

The third pillar in Europe: institutional factors and individual decisions

Julia Le Blanc



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Deutsche Bundesbank, Wilhelm-Epstein-Straße 14, 60431 Frankfurt am Main,
Postfach 10 06 02, 60006 Frankfurt am Main

Tel +49 69 9566-0

Telex within Germany 41227, telex from abroad 414431

Please address all orders in writing to: Deutsche Bundesbank,
Press and Public Relations Division, at the above address or via fax +49 69 9566-3077

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Abstract

This paper studies and documents household participation in voluntary individual retirement accounts (IRAs) in eleven European countries. Using recently available, internationally comparable data of households aged 50+, we calculate country-by-country average marginal effects of the probability to save in IRAs. We link the evidence from the micro data to the institutional differences in pension systems that prevail across the countries in our sample. Our results indicate that households' participation in the "third pillar" varies substantially across countries, both due to institutional differences and household characteristics. Higher education is crucial for participation in countries with shorter traditions of IRAs where awareness matters most. Background risk due to expectations of future pension reforms as well as experience with occupational pensions increase voluntary retirement savings additionally for the currently employed individuals in our sample.

JEL classification: D12, G11, J26.

Keywords: Individual retirement accounts, pension reform, consumption and saving over the life-cycle

Non-technical summary

Accompanied by pension reforms, most European countries have introduced tax-deferred individual retirement accounts as a means to incentivise private, voluntary savings for retirement in the “third pillar”. The introduction of these accounts has opened chances and risks for their owners: on the one hand, households can decide whether to save additionally for retirement and are rewarded with substantial tax-deferrals, on the other hand they may lack the financial knowledge to save voluntarily in these schemes and be left with insufficient retirement savings.

This paper focuses on how the characteristics of households in different countries are correlated with voluntary retirement saving. We use the most comprehensive European data set on portfolios of households aged 50 and above currently available which provides us with fully comparable data across 11 European countries. We document and study differences and similarities in ownership of tax-deferred retirement accounts. Descriptive statistics reveal that households in northern European countries where other types of pre-funded individual accounts exist in the public pension system have the highest ownership rates. Given the countries’ different pension systems, we then calculate the effects that households’ characteristics in each country have on the probability to own IRAs. We find that among households in countries which experienced structural retirement reforms educational differences matter less than in those countries where the introduction of IRAs is relatively recent and where pension systems are relatively generous. Additionally, other variables related to knowledge spillovers such as social activities and cognitive functions matter. Among the working population in our sample, educational differences play a major role for and explain differences in ownership up to 20%. Pooling households from all countries together, we find that the probability to hold an IRA in any country is substantially lower than in Sweden which we attribute to the institutional environment in this country.

Our findings suggest that policy makers can pursue two different directions to increase IRA: countries can invest in education and public campaigns to make those groups that are currently less literate more aware so that they can make informed

decisions about whether and how much to save voluntarily for retirement. Another way for policy makers could be the introduction of IRAs on a default basis, with the possibility to “opt out” as has been suggested in the literature. Such an automatic enrollment in a retirement account could compensate for the lack in financial education that prevails in some countries.

Nichttechnische Zusammenfassung

In den letzten Jahren sind Rentenreformen in den meisten europäischen Ländern mit der Einführung von steuerbegünstigten Rentensparplänen der “dritten Säule” einhergegangen. Die Einführung dieser freiwilligen privaten Konten birgt sowohl Vorteile als auch Risiken für die privaten Haushalte: Einerseits können sie sich entscheiden, ob und in welcher Höhe sie privat vorsorgen und können von den Steuervorteilen profitieren. Auf der anderen Seite kann fehlende Vorsorge und fehlendes Wissen hierüber die Haushalte in eine Situation bringen, in der sie ungenügend für das Rentenalter vorbereitet sind.

Dieses Papier untersucht die Beziehung zwischen den Eigenschaften von Haushalten in verschiedenen europäischen Ländern und ihrer privaten Vorsorge. Hierzu wird der derzeit detaillierteste verfügbare europäische Datensatz auf Haushaltsebene genutzt. Der Datensatz beinhaltet Individuen, die älter als 50 Jahre sind und enthält eine Vielzahl vollständig vergleichbarer Variablen in 11 europäischen Ländern. Wir dokumentieren und analysieren Unterschiede und Gemeinsamkeiten bei der Haltung von privaten Rentensparplänen über die Länder hinweg. Die deskriptive Auswertung zeigt, dass Haushalte in Nordeuropa den höchsten Anteil an privat vorsorgenden Haushalten haben. In diesen Ländern gibt es auch andere Formen von kapitalgedeckten Rentenkonten.

Gegeben die unterschiedlichen Rentensysteme werden die marginalen Effekte die verschiedene Haushaltseigenschaften in jedem Land in Bezug zu der Wahrscheinlichkeit, privat in Rentenplänen vorzusorgen haben, berechnet. In den Ländern, die in der Vergangenheit strukturelle Rentenreformen durchgeführt haben, macht höhere Bildung kaum einen Unterschied im Hinblick auf die private Vorsorge, anders als in den Ländern, die erst kürzlich steuerbevorzugte Rentenpläne eingeführt haben und bislang großzügige Rentenversorgungssysteme hatten. Andere Faktoren, die mit einem Informationsaustausch verbunden sind, wie etwa soziale Aktivitäten oder kognitive Funktionen sind ebenfalls wichtig. Unter der noch aktiven Bevölkerung spielen Bildungsunterschiede eine besonders große Rolle und ein höherer Bildungsgrad erhöht die Wahrscheinlichkeit, privat vorzusorgen um bis zu 20%. Nimmt man alle

Haushalte über die Länder hinweg in einem pool zusammen so ist die Wahrscheinlichkeit, privat vorzusorgen gegenüber Schweden in jedem Land geringer, was zu einem Großteil auf das institutionelle Umfeld in diesem Land zurückzuführen ist.

Die Resultate deuten darauf hin, dass eine Ausweitung der privaten Vorsorge auf zwei unterschiedlichen Wegen erfolgen kann: Zum einen scheint die Investition in finanzielle Bildung und öffentliche Kampagnen förderlich für die Erhöhung des Anteils derjenigen, die privat vorsorgen. Zum anderen könnte die private Vorsorge als “default” eingeführt werden, mit der Möglichkeit, nur durch aktive Kündigung aus einem Vertrag zu kommen. Diese Möglichkeit wird derzeit in der Literatur diskutiert. Eine automatische Teilnahme könnte die Bildungslücken hinsichtlich der privaten Vorsorge schließen, die in einigen Ländern vorhanden sind.

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THE THIRD PILLAR IN EUROPE: INSTITUTIONAL FACTORS AND INDIVIDUAL DECISIONS*

1 Introduction

Pension reforms all across Europe share a common approach: they reduce the generosity of the public pension pillar and increase responsibility of households to save privately through occupational and individual pension plans. Despite similar directions in pension policy, the institutional environments of the “third pillar” of pension saving differ substantially across countries.

*I thank Michael Haliassos, Dimitris Georgarakos, Dimitris Christelis and participants of the SHARE User conference 2009 in Mainz, the meeting of the European Society for Population Economics 2010 in Essen and the meeting of the European Economic Association in Glasgow for very useful comments and suggestions. This paper uses data from SHARELIFE release 1, as of November 24th 2010 or SHARE release 2.3.1, as of July 29th 2010. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001- 00360 in the thematic programme Quality of Life), through the 6th framework programme (projects SHARE-I3, RII-CT- 2006-062193, COMPARE, CIT5-CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812) and through the 7th framework programme (SHARE-PREP, 211909 and SHARE-LEAP, 227822). Additional funding from the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064, IAG BSR06-11, R21 AG025169) as well as from various national sources is gratefully acknowledged (see www.share-project.org/t3/share/index.php for a full list of funding institutions). The views expressed by the authors in this paper are their own and do not necessarily reflect those of the Deutsche Bundesbank.

Julia Le Blanc: Deutsche Bundesbank, Economic Research Center, Wilhelm-Epstein-Str. 14, 60431 Frankfurt am Main, Germany, email: julia.le.blanc@bundesbank.de, phone: +49 69 9566 8626.

This paper studies participation in individual retirement accounts (IRAs) in eleven European countries. Using a recently available cross-country data set, it delivers a comprehensive “snapshot” of personal retirement saving of households in Europe. Studying cross-country differences in participation and understanding their sources should be of great importance, both for policy makers and for financial practitioners. If certain household characteristics are systematically connected to individual’s non-participation, these should be taken into account by policymakers for the design of individual retirement accounts and incentive schemes for participation.

We document the heterogeneity in ownership of third pillar savings plans across our sample of countries. Linking these differences to the underlying institutional background of pension provision, we present a detailed overview of how each country has designed the interplay between public, occupational and voluntary pensions. Indicators of interest are the rules that countries apply for pension accumulation as well as aggregate measures of the generosity of public pension systems and the existence of (mandatory or voluntary) individual accounts within the pension systems. Understanding the institutional environment of IRAs is important to draw conclusions on the financial and non-financial incentives that each country has offered to the participating households in individual pension schemes. On the basis of the institutional description, we formulate hypotheses on the ownership and spread of IRAs that can be tested using comparable micro data. Our data set is the 2004 wave of the Survey of Health, Aging and Retirement in Europe (SHARE), a fully comparable cross-country micro data set covering individuals aged 50+. This is an age range when relevant decisions about retirement savings are finalized. Our sample of countries covers Austria, Germany, Sweden, Denmark, France, Italy, Spain, Switzerland, the Netherlands, Belgium and Greece.

We expect differences in the explanatory power of demographic and behavioral

variables for the ownership of IRAs across different countries. We attribute such differences to specificities in the institutional environments such as structural pension reforms in the past, the existence of other pre-funded individual accounts in the public pension system or a longer experience with individual retirement accounts. For example, owing to the long-standing experience with mandatory individual accounts and fully established third pillar markets in the Nordic countries, we expect households to be homogeneously aware of third pillar savings, while higher education should play a more important role in countries having limited experience with retirement accounts.

In the empirical section we estimate country-by country probit models and calculate average marginal effects of the ownership of IRAs, both in the whole sample in each country and within the subsamples of the working and retired population separately. Our results suggest that participation is indeed correlated to the institutional environment of IRAs. For example, the more favorable and long-standing institutional setups for funded pension schemes in Sweden, Denmark, Switzerland and in the Netherlands have led to high participation in IRAs in these countries. Moreover, having an occupational pension is correlated with higher IRA holdings in many countries, regardless of their experience with IRAs. Higher education increases the probability to save voluntarily for retirement, in particular in countries with little past exposure to individual accounts. In these countries, sociability indicators and subjective background risk stemming from expectations about future pension reforms also increase participation among the working population.

The paper is organized as follows: Section 2 reviews the literature, while section 3 introduces the data, Section 4 gives an overview of the different countries' pension systems and incentives given by the institutional environment to save in the third pillar. Section 5 describes the estimation strategy and the empirical results. Section

6 concludes.

2 Related literature

The standard life cycle model predicts that consumers should be forward-looking and smooth consumption over their lifetimes by accumulating assets during their working years and spending them in retirement. Economic models with consumption smoothing will therefore predict substitution between pay-as-you go systems (PAYG) and funded pensions.¹ A decline in the level of PAYG systems in these models will be compensated by private savings, however, there will not necessarily be an increase in private saving as private saving for retirement and private saving for other purposes are substitutes. The effect of tax incentives that are put into place to increase private retirement savings depends on the size of the substitution versus the income effect that such tax incentives create (Boersch-Supan (2004)).

Consequently, the empirical literature on individual pension plans has mostly focused on the effectiveness of tax incentives to boost retirement savings in individual plans. The central question of these works is whether new net savings are generated by IRAs or whether retirement savings are offset by an equally large decumulation of other savings. This discussion has not reached a consensus: on the one hand, several studies such as Gale and Scholz (1994) and Attanasio and de Leire (1994) conclude that tax incentives lead to a crowding-out of private savings and that households simply shift their private savings from their taxable accounts to tax-deferred accounts in order to reap the benefits of the tax deferrals; on the other hand, Venti and Wise (1990) find that tax-deferred retirement plans create new net

¹In their work Jappelli and Modigliani (2005) argue that indeed the main mechanism for retirement saving in Italy is the PAYG system.

savings.² As all of the countries in our sample have implemented tax incentives of IRAs, we do not restrict our attention on the incentives provided by tax deferrals but investigate whether, more generally, a favorable institutional environment for private pension provision is an incentive in itself to save in these plans. We focus on the differences within and across countries in voluntary retirement saving with similar tax incentives instead of the development of these differences over time.

Actual retirement savings decisions are further complicated by behavioral and psychological factors that may interfere with the ability of individuals to make and execute plans in accord with conventional optimizing theory: a considerable and growing stream of the literature, both on the theoretical and the empirical side, argues that households may not be well-informed and may not be able to correctly process information. Survey-based evidence on household participation in IRAs in the US³ and Europe⁴ shows that a consistent fraction of the population lacks basic financial knowledge about concepts like risk and compounding. Such financial illiteracy is widespread: Lusardi and Mitchell (2007) find that both young and older households in the United States appear to be under-informed about basic financial concepts, with serious implications for saving, retirement planning, mortgages, and other decisions. In the same direction, Gale, Iwry, and Orszag (2005) state that there is a mismatch in the U.S. between those who take the subsidies and those who need to save more for retirement (lower incomes, low education), and Agnew, Szykman, Utkus, and Young (2007) find that primarily better educated households in the U.S. join personal pension plans. They report higher marginal effects of education than of a substantial increase in income. The effect of education on personal retirement saving is also documented by Bernheim and Garret (2003). They conclude that financial education on the workplace stimulates saving in general and in particular

²Further examples are Attanasio and Banks (1998) and Skinner and Hubbard (1996).

³See Holden, Ireland, Leonard-Chambers, and Bogdan (2005).

⁴See Lusardi (2003).

for retirement, confirming that saving can be promoted through education with a meaningful impact on behavior, particularly among those who save the least.

The effect of the individuals' (lack of) financial awareness on individual retirement saving is one of the questions addressed in this paper. This issue is of great importance to understand the potential effects of currently or recently undertaken pension reforms, as the shift in responsibility from government provision to private retirement saving is based on the assumptions that individuals are 1) able to plan ahead for retirement to bridge the gap between public provision and their financial needs, and 2) capable of assuming responsibility and risk for making the right investment choices in their pension portfolio. To the extent that these assumptions are not verified, saving privately for retirement makes individuals vulnerable for investment mistakes, and the financially less sophisticated fraction of the population might end up lacking sufficient retirement income. Therefore, van Rooij, Kool, and Prast (2007) argue that the "cost of retirement planning" that arises from poor financial skills is the most important caveat against individual responsibility of saving for retirement. This cost can be understood as a fixed entry cost connected to participation in financial instruments, and different households' characteristics influence the individual costs of participation.⁵ Christelis, Jappelli, and Padula (2010) argue that low cognitive ability and low education may increase the perceived cost of investing in risky financial assets and may be a cause for non-participation.

A related branch of the literature has touched upon the behavioral tendencies that are connected to the long-term commitment of saving for retirement: Thaler and Bernartzi (2004) and Bernartzi and Thaler (1999) find that people tend to procrastinate and behave myopically. Using an experimental setup, Bernartzi and Thaler (2007) and Choi, Laibson, Madrian, and Metrick (2004) find out that indi-

⁵See Vissing-Jorgensen (2002).

viduals do not take part in tax-deferred retirement plans even if these offer clear arbitrage opportunities. Choi, Laibson, Madrian, and Metrick (2002) therefore call for automatic enrollment in private pension plans with the opportunity to “opt out”. Further, individuals tend to behave intertemporarily inconsistent and are likely to put off making decisions as the complexity of the decision increases: some individuals might not be able to make financial decisions, others tend to delay decisions or find it difficult to stick to them (Laibson, Repetto, and Tobacman (1998)).

Finally, the paper is also closely related to cross-country studies of portfolio choice⁶ and private saving such as Boersch-Supan (2004). Previous studies on IRAs have, however, employed micro data sets which are different across countries and thus not entirely comparable, while our analysis benefits from a recently available, directly comparable cross-country data set and takes furthermore into consideration the institutional aspects of national pension systems.

3 The Data

3.1 The Survey of Health, Ageing and Retirement in Europe (SHARE)

We use the first wave of the Survey of Health, Aging and Retirement in Europe (SHARE) which was conducted in 2004/05. The survey is modeled after the Health and Retirement Survey (HRS) in the US and the English Longitudinal Study of Ageing (ELSA) in England. SHARE comprises rich information about the lifestyles and savings, including individual retirement accounts and life insurance holdings, for 23,645 individuals (17,138 households) aged 50 and older in eleven European

⁶Guiso, Haliassos, and Jappelli (2002)

countries (Austria, Belgium, Denmark, France, Germany, Greece, the Netherlands, Italy, Spain, Sweden, Switzerland). The dataset covers detailed economic information (current work activity, job characteristics, opportunities to work past retirement age, sources and composition of current income, wealth and consumption, housing, education), health variables (self-reported health, physical health, cognitive functioning), social indicators (volunteer work, social networks, transfers of income and assets) and other socio-demographic indicators as well as expectations. The common design of questions across all countries allows for an international comparison of the data.

Our variable of interest is a binary choice variable comprising household ownership of individual retirement accounts and whole life insurances coming from the asset module in SHARE. Capital life insurances that solely insure the risk of mortality are not included. We employ this “narrow definition” of the third pillar as we want to restrict our focus on long-term, illiquid savings instruments directed at retirement.⁷ As will be discussed in the institutional section, the inclusion of whole life insurance holdings is appropriate as these instruments were the only tax-deferred long-term means similar to IRAs to save privately in several countries before the recent pension reforms.

3.2 Ownership and spread of IRAs in Europe

Figure 1 in the data appendix reports the heterogeneity of participation in IRAs in our sample of European countries of individuals aged 50 and older. We find the highest ownership rate of IRA holdings in the Scandinavian countries Sweden (46%) and Denmark (43%). At the other end of the spectrum are Spain (10%), Italy (7%)

⁷A broader definition of the third pillar would include all other private savings of households plus housing. We do not consider other (taxable) savings in bonds and equities as we want to focus on specific savings instruments for retirement purposes.

and Greece (5%), while the rest of the sample has ownership rates between 24% and 35%. This heterogeneity reflects both the different maturity levels of IRAs, i.e. the different years of introduction of IRAs and their importance in the different retirement systems.

We follow a common classification of pension schemes according to three pillars: statutory public schemes, schemes set up by employers, and personal pension schemes.⁸ Figure 2 displays the categorization used in this paper to classify pension systems along the three pillars and some of the key financing aspects corresponding to each pillar.⁹ Given that the sample comprises households aged 50+, we differentiate between retired and working households and look separately at their “pension portfolios”. Figure 3 reports the fraction of retired households in each country that receive pension income from each of the three pillars. Here, as in the rest of the paper, we do not consider other public or private transfers but only income from pensions. Between 87% and 95% of retirees in our sample receive pension benefits from a public system, reflecting the universal and mandatory nature of these pensions. Regarding the second pillar, more than 60% of households in France and the Netherlands, about 50% in Switzerland and more than 20% of retired households in Sweden, Denmark and Germany currently receive benefits from occupational pensions, while these pensions play only a minor role in Austria, Spain, Italy, Greece

⁸This is not the only way to arrange pension systems into pillars. The Worldbank defines its three pillars from the perspective of functions, rather than providers of, retirement schemes and differentiates between a mandated unfunded first pillar of basic pension to alleviate poverty, a second pillar of forced, earnings-related savings contributions with an income replacement objective and a third pillar of voluntary contributions to compensate any perceived retirement income gap for individuals in particular at the higher income end. See Worldbank (1994). The classification used by the OECD consists of three ‘tiers’ of pension provision, a first, redistributive tier, a second, mandatory earnings-related tier, and a third voluntary tier comprising voluntary occupational and voluntary personal schemes. See Whitehouse (2006). This categorization is similar to the one used in this paper but it does not differentiate between voluntary and mandatory occupational schemes, hence the second tier of the OECD classification includes occupational schemes of the first pillar as described in this paper. Our classification is closest to European Commission Directorate-General for Economic and Financial Affairs (2006).

⁹A similar categorization is done for example by Modigliani and Muralidhar (2004).

and Belgium. Additionally, more than 20% of households in Sweden and France and around 20 % in Denmark, Germany and Belgium receive benefits from private pensions of the third pillar while this fraction is only 10% in Switzerland and the Netherlands. In Italy, Spain and Greece, less than 5% of retirees receive pension benefits from the third pillar. Looking at the composition of retirement income of the retirees, Figure 4 underlines the importance of the first pillar for households in all countries of the sample. More than 70% of retirement income comes from the first pillar in all countries with the exception of the Netherlands where income from the first pillar accounts for only 58% of total retirement income. This is due to the importance of occupational pensions in the Netherlands which make up roughly 30% of retirement income. The fraction of total retirement income from the third pillar varies between 12% in the Netherlands and 2.5% Spain. Median IRA wealth is highest in Germany with 24,281 euro and is lowest in Greece with 1,764 euro.

Figure 5 provides an outlook to the future coverage of today's employees through the 3rd pillar: compared to today's retirees, a higher fraction of tomorrow's retirees in all countries owns IRAs and will be covered by pension benefits from the 3rd pillar. Tomorrow's retirees are not as widely covered by the first pillar but are instead entitled to benefits from the second and the third pillar. In particular, the fraction of the sample with entitlements to the third pension pillar increases strongly in comparison to the income sources of the retirees. More than 40% of households in the Northern and Central European countries of the sample are entitled to future pension income from the third pillar. Only in Greece, Spain and Italy the fraction of future retirees who expect income from the third pillar stays at a low level compared to the one at the time when the survey was conducted.¹⁰ As for different household characteristics, figure 6 shows that in all countries, the fraction of households owning

¹⁰The financial crisis and the restructuring of the Greek public pension system have to be analyzed in a future paper. The basis for the current discussion is the year 2004.

third pillar savings is highest among college graduates compared to households who have a high school degree or less than a high school degree. Figures 7 to 9 display the distribution of pensions from each of the three pillars across income quartiles. Households in all income groups are equally covered by pension benefits from the first pillar. This picture is different for the second and especially the third pillar where the spread of pension provision increases with income. Higher income groups are better covered especially by voluntary retirement savings in the third pillar. Even in the Scandinavian countries where the spread of private retirement saving is historically large, a higher proportion of retirees in higher income quartiles are covered.

4 Institutional Background

4.1 Structure of pension systems

To study voluntary personal retirement savings in different countries, it is necessary to understand their role in the respective national pension systems. Pension systems present remarkable differences across Europe. Most public pension schemes are financed on a pay-as-you-go (PAYG) basis, indicating that the contributions of the currently employed part of the population are used for the payments of current pensions. Across our sample of countries, the core of the pension system is a first-pillar mandatory public scheme with two purposes (or ‘tiers’): to redistribute income in order to prevent and reduce poverty among the elderly (‘first tier’) and to ensure a standard of living in retirement compared with that when working (‘second tier’). As shown in table 1, all countries in our sample have safety nets to prevent old-age poverty in the form of first-tier redistributive schemes. The second tier of public pensions is related to earnings and plays an insurance role: it aims to

provide retirees with an adequate income relative to their previous earnings. Most countries implement this via defined-benefit (DB) plans, financed on a PAYG basis, in which the amount a pensioner receives depends on the number of years of contributions made throughout his working life and on some measure of individual earnings from work. A few predominantly PAYG pension schemes have additional statutory requirements for partial pre-funding. Notably, Sweden and Denmark have switched part of their earnings-related tier into private, funded individual accounts. In these countries, 2.5% and 1% respectively of contributions to the public pension scheme flow into an individual account, and the accumulation of contributions and investment returns is usually converted into a pension-income stream at retirement. Finally, public pensions in Italy and Sweden are notional (defined) contribution plans (NDC), where workers' contributions are recorded in an individual account at a specified rate of return. The accounts are notional as both incoming contributions and the interest charged to them exist only in the books of the managing institution. At retirement, the accumulated notional capital in each account is converted into a stream of pension payments using a formula based on life expectancy.¹¹

The second pillar set up by employers complements the first pillar with (quasi-) mandatory or voluntary occupational schemes. These schemes may be defined-benefit (DB) or defined-contribution (DC), with the importance of DC plans increasing in most countries. In defined-contribution plans, benefits depends only on the contributions to these plans and their development until retirement. Occupational pension schemes are generally provided on a voluntary basis, as either the employer does not have to offer them or employees can choose to take part in these schemes. Only two countries of the sample, the Netherlands and Switzerland have privately-managed mandatory occupational DB plans, while Sweden and Denmark

¹¹Although DB, points and NDC schemes can appear very different, they are in fact closely related and one can be easily transferred algebraically into another. See Whitehouse (2006).

have quasi-mandatory schemes based on collective agreements between trade unions and employers. In all other countries, there are mixed systems with some industries offering mandatory plans and others having voluntary or no plans at all.

Some countries rely on a mix between mandatory and purely voluntary schemes (e.g. Italy's TFR scheme), on contractual or unilateral agreements with the employer (Austria's BGP, Germany's deferred compensation, Greece's occupational funds) or on the option to subscribe to pension schemes through one's employer or individually (France's PERP, Spain's Personal Plans). These schemes are of greatest importance in Belgium and Germany, where more than half of the working population is covered by voluntary occupational arrangements (Betriebsrenten and deferred compensation).

Finally and most importantly for this paper, each country's third pillar of personal pension provision consists of individual, privately-managed and fully funded DC accounts.¹² These accounts are typically subject to tax incentives granted by governments in order to promote private retirement savings. Most recent pension reforms have been accompanied by the introduction or further extension of preferential tax treatment for individual retirement saving.¹³ Many countries apply a variant of the exempt-exempt-taxed (EET) regime in which both the funds contributed and the accrual return on accumulated funds are exempted from taxation while benefits are treated as taxable income upon withdrawal (see table 2).¹⁴ In Italy, Denmark, and Sweden, contributions are tax-deferred but accrued income from fund investment is taxed (at preferential rates) and pension benefits at withdrawal are taxed

¹²Many authors summarize all private savings, whether they are short- or long-term under the third pillar. In this paper, we restrict attention to a narrower definition of savings in life insurances and individual retirement accounts, both long-term savings in accounts that require individuals to sign up explicitly.

¹³For example in Germany where the pension reform of 2001 was accompanied by public campaigns.

¹⁴This pure expenditure tax system achieves fiscal neutrality between current and future consumption as all savings are tax-exempt.

as well (ETT regime).¹⁵ In general, the fact that third pillar personal savings are directly tax-incentivized in all countries, makes them more attractive for higher income groups that benefit more from a tax-exemption of their income during working life.

The history of individual pension savings plans is diverse across countries. Supplementary, voluntary schemes in Sweden and Denmark were introduced in the 1980s. The structural pension reforms in Sweden in 1995 (and in Denmark in 1999) have introduced mandatory individual accounts in the first pillar of pension provision. In Belgium, two different programmes for voluntary pension plans exist: Pension Savings Schemes were introduced in 1987, and Life Insurance Schemes have been in place even longer. Also in the mid-1980s, Switzerland introduced its new three-pillar pension system with tax-deferred voluntary private savings to cover additional costs during retirement. In contrast to this, in Germany the traditional Bismarckian retirement system still prevails: pension accumulation and benefits are tightly connected through a “pension formula” that links pension income to job status and income during working life. While semi-mandatory occupational pensions have existed for several years, life insurance was largely the only means for individuals in Germany to fund long-term saving on a private and voluntary basis until the pension reform of 2001 which saw the introduction of tax relief for both occupational and individual pension schemes. The introduction of tax-deferred pension plans was then accompanied by a massive advertisement campaign to attract the wide public, especially low-and middle-income households into buying additional, voluntary second and third pillar accounts (“Riesterrente”). In France, the majority of the population is covered by mandatory complementary schemes (ARRCO and AGIRC) and additionally by voluntary private schemes (régimes surcomplémentaires). With tax-favored pension schemes restricted to specific categories of workers, life insur-

¹⁵Yoo and de Serres (2004)

ance has also been the favorite long-term private saving vehicle with favorable tax treatment in France and Austria.

We conclude from this section that all countries have introduced tax-preferred individual retirement accounts but that these have been put into place in different times and have been communicated with different emphasis by the governments.

4.2 Generosity of pension Systems

According to the life cycle hypothesis, an important determinant to take up voluntary savings plans should be the (shrinking) generosity of pension system in place and the exposure to IRAs.¹⁶

The rules of pension systems in all countries have been subject to changes in recent pension reforms with most changes applying to pension eligibility ages, the earnings measure, replacement and accrual rates (see table 8). The parametric changes have been modest in the some countries - especially in Greece and Austria accrual rates allow for shorter working years.

For the decision to take up private, personal pensions, individuals' exposure to other types of (mandatory individual or occupational) private, pre-funded pensions should also be of relevance and may lead to spill over effects to IRAs (see table 6). The total amount of assets held by private pension schemes, shown in figure 10, represents a useful indicator of the importance of private pension provision and its capacity to contribute to older people's income.¹⁷ It also gives a good indication of the future potential of these schemes in the overall pension system. Countries can be separated into two broad groups corresponding to their assets: those where assets

¹⁶See Borsch-Supan (2007) for a discussion of the generosity of the SHARE countries towards the elderly.

¹⁷Levels of assets also reflect the maturation of these schemes in each country as they result from the level and length of past contributions.

represent at least 60% of GDP (the Netherlands, Denmark, Switzerland, Sweden) and those where the amounts in assets accumulated in pension funds is at 15% or less in relation to the size of the economy (Germany, France, Belgium, Italy, Spain, Austria). The marked distinction between the two groups in terms of asset size reflects to some extent the fundamental difference in the design of the overall pension system as described above. In general, present levels of assets vary significantly across our sample of countries and are much smaller in those countries that have large public pension replacement rates. Countries with a small asset base are generally the ones where the pension system is dominated by the public sector on a PAYG basis and which are thus largely unfunded. Typically, in these countries, relatively high replacement rates are ensured even at upper income levels, leaving a more limited role for supplementary and voluntary private pensions.¹⁸ This is the case for Greece and the past experience in Germany, France and Austria. In Italy, the development of private pension assets has also been hindered by the existence of generous severance-pay provisions. The maturity and accessibility of private schemes in different countries is heterogeneous. Where tax-favored pension plans have only recently been introduced or made broadly accessible, the proportion of accumulated assets is small (as is the case in Germany, France, Italy, Belgium, Greece and Austria). The large proportion of assets accumulated in the Netherlands, Denmark, Switzerland and Sweden represents to a large extent the (quasi-)mandatory and -universal nature of their occupational schemes. The main occupational plans in these countries are not only (quasi-)mandatory but also privately managed and fully funded. The Netherlands only have a small flat rate, base pension provided by the PAYG system, and all additional incomes are provided by (mandatory) savings plans, commonly provided through occupational pension plans. In the case of Switzerland, Denmark and Sweden, such high proportion also reflects the significance of voluntary contri-

¹⁸Antolin, de Serres, and de la Maisonnette (2004).

butions above the compulsory threshold (Antolin et al. (2004)).

To summarize, the generosity of existing public pension schemes and experiences with private pensions should influence individuals' tendency to participate in private pension arrangements. Reasons for the extensive development of private pensions in some countries may be the limited scope of income replacement in the public scheme or the effects of pension reforms to manifest in the future, especially in those countries where replacement rates provided by first-pillar schemes are projected to decline in the coming decades. Overall, the importance of privately managed (statutory, occupational or voluntary), complementary pensions is expected to increase in the coming decades.

Although institutional indicators as the ones presented in the previous section are commonly used to assess pension systems' generosity and incentives towards private savings, such macro indicators can only hint at stylized histories of private retirement savings as undertaken by an unrealistic "average individual". These indicators are based on data for full career workers, neglecting the often incomplete contribution histories of employers as well as the influence of differences in important socio-economic variables such as education, wealth, health.

4.3 Hypotheses about the Third Pillar

What are the consequences of the highlighted differences of pension systems on the probability to own individual private pension plans? We expect 1) the differences in the generosity of national pension systems and the incentives to save privately to have consequences on the willingness to save in third pillar personal pensions. In countries where IRAs have been in place for a longer time, differences in financial sophistication should only play a minor role for the take-up of voluntary savings while higher educational degrees should matter in countries with little experience

with individual accounts. 2) Expected future pension reforms, often linking into a reduction of generosity of the first pillar pension provision, should also lead to higher savings in IRAs to buffer against this additional background risk.

On the first hypothesis, countries as Sweden and Denmark provide near-optimal conditions for the development of personal pension savings. Mandatory individual accounts in the public pension system, combined with additional quasi-mandatory private, occupational pension schemes and public benefits that are closely linked to life expectancy and lifetime average earnings have produced a good starting position for third pillar savings in these countries. The pension package already consists to a large part of income from private pensions, and fundamental pension reforms in the 1990's have shifted responsibility further away from the government to individual pension provision.¹⁹ The universal application of individual accounts for pension provision is expected to create spill-over effects on the third pillar.

The opposite should be true for countries that have produced less favorable environments and where the third pillar is hardly developed. In Italy, Greece and Austria, the first, public pillar provides 90% or more of pensions for full-career-workers, reflecting the high replacement rate target of public pensions. Earnings are averaged over shorter periods than lifetime earnings with generous accrual rates. Pension reforms in these countries have suggested a very limited role of third pillar savings vehicles and replacement rates are expected to remain high (at the time of the study in 2004). Individuals saving in the third pillar in these institutional environments are expected to be well educated and/or possibly more informed about third pillar schemes through informal networks. Despite having a slightly higher coverage of occupational pensions, also Spain provided very generous pension benefits at the time the survey was conducted. Therefore, educational differences should

¹⁹See Sunden (2006) and Cronqvist and Thaler (2007) for details on the Swedish pension reform.

matter in the Southern European countries Spain, Greece and Italy, and furthermore in those countries where private retirement saving is currently adapting to previous pension reforms.

On the second hypothesis that expected changes in generosity may also play a role, in countries like Germany, Belgium, and France, state provisions are being increasingly transformed from previously generous levels to comparatively low ones following recent pension reforms.

When focusing on the working population, having an additional occupational pension should also matter and increase the likelihood of saving in the third pillar. Given the relatively recent introduction of third pillar incentives, having a private pension scheme should be different for the working population around 50 and the already retired population. Not only should take-up rates differ but the effects of education should be further leveled out. Expectations about future pension benefits should be particularly important as workers in these prime years can still start contributing to third pillar savings vehicles.

5 Confronting institutional settings with the data

After a first look at the descriptive statistics and the institutional settings, we now take our hypotheses to a set of detailed micro data. The main questions to be answered are: How do the hypotheses outlined in the previous section translate into the probability to own IRAs in each country? Do households across different countries take up individual retirement accounts as expected by the institutional overview? To answer these questions, we estimate a battery of probit models.

5.1 Estimation strategy

The ownership decision of saving in the third pillar is estimated using a standard discrete dependent variable model. These models can be motivated by viewing the outcome of a discrete choice as a reflection of an underlying regression.²⁰

We assume that a household chooses to hold individual retirement accounts if the value of its desired retirement savings exceeds a certain threshold. Ownership of individual retirement accounts on the household level is then modeled by the following index function model: $y_h^* = x_h' \beta + u_i$

The unobserved continuous random variable y_h^* is explained by the observable independent variables x_h and unobservable variables in u_i . We do not observe y_h^* fully, instead, all we observe is the binary variable y_h which takes a value of 1 if y_h^* crosses a certain threshold and 0 otherwise, i.e. household h owns individual retirement accounts if $(y_h^* > 0)$ (in which case we observe $y_h = 1$), and it chooses not to have IRAs if $y_h^* \leq 0$ (which we perceive as $y_h = 0$). The (conditional) probability of observing ownership of Individual Retirement accounts is derived as a monotonic transformation of a specified linear index function $F(x_h' \beta)$. Different distributions for y_h^* lead to different binary outcome models. Assuming that u_i is standard normally distributed, $F(x_h' \beta)$ is the cumulative distribution function of the standard normal distribution which ensures that the probability of owning individual retirement accounts falls into the interval between 0 and 1. This is the specification of the probit model which can be estimated by maximum likelihood methods.

In our estimations we also have to deal with a sample selection problem that can lead to biased estimates and efficiency loss. Item non-response in household surveys

²⁰An alternative way to introduce latent variables in a binary outcome model is to model the difference in utility if the event of interest occurs. The discrete variable y then takes value 1 if alternative 1 has higher utility, and it takes value 0 if the other alternative has higher utility, thus presuming that the binary outcome is a result of individual choice.

is usually high in all financial questions and non-random across the observations. For each financial category, respondents are asked if they hold any assets in this category. If so, they were asked to give a value of their total holdings in this category. Respondents who refused to respond or answered “don’t know” were then routed to unfolding brackets, a procedure by household surveys where individuals who do not want to or cannot specify exact values are given the chance to answer in which interval of values the missing value lies.²¹ Ownership was imputed when respondents did not select a certain item but gave positive amounts later or if they refused to select any offered asset holdings. Missing values in financial variables of SHARE are imputed through a multiple hot-deck procedure as outlined by Rubin (1987).²² A multiple imputation procedure generating five imputates for each missing value mimics the distribution of the missing values, given the non-missing ones. In our estimations, we make use of all of the 5 imputates of each variable.

5.2 Marginal effects

In practice one wants to make statements about the expected effect or the effect of a “typical” person or household. Hence, interest lies in determining the marginal effects of a change in a regressor variable on the conditional probability that $y_h = 1$. However, the coefficients of the probit model have no direct economic interpretation. In a linear model, marginal effects are simply the derivatives of the probability that the dependent variable equals 1 with respect to the k th element in x_i . In non-linear models, the marginal effect of a change in a regressor on the conditional probability that $y_h = 1$, assumed to be continuous, is $\frac{\partial Pr[y=1|x]}{\partial x_{ij}} = F(x'_i\beta)\beta_j$. The predicted probabilities $F(x'\hat{\beta}) = \hat{F}$ and the estimated marginal effects $f(x'\hat{\beta})\hat{\beta} = \hat{f}\hat{\beta}$ are

²¹Juster and Smith (1997) discuss how unfolding brackets improve the reliability of wealth and savings data in HRS and AHEAD substantially.

²²Dimitris Christelis and Padula (2005).

nonlinear functions of the parameter estimates, i.e. marginal effects are not constant over the observations, depend on all covariates, differ with the point of evaluation, and vary with different choices of the cumulative distribution function $F(\cdot)$.

It is common practice to report marginal effects for each variable evaluated at the sample mean of the independent variables: $F(\bar{x}'_i\beta)\beta_j$. This method might be misleading as no individual or household actually reflects exactly the mean of the regressors. A more appropriate way is to find the average marginal effects by calculating the marginal probability effect for each observation and then averaging over all households: $N^{-1} \sum_i F(x'_i\hat{\beta})\hat{\beta}_j$. Because of the non-linearity of the derivative, the marginal effects at the mean and average marginal effects are not identical.

Average marginal effects are calculated using the average within marginal effect of each implicate. Standard errors have to be adjusted by the correlation between the implicates. For references on this procedure see Montalto and Sung (1996).

5.3 Empirical specification and results

We estimate country-by country probit models and calculate average marginal effects from three different specifications of the data. Given the specific nature of our data, we include a number of covariates that may be correlated with background risk of households aged 50+ and hence influence voluntary retirement saving of the households in the sample.

While the elderly are unlikely to face significant income risk, except for the inflation risk associated with annuities, they typically face a much higher health risk and therefore controlling for health is quite important in our sample.²³ SHARE data include both self-reported health and the number of limitations with daily activities as a measure of objective health. In addition to the information that investors can

²³Christelis et al. (2010).

collect from media and financial advisors, there are information spillovers from informed to uninformed investors in the same social circle.²⁴ Individuals often learn about investment opportunities from others, and how this occurs depends on the specific process of social learning and on how people interact. Another reason why the saving of the elderly might differ from that of other investors is that the elderly face a higher mortality risk, and have, of course, shorter horizons than the non-elderly. For these reasons, the intention to leave a bequest may influence taking up private pensions, in particular as many of these contracts allow for provisions to bequeath savings. Likewise, marital status may also be connected to holding IRAs as many contracts provide income for the remaining spouse in case one of the partners die. Finally, cognitive functions such as recall and numeracy abilities have been found to influence financial decision making of the elderly (Christelis et al. (2010)). Cognitive abilities are closely related to the ability to process information, they might lower information costs and may be related to more patient behavior.

At the same time, we need to take account of the fact that the historical access to IRAs has not been uniform across countries and age groups. For many older households in the sample these plans were not available until close to retirement. We exclude households in the data set that are older than 80 as we do not perceive any household owning IRAs in Italy and Greece beyond this age. Additionally, IRA ownership is not a current decision for most of our households. As our data covers only households in their late earning years or already in retirement, it is reasonable to assume that their choices to purchase IRAs have mostly been made earlier in their lives. The specifications of the probit models therefore have to consider that explanatory factors for IRA holdings may go back to past decisions, and that we can infer the ownership decision of IRAs from households' current characteristics.

²⁴Hong, Kubik, and Stein (2004).

We assume that ownership of IRAs depends on various socio-demographic characteristics: our regressors are age, age squared, gender of the household head, marital status (whether living in a couple or being a single), number of children, a dummy for self-perceived bad health status, and as an indicator of objective health status the number of limitations in daily activities, further whether the household is socially active (organized in sports clubs or social clubs), whether the household provides help to neighbors and family, cognitive abilities (his recall and numeracy score), formal educational achievements (high school certificate and post secondary degree), work status (working or retired), subjective probability to leave a bequest, income, financial and real wealth. We avoid endogeneity by excluding third pillar wealth and third pillar income from financial wealth and income. We include quartiles instead of continuous variables as income, financial and real wealth have skewed distributions. To account for institutional variation between the countries, we also ran a pooled probit including a full set of country dummies.

In our first specification, we consider all households regardless of their job situation and age. Across all countries, higher financial wealth increases the probability to hold IRAs significantly. In some countries like France, Greece, Spain and Belgium, higher income also increases the probability to hold IRAs. This fact is noteworthy as third pillar savings vehicles are mostly targeted towards middle and low-income households who will be affected more severely by pension reforms than households in higher income and/or wealth quartiles. However, the preferential tax treatment of individual retirement plans is more beneficial for higher income households than for the lower income quartiles.

Formal educational attainment generates sizable effects in many countries. Given the rich set of covariates, this underlines the importance of education for financial literacy and financial decision-making. This finding should also be crucial for poli-

cymakers as households with low education might be “left-out” of the trend toward more individual responsibility and might have additional needs for financial education in order to take-up IRAs. That formal education plays a strong role in many countries for ownership of IRAs among elderly households also means that experience gained during working life has only very limited effects and does not level out educational differences (that go back more than 30 years for the households in our sample). As discussed in the previous section, one would expect education to be more significant and to have large marginal effects in countries that have relatively unfavorable environments for third pillar savings, while there should hardly be differences in the propensities of differently educated households in the Nordic countries and Switzerland. In reality, there is substantial heterogeneity in the importance of educational levels on IRA holdings across countries: in Austria, Sweden, France and Belgium we perceive large significant effects. In these countries, where the pension system has been historically generous, pension systems have changed dramatically since the end of the 1990’s. As a result of pension reforms in these countries, replacement rates and indicators of generosity are expected to drop heavily (see Tables 3 and 10 in the estimation appendix). Even the Southern European countries, where absolute IRA levels are low, display small but significant effects of formal education. With no campaigns in favor of third pillar savings and the fact that pension systems in place are still quite generous and forecast high replacement rates in the future, formal education might be crucial for awareness of third pillar savings and be a proxy for financial literacy here. It might additionally reduce the cost of information gathering. In contrast, in Denmark, the Netherlands and Switzerland, higher formal education has no significant effect on the probability to hold IRAs. These countries have long-established three pillar pension systems with funded accounts in the mandatory second pillar, and the favorable tax treatment of IRAs has been granted by governments since the 1980s. Hence, higher educational

attainment does not contribute to a higher probability of IRA holding. We also note the surprising result that Germany shows no significant effects given the relatively recent public campaign (2001) for third pillar savings. This points to the conclusion that education has no effect in the awareness of third pillar instruments in Germany.

High sociability indicators or “helping others” increase the probability of holding individual retirement accounts significantly in Austria, Germany, Spain, Italy, Greece and France, Belgium, and Denmark. It has been argued that “social” investors differ from less social ones as their net cost of participating in the market is influenced by the presence of peers. Specifically, the cost for any social investor in a given peer group is reduced, relative to the value for an otherwise identical non-social, by an amount that is increasing in the number of others in the peer group that are participating. These variables again, although taken from current behavior, are connected to previous lifestyles and attitudes which in turn might have influenced their decision to have IRAs.

In our second specification, we divide the sample into working and retired population in order to explore differences between the holdings of IRAs of the “young” versus the “old” households in SHARE. For the sample of retired households, the dependent variable is now a dummy for pension income from personal pensions and other annuities from private retirement savings. The conclusions of the general specification are mostly confirmed by the analysis of the subsamples. In accordance to the previous model, belonging to one of the higher income or wealth quartiles is still important for both the working fraction of the sample and the retired. However, the estimations also highlight some differences between the two subsamples. The marginal effects of having a college degree (instead of less than a high school education, the omitted category) are significant and higher for the subsample of the still employed. We would have expected educational differences to matter less among the

population who is more affected by pension reforms but education matters for the younger households that can still decide about their retirement savings. In Greece a secondary degree increases the probability to save in IRAs by more than 5%, in Sweden by 10%, in Belgium and France by 14 and 19 % respectively and in Denmark by 25%. Despite offering good environments for IRAs, in the Scandinavian countries pension reforms seem to be too recent for educational differences to play no role as in those countries that have quasi-mandatory fully funded occupational pensions (Switzerland, The Netherlands).

The experience with private occupational pensions is equally important: among the working population, having an occupational pension increases the probability to hold voluntary individual retirement accounts. This effect is only relevant (significant) in those countries where occupational pensions are not quasi-mandatory and coverage is not high (Greece, Spain). Again, the experience with occupational pensions may increase awareness and familiarity with individual accounts. With regard to other forms of illiquid saving, we do not find effects of real estate wealth for the southern European countries who save primarily in housing.

Among the working households, expectations about the future state of the pension system play a big role for the holdings of IRAs: in all countries except for Italy, Spain and the Netherlands the expectation that the government would either increase retirement age or decrease benefits has high positive, significant effects on the probability to save in the third pillar. The desire to retire early, on the other hand, has no significant effect.

A pooled probit with country dummies confirms the importance of institutional differences between countries. Against the omitted category, Sweden, all country dummies are negative and significant, a result reflecting the favorable environment for third pillar savings vehicles in Sweden and the relative unfavorable environment

in the other countries. All Swedish households born after 1938 were gradually affected by the impact of the structural pension reform in the 1990's and those born after 1954 participate fully in the new pension scheme that includes mandatory individual retirement accounts in the public pension system. The oldest households in the sample (those older than 74) have not been affected at all and those in retirement age only to a small extent as they were already relatively old when the pension reform was phased in. This explains the differences in magnitude between the country dummies of the working population and the retired/ not in the work force. The highly significant negative marginal effects for the country dummies among the currently working in Greece, Spain and Italy capture the highly adverse effects that these countries' institutional environments have on IRA ownership in relationship to Sweden. Only Denmark that saw a similar structural pension reform has an insignificant country effect, leading to the conclusion that institutional differences between the two Scandinavian countries are small.

6 Conclusion

Using a recently available international dataset, in this paper we have documented and studied differences in IRA holdings across a sample of European countries. Taking each country's pension system as given, we formulated a set of hypotheses about how households' characteristics would contribute to IRA holdings within and across the sample of countries. We then checked how these results from pension system indicators compared when taken to the data. Knowing which characteristics are correlated to private retirement saving should be of importance to policy makers and financial practitioners alike.

Our findings suggest that a number of household characteristics have a systematic

effect on holding IRAs. This is important, given that pension reforms are decreasing public retirement provision in all countries. In particular, high wealth and income increase the probability to own IRAs across most countries. This implies that those who are unlikely to save privately for retirement will be more likely to end up without sufficient retirement income. This group needs to be targeted directly if participation in IRAs is to be further promoted by governments. This claim is supported by the indicators from the institutional description that the shift to private pensions has mostly benefited higher income groups. The paper also finds that, irrespective of whether households have a long standing experience with mandatory accounts in their country, higher education is still a major determinant of third pillar holdings. An important implication of this result is the need for formal education to increase IRA ownership, especially for low earners who will typically have a low tendency to save towards retirement. If private pensions are to provide retirement incomes for people with lower educational achievements, our findings suggest that policy makers can pursue two different directions: countries can invest in education to make those groups that are currently less “retirement savings literate” more aware so that they can make informed decisions about whether and how much to save voluntarily for retirement. Another way for policy makers could be the introduction of IRAs on a default basis, with the possibility to “opt out” as has been suggested in the literature. Such an automatic enrollment in a retirement account could compensate for the lack in education that prevails in some countries.

Our results and implications are limited in scope by the cross-sectional nature of the data: using one cross-section of the survey, we cannot control for cohort effects which should give important information on retirement saving over time. As SHARE becomes a panel data set, taking account of cohort effects and transitions over time should be an intuitive follow-up step of the work in this paper.

References

- AGNEW, J. R., L. SZYKMAN, S. P. UTKUS, AND J. A. YOUNG (2007): “Literacy, Trust and 401(k) Savings Behavior,” *CRR WP 2007-10*.
- ANTOLIN, P., A. DE SERRES, AND C. DE LA MAISONNEUVE (2004): “Long-Term Budgetary Implications of Tax-Favored Retirement Savings Plans,” *OECD Economic Studies*, 2.
- ATTANASIO, O. AND J. BANKS (1998): “Trends in Household Saving Don’t Justify Tax Incentives to boost Saving,” *Economic policy*, October.
- ATTANASIO, O. AND T. DE LEIRE (1994): “IRAs and Household Saving Revisited: Some New Evidence,” *NBER working paper 4900*.
- BERNARTZI, S. AND R. H. THALER (1999): “Risk Aversion or Myopia? Choices in Repeated Gambles and Retirement Investments,” *Management Science*, 45, 364–381.
- (2007): “Heuristics and Biases in Retirement Savings Behavior,” *Journal of Economic Perspectives*, 21, 81–104.
- BERNHEIM, D. AND D. GARRET (2003): “The effects of financial education in the workplace: Evidence from a survey of households,” *Journal of Public Economics*, 87, 1487–1519.
- BOERSCH-SUPAN, A. (2004): “Mind the Gap: The Effectiveness of Incentives to Boost Retirement Saving in Europe,” *OECD Economic Studies*, 39.
- BORSCH-SUPAN, A. (2007): “European Welfare State Regimes and Their Generosity Towards the Elderly,” *MEA Discussion Paper No.128*.

- CHOI, J., D. LAIBSON, B. MADRIAN, AND A. METRICK (2002): “Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance,” in *Tax Policy and the Economy*, ed. by J. Poterba, MIT Press, vol. 16, 67–113.
- CHOI, J. J., D. LAIBSON, B. C. MADRIAN, AND A. METRICK (2004): “Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance,” *NBER Working Paper*.
- CHRISTELIS, D., T. JAPPELLI, AND M. PADULA (2010): “Cognitive Abilities and Portfolio Choice,” *European Economic Review*, 54, 18–38.
- CRONQVIST, H. AND R. H. THALER (2007): “Design Choices in Privatized Social-Security Systems: Learning from the Swedish Experience,” *American Economic Review Papers and Proceedings*, 94, 424–428.
- DIMITRIS CHRISTELIS, T. J. AND M. PADULA (2005): “Generated Asset Variables in SHARE Release 1,” in *The Survey of Health, Aging and Retirement in Europe - Methodology*, ed. by A. B. Supan and H. Jürges, Mannheim.
- EUROPEAN COMMISSION (2006): “Adequate and Sustainable pensions. Synthesis report 2006.” .
- EUROPEAN COMMISSION DIRECTORATE-GENERAL FOR ECONOMIC AND FINANCIAL AFFAIRS (2006): “The impact of ageing on public expenditure: projections for the EU–25 Member States on pensions, healthcare, long-term care, education and unemployment transfers (2004–2050),” *European Economy, Special Report No 1/2006*.
- GALE, W. AND J. K. SCHOLZ (1994): “IRAs and Household Saving,” *American Economic Review*, 84.

- GALE, W. G., J. M. IWRY, AND P. R. ORSZAG (2005): “The Saver’s Credit: Expanding Retirement Savings for Middle- and Lower-Income Americans,” *The Retirement Security’s Project 2*.
- GUIISO, L., M. HALIASSOS, AND T. JAPPELLI (2002): “Household Portfolios: An International Comparison,” in *Household Portfolios*, ed. by L. Guiso, M. Haliassos, and T. Jappelli.
- HOLDEN, S., K. IRELAND, V. LEONARD-CHAMBERS, AND M. BOGDAN (2005): “The Individual Retirement Account at Age 30: A Retrospective,” Investment Company Institute Occasional Paper Vol. 11, No.1.
- HONG, H., J. KUBIK, AND J. STEIN (2004): “Social Interaction and Stock-Market Participation,” *The Journal of Finance*, 59, 137–163.
- JAPPELLI, T. AND F. MODIGLIANI (2005): “The Age-Saving Profile and the Life-Cycle Hypothesis,” in *The Collected Papers of Franco Modigliani - Vol. 6.*, Cambridge: The MIT Press, 141–172.
- LAIBSON, D., A. REPETTO, AND J. TOBACMAN (1998): “Self-Control and Saving for Retirement,” *Brookings Papers on Economic Activity*, 1998.
- LUSARDI, A. (2003): “Planning and Saving for Retirement,” *Working Paper*.
- LUSARDI, A. AND O. S. MITCHELL (2007): “Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education Programs,” *Business Economics*, 42, 35–44.
- MODIGLIANI, F. AND A. MURALIDHAR (2004): *Rethinking Pension Reform*, Cambridge University Press.
- MONTALTO, C. P. AND J. SUNG (1996): “Multiple Imputation in the 1992 Survey of Consumer Finances,” *Financial Counseling and Planning*, 7, 133–144.

- OECD (2007): “Pensions at a Glance: Public Policies across OECD countries.” .
- OECD/ISSA/IOPS (2008): “Compelmentary and Private Pensions throughout the World,” Tech. rep.
- SKINNER, J. AND R. HUBBARD (1996): “Assessing the Effectiveness of Saving Incentives,” *Journal of Economci perspectives*, 10, 73–90.
- SUNDEN, A. (2006): “The Swedish Experience with Pension Reform,” *Oxford Review of Economic Policy*, 22, 133–148.
- THALER, R. H. AND S. BERNARTZI (2004): “Save more for tomorrow: using behavioral economics to increase employee saving,” *Journal of Political Economy*, 112, 164–187.
- VAN ROOIJ, M. C., C. J. KOOL, AND H. M. PRAST (2007): “Risk-return preferences in the pension domain: Are people able to choose?” *Journal of Public Economics*, 91, 701–722.
- VENTI, S. AND D. WISE (1990): “Have IRAs Increased US Savings? Evidence from Consumer Expenditure Surveys,” *Quarterly Journal of Economics*, 105, 661–698.
- VISSING-JORGENSEN, A. (2002): “Towards an Explanation of Household Portfolio Choice Heterogeneity: Nonfinancial Income and Participation Cost Structures,” University of Chicago.
- WHITEHOUSE, E. (2006): “New indicators of 30 OECD countries’ pension systems,” *PEF*, 5, 275–298.
- WORLDBANK (1994): *Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth. A World Bank Policy Reseach Report.*

YOO, K.-Y. AND A. DE SERRES (2004): "Tax Treatment of Private Pension Savings in OECD Countries," *OECD Economic Studies*, 39.

A Figures and Tables

Figure 1: Third pillar savings of couples aged 50+

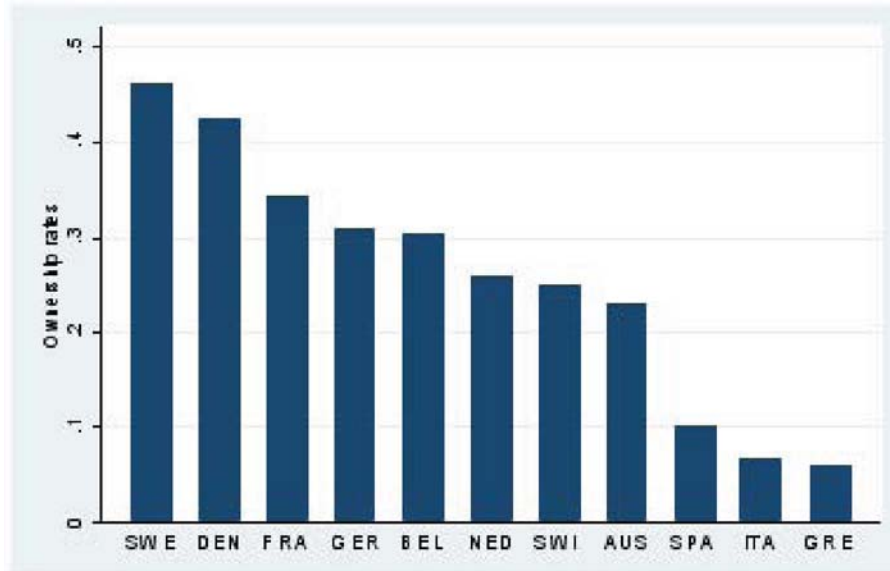


Figure 2: Classification of Pension Systems

	PROVIDERS OF SCHEMES	CONTRIBUTIONS	BENEFITS	INVESTMENT MANAGEMENT	ACCUMULATION
	Third Pillar (Personal)	Voluntary	Defined contribution	Privately managed	Fully funded
	Second Pillar (Occupational)	Voluntary or quasi-mandatory	Defined Contribution or Defined Benefit	Privately managed	Fully funded
1st tier "Redistributive" 2nd tier "Insurance"	First Pillar (Public)	Mandatory	Flat rate, Defined Benefit, Notional Defined Contribution, Defined Contribution	Publicly managed or privately managed	PAYG and partially funded

Figure 3: The pension portfolio of retirees

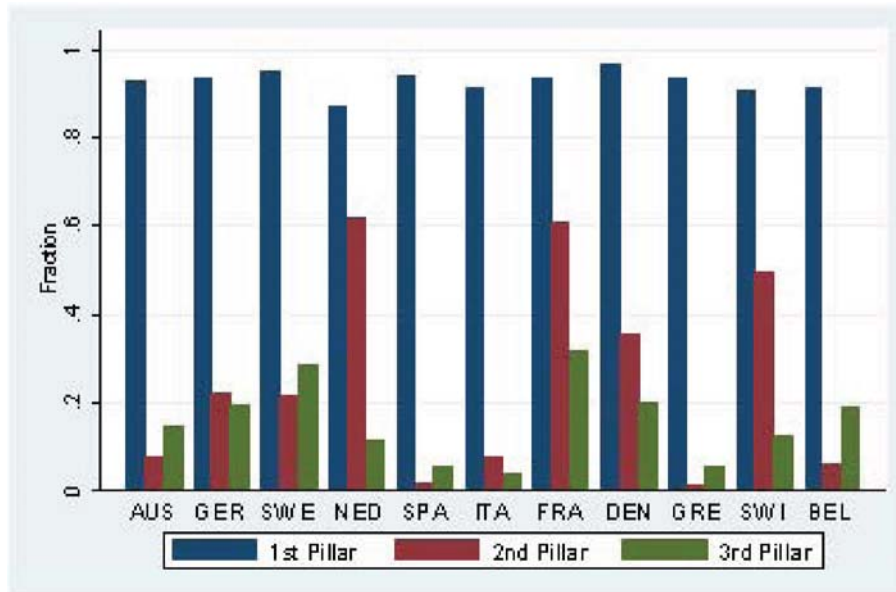


Figure 4: Composition of Retirement Income of the Retirees

Country	% Retirement Income from*			Median IRA wealth (all persons) (PPP-adj €)
	First Pillar	Second Pillar	Third Pillar	
Germany	88.1	4.3	5.3	24,281
Sweden	76.6	15.1	5.9	14,535
Netherlands	58.3	29.4	11.7	
Spain	94.9	0.0	2.5	13,528
Italy	90.9	0.0	6.9	15,880
France	75.4	19.8	3.5	16,803
Denmark	72.6	17.4	7.8	10,620
Greece	90.9	0.0	5.7	1,764

*does not add to 100% due to small proportion of employment income.

Figure 5: The pension portfolio of the working

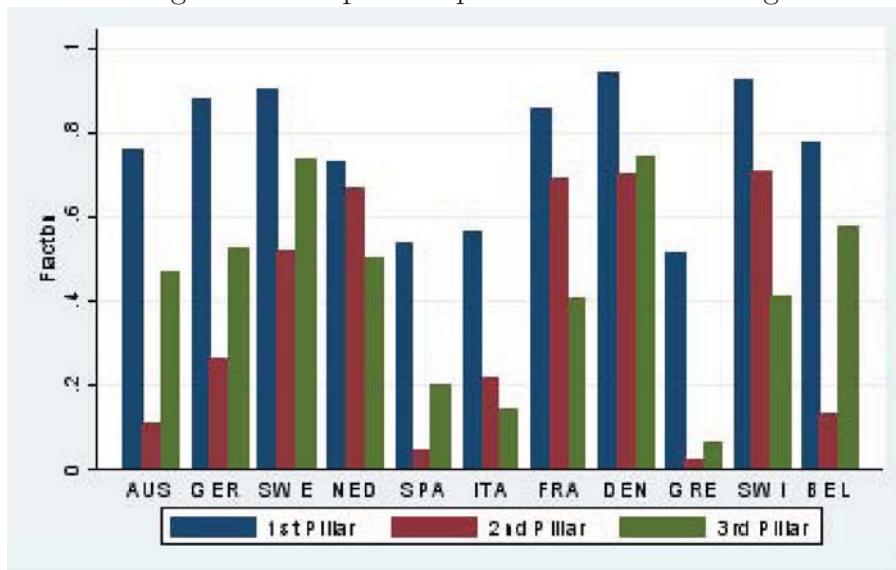


Figure 6: Third pillar savings across education

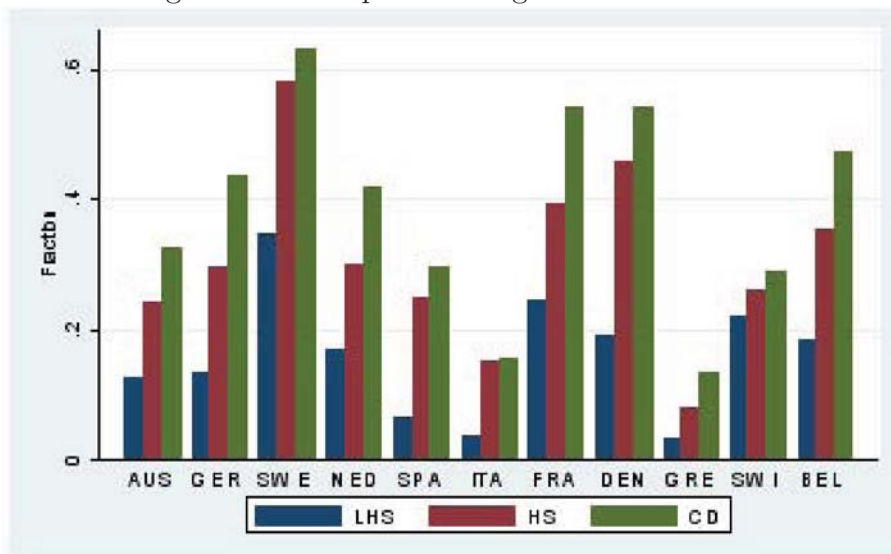


Figure 7: Fraction of retirees with a pension from 1st pillar

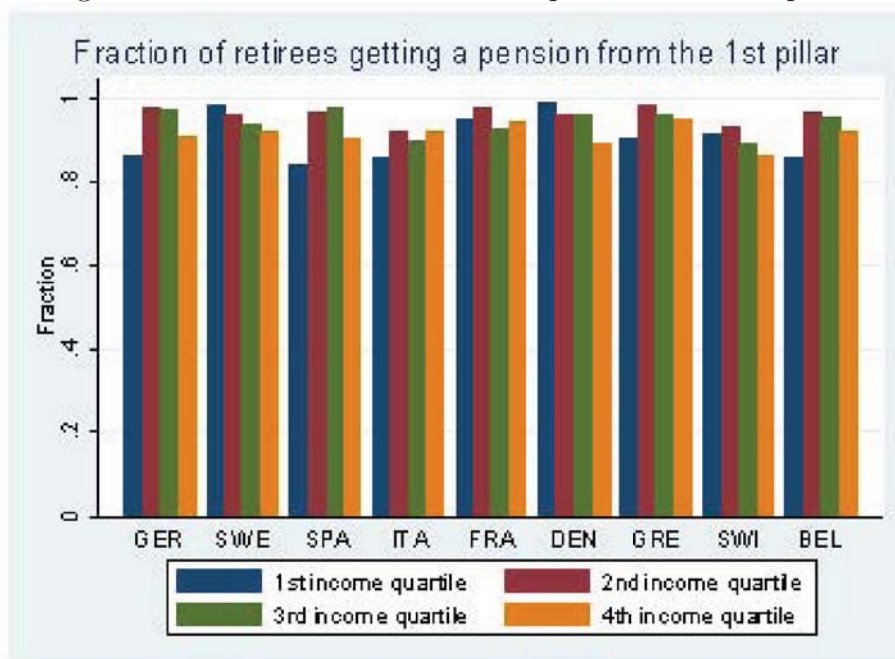


Figure 8: Fraction of retirees with a pension from 2nd pillar

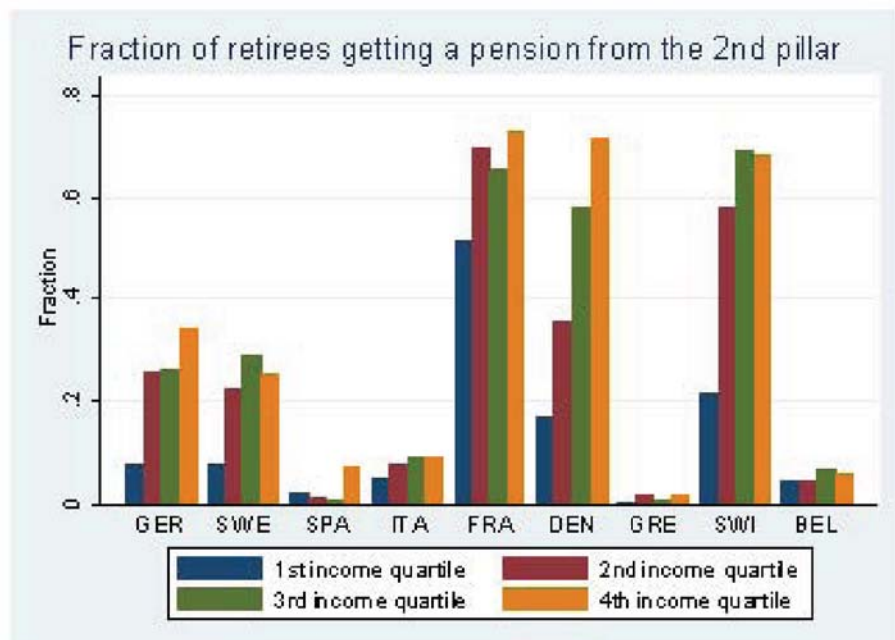


Figure 9: Fraction of retirees with a pension from 3rd pillar

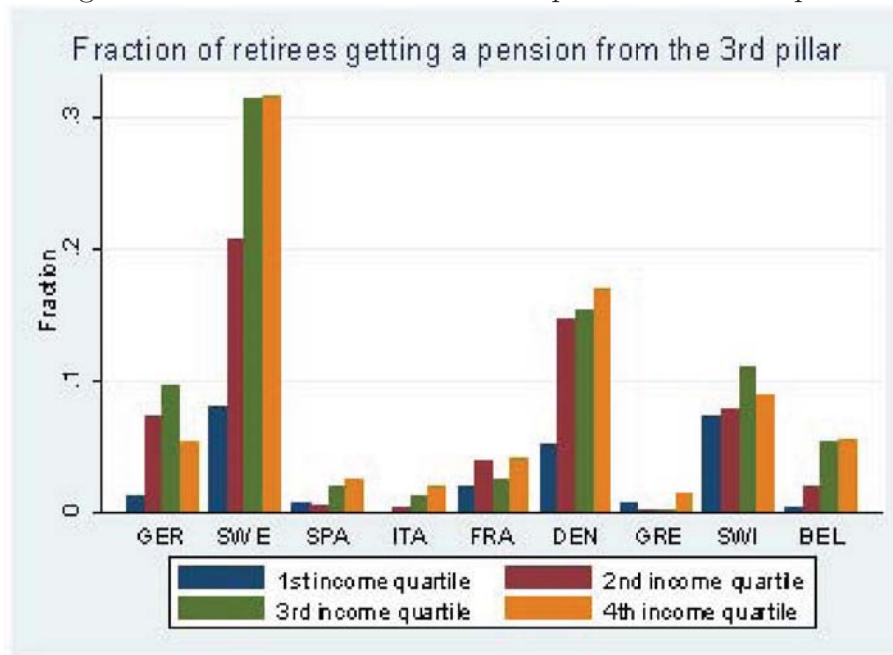
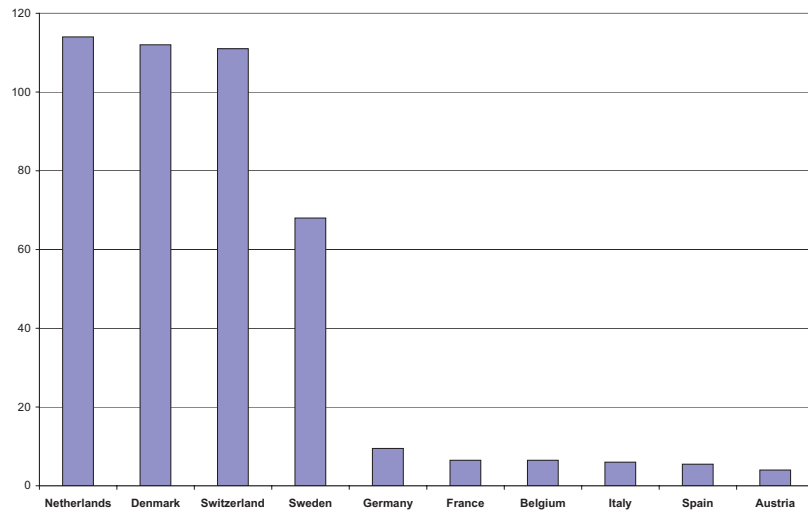


Figure 10: Assets in tax-favored retirement savings plans as a % of GDP



Source: Antolin et al. (2004)

Table 1: Structure of Pension Systems in 11 European countries with respect to providers of pensions

Country	First (Public) Pillar			Second (Occupational) Pillar			Third (Personal) Pillar		
	First tier		Second tier		Schemes provided by employers (Quasi)-mandatory or voluntary			Type	Accumulation
	Universal coverage, redistributive	Minimum	Public Type	Mandatory, insurance	Contributions	Type	Accumulation		
Austria	✓		DB		Voluntary	DB	Partially or fully funded	DC	Fully funded
Belgium	✓	✓	DB		Voluntary	DB	Partially or fully funded	DC	Fully funded
Denmark	✓	✓		DC	Quasi-mandatory	DB and DC	Partially or fully funded	DC	Fully funded
France	✓	✓	DB and points		Quasi-mandatory	DB	Partially funded	DC	Fully funded
Germany	✓		Points		Voluntary	DB	Partially or fully funded	DC	Fully funded
Greece	✓	✓	DB		Voluntary	DB	Partially or fully funded	DC	Fully funded
Italy	✓		NDC		Voluntary	DB	Partially or fully funded	DC	Fully funded
Netherlands		✓		DB	Quasi-mandatory	DB	Fully funded	DC	Fully funded
Spain		✓	DB		Voluntary	DB	Partially or fully funded	DC	Fully funded
Sweden		✓	NDC	DB and DC	Quasi-mandatory	DB and DC	Partially or fully funded	DC	Fully funded
Switzerland	✓	✓	DB	DB	Mandatory	DB	Partially or fully funded	DC	Fully funded

Source: OECD (2007) and OECD/ISSA/IOPS (2008).

Table 2: Tax treatment of private pensions in 2003 with respect to personal income taxation*

Country	Contributions**	Fund		Pension payments	
		Income	Value	Annuities	Lump sums
Austria	T/PE	E	E	T/PE	T/PE
Belgium	T/PC	E	0.17%	T/PC	10%
Denmark	E	15%	E	T	40%
France	E	E	E	T/PE	T/PE
Germany	E	E	E	T/PE	T
Greece	E	E	E	T	T
Italy	E	12.5%	E	T/PE	T/PE
Netherlands	E	E	E	T	T
Spain	E	E	E	T	T/PE
Sweden	E	15%	E	T	T
Switzerland	E	E	E	T	T

Source: Yoo and de Serres (2004).

Definitions: E = exempt; T = taxed under personal income tax; PC = partial credit; PE= partial exemption or deduction from taxation.

The severance pay scheme in Italy, known as TFR, can be converted into a retirement savings plan. Contribution rates are 6.91% for new workers and 2.41% for existing workers.

*: Private pensions refers to mandatory or voluntary funded, privately-managed pension schemes.

** : Tax-deductible contributions are subject to a certain limit in most countries.

Table 3: Pension System Parameters (Mandatory Public Pensions)

Country	First tier (% of average earnings)				Second tier				DC	
	Resource- tested	Basic	Minimum	Overall entitlement (full career worker)	Type	Accrual rate (% of ind. earnings)	Earnings measure	Valorisation		Indexation
Austria	28	—	—	28	DB	1.78	40	w ¹	d	—
Belgium	22	—	34 ²	34	DB	1.33	L	p	p	—
Denmark	17	17	—	34	None	—	—	—	—	11.5 ³
France	32	—	23	32	DB/points	1.75[w] ^{3,4}	b25/L	p/p	p/p	—
Germany	19	—	—	19	Points	1.0	L	w ⁵	w ⁵	—
Greece	11	—	34	34	DB	2.57 ⁵	fr	⁶	d	—
Italy	22	—	—	22	NDC	1.75	L	GDP	p ⁷	—
Netherlands	31	31	—	34	DB	1.75 ⁸	L ⁹	w	w	—
Spain	—	—	33	33	DB	[y] ^{1,0}	f15	p	p	—
Sweden	34	—	—	34	NDC	1.18[w] ^{3,4}	L/f	w	w-1.6	4.5 ³
Switzerland	26	—	19	26	DB	[w/a]	L	w	50w/50p	—

Source: OECD (2007), Parameters are for 2004 but include all legislated changes that take effect in the future.

--not relevant; [a]=varies with age; [w]=varies with earnings; [y]= varies with years of service.

b= number of best years; f=number of final years; L=lifetime average.

d= discretionary indexation; fr=valorisation at a fixed rate; p= valorisation/indexation with prices; w=valorisation/indexation with average earnings; GDP= linked to GDP.

DB=defined benefit; DC=defined contribution; NDC= notional accounts.

1: Austria: Valorisation assumed to move to earnings as the averaging period for the earnings measure is extended. 2: Belgium: Minimum benefit calculated from minimum credit. 3: France, Greece, Sweden, Denmark: data shown combines two different programs. 4: France, Sweden: higher accrual rates on higher earnings under occupational plans. 5: Germany: valorisation can be reduced by any increase in contributions rates and for the potential contribution to private pensions. Indexation can be reduced by any increase in contributions. 6: Greece: valorisation in line with pension increases for public sector workers. 7: Italy: indexation is fully to prices for low pensions, 90% of prices and 75% of prices and for higher pensions. 8: Netherlands: Accrual rate varies between occupational schemes. 9: Netherlands: earnings measure is average salary for around two-thirds of occupational plans and final salary for one-third. 10: Spain: higher accrual rate on early years of service and lower on later years.

Table 4: Retirement Income Indicators (Mandatory Public Pensions and Mandatory Occupational Pensions)

Country	Gross replacement rate		Net replacement rate		Gross pension wealth		Net pension wealth		Pension Gini	Progressivity index	Average Pension level				
	Individual earnings		Individual earnings		Individual earnings		Individual earnings								
	0.5	1	2	0.5	1	2	0.5	1	2						
Austria	80.1	80.1	58.8	90.4	90.9	66.4	12.2	11.7	8.1	11.0	9.0	5.7	18.9	30.4	72.8
Belgium	57.3	40.1	23.5	77.3	63.0	40.7	8.8	6.2	3.6	8.8	5.6	3.1	11.2	58.8	36.7
Denmark	119.6	75.8	57.1	132.7	86.7	72.2	19.5	11.9	8.7	13.4	8.0	5.3	11.1	59.3	76.8
France	63.8	51.2	44.7	78.4	63.1	55.4	11.5	9.2	8.0	10.8	8.1	6.6	20.5	24.6	50.1
Germany	39.9	39.9	30.0	53.4	58.0	44.4	7.2	7.2	5.5	6.2	6.3	4.2	20.0	26.7	36.9
Greece	95.7	95.7	95.7	113.6	110.1	107.0	14.3	14.3	14.3	14.3	13.0	11.1	26.5	2.6	95.1
Italy	67.9	67.9	67.9	81.8	77.9	79.3	10.0	10.0	9.9	10.0	8.4	7.4	26.4	3.1	67.7
Netherlands	80.6	81.9	82.6	97.0	96.8	94.8	14.9	15.1	15.2	13.5	12.3	10.5	26.9	0.0	81.8
Spain	81.2	81.2	67.1	82.0	84.5	72.4	12.2	12.2	10.1	11.0	10.1	7.9	22.1	18.8	75.6
Sweden	79.1	62.1	66.3	81.4	64.0	73.9	12.6	10.0	10.5	9.5	7.2	6.8	23.7	12.9	66.3
Switzerland	62.5	58.4	30.5	75.0	64.3	35.1	10.7	9.8	5.1	10.1	8.1	4.2	12.7	53.3	49.4

Source: OECD (2007). Data for 2004.

Definitions: 1. Replacement rates are (gross/net) pension benefits from mandatory pension programs as a share of (gross/net) individual lifetime average earnings. Gross and net replacement rates are given for men by earnings level where 0.5 refers to one half of the average earnings level, 1 to the average earnings level and 2 to an earnings level double the average. 2. Pension wealth measures the stock of future flows of pension benefits, taking account of life expectancy, retirement ages and the indexation of pension benefits. 3. The Pension Gini is calculated over the OECD average distribution. The higher the coefficient, the more unequal is a distribution. 4. The Progressivity index is a measure for the link between pre-retirement earnings and post-retirement pension entitlements. A pure basic scheme would score 100% and a pure insurance scheme zero. The calculation is based on the Gini coefficient, the index is calculated as $100 - \frac{Gini(pensions)}{Gini(earnings)}$, using the earnings distribution as weight. 5. The weighted average pension level is given as multiple of average earnings.

Table 5: Projected Evolution of Average Theoretical Replacement Rates

Country	2004	2030	2050
Austria			
Net replacement rate	80	92	94
Gross replacement rate 1 st Pillar	64	66	69
Gross replacement rate 2 nd and 3 rd Pillar	-	-	-
Belgium			
Net replacement rate	67	76	74
Gross replacement rate 1 st Pillar	39	38	37
Gross replacement rate 2 nd and 3 rd Pillar	4	10	10
Denmark			
Net replacement rate	71	77	76
Gross replacement rate 1 st Pillar	45	42	39
Gross replacement rate 2 nd and 3 rd Pillar	4	20	25
France			
Net replacement rate	80	66	63
Gross replacement rate 1 st Pillar	66	53	49
Gross replacement rate 2 nd and 3 rd Pillar	n.a.	n.a.	n.a.
Germany			
Net replacement rate	63	65	67
Gross replacement rate 1 st Pillar	43	37	34
Gross replacement rate 2 nd and 3 rd Pillar	0	9	15
Greece			
Net replacement rate	115	121	106
Gross replacement rate 1 st Pillar	105	112	94
Gross replacement rate 2 nd and 3 rd Pillar	-	-	-
Italy			
Net replacement rate	88	90	92
Gross replacement rate 1 st Pillar	79	71	64
Gross replacement rate 2 nd and 3 rd Pillar	0	9	16
Netherlands			
Net replacement rate	92	90	90
Gross replacement rate 1 st Pillar	30	30	30
Gross replacement rate 2 nd and 3 rd Pillar	41	39	39
Spain			
Net replacement rate	97	92	92
Gross replacement rate 1 st Pillar	91	85	85
Gross replacement rate 2 nd and 3 rd Pillar	-	-	-
Sweden			
Net replacement rate	71	60	57
Gross replacement rate 1 st Pillar	53	43	40
Gross replacement rate 2 nd and 3 rd Pillar	15	15	15

Source: European Commission (2006). Data for Switzerland not available.

Table 6: Types of systems for retirement income

Country	Basic publicly managed retirement schemes				Complementary occupational and private pensions			
	Contributory		Non contributory		Mandatory occupational schemes ^f	Mandatory personal schemes ^g	Voluntary occupational plans ^b	Voluntary personal plans ⁱ
Flat-rate ^a	Earnings-related ^b	Means-tested ^c	Flat-rate universal ^d	Provident fund ^e				
Austria	✓	✓	✓				✓	✓
Belgium	✓	✓	✓				✓	✓
Denmark			✓	✓		✓	✓	✓
France	✓	✓	✓				✓	✓
Germany	✓	✓			✓		✓	✓
Greece	✓	✓					✓	✓
Italy ¹	✓	✓	✓				✓	✓
Netherlands	✓	✓	✓				✓	✓
Spain	✓	✓	✓				✓	✓
Sweden	✓	✓	✓			✓	✓	✓
Switzerland	✓	✓	✓			✓	✓	✓

Sources:ISSA/IOPS/OECD (2008). Data for 2005.

1. Data for 2003.

Definitions: a. Flat-rate pension: A pension of uniform amount or based on years of service or residence but independent of earnings. It is financed by payroll tax contributions from employees, employers or both. b. Earnings-related pension: A pension based on earnings. It is financed by payroll tax contributions from employees, employers or both. c. Means-tested pension: A pension paid to eligible persons whose own or family income, assets or both fall below designated levels. It is generally financed through government contributions, with no contributions from employers or employees. d. Flat-rate universal pensions: A pension uniform amount normally based on residence but independent of earnings. It is generally financed through government contributions, with no contributions from employers or employees. e. Provident funds: Employee and employer contributions are set aside for each employee in publicly managed special funds. Benefits are generally paid as a lump sum with accrued interest. f. Mandatory occupational scheme: A scheme the membership of which is linked to an employment relationship between the plan member and the plan sponsor and in which at least one employer is required by law to participate as a plan sponsor. g. Mandatory personal schemes: A scheme the membership of which need not be linked to any employment relationship and in which covered individuals must become members by law. h. Voluntary occupational plan: A plan sponsored by a single or a group of employers on a voluntary basis and of which membership is linked to an employment relationship between the plan member and the plan sponsor. i. Voluntary personal plan: A plan the membership of which need not be linked to any employment relationship but is based on the personal decision of the individual.

Table 7: Structure of the pension package - Percentage contribution of the components of the pension system to weighted average pension wealth

First (Public) Pillar including mandatory occupational plans							
Country	First tier			Second tier			Total
	Resource- tested	Basic	Minimum	Public	Private DB	Private DC	
Austria				100			100
Belgium			5.4 ¹	94.6			100
Denmark	12.5	31.5				56.0 ²	100
France	1.3		1.9	96.8 ³			100
Germany	1.1			98.9			100
Greece			0.1	99.9 ⁴			100
Italy	0.1			99.9			100
Netherlands		38.2			61.8		100
Spain			0.2	99.8			100
Sweden			4.7	49.0	26.4	19.9 ⁵	100
Switzerland	0.1			68.4	31.5		100

Source: OECD (2007) and OECD/ISSA/IOPS (2008).

1. Belgium: includes both minimum pension and minimum credits. 2. Denmark: private DC plans include both quasi-mandatory occupational (51.0%) and the special pension in individual accounts (5%). 3. France: public pensions include both the state scheme (59.3%) and the complementary, occupational scheme (37.5%). 4. Greece: public pension is made up of the main (73.0%) and the supplementary components (26.9%). 5. Sweden: private DC plans include both the mandatory premium pension (11.2%) and the occupational quasi-mandatory DC scheme (8.7%).

Table 8: Reforms to national retirement income systems since 1990 regarding:

Country	Pension eligibility age	Adjusted retirement incentives	Change of years in benefit formula or qualifying conditions	Link to life expectancy and/or financial sustainability	DC scheme	Other
Austria 2003, 2004	Early retirement age increased by 1.5 years. Pension corridor between 62 and 65. Pension ages for women aligned with those of men (65).	Benefit reduction for early retirement introduced and set to increase. Tighter access to early retirement.	Best 15 to best 40 years.	Introduction of sustainability factor under discussion.		Reduction in accrual rate. Less generous indexation for higher pensions.
Belgium 2003	Pension age for women aligned with those of men.	Pension bonus for workers above age 62. Different accounting for work and credit periods. Fiscal incentive to take up private pensions only at retirement age.	Contribution condition for early retirement at 60 tightened.			
Denmark 2004	Phased increase in normal pension age from 65 to 67.	Voluntary early retirement pension less attractive		Normal pension age linked to life expectancy.	DC scheme mandatory for nearly all workers. Occupational plans switch from DB to DC.	
France 2004		Changes in adjustment to benefits for early/late retirement in public and occupational pensions.	Minimum contribution period increased. Earnings measure in public schemes from best 10 to best 25 years.	Minimum contribution period to increase further with changes in life expectancy.		Target minimum income of 85% of minimum wage. Valorisation now effectively to prices in both plans.
Germany 1992-2001 2002, 2004	Phased increase in normal retirement age until 2012 for those born in 1952 and later.	Reduction in benefits for retirement before 65.		Valorisation and indexation cut back as system dependency ration worsens.	Voluntary DC pensions with tax privileges and subsidies introduced in 2001 (Riesterrente).	Phased abolition of favorable tax treatment of pension income.

Country	Pension eligibility age	Adjusted retirement incentives	Change of years in benefit formula or qualifying conditions	Link to life expectancy and/or financial sustainability	DC scheme	Other
Greece	Pension age rising from 58 to 65.					
Italy 1995, 2004	Normal pension age for men increased from 60 to 65 and for women from 55 to 60. Early pension age for men with 35 years' coverage increases from 60 to 62.	Adjustment to early-retirement benefits through notional annuity calculation.	Qualification years for long-service pension increased from 37 to 40 years.	Through notional annuity calculation.		From DB to NDC. Less generous indexation of higher pensions.
Netherlands 2006		Planned abolition of early retirement program.	Shift from final to average lifetime salary in many occupational plans.			
Spain 2002-2005		Introduction of small increment for late retirement.				
Sweden 1995-1998			Best 15 years to lifetime average (public, earnings-related scheme).	Through calculation of notional annuity and annuity in DC schemes. Additional sustainability adjustment in notional accounts.	DC scheme mandatory for nearly all workers. Occupational plans switch from DB to DC.	From DB to NDC. Abolition of income-tax concessions for pensioners.
Switzerland	Pension age for women increased from 62 to 64.					Reduction in required interest rate and annuity rate in mandatory occupational plans

Sources: OECD (2007) and European Commission (2006).

Table 9: Types of private pension schemes, coverage and average contribution rates (where available)

Country	Largest Scheme			Second largest scheme			Third largest scheme		
	Scheme*	Coverage	Contribution	Scheme	Coverage	Contribution	Scheme	Coverage	Contribution
Austria	VO	35%	1.5-2%	VP	10%				
Belgium	VO	40-50%	1-5%	VP	40%				
Denmark	MP	>90%	1%	QMO	>80%	10.8-17%	VP		
France	VO	10%		VP	8%	2%			
Germany	VO	57%	2-4%	VP	13%	2-4%			
Greece	VO/P	negligible							
Netherlands	QMO	>90%							
Italy**	VO	8%	2-35%	VP	2%				
Spain	VP	40%		VO	10%				
Sweden	MP	>90%	2.50%	QMO	>80%	2%	VP	40%	
Switzerland	MO	>90%	7-18%	VP					

Sources: OECD (2007) and European Commission (2006). According to OECD (2007) “...Data on coverage of personal, voluntary, private pensions is especially difficult to obtain and institutional differences are even more significant than they are for voluntary, occupational pensions.” It is also suggested that Voluntary private pension saving is widespread in Belgium, France and Switzerland (OECD 2007).

* Definitions: M = mandatory, O = Occupational (employer-based), P = Personal (individual based), QM = quasi-mandatory (coverage through collective agreements), V = Voluntary. Mandatory plans are found in the first pillar, while quasi-mandatory and occupational arrangements are linked to the second pillar and voluntary private plans to the third pillar.

** The severance pay scheme in Italy, known as TFR, can be converted into a retirement savings plan. Contribution rates are 6.91% for new workers and 2.41% for existing workers.

Table 10: Average marginal effects from country-by country probits. The dependent variable is third pillar savings in IRAs and life insurances.

	Austria		Germany		Sweden		Netherlands		Spain		Italy		Greece		France		Denmark		Switzerland		Belgium	
	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.
Male	-0.06	0.04	0.01	0.05	-0.02	0.05	-0.02	0.03	-0.03	0.03	0.00	0.02	-0.01	0.02	-0.06	0.05	-0.14+	0.06	0.02	0.06	-0.12+	0.05
Married	0.01	0.04	0.07	0.05	0.00	0.06	-0.03	0.06	-0.01	0.02	-0.03	0.03	-0.02	0.02	-0.10+	0.05	-0.08	0.07	0.00	0.06	0.05	0.04
Never married	-0.05	0.04	0.07	0.07	-0.09	0.07	-0.05	0.06	-0.02	0.01	-0.02	0.01	-0.02	0.01	0.03	0.06	-0.07+	0.08	-0.05	0.07	-0.06	0.05
Widowed	0.01	0.04	0.12~	0.07	0.02	0.07	0.02	0.06	-0.01	0.01	-0.01	0.02	0.01	0.02	0.02	0.05	-0.16	0.07	0.13	0.09	-0.07	0.04
Number of children	0.01	0.01	0.03+	0.01	0.00	0.01	0.01	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.01
Bad health	-0.01	0.02	0.06+	0.03	-0.04	0.04	0.01	0.02	-0.01	0.01	-0.01	0.01	0.02	0.01	-0.01	0.03	0.02	0.05	0.04	0.05	-0.03	0.02
Number ADL	0.02	0.02	0.01	0.01	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.03	0.08	0.04	-0.02	0.02
Age	0.00	0.02	0.02	0.03	0.03	0.03	0.01	0.02	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.06	0.04	0.03	0.03	0.09#	0.02
Age Squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
High School Degree	0.07+	0.04	0.00	0.06	0.09+	0.03	0.02	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.03	0.09	0.07	-0.02	0.04	0.07+	0.03
Post-secondary Degree	0.07~	0.04	-0.01	0.07	0.06~	0.03	0.04	0.03	0.02	0.01	0.00	0.01	0.03	0.02	0.07~	0.04	0.11	0.07	-0.07	0.04	0.08#	0.03
Engage in social activities	0.03	0.03	0.04	0.03	0.04	0.03	0.01	0.02	-0.01	0.01	0.01	0.01	-0.01	0.01	0.03	0.03	-0.01	0.04	0.08	0.03	0.05	0.02
Provides help to other:	0.09#	0.03	0.05~	0.03	0.05	0.03	0.00	0.02	0.02	0.01	0.02	0.01	0.03#	0.01	0.06+	0.03	0.08+	0.04	0.04	0.04	0.05+	0.02
Recall Score	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00
Probability to leave a bequest	0.00	0.00	0.00#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Working	0.06~	0.03	0.05	0.03	0.19#	0.04	0.07+	0.03	0.01	0.01	0.01	0.01	-0.02	0.01	0.03	0.04	0.22#	0.05	0.10	0.05	0.07~	0.03
2nd Income Quartile	0.01	0.03	-0.02	0.04	-0.05	0.04	-0.06	0.03	0.00	0.01	-0.01	0.01	0.02	0.01	0.11+	0.04	0.04	0.06	-0.07	0.05	-0.01	0.03
3rd Income Quartile	0.03	0.04	0.04	0.04	0.05	0.05	0.01	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.14+	0.04	0.13~	0.07	0.05	0.05	0.06~	0.03
4th Income Quartile	-0.04	0.03	0.06	0.04	0.04	0.05	0.01	0.03	0.05#	0.02	0.01	0.03	0.02	0.13+	0.05	0.10	0.08	-0.04	0.05	0.04	0.03	
2nd Fin. Wealth Quartile	0.04	0.05	0.27#	0.05	0.05	0.04	0.35#	0.06	-0.01	0.01	0.01	0.02	0.06+	0.04	0.11~	0.04	0.09	0.06	0.25#	0.07	0.25#	0.04
3rd Fin. Wealth Quartile	0.33#	0.05	0.46#	0.04	0.28#	0.03	0.42#	0.05	0.03+	0.02	0.10#	0.03	0.12#	0.03	0.40#	0.04	0.39#	0.05	0.37#	0.07	0.54#	0.04
4th Fin. Wealth Quartile	0.45#	0.05	0.56#	0.04	0.46#	0.03	0.55#	0.05	0.14#	0.03	0.16#	0.03	0.21#	0.03	0.65#	0.03	0.44#	0.05	0.40#	0.07	0.67#	0.03
2nd Real Wealth Quartile	-0.06	0.03	-0.01	0.05	0.05	0.04	0.04	0.05	-0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.04	0.09	0.06	0.09	0.06	0.04	0.04
3rd Real Wealth Quartile	-0.05	0.03	-0.04	0.05	0.03	0.05	0.06	0.05	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.04	0.09	0.07	0.05	0.07	0.03	0.04
4th Real Wealth Quartile	-0.01	0.04	-0.04	0.05	0.05	0.05	0.08	0.05	0.01	0.01	0.00	0.01	0.02	0.02	-0.03	0.05	0.10	0.07	0.10	0.07	0.11#	0.04

(~, +, #) significant at 10%, 5%, 1% level

Table 11: Average marginal effects from country-by country probits. Only working population. The dependent variable is third pillar savings in IRAs and life insurances.

	Austria		Germany		Sweden		Netherlands		Spain		Italy		Greece		France		Denmark		Switzerland		Belgium	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Male	-0.03	0.14	-0.13	0.07	0.02	0.06	-0.13	0.10	-0.32+	0.16	0.04	0.04	-0.01	0.05	-0.02	0.09	-0.09	0.06	0.02	0.13	-0.13	0.08
Married	0.08	0.13	0.14	0.08	-0.01	0.05	0.08	0.11	0.07	0.10	-0.06	0.10	0.03	0.02	-0.02	0.08	-0.01	0.07	-0.05	0.12	0.00	0.08
Never married	-0.21	0.13	0.00	0.10	-0.08	0.08	0.14	0.12	-0.15	0.06	-0.06	0.03	0.04	0.08	0.08	0.11	-0.02	0.09	-0.08	0.15	0.02	0.13
Widowed	-0.12	0.16	0.11	0.11	-0.04	0.11	0.04	0.15	-0.02	0.14	-0.01	0.08	0.00	0.01	-0.09	0.12	-0.15	0.13	0.01	0.25	-0.36+	0.12
Number of children	-0.02	0.03	0.05+	0.02	0.00	0.01	0.03	0.02	-0.03	0.02	0.00	0.01	0.04	0.03	0.03	0.02	0.02	0.02	0.04	0.03	0.04+	0.02
Bad health	0.07	0.08	0.05	0.05	0.02	0.04	-0.03	0.05	-0.01	0.05	-0.01	0.03	0.02	0.02	-0.09	0.05	0.02	0.05	0.03	0.10	0.06	0.05
Number ADL	-0.07	0.07	0.06	0.05	-0.02	0.03	-0.02	0.05	0.09	0.07	0.03	0.02	0.03	0.03	0.01	0.05	0.03	0.05	0.19	0.15	-0.04	0.05
Age	-0.04	0.12	0.03	0.09	0.01	0.04	-0.06	0.12	0.03	0.07	0.02	0.04	0.00	0.00	0.09	0.09	0.09	0.07	0.09	0.11	0.07	0.10
Age Squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
High School Degree	-0.08	0.15	0.00	0.17	0.12#	0.03	0.03	0.06	-0.01	0.06	0.01	0.03	0.05+	0.03	0.07	0.07	0.24#	0.07	-0.03	0.09	0.16+	0.05
Post-secondary Degree	-0.06	0.16	-0.05	0.17	0.10#	0.03	0.10	0.06	0.04	0.06	0.02	0.04	0.05~	0.02	0.14+	0.07	0.25+	0.09	-0.01	0.08	0.19#	0.06
Engages in social activities	0.06	0.08	0.06	0.04	0.05~	0.03	-0.07	0.04	-0.03	0.06	0.04	0.04	0.04	0.02	0.07	0.05	0.03	0.04	0.13	0.07	0.11+	0.04
Provides help to others	0.06	0.08	0.02	0.05	0.03	0.03	-0.04	0.04	0.10	0.07	0.06	0.04	0.04+	0.00	0.03	0.05	0.04	0.04	-0.05	0.07	0.01	0.04
Recall Score	-0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Probability to leave a bequest	-0.00	0.00	0.00+	0.00	0.00~	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00~	0.00
Expects gov't to increase ret.age	-0.00	0.00	0.00~	0.00	0.00~	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00+	0.00	0.00	0.00	0.00	0.00	0.00+	0.00	-0.00	0.00
Expects gov't to reduce benefits	0.00#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00+	0.00	0.00+	0.00	0.00	0.00	0.00+	0.00
Occupational pension	0.03	0.11	0.02	0.05	0.02	0.03	0.08	0.05	0.38#	0.11	0.03	0.03	-0.02	0.02	0.09~	0.05	0.09~	0.05	-0.12	0.08	0.22	0.05
Desires early ret.	-0.05	0.07	0.05	0.04	-0.01	0.03	0.06	0.05	0.04	0.05	0.02	0.02	0.00	0.03	0.05	0.05	0.04	0.05	-0.06	0.07	-0.05	0.05
2nd Income Quartile	0.08	0.10	0.04	0.08	-0.29+	0.09	-0.12	0.08	0.14	0.14	-0.07+	0.02	-0.02	0.02	0.26#	0.09	0.08	0.08	-0.08	0.11	-0.17+	0.08
3rd Income Quartile	0.06	0.10	0.08	0.07	-0.14+	0.07	0.04	0.07	0.12	0.09	-0.08+	0.03	0.04	0.03	0.21+	0.09	0.15~	0.08	0.15~	0.09	0.06	0.06
4th Income Quartile	0.02	0.09	0.10	0.06	-0.19+	0.07	0.04	0.07	0.26+	0.09	-0.03	0.03	0.11~	0.04	0.21+	0.09	0.17~	0.09	0.04	0.09	-0.01	0.06
2nd Fin. Wealth Quartile	-0.15	0.13	0.14+	0.07	-0.02	0.04	0.40#	0.06	-0.02	0.09	0.08	0.11	0.15+	0.04	0.05	0.07	-0.05	0.06	0.29#	0.11	0.29#	0.05
3rd Fin. Wealth Quartile	0.35#	0.09	0.34#	0.05	0.16#	0.02	0.44#	0.07	0.14	0.09	0.27#	0.08	0.10+	0.03	0.37#	0.06	0.18#	0.04	0.44#	0.09	0.50#	0.04
4th Fin. Wealth Quartile	0.45#	0.08	0.53#	0.05	0.27#	0.03	0.57#	0.06	0.47#	0.08	0.39#	0.07	0.15#	0.03	0.63#	0.03	0.25#	0.04	0.47#	0.09	0.60#	0.04
2nd Real Wealth Quartile	-0.01	0.13	-0.07	0.10	0.08	0.36	-0.09	0.09	-0.15+	0.06	-0.04	0.03	0.08~	0.06	0.03	0.08	-0.01	0.08	0.15	0.12	-0.04	0.08
3rd Real Wealth Quartile	0.13	0.14	0.03	0.10	0.05	0.04	0.05	0.09	-0.05	0.07	-0.03	0.04	-0.09	0.03	-0.01	0.08	0.02	0.09	0.06	0.13	0.20	0.07
4th Real Wealth Quartile	0.17	0.13	0.04	0.10	0.90+	0.04	0.05	0.09	0.02	0.07	0.03	0.05	0.02	0.03	-0.04	0.09	-0.01	0.09	0.10	0.13	0.06	0.07

Table 12: Average marginal effects from country-by country probits. The dependent variable is third pillar savings in IRAs and life insurances.

	Austria		Germany		Sweden		Netherlands		Spain		Italy		Greece		France		Denmark		Switzerland		Belgium	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Male	-0.05	0.03	0.09+	0.03	-0.04	0.06	0.01	0.03	0.00~	0.00	-0.01	0.01	0.00	0.00	-0.10	0.06	-0.07	0.05	-0.03	0.04	-0.08+	0.03
Living in a couple	-0.01	0.04	-0.05	0.04	0.01	0.07	0.01	0.03	0.00	0.00	-0.01	0.01	0.00+	0.00	-0.14+	0.06	0.03	0.05	0.02	0.05	0.06+	0.03
Number of children	0.01~	0.01	0.02+	0.01	0.01	0.01	0.00	0.00	0.00+	0.00	0.00	0.00	0.00+	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00~	0.01
Bad health	0.00	0.02	0.01	0.02	-0.03	0.04	0.04+	0.02	0.00	0.00	-0.1~	0.01	0.00	0.00	0.03	0.04	0.03	0.03	0.03	0.03	-0.03	0.02
Number ADL	0.02+	0.01	-0.01	0.01	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00+	0.00	0.01	0.03	-0.02	0.02	0.02	0.02	-0.01	0.01
Age	0.05~	0.03	-0.06~	0.03	0.01	0.06	-0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.04	0.00	0.02	0.04~	0.02
Age Squared	0.00+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00+	0.00
High School Degree	0.07+	0.03	-0.01	0.05	0.03	0.04	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.04	0.00	0.04	-0.01	0.02	0.04+	0.02
Post-secondary Degree	0.07~	0.04	-0.02	0.05	0.07	0.05	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.05	0.04	0.05	-0.06+	0.02	0.05+	0.02
Engages in social activities	0.01	0.02	0.03	0.03	0.01	0.04	0.03~	0.02	0.00+	0.00	0.00	0.01	0.00	0.00	0.00	0.04	-0.05~	0.03	0.04	0.03	0.01	0.02
Provides help to others	0.07#	0.02	0.03	0.03	0.04	0.04	-0.01	0.02	0.00	0.00	0.01~	0.01	0.00+	0.00	0.07~	0.04	0.03	0.03	0.03	0.03	0.03+	0.02
Recall Score	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00+	0.00	0.02~	0.01	0.01	0.01	0.00	0.01	0.00	0.00
Occupational Pension	0.01	0.03	0.00	0.03	0.03	0.04	0.02	0.02	0.02+	0.03	0.03+	0.02	0.00	0.00	0.06	0.04	0.05	0.03	0.01	0.02	0.11#	0.04
Probability to leave a bequest	0.00~	0.00	0.00+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00~	0.00	0.00	0.00
2nd Income Quartile	0.02	0.04	-0.07+	0.03	0.10~	0.06	-0.01	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.06	0.05	-0.02	0.04	-0.06+	0.03	0.00	0.00
3rd Income Quartile	0.06	0.04	-0.01	0.04	0.14+	0.07	0.00	0.02	0.00	0.00	0.03~	0.02	0.00	0.00	0.10~	0.06	-0.03	0.05	-0.02	0.03	0.01	0.02
4th Income Quartile	0.00	0.04	0.00	0.04	0.15+	0.07	-0.01	0.02	0.01~	0.01	0.02~	0.02	0.86	0.56	0.02	0.06	-0.05	0.05	-0.06+	0.02	0.02	0.03
2nd Fin. Wealth Quartile	0.08~	0.05	0.33#	0.08	0.11	0.06	0.18#	0.06	0.00	0.00	0.00	0.01	0.68	0.63	0.11+	0.06	0.15+	0.07	0.24+	0.10	0.09+	0.04
3rd Fin. Wealth Quartile	0.30#	0.07	0.49#	0.08	0.28#	0.06	0.26#	0.07	0.00	0.00	0.03+	0.02	0.84	0.41	0.39#	0.06	0.36#	0.09	0.39#	0.13	0.28#	0.05
4th Fin. Wealth Quartile	0.50#	0.08	0.52#	0.08	0.53#	0.06	0.41#	0.09	0.05#	0.03	0.07#	0.03	0.00	0.00	0.68#	0.05	0.36#	0.09	0.39#	0.13	0.48+	0.06
2nd Real Wealth Quartile	-0.05+	0.02	0.00	0.04	-0.04	0.05	0.06~	0.04	0.00	0.00	-0.01	0.01	0.00	0.00	0.00	0.05	0.10+	0.05	0.01	0.03	0.05	0.03
3rd Real Wealth Quartile	-0.05+	0.02	-0.09+	0.03	-0.04	0.05	0.04	0.04	0.00	0.00	0.00	0.01	0.00	0.00	-0.01	0.06	0.08	0.06	0.04	0.05	0.03	0.03
4th Real Wealth Quartile	-0.05+	0.02	-0.06	0.03	-0.02	0.06	0.09+	0.05	0.00	0.00	0.00	0.01	0.00	0.00	-0.03	0.06	0.18+	0.08	0.07	0.05	0.08+	0.03

Table 13: Average marginal effects from pooled probits. The dependent variable is third pillar savings in IRAs and life insurances.

	All ages, age > 80 dropped		Only Working	Not active in Work Force
Male	-0.05#	0.01	-0.07+	0.03
Married	0.00	0.01	0.03	0.03
Never married	-0.04+	0.02	-0.08+	0.04
Widowed	0.02	0.02	-0.04	0.05
Number of children	0.00	0.00	0.02+	0.01
Bad health	0.00	0.01	0.00	0.02
Number ADL	0.01	0.01	0.02	0.02
Age	0.02#	0.01	0.04	0.03
Age Squared	0.00#	0.00	0.00~	0.00+
High School Degree	0.04#	0.01	0.11#	0.02+
Post-secondary Degree	0.05#	0.01	0.12#	0.02
Engages in social activities	0.03#	0.01	0.05#	0.02
Provides help to others	0.05#	0.01	0.04+	0.03#
Recall Score	0.01#	0.00	0.00	0.00+
Probability to leave a bequest	0.00#	0.00	0.00#	0.00
Working	0.07#	0.01	0.00#	0.00#
Expects gov't to increase ret.age			0.00#	0.00
Expects gov't to reduce benefits			0.00+	0.00
Occupational pension				0.03#
Desires early ret.			0.02	0.02
1 st Income Quartile	-0.01	0.01	0.00	0.03
3 rd Income Quartile	0.04#	0.01	0.06+	0.02
4 th Income Quartile	0.05#	0.01	0.09+	0.02
2 nd Fin. Wealth Quartile	0.08#	0.01	0.03	0.03
3 rd Fin. Wealth Quartile	0.30#	0.01	0.30#	0.02
4 th Fin. Wealth Quartile	0.46#	0.01	0.45#	0.02
2 nd Real Wealth Quartile	0.01	0.01	0.02	0.03
3 rd Real Wealth Quartile	0.01	0.01	0.02	0.03
4 th Real Wealth Quartile	0.03+	0.01	0.04	0.03
AUS	-0.16#	0.01	-0.52#	0.03
GER	-0.13#	0.01	-0.26#	0.03
NED	-0.18#	0.01	-0.34#	0.02
SPA	-0.20#	0.01	-0.36#	0.02
ITA	-0.23#	0.01	-0.45#	0.01
FRA	-0.11#	0.01	-0.35#	0.02
DEN	-0.07#	0.01	-0.02	0.04
GRE	-0.23#	0.00	-0.53#	0.01
SWI	-0.18#	0.01	-0.38#	0.02
BEL	-0.14#	0.01	-0.21#	0.03

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