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Self-assessed Preparation for Retirement, Life-Course Shocks and the Role of Social Insurance:

An International Comparison

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Abstract

There is considerable concern that some individuals have not saved adequately for retirement. But whether households reach retirement with adequate financial resources depends not only on their spending and saving choices over the lifecycle leading up to retirement, but also on economic uncertainties and the institutional environment they face. We analyzed what fraction of households in their 60s and 70s wished to have saved more (and spent less) earlier in life. We refer to the wish to have saved more earlier as "*saving regret*." We document large differences across countries. Overall, we found saving regret is lower in Singapore (45%) than in the U.S. (55%), and much lower in Europe (12%).

To explain the differences we investigated the role of shocks that set people back financially and of economic policy that is meant to guard against shocks. In the U.S., 47% of respondents reported at least one shock that negatively affected their financial position; in Singapore this was the case for 46%, in Europe 38.%. Further, the impact of a negative shock on saving regret was greatest in the U.S. followed by Singapore and then by Europe.

The institutional differences across countries, notably the more generous social welfare systems in Europe, appear both to reduce substantially the likelihood of experiencing negative economic shocks and also to reduce their impact on self-assessed preparation for retirement.

1. Introduction

There is considerable concern that some individuals have not saved adequately for retirement. This has motivated tax-privileges and subsidies for retirement saving. Examples are individual retirement accounts in the U.S. and Riester pensions in Germany (Börsch-Supan, Coppola and Reil-Held, 2012). Some countries use nudging mechanisms to foster saving for old age, such as the U.K. (Department for Work and Pensions, 2015), or make saving mandatory (e.g. Singapore). The extent of under-saving in countries, where saving is voluntary, is controversial. Scholz, Seshadri, and Khitatrakun (2006) argue that 80 percent of U.S. households are saving at least as much as an augmented life-cycle model would predict, and that the saving gap for the remaining 20 percent is small. Hurd and Rohwedder (2012) estimate that 75 percent of retirees have sufficient savings to reach the end of their lives with positive wealth. Other economists (e.g., Laibson et al. 1998; Madrian and Shea 2001; Poterba, Venti, and Wise 2011; Stanford Center on Longevity 2016) argue that undersaving is widespread among households.

An important implication of under-saving and thus justification for policy intervention is that on hindsight, the preferred choice of under-saving persons would be to have saved more than they actually did. If persons indicated they wished to have saved more (and spent less) earlier in life, we say as a shorthand that they have “saving regret.”

Saving regret may have many reasons which may overlap. One set of reasons includes failures of planning, procrastination, miscalculations, or lack of information or financial literacy. Another set of reasons includes experiencing negative shocks to finances, e.g., bad health, divorce or unemployment. A third set of reasons relates to the general environment in which saving choices are made and shocks are absorbed, in particular social and private insurance. The aim of this paper is to use comparable data sets in very different countries -- the U.S., Singapore, 18 European countries and Israel -- to compare the extent of saving regret and to shed light on the mechanisms leading to saving regret and how these may interact with the policy environment.

In 2016, we fielded two surveys in the RAND American Life Panel (ALP). The first wave was from August through December 2016, the second about one and a half years later, partly to the same people and partly to other people. We asked persons aged 60-79 whether, if they were given the chance to do it over again, they wished to have saved differently earlier in their lives. Results from these surveys are published in Börsch-Supan,

Bucher-Koenen, Hurd and Rohwedder (2023). We found that saving regret is widespread (58 percent of U.S. households) and varies plausibly with risk factors such as age, income, wealth and health. We also found that there is little evidence to support the hypothesis that procrastination and a lack of perseverance explain the variation in saving regret. In fact, two groups of psychological factors (personal traits and indicators for procrastinating behavior) exhibit only limited and unsystematic variation with the extent of saving regret. Moreover, adding the battery of indicators that measure procrastinating behavior (as opposed to personal traits) to the regression adds only very little explanatory power to the model. In the multivariate analysis we controlled for the occurrence of negative shocks by including a set of indicator variables for such shocks. Similarly, we accounted for a set of financial and cognitive skills. Shocks and skills contribute significantly to the explanatory power in the multivariate model.

In May 2018, we fielded a similar survey to 60-74-year-old participants of the Singapore Life Panel (SLP).[1] Viewed in international context, Singapore is similar to the U.S. in encouraging self-reliance, although institutions differ substantially. Unlike the U.S., Singapore does not offer unemployment benefits, and the institutions surrounding health care and economic preparation for retirement are very different. In particular, Singapore mandates a total contribution rate of 37% of earnings (employee and employer combined) for most workers into funds managed by the Central Provident Fund. These funds finance consumption in retirement and health care both pre- and post-retirement. They can also be used for financing the purchase of a home. There are very few defined benefit (DB) pension plans, no Social Security, and limited public health insurance. Results comparing the U.S. and Singapore are published in Börsch-Supan, Hurd and Rohwedder (2020). While Singapore exhibits similar patterns of associations between risk factors and saving regret as the U.S., the extent of saving regret is substantially lower: only 46 percent of Singaporeans voiced saving regret compared with 58% in the U.S.

This international variation motivated us to field between November 2019 and March 2020 the same set of core questions about saving regret and its potential determinants to 17 EU countries, Switzerland and Israel as part of Wave 8 of SHARE, the Survey of Health,

[1] Data collection of the SLP was funded by the Singapore Ministry of Education under grant number MOE2013-T3-1-009 to the Singapore Management University.

Ageing and Retirement in Europe. These core questions were also added to the 2017 wave of the Consumption and Activities Mail Survey (CAMS), a paper-and-pencil survey that is an ongoing supplement to the American Health and Retirement Study (HRS). The HRS is a longitudinal survey to which SHARE is closely harmonized and so provides the opportunity for comparable controls across a wide range of variables.

There has been little research on saving regret. Based on a special data collection in the HRS, Hurwitz and Mitchell (2025) looked at how regret varied with longevity expectations. Castaldo et al (2024) used SHARE data to study how regret is related to early retirement.

The key contribution of this paper is to exploit the very different policy environments in the U.S., Singapore, across Europe and Israel to shed light on how social and public insurance interact with the occurrence of life-course shocks. The E.U. countries and Israel have a much tighter safety net than both the U.S. and Singapore, in particular large pay-as-you go systems for pensions and universal health insurance. Moreover, some E.U. countries have mandatory public long-term care insurance. The need to save beyond what is mandatory is thus less pronounced in these countries than in the U.S. and Singapore. One may hypothesize that this leads to lower levels of savings regret.

A similarly salient question is whether the Singapore approach of mandatory saving into the Central Provident Fund is more effective in preventing ex-post regret in saving decisions than the U.S. approach of merely encouraging saving, or the European approach with its greater emphasis on social protection. Another aim of this paper is to exploit the considerable variation in the coverage and generosity of social insurance across the European countries which exists in spite of the communalities of the European social insurance systems. Do the different models of social protection, such as the “Nordic model”, the “Corporate model” in Germany and France, and the more family-oriented model in the Mediterranean countries imply different saving regret at older ages?

Regarding the mechanisms that may lead to saving regret, one may argue that the high level of mandated saving in Singapore makes procrastination less relevant, bringing the role of financial risks over the lifecycle into focus. This raises the broader question of what is the role of uncertainty and to what extent individuals are able to manage unexpected financial shocks in shaping retirement saving outcomes and how do these differ in Europe, Israel, Singapore and the U.S.

2. Institutional background

2.1 Singapore

For many years Singapore has experienced strong economic growth: GDP per capita was $12,400 in 1979 and $58,800 in 2019 (both in 2010 USD). And it experienced similarly strong growth in education. In 2015, for example, only 25% of 65-69 year-olds in Singapore had some post-secondary education, while 45% of 50-54 year-olds did. This implies that in 15 years the proportion of the population attending at least some college increased 20 percentage points.

The economy of Singapore is strongly market based but with significant policy interventions at several key points. The most important intervention for saving behavior is the Central Provident Fund (CPF), which is operated by the Singapore Government. While there is some variation by age and cohort, for most workers 37% of earnings is mandated to be contributed to the CPF, about half paid by the employee and half by the employer. These contributions are on a pre-tax basis (tax advantaged). They are paid into three accounts. First, about half the mandated contribution is deposited into the Ordinary Account. This account may be used for investment and for purchasing housing and servicing a mortgage, even during the working life. Unspent funds from this account may be used to support spending in retirement. Second, about one-fourth of the total contribution is paid into the Special Account, which is savings for retirement. These funds cannot be withdrawn before age 55. Thus about 9% of earnings are dedicated solely to retirement, which is slightly less than what is paid into Social Security for retirement in the U.S. (about 10%). Both the Special Account and the Ordinary Account are defined contribution (DC) pension schemes; unlike the U.S. Social Security system, they lack progressivity. Third, the remaining one-fourth of contributions are paid into the MediSave account, which is used for health care insurance and spending on health care during working life and in retirement. The MediSave account can also be used to fund health care insurance and health care spending by family members. At age 55, a fourth account, the Retirement Account, is established using monies from the Special Account and the Ordinary Account. There is a required minimum that must be deposited into the Retirement Account. At age 65 or at least by age 70, a mandated minimum amount of the Retirement Account must be converted to an annuity.

The savings in the Ordinary and Special accounts (about 27% of earnings) would appear to be adequate to finance retirement, but apparently much of the savings in the Ordinary Account have been used to finance the purchase of housing. Housing is quite expensive in Singapore resulting in a high concentration of wealth in housing: our SLP sample shows that Singaporeans 50 to 70 years old in 2018 had median housing wealth of about $377,000 (converted to 2018 US dollars using purchasing power parity)[2] and median total wealth of $613,000. To put these values into perspective, we note that median income of Singapore couples shortly before retirement (age 50-55) was about $47,000.

All persons can buy subsidized health care insurance that aims to cover costs in public hospitals and clinics, which perhaps are of lower quality. Lower income persons can be subsidized further. Higher income persons can buy additional integrated plans; 68% of the population purchases such plans which cover private hospitals and better wards. The insurance purchase can be made from the MediSave account.

Most assets in CPF accounts earn interest above market rates. CPF account holders have some ability to invest in stocks and other limited vehicles, but mostly the funds are interest bearing. Retirement is financed by the CPF account and any private savings. Private pensions are rare.

When we fielded the SLP survey, the “Retirement Age” was 62. Employers could not dismiss employees on grounds of age before the retirement age of 62. The retirement age was raised in steps to 65 beginning in 2022. Employees work on contracts, which often have end dates at specific ages, particularly age 62 and 65.

Singapore has a policy to encourage later retirement, the Retirement and Re-employment Act (RRA). The RRA was introduced in 2007 but not enacted until 2012. The employers of workers whose contracts ended between the ages of 62 and 65 were encouraged to extend their contracts either in one shot or in a series of one-year contracts to the Re-employment Age, which was specified in the RRA act to be age 65. The new contract may be subject to negotiation, resulting in a change in duties or a reduction in wages within limits. The employer has an incentive to “re-employ” the worker because of penalties that could be imposed should an unwillingness to re-employ not be justified.

[2] The conversion is to multiply the Singapore dollar by 0.94. According to the actual exchange rate the Singapore dollar is worth about 0.73 US dollar

Satisfactory reasons for not re-employing would include health conditions or poor job performance.

The Re-Employment Age was increased to age 67 in 2017 and beginning in 2022 was further increased in steps, scheduled eventually to reach age 70. Likely as a result of the discussion surrounding the RRA, labor force participation at older ages increased sharply even before the formal enactment in 2012: in 2005 the labor force participation rate of males 60-64 was 52.5% and of females was 21.3%; in 2019, these rates were 76.7% for males and 50.7% for females.

There is no public unemployment insurance in Singapore. The stated aim of the government is to help with re-employment. But some long-term unemployment exists (Hurd and Rohwedder 2018).

Social Insurance in Europe and Israel

Europe generally follows the approach of universal social insurance to cover various risks that individuals and households face, including generous pension, healthcare and unemployment benefits. Many risks to which U.S. and Singaporean citizens are exposed are covered by mandatory social insurance. Together, these entitlement programs represent between 20 and 30% of GDP in most European countries, with considerable variation especially in Eastern Europe, while it is about 18.5% of GDP in the U.S.

Since most European entitlement programs are pay-as-you go financed, population aging forces Europe to align current entitlements with future fiscal capacity. Reform processes are under way in almost all European countries. Some countries reformed early in the 1980s (e.g. Sweden), most countries much later, and some just recently (e.g. Greece). Typically, the process is “reforms in installments”. These reforms have combined “parametric” elements (introducing actuarial adjustments, changing the benefits indexation formula, increasing the retirement age) with “fundamental” elements (changing the financial mechanism by moving substantial parts of retirement income from public pensions to private savings). Similar reforms have reduced the generosity of the universal health insurance systems, e.g. by introducing or increasing co-payments and by reducing the healthcare services that are covered by health insurance.

These reforms have made the future more uncertain than Europeans have been used to. Some countries have formalized the link between demographics and benefit level.

Sweden and Italy have introduced notional defined contribution systems which compute benefits on the basis of the accumulated contributions plus some nominal interest. This nominal interest depends on demographic essentials such as life expectancy, dependency ratio and wage growth. Since the labor force growth rate declines as a population ages, a NDC system features a declining replacement rate in the course of population aging. Moreover, longevity decreases the annual level of the annuity emanating from the accumulated notional wealth. People have to predict these benefit cuts and save accordingly if they want to maintain the level of retirement income that they have been accustomed to.

Similarly, Germany and other countries have created a link between demographics and benefit level within the defined benefit structure in order to gain political acceptance. The conventional benefit formula which indexes benefits to wages/prices is multiplied by the relative number of contributors to pensioners, the so-called sustainability factor. This augmented indexation formula will lead to decreases in pension benefit levels compared to wages. To offset these benefit cuts, Germany has called for more private saving and introduced voluntary tax-advantaged saving plans. Failures to take up these saving plans will result in lower retirement incomes and potentially to saving regret.

3. Data

We use three datasets in this study. The Consumption and Activities Mail Survey (CAMS), which is a sub-study of the Health and Retirement Study (HRS); the Survey of Health Ageing and Retirement in Europe (SHARE); and the Singapore Life Panel (SLP). These three datasets have been harmonized so that the measurement of socioeconomic variables is the same across these surveys, and the measure of saving regret is the same.
The HRS and SHARE survey the population over age 50, whereas at its first wave in 2015 the SLP surveyed the population ages 50 to 70 and it has longitudinally followed that cohort since that time. Based on prior research we wanted to use the population aged 60 to 79 for this study. However, in 2018 at the time we fielded the saving regret module, the SLP cohort was 53 to 73-74. Nonetheless, not wanting to drop people aged 75 to 79 from HRS and SHARE, we will present some results with harmonized age range 60 to 74 but our main results will retain the entire sample 60 to 79, and in many of the results we will control for age.

3.1. U.S.: The Consumption and Activities Mail Survey of the Health and Retirement Study

The Health and Retirement Study (HRS) is a longitudinal survey of a representative sample of Americans over age 50 conducted since 1992. The study interviews approximately 20,000 respondents every two years on subjects like health care, housing, assets, pensions, employment and disability. Since 2001, the HRS added a supplemental survey eliciting details of household spending, the "Consumption and Activities Mail Survey" (CAMS). The CAMS is collected every two years (odd-numbered years) in the year between the core interviews. The CAMS sample consists of some 5,000 randomly selected HRS households who are followed longitudinally. Our sample consists of 1,807 respondents in the age range 60-79.

CAMS provides information on some 38 categories of household spending, designed to measure total household spending over the preceding 12 months. The spending data can be linked to the rich background information that respondents provide in the HRS core interviews. Rates of item nonresponse are very low (mostly single-digit), and CAMS spending totals aggregate closely to those in the Consumer Expenditure Survey, which is the most authoritative source of information on household spending in the U.S. (Hurd and Rohwedder, 2009).

In the 2017 wave of CAMS respondents were asked

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     Please think back to when you were around 45 years old.
Suppose you could re-do your spending and saving from then to now,
would you…
     1 Save more over the years?
     2 Save about the same over the years?
     3 Save less over the years?
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We call the choice of 1 "saving regret."

We also conducted the following design experiment: For a random 50% of respondents we modified response 1 to:

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     1 Spend less and save more over the years?
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to remind respondents that saving more would require a reduction in spending. We call this the "framed" version. Framing resulted in a reduction of regret of about seven percentage points.

For those who expressed regret we followed up with a list of categories of spending items such as housing, food or clothing and asked which of them could have been reduced. We included a response of

`No way we could have cut spending. We could not have saved more`

in which case we re-coded the respondent as not expressing saving regret. The objective of the follow-up questions was to remind, perhaps more forcefully, that saving more would require spending less.

A possible explanation for saving regret is shocks that may have occurred earlier in life and which had an important impact on the respondent's financial situation. In CAMS we asked about negative shocks in the following way:

`Sometimes people have negative surprises earlier in life that cause their finances to turn out worse than expected. Did any of the following happen to you? Please check all that apply.`

We listed eleven negative shocks such as unemployment or a large health expense. A similar question was posed about positive shocks.

3.2 The Singapore Life Panel

The Singapore Life Panel (SLP) is a monthly, Internet-based survey which was representative of the Singapore population age 50-70 (and their spouses) when first recruited in July, 2015 (Vaithianathan et al., 2021). The SLP has a core of regular monthly questions, some additional regular quarterly content, plus rotating modules. In January it obtains a complete assessment of income during the preceding year and a complete balance sheet of assets. The SLP has consistently high response rates, obtaining about 8,000 interviews every month (Vaithianathan et al., 2021).

In May 2018, we fielded a survey in the SLP on saving regret. We aimed to obtain data elicited in exactly the same way as in the 2017 wave of CAMS. We asked about saving regret in the framed version. We obtained 4,319 responses in the age range 60-74. Some of the oldest age are not from the target cohort of SLP, but are spouses of age-eligible SLP respondents.

3.3 The Survey of Health, Ageing and Retirement in Europe

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a research infrastructure for studying the effects of health, social, economic and environmental policies over the life-course of European citizens and beyond (Börsch-Supan et al. 2013). In eight waves between 2004 and 2020, about 530,000 in-depth interviews with 140,000 people aged 50 or older from 28 European countries and Israel have been conducted. The main hallmark of SHARE is its strict international comparability. All countries use exactly the same questionnaire; much work has been invested in making sure that questions are functionally identical across the almost 40 languages that are covered by the SHARE survey instruments.

In Wave 8, between November 2019 and March 2020, SHARE administered a saving regret module to 19 of the SHARE countries: 17 EU countries, Switzerland and Israel, to a total of 24,153 individuals. Per country, the average sample size was 1,271, ranging from 526 in Poland to 1,995 in The Czech Republic.

The module was located after about 90% of the core questionnaire, including information about demographic and socio-economic status. The module started with questions about negative and positive shocks with financial consequences, then the saving regret questions exactly as formulated in the U.S. CAMS questionnaire, including a randomized split between the framed and unframed version and probing.

3.4 Measurement of Social Insurance Protection

We collected data from the European Commission, the OECD, the WHO, the World Bank, and national statistics that capture the most salient features of the social support systems in the U.S., Singapore and the SHARE countries. We anticipated that respondents from countries with a robust social support system will express less saving regret because more of their economic resources in retirement will have been provided by the state, possibly reducing the chances of undersaving.

Results

Table 1 shows the percent of respondents expressing regret in the three data sets, both before and after revision. The international differences are striking. In the U.S., on initial questioning, 57.1 percent wished to have saved more. In Singapore, this percentage is three percentage points lower at 53.3%. In Europe it is lower by a very large margin. On average (weighted by country sample size), only 15.0 percent expressed saving regret.

Some study participants adjusted their responses when asked what types of spending they could have reduced earlier life in order to save more. The revisions reduced the prevalence of saving regret in the CAMS by about three percentage points, in the SLP by about eight percentage points, and in SHARE by about three percentage points.

The variation in saving regret (after revision) within Europe is large, ranging from 22 percent in Greece to 8 percent in the Czech Republic (Figure 1).

Very few respondents in the U.S. wished they had saved less. In Europe and Singapore, 5.9% and 4.4%, respectively, of respondents wished to have saved less.

To find whether the lack of observations in SLP in the age band 75-79 made a material difference in the overall population outcome we restricted the sample in the HRS and SHARE to ages 60-74, so as to match the SLP. The overall frequencies were very little changed, 2.0 ppts higher in HRS and 0.8 ppt higher in SHARE (Table 1b).

Table 2 shows the variation in saving regret as a function of socio-demographic characteristics. There is little difference between males and females.

In Europe, there is a monotonic age gradient: age is associated with statistically significantly less regret. In the U.S. regret is lower among those 75-79. No pattern is found in Singapore.

The distribution of the population by marital status is quite different in the three regions: Divorce is 12 percentage points lower in Singapore than in the U.S. and 11 percentage points lower in Europe. In the U.S. and Europe, higher proportions of those who are separated, divorced, or widowed express saving regret. This is in line with the well-known economic status of those groups: particularly divorced or separated women have fewer economic resources. This pattern by marital status is not evident in Singapore.

Because the levels of education across countries are quite different, we divided educational attainment into terciles. This division is based on years of schooling in the U.S. and Singapore, and on the International Standard Code of Education (ISCED) in SHARE.

Given the large number of U.S. respondents who have completed high school but no further education, we used randomization to achieve the equal allocations.[3] In Europe, each of the ISCED code groups 0-2, 3-4, and 5-6 represent roughly a third of the sample. In the U.S. and Europe, those in the lowest educational tercile expressed regret with the greatest frequency, with the gradient in the U.S. being much larger. In Singapore there is no such education pattern.

Table 3 shows the variation in saving regret as a function of economic status and health. In all countries, those in the highest wealth quartile are the least likely to express saving regret, with the difference between the highest wealth quartile and the others being greater in the U.S. than in Europe or Singapore. The U.S. and Europe exhibit a gradient in saving regret by income.

In the U.S. and Singapore, those in fair or poor self-assessed health are more likely to express regret. The difference is small and is not statistically significant in Europe.

Table 4 shows the frequency of negative and positive shocks in the three samples. The twelve items are ordered from most frequent to least in the SLP. Fewer in SHARE experienced negative shocks (38.2%) than in the U.S. (46.6%) or Singapore (45.9%).

In the U.S., the frequency of saving regret among those who did not report a negative shock was 46.6%. Among those who experienced an unemployment shock (a spell “that cause[d] their finances to turn out worse than expected”), the proportion who stated regret was 63.9%, a difference of 17 percentage points. In Singapore, among those who did not experience a negative shock the frequency of expressing regret was 39.8%. Among those who experienced an unemployment shock, the frequency of expressing regret was 53.8%, about 14 percentage points higher. In Europe, among those who suffered from an unemployment shock, 20.2% expressed saving regret 11.0 percentage points higher than those without negative shocks), lower than in the U.S. and in Singapore. The other labor market shocks, “health limited work,” “retired too early,” and “earnings less than expected,” also cause higher proportions of respondents in the U.S. than in Europe and Singapore to express saving regret.

[3] In CAMS the lowest tercile is mostly composed of those who completed high school, whereas in the SLP it is mostly composed of those with a primary education only.

Shocks from giving financial help to relatives were more common in the U.S. than in Singapore and even less common in Europe. Other shocks include having unexpectedly high college costs (not asked in SHARE), having a death in the family (more frequent in SHARE than in SLP), and having a divorce or separation (more frequent in SHARE than in SLP). The impact of such shocks on saving regret is substantial in the U.S. but not statistically significant in Singapore. In SHARE, especially the shock of a divorce or separation has a significant effect on saving regret. The frequency of a health care spending shock is about the same in the CAMS and the SLP (10.8 and 10.9%, respectively), but the effect on expressing regret is much greater in the U.S., 18.8 ppts more likely. In Europe, fewer respondents reported large health expenses. Saving regret was 0.063 higher among those who did (statistically significant).

We also queried and studied positive shocks, even though public policy tends to focus on negative shocks. It is worth noting that unambiguously defining positive financial shocks was more challenging than expected, and the list that was included turned out to have some conceptual weaknesses. For example, “spent less than expected” is conceptually almost the opposite of “wished to have saved more.” “Worked longer than expected” may have been due to unexpectedly good health (positive shock), but for others it may have been due to financial necessity (marker of a negative shock); similarly, “received financial help” appears to be a marker of severe financial difficulty and thus associated with elevated saving regret. The different institutional settings across countries complicate definition and interpretation further. We accounted for the lessons learned by narrowing the definition of “any positive shock” in Table 4 and did not count reports of having spent less than expected, having received financial help, or respondent or spouse worked longer than expected.

Positive shocks occurred most often in the U.S., less so in Europe, and even less in Singapore. A positive shock significantly reduces saving regret in the U.S., but not in Europe and Singapore.

Figures 2a and 2b show the distribution of the number of negative shocks and the associated saving regret. The difference in shock prevalence is best seen at the upper tail of the distribution: 12% of CAMS respondents reported three or more shocks compared with 10% in the SLP and 6% in SHARE. Especially in SHARE, the consequences of several shocks for saving regret are greater than for one shock: saving regret is eight percentage

points higher among those experiencing four shocks than among those experiencing one shock.

Thus, a first explanation for the difference in the level of regret between the U.S., Singapore, and Europe is that more people in the U.S. had one or more negative shocks.

Multivariate Regression Analysis of the Pooled CAMS-SLP-SHARE Sample

We pooled the three study samples to achieve two aims. First, we wanted to find the effects of national social insurance systems on saving regret. The pooled sample permits cross-country comparisons across the U.S., Singapore, the 18 European countries plus Israel that differ strongly in their social insurance systems. These systems are described by a set of social policy indicators that we added to the set of explanatory variables. Second, we wanted to check which of our main results are robust to controls for correlations among the explanatory variables.

Table 5 displays the means by country of data that capture the most salient features of the social support systems in the U.S., Singapore and Europe. Details of their construction are relegated to the Appendix. Pension systems are characterized by the statutory retirement age and the replacement rate provided by the OECD and the World Bank. The replacement varies by income quartile and sex. In addition, we use an index for the sustainability of the pension system and an index for the adequacy of pension benefits, citing work by Allianz based on comparative studies by the European Commission and the OECD plus national statistics. The sustainability index assesses whether there are mechanisms that cushion the pension system against demographic aging, while the adequacy index combines an assessment of coverage and benefits of all pillars of the pension systems. Given the universal coverage of healthcare in Europe, we characterize the healthcare systems by the share of out-of-pocket costs obtained from WHO publications. The other large social insurance systems in Europe provide public spending for youth and family, unemployment and disability.

As for the second aim, we estimated linear regressions of the probability of regret on the explanatory variables that we discussed in the preceding tables. We show four variants: with and without wealth, and with and without social policy indicators. Table 6 has excerpts from those regressions; complete results are in the Appendix. Our regression results show

the strongly significant effect of negative shocks on saving regret. Controlling for wealth quartile and adding social policy variables only slightly attenuate this effect but it remains significant both statistically and in magnitude.

The estimation results further support the notion that saving regret depends significantly on the structure of social insurance. Lower replacement rates of the pension system imply more self-reliance – which may fail, and which would induce significantly more saving regret. The adequacy index is scaled 1-7 with 1 being best. Thus an improvement in adequacy (negative movement in the index) reduces saving regret. The sustainability index is also scaled 1-7 with 1 being best, but an improvement increases saving regret. We would have thought that pension systems that are threatened by a lack of sustainability create a sense of uncertainty about the future which fosters regret about not having saved sufficiently to be independent of the government pension systems.

The universal healthcare coverage in Europe provides a high level of security and demands only little out-of-pocket spending in general. Where out-of-pocket healthcare payments are necessary, especially in the U.S. and Singapore, they demand more saving; yet, greater out-of-pocket costs are associated with reduced saving regret.

The three general measures of social protection (social spending on family, on unemployment, and on disability) are statistically significant and predict reduced saving regret.

The regressions in Table 6 include a large number of controls for individual characteristics and both negative and positive shocks. They are displayed in the Appendix. Results correspond to the insights drawn in the preceding sections of this paper.

Discussion

Overall, we find saving regret is lower in Singapore than in the U.S., and substantially lower in Europe. This may be a result of long-term economic conditions as well as the coverage and generosity of the social insurance systems. The Singapore economy has grown greatly for many years, possibly leading to a current financial position that is better than many had expected. By contrast, since 1973 the U.S. has had periods of a stagnating economy with periods of quite high unemployment, possibly leading to a current financial position that is worse than many expected. The Great Recession (2008/2009) appears to be particularly relevant for this observation: our U.S sample of 60-74 year-olds would have

been in their prime saving years for retirement at the time of the downturn. Europe has experienced little growth as well, but has less of a divide between income classes than in the U.S. In many European countries and in the E.U. as a whole, the Gini-coefficient has essentially remained constant in sharp contrast to the U.S.

Although all economies in our sample are market-driven, there are considerable differences in the weight on self-reliance versus relying on social insurance. Singapore has an important forced saving mechanism, the CPF.

While the U.S. Social Security system may be even more important for retirement saving than the CPF, particularly for low-income individuals because of the progressivity in its benefit schedule. Furthermore, in the U.S. there is no forced saving for the provision of health care prior to Medicare eligibility or as a buffer for negative economic shocks.

In Europe, social insurance policy is almost omnipresent. The social security replacement rates in Europe are higher than in the U.S., and health insurance is universal. Nevertheless, there are substantial differences between the European countries, especially in the mix between defined benefit pension systems on a pay-as-you-go basis and defined contribution systems based on collective or individual savings.

These differences in social policy are reflected in the variation in saving regret, but they only explain a modest fraction of the difference between the U.S. and Singapore on the one hand and Europe on the other. For example the interquartile range of the OECD replacement rate is 27% in our sample. Based on the regression results in Table 6, that variation predicts a difference in the frequency of population saving regret of 0.063. Within Europe, 0.063 is a meaningful variation, but it explains little of the difference between Europe, and the U.S. and Singapore. For example, the U.S. OECD replacement rate is 51.1% and the European average is 65.9%. The regression result would predict a difference in saving regret between the U.S. and Europe of 0.034, whereas the actual difference is 0.455.

Even the most generous system of social support does not cushion against all shocks that may occur over a life course. These shocks appear to be quite important in all countries. Among SLP respondents, 46% had at least one negative shock that affected their financial position; among CAMS respondents 47%, in Europe 38%. The effect of shocks was not symmetric; very few reported they wished that they had saved less. Shocks did have a smaller impact on saving regret among SLP respondents and even less among

SHARE respondents, which is consistent with shocks for SLP and SHARE respondents being less severe due to substantial forced self-insurance (forced saving) in Singapore and due to extensive social protection in Europe. Some institutional reasons may also contribute to shocks having less of an impact in Singapore. In 2017, Singapore spent just 4.4% of GDP on health care while the U.S. spent 17.9%. As a result, the forced contributions to saving in MediSave coupled with possibly some small co-pays could shield many Singaporeans from health care spending shocks.

College expenses may also cause greater shocks in the U.S. than in Singapore and Europe. Between 1989 and 2016, the cost of attending a four-year university in the U.S. doubled in real terms while median real wages barely increased.[4] In Singapore, tuition at the five autonomous universities increased by 14% in real terms between 2007 and 2016, but median wages increased by 23% in real terms. As a result, college education became more affordable in Singapore but less affordable in the U.S. In Europe, most education is free.

Another large difference between the U.S. and the other two regions is the frequency of a death in the family (likely widowing but not specifically asked) and of divorce. Both are more frequent in the U.S., and the effects of each on saving regret is higher in the U.S. Labor market shocks are another difference between the countries: such shocks are more frequent in the U.S., and the effect on saving regret is greater.

Finally, we note that our earlier research (Börsch-Supan, Bucher-Koenen, Hurd and Rohwedder, 2023) showed that psychometric variables do not explain much of saving regret in either the U.S. or Singapore. A battery of measures of procrastination, or a tendency not to tackle difficult tasks as measured by 12 indicators, was of little use in distinguishing persons who would have liked to have saved more from those who were satisfied with their saving behavior.

Our main conclusion is that to understand economic preparation for retirement we need to understand better the role of shocks in the given economic and social policy environment. Part of that understanding is to learn more about the expectations of individuals about lifetime shocks and their understanding of the consequences of shocks.

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[4] https://www.forbes.com/sites/camilomaldonado/2018/07/24/price-of-college-increasing-almost-8-times-faster-than-wages/#30efd6b66c1d

An approach to uncertainty undertaken by the government in Singapore is to force people to engage in saving that can be used during the working life for health care and housing, and retirement, but otherwise social insurance is very limited. Perhaps recognizing that people are under-insured the Singapore government has recently introduced various Silver Support schemes designed to help the less-well-off older population. The U.S. approach is substantial forced saving for the retirement years via Social Security and Medicare, but limited social insurance during the working life coupled with financial incentives for retirement savings that can also be used for emergencies. The European approach is to force people to participate in large public pay-as-you-go pension systems and universal health insurance. However, this is easier to do when an important sector, health care, is so much cheaper than in the U.S.

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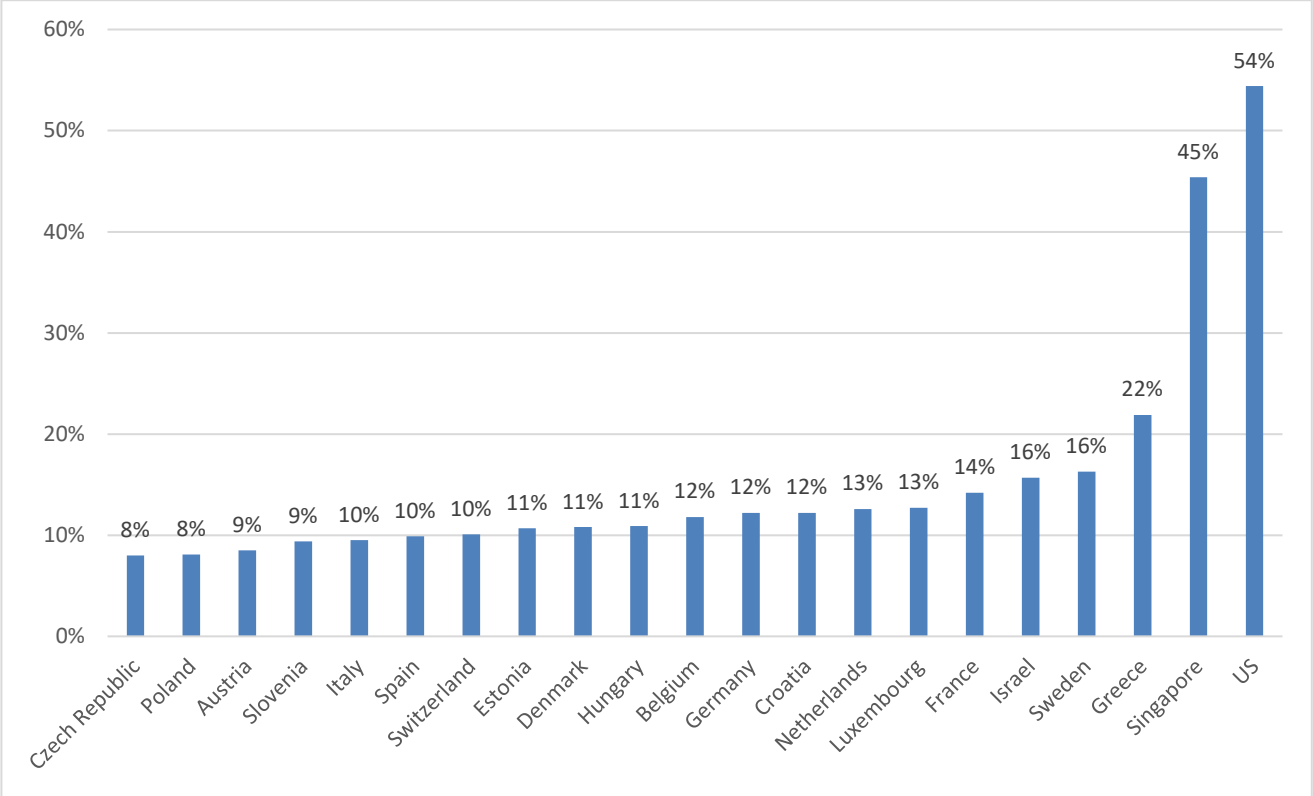
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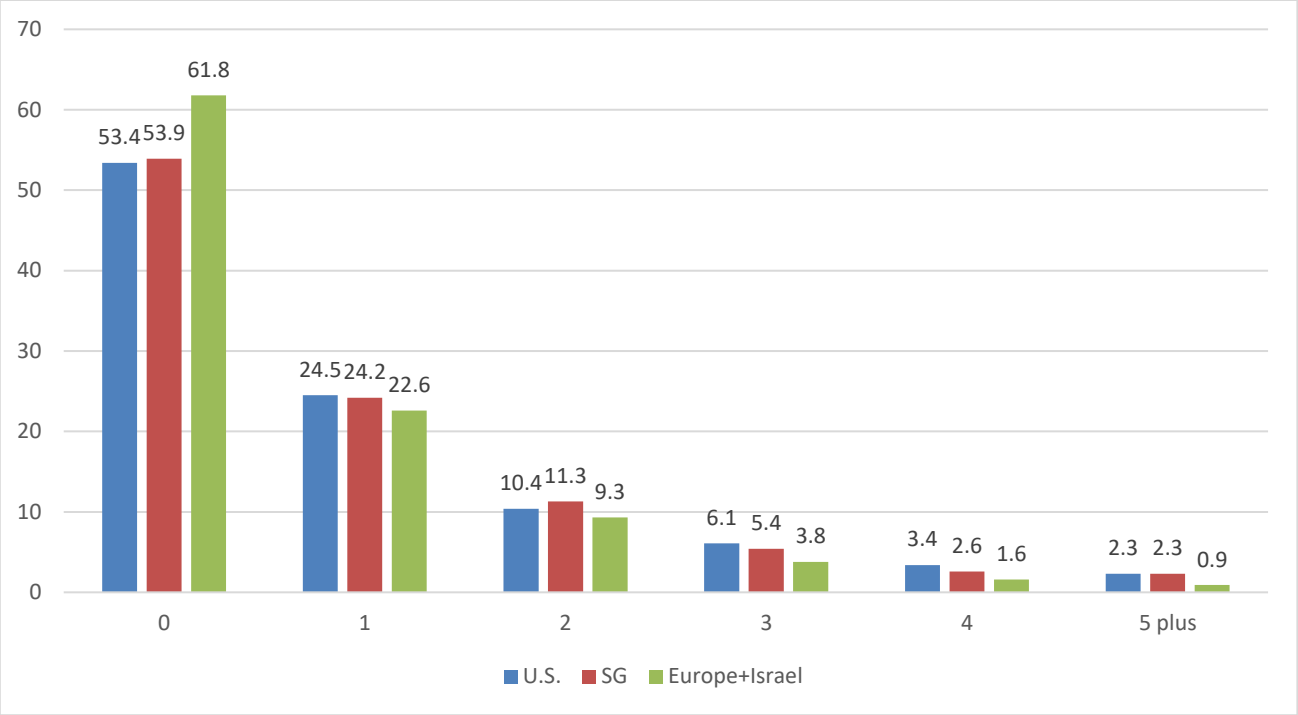
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Figure 1: Prevalence of saving regret by country



Note: Saving regret after revision; weighted statistics.

Figure 2a: Number of negative shocks by country (%)



Weighted statistics

Figure 2b: Saving regret by number of shocks, by country, weighted.

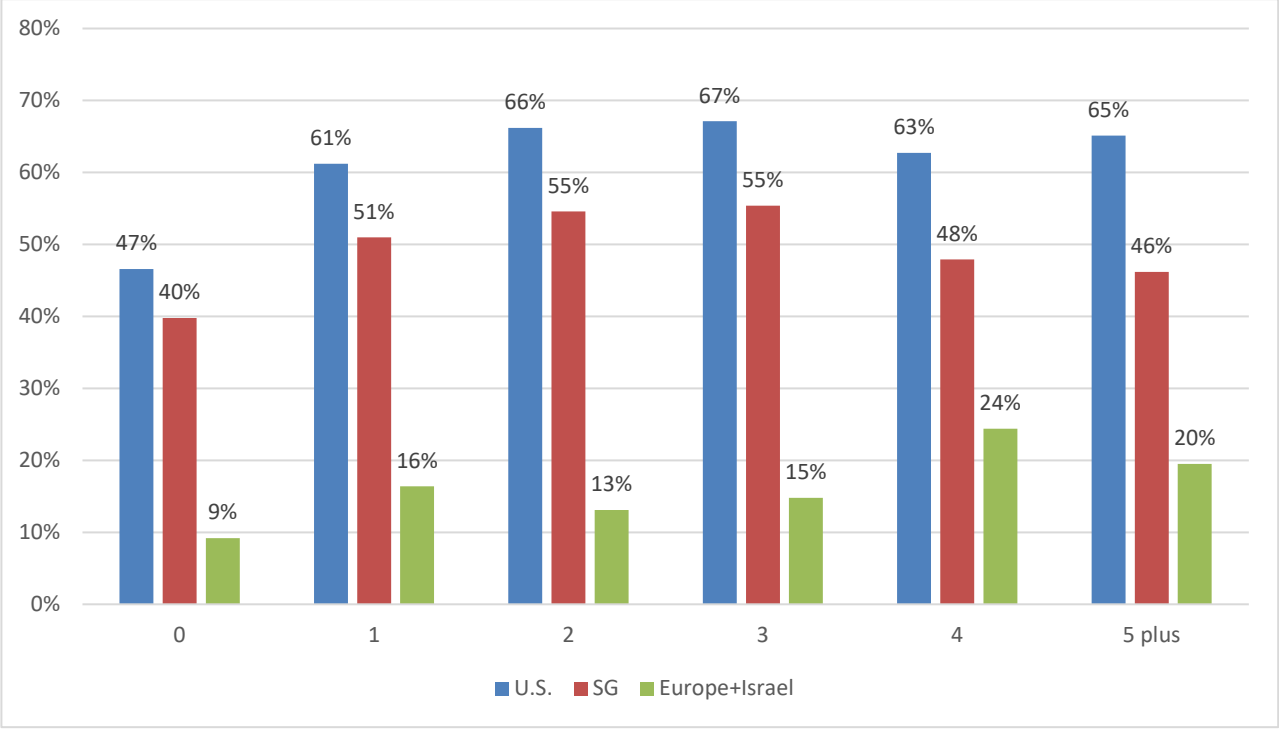


Table 1: Prevalence of saving regret, before and after revision

	CAMS		SLP		SHARE	
	Total		Total		Total	
Wish to have	**before revision**	**after revision**	**before revision**	**after revision**	**before revision**	**after revision**
…saved more	57.1	54.4	53.3	45.4	15.0	11.7
…about the same	40.6	43.6	42.3	50.3	78.7	82.4
…saved less	2.3	2.0	4.4	4.4	6.3	5.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	1,807		4,319		24,153	
Age range:	60-79		60-74		60-79	

Note: In CAMS and in the SLP respondents were asked whether they would "Spend less and save more over the years?" which we call the framed version of the question. In SHARE a random two thirds of the sample were asked the framed version; the remaining third was asked whether they would "Save more over the years?" which we call the unframed version. On average across all SHARE countries, saving regret is 2.4 ppts lower in the framed version vs the unframed version. Because only one third of the sample received the unframed version, the SHARE population average is less than 1 ppt higher than the framed version. We therefore combined these two samples for SHARE when presenting descriptive statistics. The regression analyses include an indicator for the question format in SHARE.

Table 1b: Prevalence of saving regret, before and after revision (Ages 60-74)

	CAMS		SLP		SHARE	
	Total		Total		Total	
Wish to have	**before revision**	**after revision**	**before revision**	**after revision**	**before revision**	**after revision**
…saved more	59.1	56.4	53.3	45.4	15.9	12.5
…about the same	39.0	42.0	42.3	50.3	77.8	81.5
…saved less	2.0	1.6	4.4	4.4	6.3	6.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	1,403		4,319		18,912	

Table 2: Saving regret by sociodemographic characteristics

	CAMS					SLP					SHARE				
			Saving Regret (After Revision)					Saving Regret (After Revision)					Saving Regret (After Revision)		
	N	In %	Mean	Std. Error	T-test	N	In %	Mean	Std. Error	T-test	N	In %	Mean	Std. Error	T-test
Total	1,807	100.0	0.544	0.015		4,319	100.0	0.454	0.008		24,153	100.0	0.117	0.005	
Female															
0	704	45.2	0.534	0.024	ref	2,125	49.3	0.466	0.011	ref	10,524	45.8	0.124	0.008	ref
1	1,103	54.8	0.553	0.019	ns	2,194	50.7	0.442	0.011	ns	13,629	54.2	0.111	0.005	***
Age															
60-64	541	33.7	0.574	0.028	ref	2,051	46.4	0.457	0.011	ref	5,444	30.1	0.143	0.012	ref
65-69	531	28.1	0.542	0.028	ns	1,493	34.9	0.451	0.013	ns	6,953	26.5	0.124	0.006	***
70-74	331	23.1	0.576	0.031	ns	775	18.7	0.451	0.018	ns	6,515	23.9	0.104	0.006	***
75-79	404	15.1	0.435	0.028	***						5,241	19.5	0.085	0.006	***
Marital status															
Married	933	57.6	0.505	0.020	ref	3,351	76.6	0.452	0.009	ref	17,966	70.1	0.111	0.006	ref
Separated or divorced	379	20.0	0.674	0.030	***	346	7.8	0.480	0.027	ns	2,011	9.1	0.169	0.016	***
Widowed	335	14.7	0.534	0.035	ns	208	5.1	0.474	0.035	ns	999	6.3	0.124	0.017	ns
Never married	106	6.3	0.524	0.067	ns	410	10.4	0.438	0.025	ns	3,135	14.3	0.113	0.010	ns
Missing	29	1.4	0.469	0.127	ns	4	0.1	0.249	0.216	ns	42	0.2	0.011	0.009	**
Education terciles															
Lowest	603	33.4	0.602	0.023	ref	1,440	33.3	0.428	0.014	ref	8,051	33.3	0.122	0.009	ref
2	602	33.3	0.568	0.026	ns	1,440	33.3	0.464	0.013	**	8,051	33.3	0.118	0.007	ns
Highest	602	33.3	0.463	0.028	***	1,439	33.3	0.469	0.013	**	8,051	33.3	0.112	0.007	*

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10. Unweighted Ns, weighted statistics.

Table 3: Saving regret by economic status and health

	CAMS					SLP					SHARE				
			Saving Regret (After Revision)					Saving Regret (After Revision)					Saving Regret (After Revision)		
	N	In %	Mean	Std. Error	T-test	N	In %	Mean	Std. Error	T-test	N	In %	Mean	Std. Error	T-test
Wealth quartiles															
Lowest	450	24.9	0.701	0.025	ref	1,081	25.0	0.452	0.016	ref	6,070	25.1	0.179	0.011	ref
2	448	24.9	0.643	0.027	*	1,072	24.9	0.472	0.016	ns	6,027	25.1	0.114	0.009	***
3	449	24.9	0.518	0.031	***	1,072	24.8	0.485	0.015	ns	6,045	24.9	0.101	0.007	***
Highest	447	24.8	0.313	0.031	***	1,070	24.7	0.406	0.014	**	6,011	24.9	0.075	0.008	***
Missing	13	0.5	0.538	0.138	ns	24	0.6	0.470	0.103	ns					
Income quartiles															
Lowest	450	25.0	0.617	0.027	ref	997	23.8	0.458	0.016	ref	6,085	25.2	0.145	0.013	ref
2	448	24.8	0.567	0.029	ns	940	20.6	0.444	0.017	ns	6,018	25.2	0.110	0.007	***
3	449	24.9	0.529	0.031	***	996	22.0	0.473	0.016	ns	6,042	24.9	0.111	0.008	***
Highest	447	24.8	0.465	0.032	***	909	22.1	0.450	0.016	ns	6,008	24.8	0.103	0.007	***
Missing	13	0.5	0.538	0.138	ns	477	11.4	0.433	0.023	ns					
Financial Planning Horizon															
Next few months	250	10.4	0.615	0.041	ref	544	12.8	0.488	0.022	ns	6,244	27.2	0.149	0.012	ref
Next year	229	13.2	0.527	0.041	*	325	7.5	0.429	0.028	ns	4,207	17.7	0.116	0.009	***
Next few years	480	27.4	0.586	0.028	ns	1,280	29.8	0.474	0.014	ref	5,149	23.9	0.107	0.009	***
Next 5-10 years	526	30.7	0.538	0.027	*	1,002	22.8	0.465	0.016	ns	3,109	11.9	0.093	0.008	***
Longer than 10 years	260	14.9	0.421	0.040	***	653	14.6	0.396	0.019	***	1,588	5.6	0.070	0.011	***
Missing	62	3.4	0.657	0.076	ns	515	12.4	0.434	0.022	ns	3,856	13.6	0.112	0.008	***
Fair or poor health															
0	1,223	78.1	0.517	0.018	ref	2,644	60.7	0.428	0.010	ref	15,936	64.5	0.116	0.006	ref
1	423	21.9	0.608	0.032	***	1,675	39.3	0.493	0.012	***	8,210	35.5	0.119	0.006	ns
Fair or poor memory															
0	1,146	74.6	0.519	0.019	ref						18,316	75.5	0.112	0.005	ref
1	484	25.4	0.588	0.029	**						5,826	24.4	0.133	0.011	***
Missing											11	0.0	0.083	0.081	

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10. Unweighted Ns, weighted statistics.

Table 4: Saving regret and negative/positive shocks

	CAMS					SLP					SHARE				
	N	In percent	Saving Regret (After Revision)			N	In percent	Saving Regret (After Revision)			N	In percent	Saving Regret (After Revision)		
			mean	Std. Error	T-test			mean	Std. Error	T-test			mean	Std. Error	T-test
Negative Shocks															
Health limited work	264	13.8	0.659	0.038	***	598	14.3	0.516	0.021	***	2,540	10.2	0.138	0.012	***
Earnings less than expected	144	7.9	0.784	0.045	***	522	12.4	0.569	0.022	***	1,401	5.5	0.226	0.041	***
Unemployment	122	7.6	0.639	0.059	**	478	11.2	0.538	0.023	***	1,424	6.3	0.202	0.029	***
Large health expense	195	10.8	0.654	0.043	***	454	10.9	0.496	0.024	**	1,299	5.6	0.155	0.016	***
Retired too early	140	8.5	0.688	0.052	***	359	8.2	0.595	0.026	***	1,706	5.7	0.135	0.014	**
Financial help to relatives	218	12.1	0.594	0.043	ns	330	7.7	0.484	0.028	ns	889	4.1	0.143	0.017	**
Bad investment	56	3.8	0.657	0.077	*	294	6.4	0.489	0.029	ns	558	2.7	0.109	0.018	ns
Large (non-health/educ) expense	98	5.7	0.655	0.058	**	205	4.9	0.512	0.035	ns	582	2.3	0.224	0.056	***
Death in family	155	7.1	0.669	0.049	***	181	4.4	0.456	0.038	ns	1,974	7.8	0.123	0.012	ns
College costs > than expected	55	3.6	0.524	0.082	ns	176	4.1	0.448	0.038	ns		Not in SHARE			
Divorce/separation	116	7.0	0.522	0.057	ns	62	1.5	0.409	0.064	ns	1,187	5.5	0.209	0.029	***
Pension benefits < than expected		Not in CAMS					Not in SLP				1,859	6.8	0.156	0.014	***
Other	40	2.1	0.488	0.097	ns	40	1.0	0.313	0.073	*	356	1.7	0.160	0.035	***
No Negative Shock	976	53.4	0.466	0.020	***	2,343	54.1	0.398	0.010	***	14,896	61.8	0.092	0.005	***
Any negative shock	831	46.6	0.634	0.022	***	1,964	45.9	0.520	0.011	***	9,200	38.2	0.159	0.009	***
Positive Shocks															
Spent less than expected	148	8.6	0.557	0.053	ns	723	16.6	0.504	0.019	***	626	2.5	0.151	0.026	***
R worked longer than expected	117	7.1	0.579	0.058	ns	614	13.9	0.496	0.020	**	755	2.2	0.157	0.024	***
Received fin. help from family	99	5.1	0.705	0.057	***	490	11.8	0.502	0.023	**	559	2.6	0.184	0.052	***
R salary/earnings >than expected	124	7.6	0.586	0.053	ns	460	10.3	0.450	0.023	ns	1,607	5.8	0.132	0.015	*
Good investments/business	240	18.2	0.392	0.039	***	391	8.4	0.387	0.025	***	913	3.5	0.091	0.014	**
Spouse worked longer than exp.	49	2.8	0.668	0.078	ns	271	6.1	0.512	0.031	**	303	0.8	0.136	0.033	ns
Spouse salary/earnings>than exp	85	5.4	0.578	0.066	ns	250	5.5	0.509	0.032	*	856	3.0	0.137	0.021	*
Received an inheritance	151	10.0	0.456	0.048	**	143	3.1	0.453	0.042	ns	4,116	17.7	0.100	0.007	***
Pension benefits >expected		Not in CAMS					Not in SLP				760	2.9	0.107	0.017	ns
Other	60	3.2	0.630	0.084	ns	51	1.2	0.415	0.070	ns	368	1.8	0.177	0.036	***
No positive shock*	1,302	66.6	0.576	0.018	***	3,285	77.2	0.451	0.009	ns	17,340	72.2	0.119	0.006	ns
Any positive shock*	505	33.4	0.481	0.027	***	1,026	22.8	0.461	0.016	ns	6,745	27.8	0.113	0.006	ns
All	1,807	100.0	0.544	0.015		4,319	100.0	0.454	0.008		24,153	100.0	0.117	0.005	

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10. Unweighted Ns, weighted statistics.

The definitions of “any positive shock” and “no positive shock” were adjusted to exclude the positive shocks that – upon further thought – had conceptual weaknesses: receiving financial help (marker of financial difficulty), respondent or spouse working longer than expected (often a marker of financial necessity).

Table 5: Social Policy Indicators and Savings Regret by Country

			Social Policy Indicators								
Country	N	Saving Regret	Statutory Retire-ment Age	OECD Replac e-ment Rate	Sustain ability Index	Ade-quac y Index	Social spendi ng health (share GDP)	Social spen-ding family (share GDP)	Social spending unemploy ment (share GDP)	Social spending Incapacit y (share GDP)	Share out of pocket (% of total health expenditure)
Austria	1,076	0.080	61.9	89.8	3.9	2.6	7.3	2.5	1.0	2.0	17.9
Germany	1,862	0.113	65.5	52.8	3.3	2.8	9.0	2.4	0.8	1.8	13.2
Sweden	1,620	0.153	65.0	59.1	2.9	2.1	6.6	3.5	0.3	3.4	13.7
Netherlands	1,396	0.116	65.8	79.2	3.4	1.7	2.8	1.5	0.7	2.8	10.4
Spain	1,314	0.074	65.0	82.1	3.7	2.7	6.4	1.3	1.5	2.5	21.9
Italy	1,338	0.097	66.8	92.5	3.1	2.7	6.4	1.4	1.1	1.7	23.5
France	1,602	0.129	63.3	71.9	3.7	2.8	8.5	2.7	1.5	1.7	9.7
Denmark	1,437	0.106	65.0	77.5	2.5	1.4	6.9	3.3	0.0	4.7	13.8
Greece	1,846	0.209	62.0	52.5	3.0	3.0	5.0	1.6	0.6	1.3	33.6
Switzerland	1,348	0.102	64.5	43.0	3.9	2.4	3.1	1.6	0.7	2.4	21.9
Belgium	1,316	0.114	65.0	62.9	3.0	2.4	7.2	2.7	1.4	3.2	19.7
Israel	538	0.153	64.1	54.5	3.5	2.5	4.8	2.1	0.3	2.8	21.4
Czech Replc	2,034	0.080	62.9	65.1	3.8	3.6	6.4	2.1	0.4	1.8	14.3
Poland	535	0.080	62.6	32.0	3.7	3.9	4.6	3.0	0.1	1.9	20.1
Luxembourg	628	0.118	62.0	91.3	4.1	2.1	4.6	3.3	0.6	2.8	9.6
Hungary	561	0.097	62.6	80.7	3.8	3.4	4.3	2.4	0.3	1.5	27.8
Slovenia	1,604	0.088	61.8	59.0	4.3	2.8	6.2	1.8	0.4	1.9	11.7
Estonia	1,839	0.100	63.3	55.3	3.1	3.4	5.0	3.1	0.3	2.3	23.9
Croatia	711	0.125	63.4	64.8	3.5	3.5	5.6	1.9	0.5	3.1	11.5
Usa	1,807	0.569	66.0	51.1	2.8	2.6	8.4	0.6	0.2	1.0	11.3
Singapore	4,641	0.456	63.0	34.2	4.1	3.2	2.3	0.6	0.1	0.1	28.7
Unweighted Means All	31,053	0.189			3.5	2.8					
Unweighted Means Eu Only	24,605	0.114	63.9	65.9	3.4	2.6	6.1	2.3	0.7	2.4	17.8

Note: saving regret after revision. OOP = out-of-pocket.

See Appendix for information on the policy variables.

Table 6: Extract from regressions of saving regret (0, 1) on number of shocks and social policy indicators (pooled sample of CAMS, SLP and SHARE)

	Model 1	Model 2	Model 3	Model 4
Shocks				
An negative shock	0.0793***	0.0747***	0.0676***	0.0628***
Any positive shock	-0.0169***	-0.00797	-0.00445	0.00572
Saving regret question unframed	0.0662***	0.0664***	0.0151***	0.0153***
Social Policy Indicators:				
Statutory Retirement Age			0.00157	0.00162
OECD Replacement Rate			-0.00232***	-0.00229***
Sustainability Index			-0.0845***	-0.0836***
Adequacy Index			0.0146***	0.0184***
Out-of-pocket health costs (share)			-0.00145***	-0.00131***
Social Spending Family share			-0.0682***	-0.0694***
Social spending unemployment share			-0.0215***	-0.0209***
Social spending disability share			-0.114***	-0.113***
Wealth included	N	Y	N	Y
Macro vars included	N	N	Y	Y
Observations	30,279	30,279	30,279	30,279
Adjusted R-squared	0.0578	0.0631	0.132	0.138

*** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

All regressions control for socio-demographic variables (age, gender, couple, education, self-reported health, working for pay, income quartile, saving regret question format (framed)).

Appendix 1: Definition of Policy Variables

Statutory Retirement Age

For Europe and the US, the statutory retirement ages ("normal retirement age" or age that qualifies for full pension benefits) are based on OECD (2019), Figure 9.6. They vary by country and gender. For Singapore, we used the corresponding data from the World Bank Gender Data Portal. Mean retirement age across all countries is 63.92 years (SD=1.6), ranging from 60 to 67 years.

OECD (2019): https://data-explorer.oecd.org/vis?df[ds]=DisseminateFinalDMZ&df[id]=DSD_PAG%40DF_PAG&df[ag]=OECD.ELS.SPD&dq=HRV%2BCHE%2BSWE%2BESP%2BSVN%2BNLD%2BPOL%2BLUX%2BITA%2BHUN%2BISR%2BGRC%2BDEU%2BFRA%2BEST%2BDNK%2BCZE%2BAUT%2BBEL.A.CRPLF22..M%2BF..&pd=%2C2022&to[TIME_PERIOD]=true&vw=tb
World Bank (2023): https://genderdata.worldbank.org/en/indicator/sg-age-rtre-ben

Replacement Rates

For Europe and the US pension replacement rates are based on OECD (2019), Table 5.5. These are net replacement rates based on the OECD pension simulation model. The year 2019 is the closest year corresponding to the year in which the saving regret data was collected. The replacement rates vary by country, gender and income group. The OECD computes the replacement rates for three income groups (50%, 100%, 150% of average income) which we assigned to the lowest, the two middle and the highest income quartile).

For Singapore, net replacement rates are based on Asher (1999) which reports that the typical low, middle and high earner needs to contribute additional 18.7 percent, 32.6 percent and 46.6 percent of their monthly income to the Central Provident Fund to meet the benchmark replacement rate of two-thirds of final income. Hence, replacement rates are 47.9%, 34% and 20% respectively, to be assigned to the first, second + third, and fourth income quartile, similar as for the EU and U.S.

Mean net replacement net across all countries is 60.47% with a standard deviation (SD) of 19.56, ranging from 20.0 to 104.5%.

OECD (2019): Pensions at a Glance 2019 (https://www.oecd.org/en/publications/pensions-at-a-glance-2019_b6d3dcfc-en.html)
Mukul G. Asher (1999): The Pension System in Singapore. SP DISCUSSION PAPER NO.9919, The World Bank

Social Spending

Social spending for families and for unemployment is measured as share of GDP in 2019. For Europe and the US, it is based on the OECD Data Archive (OECD 2023) while for Singapore we use Table 4.1.1 in Theseira (2021). Mean social spending for families across all countries is 1.1% of GDP (SD=0.5), ranging from 0.3 to 2.3%. Mean social spending for unemployment across all countries is 0.5% of GDP (SD=0.4), ranging from none to 1.5%. Mean social spending for disability across all countries is 1.4% of GDP (SD=0.7), ranging from 0.1 to 2.6%.

OECD (2023):- https://data-explorer.oecd.org/vis?lc=en&df[ds]=DisseminateArchiveDMZ&df[id]=DF_DP_LIVE&df[ag]=OECD&df[vs]=&av=true&pd=%2C2022&dq=AUT.FAMPUBEXP%2BPUBEXPINCAPACITY%2BPUBUNEMPEXP%2BPENSIONEXP..PC_GDP.A&to[TIME_PERIOD]=false&vw=tb
Walter Theseira (2021): Social Welfare Spending, Programmes and Development in Singapore, in Mokhtar, I. A. & Ibrahim, Y. (Eds.). Social Context, Policies and Changes in Singapore: Beyond the First 50 Years. Singapore: World Scientific.

Share of Out-of-Pocket Health Expenditures

Out-of-pocket health expenditures by households are measured as share of total current health expenditures by country in 2019. They are based on the Global Health Expenditure Database of the World Health Organization (WHO 2023). Their mean is 19.31% (SD=7.76) with a range from 9.50% to 36.08%.

World Health Organization (2023): https://data.worldbank.org/indicator/SH.XPD.OOPC.CH.ZS

Sustainability and Adequacy Assessments

The assessment of sustainability and adequacy of the pension systems in Europe, the US and Singapore relies on ratings provided by Allianz (2023).

The sustainability index assesses the strength of built-in mechanisms that cushion the pension system against the impacts of demographic change, while the adequacy index rates pension systems by whether they provide an adequate standard of living in old age, have a sufficient coverage, provide access to financial services and the integration of older workers in the labor market. Each index is based categories and sub-categories characterized by a parameter that is rated on a scale of 1 to 7, with 1 being the best grade. The bands defining each parameter's grade are chosen in a way that the grading results of all countries are normal distributed. By adding up all weighted subtotals, the index in each country assumes values between 1 and 7.

Specifically, the sustainability index is based on two categories: Preconditions (60%), which is split into the sub-categories retirement age (80%) and minimum contribution period (20%), and Finances (40%), which consists of the sub-categories financing (70%) and pension formula (30%). Data sources are the European Commission, the OECD, Axco Life and Benefits reports, and the respective national social security administrations and providers.

The sustainability index has a mean of 3.4 across all countries with a standard variation of 0.5. It ranges from 2.5 to 4.3.

The adequacy index is based on two categories First Pillar (50%), which is split up in Coverage (70%) and the Benefit level (30%), and Other Pension income (50%), which is split up in the sub-categories Second Pillar (20%), Financial Assets (70%) and Gainful Employment (10%). The data for this index is based on publicly available information of national social security administrations, ministries of finance and ministries of social affairs as well as on including publications of the European Commission, OECD, ILO, UN, Axco, and World Bank.

The adequacy index has a mean of 3.5 across all countries with a standard variation of 0.5. It ranges from 2.5 to 4.3.

Allianz (2023):
https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/economic-research/publications/specials/en/2023/april/2023-04-19-PensionReport.pdf

Appendix 2. Variable definitions

[TBA: Table with var definitions for each data set and show harmonization.]

Appendix 3. Complete Regression Results of Table 6

	Model (1)		**Model (2)**		**Model (3)**		**Model (4)**	
	savemore2		savemore2		savemore2		savemore2	
unframed	0.0662***	(0.00502)	0.0664***	(0.00500)	0.0151***	(0.00493)	0.0153***	(0.00491)
60.ageband	0	(.)	0	(.)	0	(.)	0	(.)
65.ageband	-0.00707	(0.00615)	-0.00665	(0.00614)	-0.0148**	(0.00592)	-0.0142**	(0.00590)
70.ageband	-0.0479***	(0.00662)	-0.0464***	(0.00660)	-0.0438***	(0.00637)	-0.0418***	(0.00636)
75.ageband	-0.0766***	(0.00727)	-0.0752***	(0.00726)	-0.0638***	(0.00704)	-0.0617***	(0.00702)
Female	-0.0199***	(0.00452)	-0.0200***	(0.00451)	-0.0150***	(0.00448)	-0.0150***	(0.00447)
Couple	-0.0624***	(0.00543)	-0.0640***	(0.00542)	-0.0439***	(0.00524)	-0.0460***	(0.00523)
1.edut	0	(.)	0	(.)	0	(.)	0	(.)
2.edut	-0.00995*	(0.00540)	-0.00553	(0.00540)	-0.00824	(0.00524)	-0.00364	(0.00523)
3.edut	-0.0135**	(0.00557)	-0.00388	(0.00561)	-0.0134**	(0.00543)	-0.00285	(0.00547)
0.rfairpoor	0	(.)	0	(.)	0	(.)	0	(.)
1.rfairpoor	0.0186***	(0.00477)	0.0148***	(0.00477)	0.0176***	(0.00464)	0.0131***	(0.00463)
0.workingforpay	0	(.)	0	(.)	0	(.)	0	(.)
1.workingforpay	0.106***	(0.00642)	0.105***	(0.00641)	0.0307***	(0.00645)	0.0299***	(0.00643)
1.finplan	0	(.)	0	(.)	0	(.)	0	(.)
2.finplan	-0.000985	(0.00716)	0.00232	(0.00715)	-0.0117*	(0.00688)	-0.00809	(0.00687)
3.finplan	0.0376***	(0.00651)	0.0431***	(0.00651)	-0.00317	(0.00631)	0.00267	(0.00631)
4.finplan	0.0508***	(0.00732)	0.0578***	(0.00732)	-0.00490	(0.00718)	0.00318	(0.00718)
5.finplan	0.0191**	(0.00899)	0.0284***	(0.00899)	-0.0344***	(0.00880)	-0.0239***	(0.00881)
99.finplan	-0.00430	(0.00731)	-0.000187	(0.00731)	-0.0449***	(0.00733)	-0.0411***	(0.00732)
1.incq	0	(.)	0	(.)	0	(.)	0	(.)
2.incq	-0.0118*	(0.00624)	-0.00667	(0.00625)	-0.0211***	(0.00605)	-0.0160***	(0.00606)
3.incq	-0.0168***	(0.00630)	-0.00475	(0.00636)	-0.0327***	(0.00622)	-0.0207***	(0.00628)
4.incq	-0.0477***	(0.00657)	-0.0253***	(0.00677)	-0.0580***	(0.00658)	-0.0353***	(0.00676)
9.incq	0.205***	(0.0180)	0.199***	(0.0180)	0.0340	(0.102)	-0.0116	(0.126)
1.wealthq			0	(.)			0	(.)
2.wealthq			-0.0315***	(0.00622)			-0.0307***	(0.00597)
3.wealthq			-0.0486***	(0.00638)			-0.0474***	(0.00612)
4.wealthq			-0.0862***	(0.00671)			-0.0882***	(0.00646)
9.wealthq			0.120*	(0.0630)			0.0123	(0.0747)
any_negshock	**0.0793*** **	**(0.00459)**	**0.0747*** **	**(0.00460)**	**0.0676*** **	**(0.00443)**	**0.0628*** **	**(0.00443)**
any_posshock	**-0.0169*** **	**(0.00505)**	**-0.00797**	**(0.00509)**	**-0.00445**	**(0.00495)**	**0.00572**	**(0.00499)**
couple_miss	-0.160	(0.190)	-0.156	(0.190)	-0.239	(0.183)	-0.238	(0.182)
rfairpoor_miss	0	(.)	0	(.)	0	(.)	0	(.)
workingforpay_miss	0	(.)	0	(.)	0	(.)	0	(.)
any_negshock_miss	0.120	(0.120)	0.113	(0.120)	0.0332	(0.116)	0.0230	(0.115)
any_posshock_miss	0.258*	(0.147)	0.255*	(0.147)	0.203	(0.141)	0.199	(0.141)
statutory_ret_age					0.00157	(0.00213)	0.00162	(0.00212)
replrate					-0.00232***	(0.000149)	-0.00229***	(0.000148)
sustainability					-0.0845***	(0.00636)	-0.0836***	(0.00634)
adequacy					0.0146***	(0.00542)	0.0184***	(0.00541)
share_oop					-0.00145***	(0.000354)	-0.00131***	(0.000353)
spending_family					-0.0682***	(0.00668)	-0.0694***	(0.00666)
spending_unempl					-0.0215***	(0.00607)	-0.0209***	(0.00605)
spending_incapacity					-0.114***	(0.00507)	-0.113***	(0.00506)
_cons	0.182***	(0.0109)	0.206***	(0.0113)	0.828***	(0.155)	0.829***	(0.155)
r2	0.0585		0.0640		0.133		0.139	
r2_a	0.0578		0.0631		0.132		0.138	
N	30279		30279		30279		30279	
F	78.39		73.83		141.1		131.8	

Notes: Standard errors in parentheses. * p<0.1 ** p<0.05 *** p<0.01"