research.

6   Conclusion

We use harmonized cross-country data on twelve developed economies to document the patterns of (dis)saving among retirees in housing versus non-housing assets, and the extent of the retirement saving puzzle in these countries. We find that countries in our sample vary noticeably in the extent of the puzzle. We show that in order to account for differences in the rate of wealth spend-down, it is important to understand decisions of retired households regarding homeownership and housing assets, as the decline in the rate of homeownership is highly correlated with the decline in the rate of saving overall.

There is also a large variety of institutional differences in the countries of interest. In addition to the important differences in healthcare and long-term care insurance policies, pension programs, social safety nets such as Medicaid in the U.S., housing markets and their dynamics, mortgage markets and the like may all play a role. It is also possible that these institutional differences produce differences in preferences, such as bequest motives. In this paper, our goal was to document overall empirical facts and suggest some candidate explanations for them. We leave further exploration of these links to future research.

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APPENDIX

A   Institutional Details

A.1   Health Care

This information is based on Allin et al. (2005).

Austria: statutory health insurance (SHI) - covers 95% of population mandatorily, 2% voluntarily. 19% of total expenditure was financed from user charges or direct payments (2000). Contributions represent from equal shares from employees and employers, accounting for 7.4% of salary in 2004. There are ceilings for max income and contributions.

Belgium: 99% of population are covered by compulsory health insurance; reimbursements are differentiated by social-risk status, and thus, patients finance about 19% of health expenditure mostly through OOP payments (as well as some voluntary health insurance (VHI) premiums). OOP payments are capped based on family income and "other socioeconomic factors".

Denmark: tax-based universal system. Private payments cover about 17% of costs, via OOP co-pays for PT, dental, glasses and drugs, as well as contributions to voluntary health insurance schemes. (About 30% of population purchases VHI coverage for the co-pays.)

France: covers via national social insurance system by tax-based financing and complementary VHI. OOP payments cover 9.8% of total expenditure, VHI premia – 13.2%.

Germany: universal healthcare coverage; OOP expenses only for drugs (copays). Starting in 2004, co-pays introduced for outpatient visit and have been raised for other benefits.

Greece – one of the most "privatized" in the EU; voluntary payments by individuals or employers represent 42% of total health expenditure (2002). There are both compulsory HI and VHI schemes, the latter purchased by 8% of population.

Italy – universal healthcare; OOP payments capped at EUR36 since 2002 for outpatient care; co-pays for drugs and specialist services are low and make a low contribution to overall cost (2.9% in 2002). There are also *private* healthcare services and OTC drugs that require OOP payment; 15% has complementary private health insurance either individually or through employer.

Netherlands –(a) national insurance scheme for exceptional/ high-cost medical expenses; (b) compulsory sickness funds for those with income below EUR 30000, with PHI for those above the ceiling (28% of population). (c) Supplementary private insurance covers dentists and the like. PHI and OOP payments cover , respectively, 16% and 5% of total medical costs.

Spain - universal public care, plus 15% of population purchase also private insurance (to avoid lines).

Sweden – compulsory tax-based system for the entire population; voluntary additional insurance is very limited. Private expenses are OOP and premia (14% of total); 90% of employers pay for voluntary

insurance to avoid paying for sick leave.

UK – NHI renders OOP medical expenses at zero; uptake of private medical insurance is low (11.5% of population). Service is usually free at point of service.

A.2   Long-Term Care

Based on the information in OECD (2005), we categorize the countries as follows:

(A) All public long-term care, no means-testing, no OOP expenses: Sweden, Netherlands, Denmark, Norway (not in our sample). *Eligibility does not depend on assets.*

(B) A mix, some OOP expenses: Austria, Germany. *Low or no dependence on assets.*

(C) A lot of OOP expenses/means-testing: Spain, Switzerland (not in sample), Italy, UK, U.S.. *Eligibility depends on assets.*

Group A: Netherlands provides both home-care (consumer-directed budged) and institutional (in-kind) care benefits, which are universal (not means-tested). On the consumer's part, income-related co-payments are required. Usage: 2.4% of those aged 65+ received long-term institutional care; 12.3% received home care benefits (2000).

Sweden similarly provides universal public long-term care in-kind benefits for both home and institutional care; users pay moderate amount of fees set by the local government. Usage: 7.9% institutional / 9.1% home care (2000).

Norway (not in our sample): also universal benefits for both home and institutional care; residents in institutions are charged about 80% of their income. Usage: 6% institutional / 18% home care (2000).

Group B: Austria provides a long-term care cash allowance universally (not means-tested), financed by general taxation, but the user will pay the difference between the benefit and actual cost, both for institutional care and home care. Usage: 3.6% of 65+ received institutional long-term care; 14.8% received home care benefits. (2000)

Germany has social long-term care insurance for both home and institutional care, which is universal (not means-tested). Benefits are in-kind for nursing home care, and cash and in-kind for home care. For home care, the average OOP to cover additional/more expensive services were about EUR 130 per month on average (2003) - I do not know if this is a conditional number. For nursing home care, board/lodging are not covered (EUR 560 per month on average). Service charges in excess of statutory limit are EUR 313 per month on avg, though these can be covered by means-tested social assistance. Usage: 3.9% institutional / 7.1% home care (2003).

Group C: Spain: in 1998, 73% of total long-term care cost was met privately. There are social-care programs for both home and nursing home care, but they are all means-tested. In Spain, high prevalence of informal/family arrangements is noted. This is also true for Italy, where informal arrangements involving hiring of live-in help for care of the elderly are common.

Switzerland: private cost-sharing is "high" – no numbers provided. Benefits are in-kind and cash. Institutional care benefits are means-tested. Usage: 7% institutional / 5.4% home care (2000).

The U.K. has a tiered system. The NHS provides universal in-kind home-care and nursing home benefits, which is completely free. Social services provide additional such benefits, but they are means-tested, and users are charged according to ability to pay. Social Security provides cash home-care benefit in addition, which is means-tested. . Usage: 5.1% institutional / 20.3% home care (2000/2002).

In the U.S., Medicare and Medicaid both provide in-kind homecare and institutional benefits. Medicare is universal, but has limits. (E.g. home nursing care is free of charge, but skilled nursing care is only covered up to 20 days for $0 OOP, 20-100 days – $105 per day, 101+ days – user pays 100% of the cost). Medicaid is means-tested, and will require co-pay based on financial status of recipient. . Usage: 4.3% institutional / 2.8% home care (1999/2000).

A.3 Housing and Mortgage Markets

These notes are a brief summary of ECB (2003) and is the starting point of our institutional analysis This information is not specific to retirees.

Spain, Netherlands and the UK have experienced two-digit growth rates in house prices in the 1990's; since 2002 (our data), Spain and the UK have as well. 2001-2002 saw rapid rise of house prices in Greece and Italy.

In many EU countries, tax policies are favorable to owner-occupied housing, while rental markets feature strict rent controls, which makes it favorable to be a long-term renter in particular, but may make the transition from homeownership to renting more difficult. Denmark, France, Sweden all have provisions to index rent to house pries or costs, which at least captures a trend above CPI. In other countries, rent controls make rents particularly of sitting renters be below market conditions. Denmark, France, Netherlands have high public ownership of rental property – around half of the rental market.

House buying: mortgage interest relief in Belgium, Denmark, Greece, Spain, Italy, Netherlands, Portugal, Sweden. The U.K. phased out mortgage interest relief in the 1990's.

Ownership: property taxes in most places, though not Germany (there is land tax instead). Rates vary from 0.025% (Greece) to 1.5% (Austria) to much higher in France.

House selling: capital gains taxes everywhere, though generally excepted for long-term owner-occupiers (exemptions for those living over 5-10 years or reinvesting within 2 years).

Bequests: in addition to capital gains taxes, there are inheritance taxes – same as for financial assets –

in Belgium, Denmark and the UK; lower than financial assets in Germany; progressive between 0 and 65% in Greece, between 8 and 34% in Spain, 5-40% in France, 5-27% in NL above threshold. Sweden taxes too. In Italy, the tax was abolished in 2001. If taxing at the same rate as financial assets, then makes little difference whether to inherit a house or financial assets.

Mortgage markets: home equity withdrawal has been significant in Denmark, Netherlands and UK. In Netherlands, the average LTV for a new mortgage loan is 112% (no legal limits on LTV). Denmark requires 20% downpayment on a new mortgage loan. UK average LTV is 30%. All three have equity release products available. Among these, Netherlands and Denmark are among countries with high secured debt rates in our sample (around 40% at age 65, to 5% at 90). In Austria, average LTV is 60%; in Germany, it is 60% by law. We observe, consistent with this, noticeably lower homeownership rates in these countries.

Countries with no equity release products/not permissible: Belgium, France (or not used), Italy. They are available but unusual in Spain, of very limited use in Greece, and restricted purpose-wise in Germany.