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Origin country institutions and immigrant retirement timing

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Origin country institutions and immigrant retirement timing*

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Abstract

We study how immigrants' retirement expectations and behavior are affected by formal retirement institutions in their country of origin. The analysis combines newly collected world-wide gender-specific data on retirement age regulations with individual-level panel data from across Europe. Although the institutions in the country of residence are the most influential, immigrants are still considerably more likely to retire at an age that matches an institutionalized retirement age in their country of origin. The relative importance of the origin country institutions is highest for immigrants who arrived at a higher age, those who have low financial literacy, and those for whom pension rights are internationally portable. These results indicate that mechanisms related to both social norms and economic incentives are at work. Our findings demonstrate how immigrants' beliefs and behavior are influenced not only by *informal* cultural institutions stemming from their country of origin (documented in previous research), but also by specific and alterable *formal* institutions determined by legislative processes.

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1 Introduction

We study how formal and politically malleable origin country institutions affect immigrant retirement decisions in Europe, combining newly collected data on retirement institutions across the world with individual data from the Survey of Health, Ageing and Retirement in Europe (SHARE). Retirement timing is becoming increasingly important in societies facing aging populations and increasing old-age-dependency ratios. As foreign-born to population ratios are often substantial and expected to rise (Scott and Tegunimataka 2020),[1] it is noteworthy that our knowledge on the behavior of this group of older workers is still limited.[2]

Our study departs from findings in two established literatures. First, retirement patterns correlate with institutional design (Gruber and Wise 1999), and statutory retirement ages exert a strong influence on the exact timing of retirement (Seibold 2021; Behaghel and Blau 2012). Second, there is ample evidence that geographically rooted culture and values are related to economic behavior and outcomes. Building on early contributions in economics and sociology applying so-called 'epidemiological' approaches to analyzing the influence of culture (Hofstede 2001; Inglehart and Baker 2000), a growing literature has studied an array of economic outcomes (Fernández 2011 provides a survey), but with limited attention to workers in the later years of work-life.

The retirement age literature shows that formal institutions can create norms or reference points that affect behavior at a collective level. The evidence suggests impacts beyond predictions based on economic incentives and individual optimization. The epidemiological work on culture shows that migrants are affected by factors related to their place of origin. Our contribution is to combine these two perspectives, investigating how formal

[1] According to Eurostat, the fraction of migrants in the EU is substantially higher in the 30–50 age span than in the older population, and recent increases in the foreign-born populations have been concentrated to younger age groups. In the US, the foreign-born population constituted roughly 18% of the 45–64-year-olds in 2016, but is expected to rise to 23% by 2030 (United States Census Bureau 2017). Immigration is projected to have a significant bearing on the development of the old-age-dependency ratio in the US (Johnson 2020; Vespa 2018).

[2] US studies tend to find that immigrants in general have lower labor market exit rates than natives (Borjas 2011; Johnson, Mudrazija, and Xiaozhi Wang 2017; Lopez and Slavov 2020), although differences decline as migrants live and work longer in the host country (Kaushal 2010; Borjas 2011). By contrast, European studies based on administrative data find that immigrants often leave the labor market at lower ages, a result sometimes associated with access to welfare state systems (Bratsberg, Raaum, and Røed 2010; Bratsberg, Raaum, and Røed 2014; Åslund, Larsson, and Laun 2023).

institutions in the country of origin shape behavior among migrant workers. Institutionalized retirement ages are particularly relevant to study in this context. They influence a very specific decision (retirement at a particular age) and there is a lot of variation among origin countries and between the genders.

The survey data from SHARE used in our main analyses comprise up to 9,500 foreign-born individuals living in 29 European countries, with 128 different countries of origin around the world. In addition to detailed individual background variables, the data contain information both on self-reported expected retirement age as well as stated actual age of retirement.

The data on retirement age regulations collected for this project provides information on several types of (potentially) gender-specific statutory and early retirement ages in public mandatory old-age security programs in each of the involved countries, by approximately five-year intervals between 1961 and 2019. By linking these institutional data to the survey data, we can thus analyze and compare the impact of both residence country and origin country institutional regulations on retirement expectations as well as on actual behavior in a broad geographical setting.

We begin by documenting that institutional retirement ages vary substantially across countries as well as over time. While there is some concentration to ages 60 and 65, the span includes ages below 55 and up to 70, with female retirement ages often being lower than male. Changes over time are not uniform, but many countries exhibit a trend toward higher statutory retirement ages, especially so for women.

Our analysis then proceeds in two steps. We first show that origin and residence country institutions are related to retirement expectations. Estimates from conditional logit (McFadden 1974) specifications, relating responses on the specific expected age of first claiming pension benefits, show a robust significant association between expectations and stipulated retirement ages in the country of origin. While the association with residence country institutions is even stronger (and only slightly weaker than that of natives), there is an economically and statistically significant influence of origin country institutions: immigrants have around 75 percent higher odds of expecting to retire at a particular age if that age matches a regulated retirement age in their country of origin. The corresponding difference in odds if the age matches a country of residence retirement age ranges between 270 and 400 depending on specification.

The second step of our analysis reveals that the impact also holds for actual retirement. Hazard models of the labor market exit of immigrants (controlling for age, gender, education, number of children, health, calendar year, country of residence, and country of origin) suggest that the retirement

hazard increases by around 2.7 percentage points—more than 50 percent of the mean hazard—in any year matching a statutory or early retirement age in the country of origin. As expected, the corresponding estimates for country of residence institutions are larger, in the order of 12 percentage points. The estimated impact is driven by exits in the exact year associated with formal regulations. Robustness checks show that retirement is slightly decreased in the year before stipulated retirement. In the year after, there is a tendency to a continued increase, suggesting that formal retirement institutions is seen as a signal on the earliest appropriate age for retirement.

We also seek to identify the mechanisms at work, focusing on the actual retirement outcome which is ultimately the outcome of primary interest. As discussed in the next section, the influence of formal institutions in the country of origin can partly be direct and financial (i.e., you may have entitlements that become available in a given year). But as the literature on retirement timing shows, retirement age regulations also shape behavior beyond economic incentives, by providing reference points in the form of social norms or institutionalized options.

Our results indicate that both financial and non-financial mechanisms are likely to matter. First, there is evidence of assimilation in the sense that the influence of origin country institutions is higher among those immigrating at a higher age, whereas the opposite is true for country of residence institutions. The result is consistent with previous evidence of gradual adjustments in norms and values (Hammar 2021). However, it could also be related to funds connected to the source country becoming available.[3] Also, women tend to respond more strongly than men to origin country institutions, which is in line with theories of female workers being more affected by cultural traits.

Second, if retirement institutions operate by providing institutionalized options, we should expect them to matter more for people with low financial literacy (cf. Van Rooij, Lusardi, and Alessie 2011). We find that the effects of origin country institutions are larger for those individuals who have the lowest level of financial literacy, while those with the highest level appear unaffected. Interestingly, an inverse pattern is observed for residence country institutions. A possible interpretation of this result, in line with the overall theoretical argument, is that more financially literate immigrants are better able to acquire the knowledge needed about the pension system in their new country, and thus able to adjust their retirement decisions according to its regulations, whereas the less financially literate are more likely to resort to the norms of their country of origin.

[3]Indeed, a supplementary analysis shows that foreign income among Nordic migrants to Sweden increases substantially in association with source country retirement ages.

Third, we find that the effect of retirement institutions—particularly so those in the residence country—is greater in cases where they have not been changed over time in our data. This is what we would expect if retirement age regulations operate by defining institutionalized options and social norms.

Fourth, the relevance of financial mechanisms is supported by our finding that the effects of country of origin institutions are primarily driven by migrants covered by a social security agreement enabling the transfer of pension rights and benefits across international borders.

As discussed above, migrants make up a substantial and increasing share of older workers in many countries. Our results show that origin country retirement age regulations play a significant role in determining their timing of retirement; a decision with bearing on economic outcomes at the individual as well as the societal level. Our more general contribution to the recent literature, thus, is to demonstrate that immigrants' beliefs and behavior are influenced not only by *informal* cultural institutions stemming from their country of origin (as widely documented in previous research), but also by specific and alterable *formal* institutions determined by legislative processes.

2 The expected effects of origin country retirement age regulations on migrant workers

Retirement institutions in the country of origin could be associated with behavior in the migrant's new residency country through various mechanisms. First, they could affect economic incentives and imply restrictions for individual optimization of balancing consumption and leisure over the life cycle. Second, they could affect norms and collective behavior with the potential to influence also emigrants currently residing in other countries.

The retirement literature shows that retirement age regulations are powerful policy tools with a potential impact on an array of outcomes (Pilipiec, Groot, and Pavlova 2021). There is also strong evidence that even though financial incentives are an important determinant of behavior (Gruber and Wise 2004), neoclassical life-cycle models focusing on such incentives are insufficient for explaining peaks in retirement at particular regulatory key ages (van Erp, Vermeer, and van Vuuren 2014). Recent work building on rich data find that retirement age regulations have an impact exceeding expectations based on financial incentives (Seibold 2021).

Different explanations have been proposed for these findings. Accounts focusing on bounded rationality emphasize how financial illiteracy or a tendency to economize on cognitive effort when making financial decisions may lower

people's propensity to engage in retirement planning (Van Rooij, Lusardi, and Alessie 2011), and instead prompt them to choose the 'default' option provided by an institutionalized retirement age (van Erp, Vermeer, and van Vuuren 2014). Aside from bounded rationality, the impact of retirement age regulations may also be explained with reference to social norms. People approaching retirement tend to be aware of where they are situated in the social timetable and be able to tell whether they are 'off time' or 'on time.' (Van Solinge and Henkens 2007). If the norm is that those who are able to participate in the labor market do so until a specific age, then a worker who retires early would—aside from the utility derived from leisure—derive disutility in the form of norm deviation (Lindbeck, Nyberg, and Weibull 1999; van Erp, Vermeer, and van Vuuren 2014; Seibold 2021). Such norms regarding the appropriate time to retire may vary between social groups (Duflo and Saez 2002; Krauth 2006), and while they may change they are likely to do so gradually. Indeed, there is evidence that workers align to previous norms on retirement ages even after formal institutions change (Deshpande, Fadlon, and Gray 2021; Behaghel and Blau 2012).

To date, studies investigating the behavioral effects of retirement age regulations have invariably focused on regulations or regulatory changes pertaining to the individual's country of residence or a more local context. When seeking to understand the retirement behavior of international migrants, however, a crucial question is whether these effects are confined to the place of residence, or whether they extend beyond borders to people who reside in a country different from their country of origin.

Research in economics and sociology building on the epidemiological approach to analyzing culture, which focuses on traits that are seen as inherited and persistent among people originating from a certain context (Inglehart and Baker 2000; Hofstede 2001), give an indication on the potential reach of source country factors. This literature suggests that cultural values along various dimensions substantially influence economic outcomes and decisions of international migrants (Guiso, Sapienza, and Zingales 2006; Fernández 2011). Several studies also point to cultural origins as drivers of gender differences (Fernández and Fogli 2009; Alesina, Giuliano, and Nunn 2013; Antecol 2000).

Many studies in this vein analyze labor force outcomes, and a few specifically investigate how the labor force participation of older immigrants are impacted by norms and beliefs linked to family ties or leisure, which vary depending on their cultural origin (Alesina and Giuliano 2014; Cottier 2018). However, while these factors—like those in focus in most research applying the epidemiological approach—are best described as broadly defined *informal* institutions, the retirement age regulations that we are interested in here are

specifically formulated *formal* institutions determined by legislative processes (Alesina and Giuliano 2015).

Nevertheless, we might expect these institutions to matter for international migrants, for both financial and non-financial reasons. On the one hand, migrants who have worked in their country of origin may have accrued pension entitlements that become accessible at a specific age according to regulations in the country of origin, thus impacting the costs and benefits associated with remaining on the labor market in the country of residence. On the other hand, given the role of bounded rationality and social norms for people's perceptions about the proper time to retire, we might expect that the precise institutionalized options and norms prescribed by such regulations may be strong enough to have made a lasting impact on migrants, especially if the same retirement age regulations have been in place for a long time. For both these reasons, we should furthermore expect that the impacts of the regulations in the country of origin and those in the country of residence are to some extent substitutes, in the sense that migrants who have spent more time in their country of origin should be relatively more influenced by the former and less by the latter, and vice versa.

3 Data

This section presents the two data sources used in the study: the SHARE micro data on individual retirement, and our own collection of retirement regulations from around the world.

3.1 SHARE data on individual retirement

We use individual micro-level data from the Survey of Health, Ageing and Retirement in Europe (SHARE), which is a longitudinal survey on health, socio-economic status and social networks that has been collected across most of Europe and Israel at (fairly) regular intervals over the period 2004–2020, targeting residents aged 50 years or more and their partners.[4] Response rates vary across countries and waves (and are computed in different ways

[4]As detailed in Börsch-Supan et al. (2013), the SHARE sample only excludes people that are incarcerated, hospitalized or out of the country during the entire survey period, unable to speak the country's language(s) and those who have moved to an unknown address, which means that the sample also includes persons living in nursing homes and residential care whenever they are covered in the sampling frame. Specifically, we use data from waves 1, 2, 4, 5, 6, 7, and 8, release 8.0.0 (Börsch-Supan 2022a; Börsch-Supan 2022b; Börsch-Supan 2022c; Börsch-Supan 2022d; Börsch-Supan 2022e; Börsch-Supan 2022f; Börsch-Supan 2022g).

in the survey), but generally fall in the range of 45–60 percent (Bergmann et al. 2019). For more details about the design, panel structure and data collection procedures of the survey, see Börsch-Supan et al. (2013). Our analyses primarily focus on respondents with an identifiable foreign country of birth, but for the purpose of comparison we also run certain analyses on natives.

As described in further detail below, there are two basic outcomes in our analyses: expected and actual retirement. For the analysis of expected retirement age, we restrict the analysis to interviews carried out with respondents aged 50 or above who are still participating in the labor market (employed or unemployed) at the time of the interview. At these interviews, respondents are asked a set of questions regarding what types of future pensions they are entitled to, and at what age they expect to begin collecting them. For the sake of comparability, we focus our analysis primarily on public old age pension, for which 93 percent of foreign-born respondents state eligibility; but we also confirm that our results remain if we instead consider the earliest expected age for beginning to collect any pension. In total, this leaves us with a sample of approximately 6,200 interviews representing 3,000 foreign-born individuals from 120 countries. In all analyses, individuals are weighted using the calibrated cross-sectional individual weight (cciw) provided in the SHARE dataset to deal with problems of sample attrition and unit or item non-response (Börsch-Supan et al. 2013). However, we also confirm that our main results are similar without these weights.

As to actual retirement, the SHARE dataset includes information about the stated retirement year (and thereby age) of retired respondents. For our analyses of this variable, we create individual-year panels that, for each respondent, start at age 49 and ends at the age reached at their last SHARE interview. To ensure that the analysis only includes individuals for which regulated retirement ages might matter, we exclude 1) those who have never worked, and 2) those who have ever been observed as homemakers or permanently sick/disabled at the time of survey. In addition, those whose retirement age is 48 or lower and those who do not know their retirement age (1.9 percent) are inevitably excluded. Because many respondents are at a fairly high age when participating in the surveys, making the panel start at age 49 implies that it contains observations from as early as 1961 (which is when our retirement age data starts) up until 2020, with a majority of the observations in the 1995–2010 span. Considering that 128 countries of origin and 29 countries of residence are represented in the final sample of 9,200 respondents, there is accordingly ample variation in retirement age regulations to be exploited in our analyses, across countries, time, and genders.

Table 1 presents selected background variables of the foreign-born individ-

Table 1: Descriptive statistics, immigrants in the analysis samples

Variable	Mean	Std. Dev.	Min.	Max.	N
Sample 1: Analysis of expected retirement					
Female	0.44	0.5	0	1	3033
Age at interview	57.86	3.88	50	77	3033
Age at immigration	23.02	14.11	0	61	3026
Education: Pre-primary	0.06	0.23	0	1	2968
Education: Primary or first stage basic	0.05	0.22	0	1	2968
Education: Lower secondary or second stage basic	0.11	0.32	0	1	2968
Education: (Upper) secondary	0.37	0.48	0	1	2968
Education: Post-secondary non-tertiary	0.05	0.22	0	1	2968
Education: First stage tertiary	0.33	0.47	0	1	2968
Education: Second stage tertiary	0.02	0.14	0	1	2968
Children	2.13	1.35	0	10	3020
Grand children	1.39	2.32	0	29	3016
Partner in household	0.75	0.44	0	1	3033
Self-perceived health	2.89	1	1	5	3032
Unemployed	0.16	0.36	0	1	3033
Expected retirement age	64.29	2.94	55	100	3033
Sample 2: Analysis of observed retirement					
Female	0.47	0.5	0	1	9267
Age at interview	66.63	11.06	50	105	9267
Age at immigration	24.48	16.33	0	90	9191
Education: Pre-primary	0.09	0.28	0	1	9140
Education: Primary or first stage basic	0.11	0.31	0	1	9140
Education: Lower secondary or second stage basic	0.14	0.35	0	1	9140
Education: (Upper) secondary	0.33	0.47	0	1	9140
Education: Post-secondary non-tertiary	0.04	0.2	0	1	9140
Education: First stage tertiary	0.28	0.45	0	1	9140
Education: Second stage tertiary	0.02	0.12	0	1	9140
Children	2.26	1.51	0	14	8819
Chronic diseases	2.14	1.79	0	11	9236
Observed retirement age	61.13	4.44	49	93	5336

Calibrated individual weights applied. For the first sample, values at the last recorded interview regarding retirement expectations are reported. For the second sample, individuals' maximum values are reported.

uals in the two estimation samples. The variables are measured at the last recorded interview within the included time span (note that in both analyses, most individuals are observed more than once). A slight majority of the migrants are male, and they have on average a little more than two children and around 1.4 grandchildren. About one third have tertiary education, whereas 22–35 percent lack upper secondary education. The average migrant was around 23–24 years old when coming to live in the country of residence. In the second sample, the average respondent reports two chronic diseases. Taking the calibrated cross-sectional weights into account, the most frequent countries of origin in this sample are Poland (9.9%), Russian Federation (7.5%), and Algeria (6.7%), whereas Germany (34.2%), France (24.8%), and Israel (7.7%) host the largest number of migrants. See Tables A4–A7 in the Appendix for the full distribution of countries in both samples.

The migrants in the first sample, who are still participating in the labor market, on average expect to retire at the age of 64.3. In comparison, the average stated retirement age among those in the second sample who have retired is considerably lower: 61.1 years. More detailed distributions of these two outcome variables, and how they compare to those of natives, are reported in Figures A1 and A2 in the Appendix. Also in the Appendix, Table A1 reports the corresponding descriptive statistics for the aforementioned samples on natives that are used in supplementary analyses.

3.2 Retirement ages throughout the world

We have collected data on regulated retirement ages in the public mandatory old-age security programs around the world, relying primarily on the Social Security Programs Throughout the World reports (SSPTW) published by the US Social Security Administration (1961–2019).[5] Data contain separate information for men and women by country for approximately every fifth year between 1961 and 2018/2019.[6] For each observation in our individual-year survey to which we link these regulatory data, we use the most recently observed regulations.

[5] When the information from SSPTW's summary tables appeared inconsistent over time, information was taken from the same publication's country reports. When it showed continuity disruptions, we used additional sources to assess its reliability, including Knutsen and Rasmussen (2018), the European Commission's Mutual Information System on Social Protection (MISSOC), the ILO's Legislative Series and NATLEX database, the OECD's Pension at a Glance series, and other country-specific resources.

[6] All in all, the dataset includes information about 182 countries that have existed and have had a pension system in place at one or more years between 1961 and 2019. Specifically, data have been collected for 1961, 1967, 1969, 1973, 1979, 1985, 1991, 1995, 1999, 2003/2004, 2008/2009, 2013/2014, and 2018/2019.

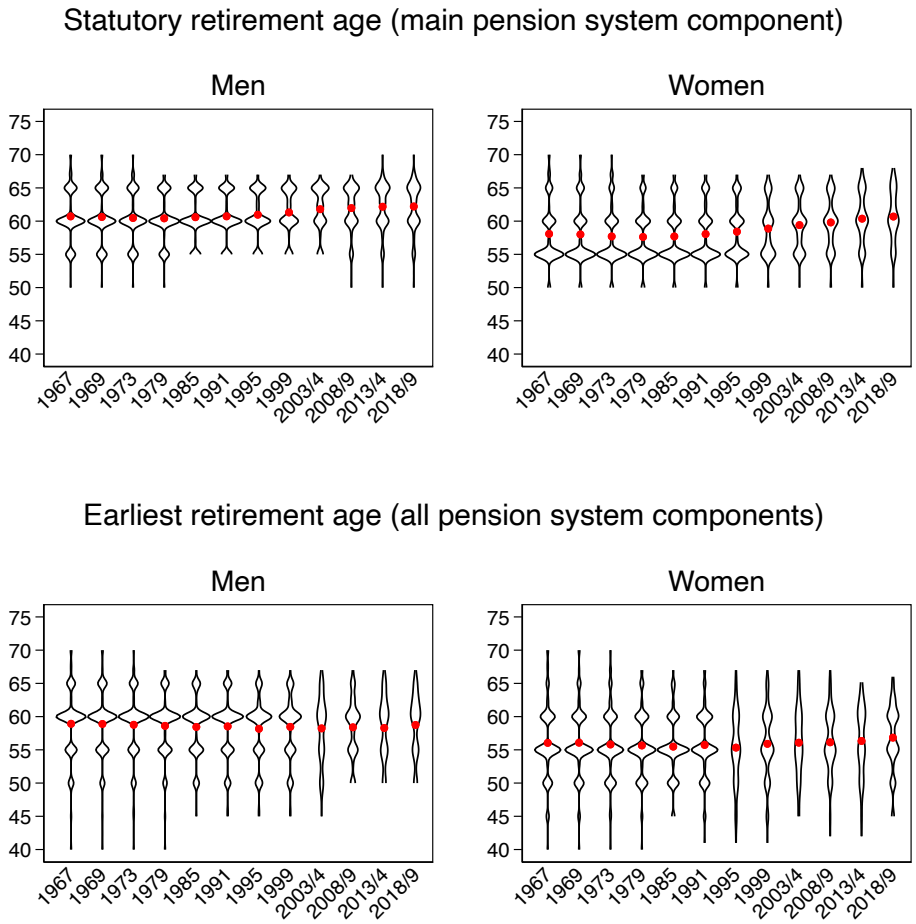

Figure 1: Retirement ages in 93 countries, 1967–2019
Note: The plots show the distribution of retirement ages by gender across time. A "thicker violin" means a higher density at a particular age. Red dots indicate mean of 93 countries.

The regulatory data include two types of *statutory* retirement ages. The first refers to the age stipulated for the main component of each country's pension system. In most cases this is an earnings-related component, but it might also be another type of system, such as a provident fund in which case the age refers to the age when withdrawal first becomes possible. The second type of statutory retirement age refers to the age at which a universal pension benefit becomes available. Benefits of these kinds are typically flat-rate and they are observed in 36 countries at one or more points in time, mostly with the same age regulations for men and women. In most cases, including the

Nordic countries and Canada, these benefits exist alongside some type of earnings-related component.[7] However, in some countries, for instance New Zealand and Botswana, they constitute the main component of the system.

In addition to the two types of statutory retirement ages, we have collected data on the availability of an *early* retirement age, again focusing on the main earnings-related component of the pension system. Possibilities of receiving a pension at an early age as a result of employment in hazardous occupations or specific occupations are not considered. However, cases where women who have raised a certain amount of children have the possibility of doing so are included in the collection.

To provide an overview of the variation in retirement age regulations in our analysis across time and space, Figure 1 reports the long-term trends in the distribution of retirement ages across countries by gender. To avoid conflating trends within countries with changes to the composition of countries in the world, this description focuses on the 93 countries for which data are available continuously between 1967 and 2018/2019, and which are also included in our SHARE samples. The two upper panels of the figure present the distribution of statutory retirement ages in the main component of each country's pension system, separately for men and women, using violin plots. The red dots indicate the mean among the 93 observed countries.

First, throughout the time period, there is considerable variation in retirement ages, both between men and women and between statutory and early retirement ages. At most time periods, observations range from 50 or below to 67 or above. Second, whereas historically a majority of countries have had statutory retirement ages in the 60–65 span for men and 55–60 span for women, the past three decades have seen a gradual diversification and an increase on average. This increase has been particularly pronounced for women, resulting in a gradual convergence between the genders. For women, the average statutory retirement age has increased by 3 years, from 57.7 in 1985 to 60.7 in 2018/2019, whereas for men, it has increased by 1.6 years, from 60.6 to 62.2, over the same period.

Next, Figure 2 describes the variation in residence country and origin country retirement age regulations facing the non-retired immigrant respondents in the first of the two SHARE samples described above. Whereas there are evident peaks at certain ages such as 65, 60, and 55, these peaks differ between men and women and between countries of residence and countries of origin. Furthermore, there is also a substantial amount of regulations

[7] In 85 percent of these cases, the statutory age for the universal component is the same as for the main earnings-related component, and in almost all remaining cases it is between 2 and 10 years higher

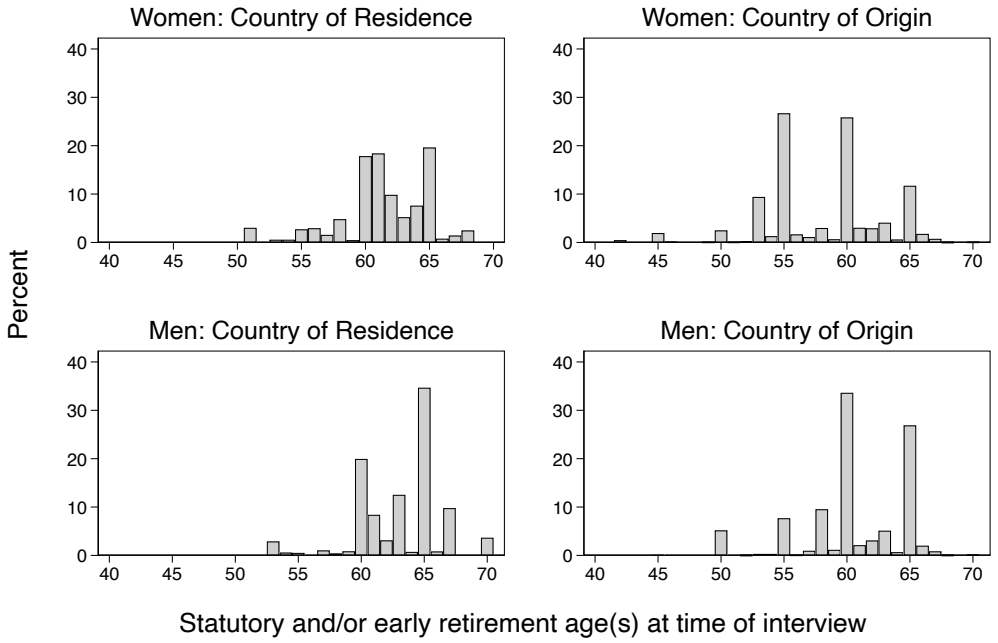

Figure 2: Distribution of regulated retirement ages among the respondents
Note: Persons are represented once for each age that matches a regulated retirement age

indicating ages in between the five-year intervals. In other words, there is a considerable degree of variation in the data. The empirical analysis can also utilize the aforementioned historical variation in retirement ages present in the panel data. For a more detailed description of which combinations of age regulations apply in our two samples, see the cross-tabulations in Figures A2–A3 in the Appendix.

4 Empirical approach

The aim of our empirical analysis is to establish a connection between on the one hand national retirement institutions, and on the other individual stated intentions and actual behavior. As a first step, we seek to find out whether there is an impact of residence and origin country regulated retirement ages on individual expectations about retirement. Second, we aim to uncover whether these regulations also have an impact on observed retirement timing.

Studying the impact of country-of-origin policy regulations has both similarities and differences with studying the impact of culture on economic outcomes. Guiso, Sapienza, and Zingales (2006) argue that to establish a

causal effect of culture one should focus on dimensions of culture that are inherited rather than voluntarily accumulated, and aspects that are constant over the lifetime. Nationally regulated retirement ages are arguably exogenous in the sense that the individual is unable to choose them. But they may well reflect other characteristics of the workforce correlated with retirement behavior at the individual level (e.g. health). On the other hand, variations in regulations may be seen as an asset rather than a problem (cf. a year-to-year change or a gender difference in stipulated retirement age vs. a gradual change in culture).

Our baseline approach to handle the empirical challenges is to exploit the variation in data covering migrants of varying origin living in multiple European countries, using econometric specifications that narrow down the comparisons to very specific expectations and behavior concerning the exact timing of retirement. This means that we account for general retirement behavior in the residence and origin countries, as well as overall age profiles in retirement. Furthermore, we take advantage of gender and time variation in the retirement age regulations. Our approach also allows for placebo tests where we assume that the regulated retirement ages of interest occur one year earlier or one year later, respectively.

Another advantage of analyzing the impact of country of origin institutions on immigrant behavior in the residence country is that we can rule out a common potential concern in studies of the behavioral effects of retirement age regulations, namely that any observed effect may be driven by simultaneous changes in other institutions (financial markets, employment protection legislation etc.) (van Erp, Vermeer, and van Vuuren 2014). Such institutions in the origin country do arguably matter less for people once they have migrated, suggesting that any observed effect is likely to be linked to the pension system.

4.1 Discrete choice model of expected retirement age

We analyze respondents' answers to the question "At what age do you yourself expect to start collecting this pension payment for the first time?" using a McFadden (1974) discrete choice model, where each respondent i (individual*wave) selects one and no more than one age alternative a in a choice set A that ranges between 50 and 75.[8] This means that the dataset used in our analysis contains 26 rows for each respondent, and that the dichotomous dependent variable equals 1 for the chosen age alternative.

[8] Although respondents could answer any age, our truncation at 75 affects no more than 34 individuals who answered 99 or 100.

The discrete choice model is estimated using the following conditional logit specification:

$$\hat{y}_{ai} = \frac{e^{\gamma R_{rsat} + \delta O_{osat} + \boldsymbol{\beta_1}' \boldsymbol{x}_a + \boldsymbol{\beta_2}' \boldsymbol{x}_a \times \boldsymbol{z}_i}}{\sum_{a=1}^{A} e^{\gamma R_{rsat} + \delta O_{osat} + \boldsymbol{\beta_1}' \boldsymbol{x}_a + \boldsymbol{\beta_2}' \boldsymbol{x}_a \times \boldsymbol{z}_i}} \tag{1}$$

where the probability $\hat{y}$ that age alternative a is the one chosen by respondent i out of the set of possible alternatives A is written as a logistic function of a vector of alternative-specific characteristics associated with each age a ($\boldsymbol{x}_a$), a set of interactions between those alternative-specific characteristics and a vector of respondent-specific characteristics $\boldsymbol{z}_i$, as well our two key variables of interest, R_{rsat} and O_{osat}.

Here, R_{rsat} scores 1 if the age alternative a equals a regulated retirement age in the country of residence r, in the year of the interview t, pertaining to his or her sex s. O_{osat}, equivalently, scores 1 if the age alternative a equals a regulated retirement age in the country of origin o, in the year of the interview t, pertaining to his or her sex s.[9] All three types of retirement age regulations—statutory ages in the main and universal system component(s) as well as early retirement ages—are taken into account in this procedure. A two-way robust variance estimator is used to compute the standard errors, to account for the possibility that error terms are correlated within both levels at which the two variables of interest vary, i.e. "country of residence #sex #year" and "country of origin #sex #year".

4.2 Hazard model of observed retirement age

For the panel data analyses of observed retirement, we create a dichotomous event variable that scores 0 until the year when (for retired individuals) the individual's stated retirement occurs and the variable switches to 1.[10] Individuals are treated as censored after retirement or—in case their retirement has not yet occurred—after their last SHARE interview.

We next create two time-varying treatment variables, which score 1 in the year(s) for which the respondent's age equals a regulated retirement age pertaining to his or her sex, in the country of residence or the country of birth, respectively, and 0 otherwise.

[9] For a few countries where the retirement age is not an integer—for instance due to an ongoing gradual increase between two integer ages—we here round the value to the closest integer.

[10] The indicator in question refers to being retired from own work, including semi-retired, partially retired, early retired, or pre-retired.

Because most individuals are only observed a handful of times and mostly at higher ages, the SHARE data cannot be used to create time-varying control variables. A number of time-invariant covariates with potential relevance for individuals' retirement timing can however be constructed. We create four such variables. The first variable indicates whether or not the respondent is female. The second is a categorical variable indicating the highest level of education ever attained (six levels based on the ISCED1997 classification). The third variable indicates the maximum number of children ever reported by the respondent (presuming that for the vast majority of people, all children—unlike grandchildren—were born well before retirement). The fourth variable is the maximum number of chronic diseases ever reported by the respondent.

Most of our analyses are set up as linear probability models that are estimated using ordinary least squares regression, which allows for more computationally demanding specifications than traditional duration models such as the Cox proportional hazards model. However, as a robustness check, a set of analyses corresponding to the first set of OLS regressions are estimated using the Cox model.

Our analyses are run on the the uncensored observations in the panel dataset described above, using the dichotomous retirement indicator as the outcome variable and adding age fixed effects that would be automatically accounted for in the Cox model. Like in our analysis of retirement expectations, a two-way robust variance estimator is used to compute the standard errors, to account for the possibility that error terms are correlated within both country of residence #sex #year and country of origin #sex #year.

The baseline model is specified as follows:

$$H_{it} = \alpha + \gamma R_{rsat} + \delta O_{osat} + \boldsymbol{\beta'} \boldsymbol{x}_{it} + \eta_a + \theta_t + \epsilon_{it} \tag{2}$$

where H_{it} is the retirement hazard of individual i at year t, $\boldsymbol{x}_{it}$ is a vector of covariates, η_a is a vector of age fixed effects, θ_t is a vector of year fixed effects and ϵ_{it} is an error term. Equivalent to Equation 1, R_{rsat} scores 1 in the year(s) t for which the individual's age a equals a regulated retirement age in the country of residence r, pertaining to his or her sex s. O_{osat}, equivalently, scores 1 in the year(s) t for which the respondent's age a equals a regulated retirement age in the country of origin o, pertaining to his or her sex s.

5 Results

We first present results on retirement expectations and then move on to actual retirement. The section is concluded by supplementary investigations illuminating potential mechanisms behind the impact on actual retirement.

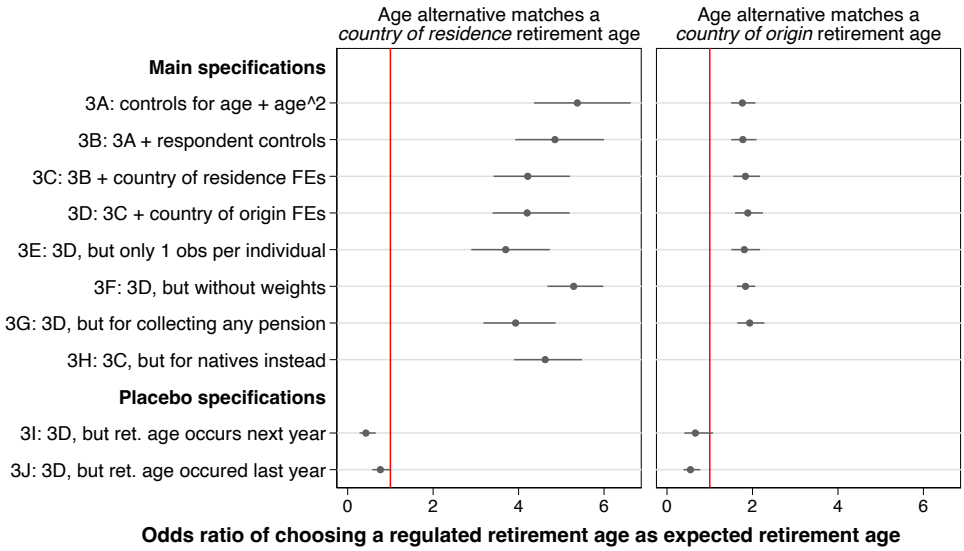

Figure 3: Results from conditional logit analysis of expected retirement age
Note: Spikes denote 95% confidence intervals. For full model output, see Table A8 in the Appendix.

5.1 Retirement expectations

Figure 3 reports the results for the two alternative-specific variables of key interest, expressed in odds ratios. The first variable scores 1 if the age alternative equals a statutory or early retirement age in the country of residence pension system, and 0 otherwise. Analogously, the second variable scores 1 if the age alternative equals a statutory or early retirement age in the country of origin pension system, and 0 otherwise. The simplest specification (3A) includes in the vector $\boldsymbol{x}_{ai}$ only these two variables and continuous age controls (linear and squared) to account for the varying likelihood of choosing age alternatives in different parts of the 50–75 range. The results from this specification clearly indicate that retirement age regulations both in the country of residence and the country of origin impact people's retirement expectations. According to the estimated odds ratios, a respondent has more than 5 times higher odds of selecting a particular age alternative as his or her expected retirement age, if that alternative matches a regulated retirement age in the country of residence, and around 75 percent higher odds of doing so if it matches a regulated retirement age in the country of origin.

Very similar results derive from a subsequent set of specifications where control variables are step-wise added to the model. First, to account for the likelihood that respondents with certain characteristics systematically choose

a higher or lower expected retirement age, specification 3B includes a set of interactions between the continuous age alternative variable and a set of respondent covariates ($\boldsymbol{x}_{ai} \times \boldsymbol{z}_i$), all referring to the time of interview. These include a dummy variable indicating sex (male or female), age, the highest level of education attained (six levels based on the ISCED1997 classification), unemployment status, self-perceived health, number of children, number of grandchildren, and whether or not the respondent lives with a spouse/partner in the household. Survey wave fixed effects are also included and interacted in the same manner. Next, specification 3C adds interactions between the continuous age alternative variable and a full set of country of origin dummies. Specification 3D, subsequently, also adds the corresponding interactions with a full set of country of origin dummies. As a result, only variation within countries—over time and between genders—is used in the estimation of our coefficients of interest. Specification 3E restricts the analysis to only the most recent wave in which each individual answered the question of interest. Specification 3F re-estimates specification 3D without weights, while specification 3G, lastly, considers the lowest age for when the respondent expects to begin collecting any of the pension payments for which he or she states eligibility (instead of only the public old age pension considered above).

Across the six specifications 3A–3G, the odds ratio for selecting an age alternative that matches a country of residence ranges between 3.70 and 5.38. The corresponding odds ratio for an age alternative that matches a country of origin is unsurprisingly lower—ranging from 1.76 to 1.94—but is both economically and statistically significant. It thus appears that regulations in the country of origin matter for immigrants' retirement expectations. Estimates from analyses run on samples split by gender, reported in Figure A3 in the Appendix, suggest that women are more affected by country of origin regulations than men, whereas the opposite appears to be the case for country of residence regulations. It is worth noting that Model 3H, which replicates model 3C on a randomized sample of native respondents in the SHARE survey, estimates a very similar association between country of residence institutions and retirement expectations.

A potential concern is that the country of origin retirement age may pick up, e.g., unobserved worker characteristics related to generally lower/higher retirement ages. Straight-forward "placebo" analyses—assuming that the regulated retirement ages of interest occur one year earlier or one year later—do, however, support the interpretation of the estimates as a sharp expectation on a specific retirement age. These analyses, which are otherwise identical to specification 3D, are reported as specifications 3I and 3J in Figure 3. Both models return negative coefficients for regulated retirement ages in both countries, which means that people are somewhat less likely to expect

retiring one year before or after the regulated retirement ages than otherwise (estimates range from 23 to 57 percent less likely). This is what we would expect if people concentrate their retirement plans to a specific year, given the feasible/relevant age interval.

5.2 Retirement behavior

Having established that retirement age regulations—in both countries of residence and countries of origin—affect retirement expectations, we now move on to investigating their effects on stated actual retirement timing.

Figure 4 reports our main results. First, specifications 4A–4D step-wise add respondent controls and fixed effects for country of residence and country of origin to vector $\boldsymbol{x}_{it}$. Reassuringly, the effects of retirement age regulations on the retirement hazard estimated in these models are substantial and stable, and they are well in line with the results for expected retirement. According to these specifications, an average individual's retirement hazard at a given age increases by 12.4–12.7 percentage points if that age matches a regulated retirement age in the country of residence, and by 2.7–2.8 percentage points if it matches a regulated retirement age in the country of origin. Considering that the mean hazard in the sample is 5.0 percent, these average effects must be considered large—although, perhaps unsurprisingly, smaller than the corresponding effects on retirement expectations.[11]

Next, Model 4E adds dummies representing each combination of country of residence, year, and age as well as each combination of country of origin, year, and age. Accordingly, this model only exploits variation in regulations facing men and women of the same age in a given year. Here, the effect of country of residence regulations drops to 9.7 percentage points while the point estimate for country of origin regulations increases to 3.9 percentage points.

Finally, the figure reports two placebo analyses corresponding to those reported above. These are identical to specification 4D but assume that the regulated retirement ages of interest occur one year earlier or one year later, respectively. Neither of the specifications yield a statistically significant estimate for the country of origin regulations, lending support to the interpretation that our main analysis captures an actual effect of retirement

[11] Emigration in association with retirement (Klinthäll 2006; Kuhlenkasper and Steinhardt 2017) could lead to attrition in the stated retirement sample compared to the expected retirement sample. If people with the intention to adhere to country of origin institutions are more likely to be missing in the data on stated retirement, our estimates arguably reflect a lower bound for the actual impact. Having said this, we note that Åslund, Larsson, and Laun (2023) find that emigration after retirement has little impact on relative retirement hazards.

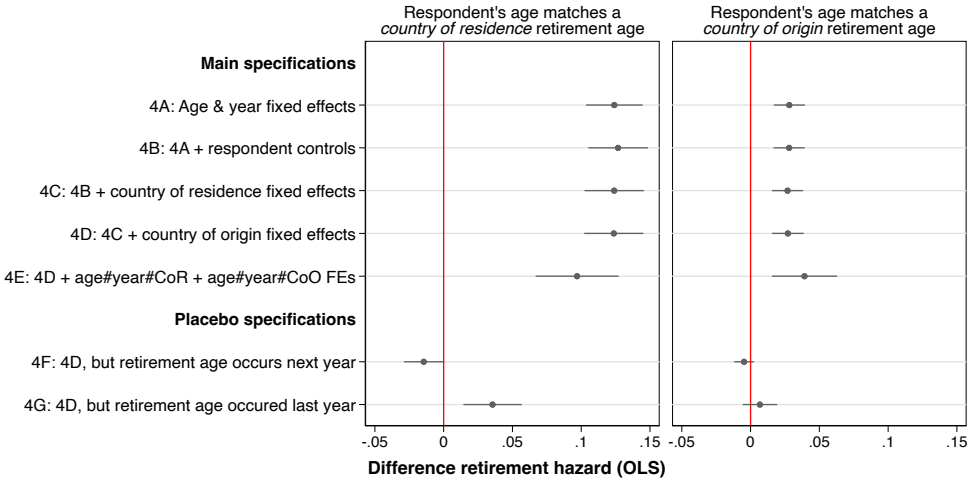

Figure 4: Results from OLS analyses of observed retirement age
Note: Spikes denote 95% confidence intervals. For full model output, see Table A10 in the Appendix.

institutions. For country of residence, there is a marginally significant negative estimate for retirement in years preceding a stipulated year (4F), and a 3.6 percentage points higher hazard in the year after a regulated retirement age (4G), although this only corresponds to one fourth of the main effect reported in Models 4A–4D. An effect of the same proportion (0.7 percentage points) is reported for country of origin regulations, although this effect is not statistically significant. One interpretation of these results is that what retirement age regulations do is to define when it *starts being* more socially acceptable or economically advantageous to retire, rather than an exact age for when to retire.

Figure 5 presents a set of additional specifications, most of which are modified versions of model 4D. Specification 5A confirms that the results are not sensitive to the addition of time-varying country-level controls that capture, for the countries of residence and origin respectively, the gender-specific labor force participation rate of older working-age individuals (ages 55–64), the statutory and the earliest available retirement age in the main pension system component, and GDP per capita.[12] Specifications 5B and 5C perform the analysis separately for men and women. Point estimates

[12]Labor force participation estimates and projections are retrieved from ILO (2017) from 1990 on. Retirement age regulations are retrieved from our own data collection. GDP per capita estimates are based on current purchasing power parity (PPP), created by the World Development Indicators, and retrieved from (Teorell et al. 2023).

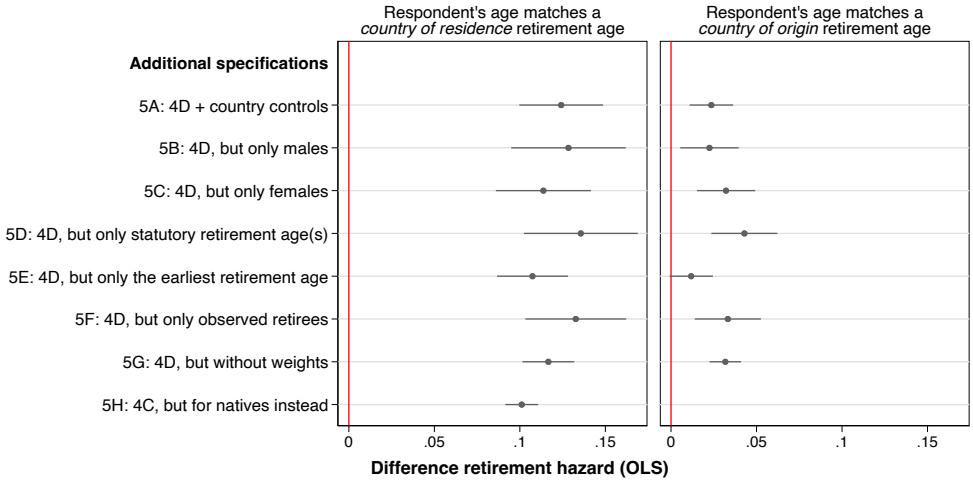

Figure 5: Results from additional OLS analyses of observed retirement age
Note: Spikes denote 95% confidence intervals. For full model output, see Table A11 in the Appendix.

suggest that the effect of residence country regulations may be somewhat larger for men, whereas the effect of origin country regulations is larger for women.[13] In the subsequent two specifications, we separately consider only statutory retirement ages (5D), and only the earliest available retirement age taking into account early retirement ages where those exist (5E). We find that the effect of statutory retirement ages are larger than the effect of the earliest retirement ages. Especially the impact of origin country regulations are mostly driven by the statutory ages.[14]

For specification 5F, the sample has been limited to uncensored observations, meaning that it only includes those whose retirement has been observed prior to their last recorded SHARE interview. This reduces the sample by 39 percent and results in a slight increase of the effect estimates. Specification 5G shows that very similar results emerge if we do not apply the weights. Lastly, as a point of comparison, specification 5H replicates specification 4C on a sample of native residents observed in the SHARE surveys, otherwise using the same inclusion criteria. While this analysis naturally omits the

[13]Using the full sample, an estimate for the interaction between country of origin retirement age and female is statistically significant ($p = 0.026$).

[14]An alternative way of demonstrating this is by only considering early retirement ages, with the consequence that the variable always scores 0 for people in/from countries without early retirement options. The coefficients then shrink to 0.05 for country of residence regulations and -0.005 for country of origin regulations.

country of origin regulations, the estimated effect of the country of residence regulations on natives is fairly similar to that observed for the foreign born (10 percentage points). As reported in Figure A4 in the Appendix, fairly similar results emerge from a set of analyses run on the same sample, that are instead estimated using the Cox model.

5.3 Closing in on the mechanisms

We now move on to a set of analyses that extend specification 4D in order to get closer to the mechanisms at work. The idea is to use differences brought by variation in theoretically relevant factors to illuminate the importance of norms and other reference points, on the one hand, and economic incentives on the other hand, for retirement behavior which is our outcome of primary interest. We consider two individual-level factors; age at migration and financial literacy, as well as two institutional factors; whether the country's statutory retirement age has seen a change and whether or not the two countries have signed a social security agreement that allows for the maintenance of migrants' acquired pension rights and the international portability of pension benefits.

First, to assess the role of gradual assimilation into host societies (cf. Hammar 2021), we investigate how the effects of retirement age regulations vary by age at migration. We use self-declared data to divide respondents into four groups based on whether they immigrated in their childhood (aged 0–14), youth (15–24), prime working age (25-44) or later (45 or above). We then interact the age group indicators with the two retirement age regulation variables. The marginal effects of the retirement age regulations on the retirement hazard by age at immigration are reported in Figure 6.

Beginning with the country of origin regulations reported in the right-hand plot, the estimated impact is particularly strong for the group that arrived at the highest age: 7.6 percentage points compared to 1.5–2.4 percentage points for the earlier groups. Correspondingly, and in line with theoretical expectations, the group arriving at the highest age is also the group least impacted by retirement age regulations in the country of residence. According to the results in the left-hand plot, this effect decreases from a 16.8 percentage points increase in the retirement hazard rate for those arriving as children to a 7.3 percentage points increase for those arriving at age 45 or later.[15]

Second, if origin country retirement age regulations provide immigrants with social norms or other reference points for when to retire, we should

[15]The differences between the oldest and each of the three younger groups in the country of origin estimates are all statistically significant ($p = 0.029$ or lower). The difference between the youngest and oldest groups in the country of residence analysis is highly significant ($p = 0.001$).

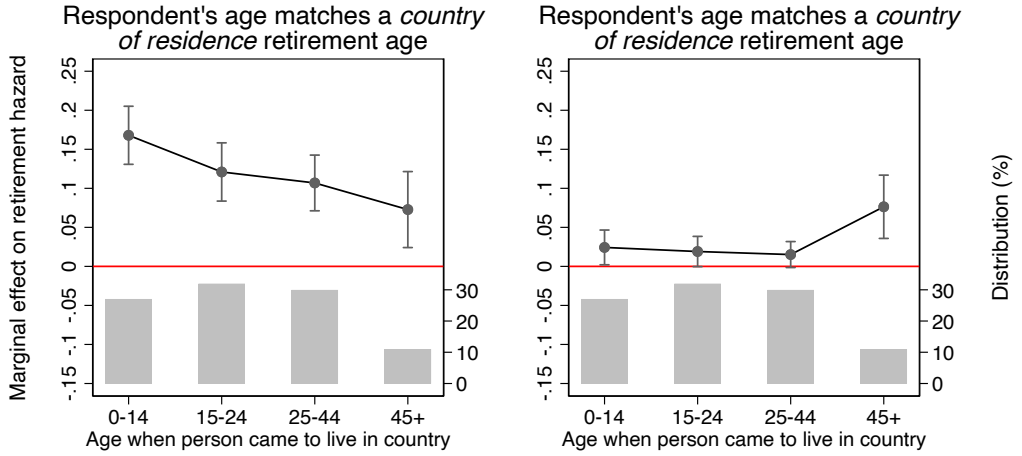

Figure 6: Results from OLS analyses, by age at immigration
Note: Based on model 4D, but adding interaction terms as described in the text. Bars indicate distribution in sample (right axis). Spikes denote 95% confidence intervals.

expect them to have larger effects on the retirement hazard for people with lower levels of financial literacy, given that these have been found to engage less in retirement planning (cf. Van Rooij, Lusardi, and Alessie 2011). To test this expectation, we use a SHARE survey indicator on numeracy, based on respondents' answers to a set of questions evaluating their mathematical proficiency. For each respondent, we use the highest achieved numeracy score, ranging from 1 (lowest) to 5 (highest). A set of numeracy indicators representing each of the five maximum scores are then interacted with our two retirement age regulations.

Figure 7 reports the marginal effects of age regulations on the retirement hazard by numeracy score. As to the origin country regulations reported in the right-hand plot, the estimations lend some support to the notion that retirement ages define reference points, considering that those with the lowest level of financial literacy respond to the largest extent—a 6.3 percentage point increase in the retirement hazard rate—whereas those with the highest level appear not to respond at all (the difference is statistically significant; $p = 0.02$). For residence country regulations, the theoretical expectations are not clear, and the results suggest that immigrants with higher levels of financial literacy are more likely to respond. A possible interpretation of this result, in line with the overall theoretical argument, is that those individuals are better able to acquire the knowledge needed about the pension system in their new country of residence to be able to adjust their retirement decisions

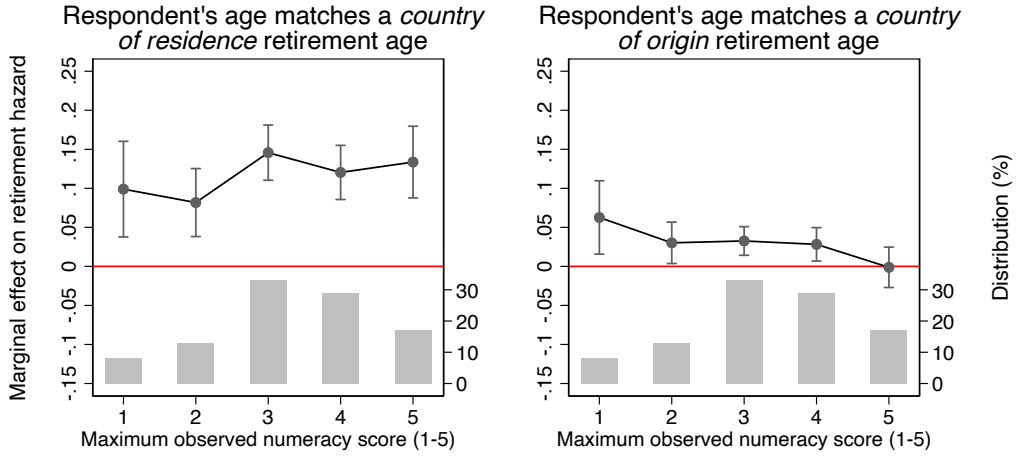

Figure 7: Results from OLS analyses, by financial literacy
Note: Based on model 4D, but adding interaction terms as described in the text. Bars indicate distribution in sample (right axis). Spikes denote 95% confidence intervals.

according to its regulations.[16]

Third, if retirement age regulations function by defining social norms or institutionalized options, we would expect that their effects are larger if the same regulation has been in place for a long time. This is, however, not what we would expect if their primary function is to determine availability of pension wealth. To investigate this empirically, we define a country-level indicator that scores 0 for country-years prior to which our retirement age data collection records a first change in the statutory retirement age in the country in question, and 1 once (if ever) it has changed. A caveat here is that even if a country changes its retirement age, all financial incentives do not necessarily change.[17]. We then interact the two treatment variables with the two change variables as defined for the country of residence and origin respectively. The marginal effect plots reported in Figure 8 provide some evidence in line with social norms and institutionalized options. For country of residence regulations, the estimated effect on the retirement hazard is 63 percent higher for country-years until which no change in the statutory

[16]Considering that there is a weak but significant correlation (r=-0.07) between age at immigration and numeracy in our sample, it is worth noting that essentially identical results emerge if both set of interactions are included in the same model.

[17]Even if the statutory retirement age increases, there might still be strong financial incentives for people not to retire later, stemming from other social benefits, second- or third-pillar pension plans, etc.

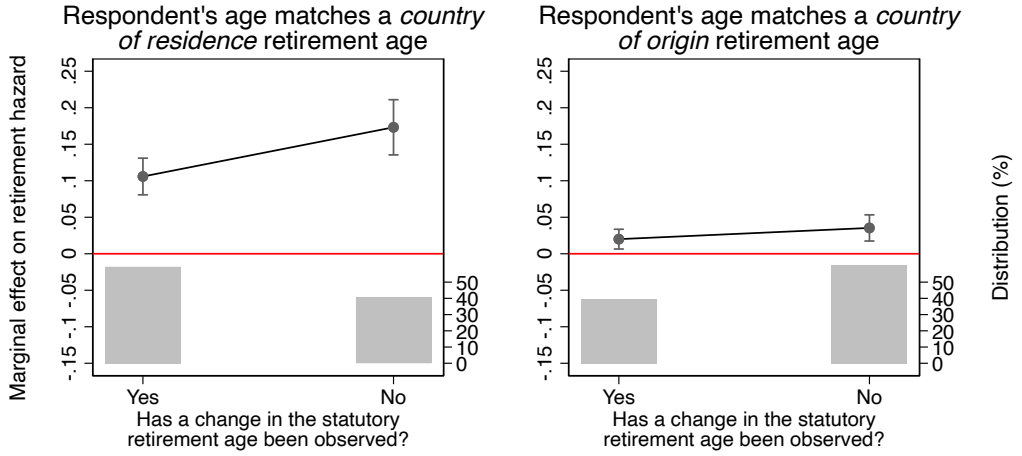

Figure 8: Results from OLS analyses, by whether retirement age has changed
Note: Based on model 4D, but adding interaction terms as described in the text. Grey bars indicate distribution in sample (right axis). Spikes denote 95% confidence intervals.

retirement age has been observed (17.3 vs. 10.6 percentage points), and this difference is statistically significant ($p = 0.003$). The corresponding difference for country of origin regulations is greater in relative terms (3.53 vs. 2.00 percentage points), yet does not reach statistical significance ($p = 0.171$).

Fourth, if origin country institutions operate by determining the availability of pension wealth from the origin country's pension system, we should expect the observed effects to be driven primarily by country-pairs between which pension benefits are readily portable. The predominant way for such international portability to be established is by coordination through bilateral or multilateral social security agreements (SSAs). Such agreements have a long history but have gone through a large, yet markedly uneven, expansion across the globe in the past decades. We here use treaty data collected by Cronert and Palme (2023) that include annual observations on whether or not a particular country-dyad have signed a social security agreement, spanning all of the world between 1945 and 2015. Although we have no systematic information about the contents of these agreements, coordination of pension systems is an important objective in most of them (Holzmann and Wels 2020).

Figure 9 reports the results from a model where the two treatment variables are interacted with a dummy variable indicating whether or not the immigrant's country of origin and country of residence have signed a social security agreement. According to the right-hand plot, our results for country of origin institutions indeed appear to be driven by migrants covered by a

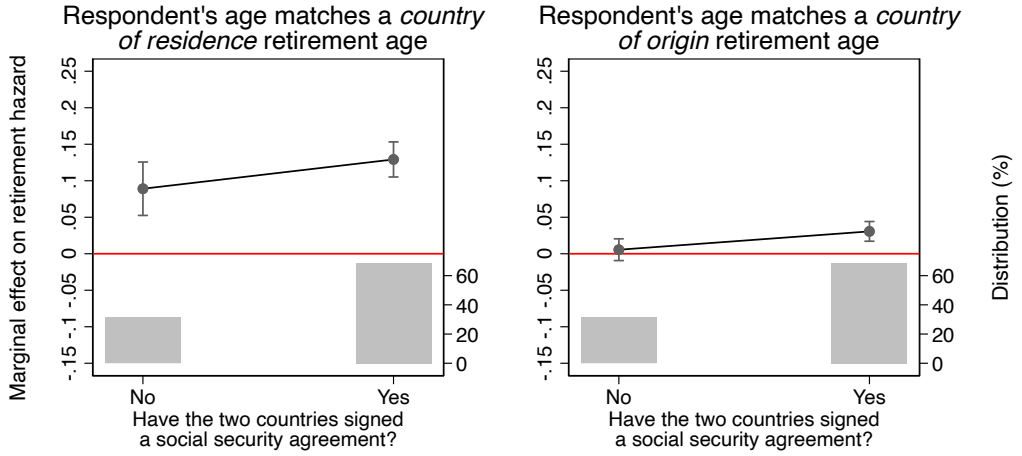

Figure 9: Results from OLS analyses, by social security agreement coverage
Note: Based on model 4D, but adding interaction terms as described in the text. Grey bars indicate distribution in sample (right axis). Spikes denote 95% confidence intervals.

social security agreement; for the roughly one third that are not, the marginal effect is close to zero and not statistically significant.

Further evidence that country of origin retirement age regulations may help determine the timing of pension wealth import is reported in two figures in the Appendix. First, the SHARE survey includes a question about "For which reasons did you retire?" Figure A5 reports the share of retired foreign-born respondents who stated that they retired (only or in part) because they became eligible for public pension, by whether or not they are covered by a social security agreement and whether or not their stated retirement age matches any country of residence and/or country of origin retirement age. The figure shows that among immigrants not covered by an SSA, those who have retired at an age matching a country of origin retirement age are substantially less likely to state public pension eligibility as a reason than those who retired at an age matching a country of residence retirement age. By contrast, among those who are covered by an SSA, public pension eligibility was an equally common reason among those who retired at an age that matches only a country of origin retirement age.

As a second indication on the role of origin country pension wealth, Figure A6 reports Swedish administrative data on incomes imported from Nordic countries in 2015–2019, among Nordic-born migrants residing in Sweden (all of which have for long been covered by a multilateral social security agreement). These data reveal substantial increases in the likelihood of

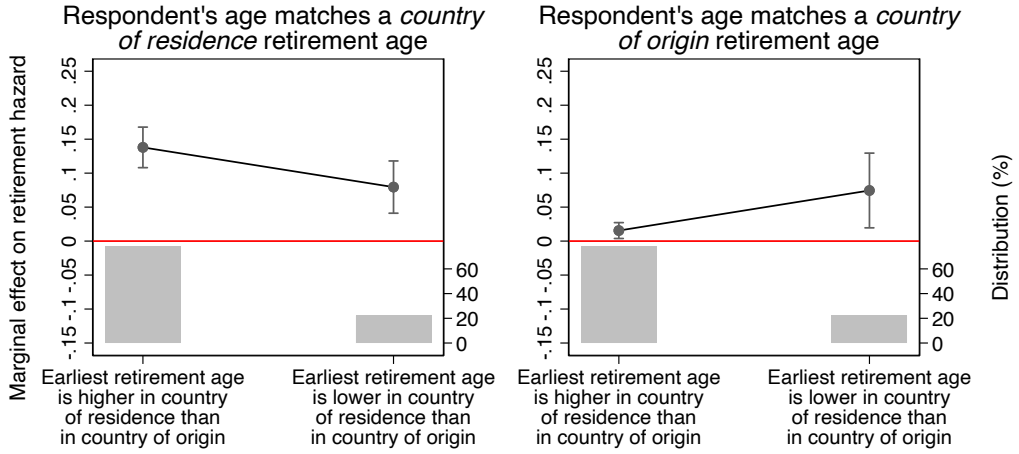

Figure 10: Results from OLS analyses, by country difference in regulations
Note: Based on model 4D, but adding interaction terms as described in the text. Grey bars indicate distribution in sample, omitting cases where the earliest available retirement age in the country of residence equals the earliest available retirement age in the country of origin (right axis). Spikes denote 95% confidence intervals.

receiving an imported income, as well as in the average level of imported income, for immigrants from Denmark, Norway and Iceland right at the specific statutory retirement age in the respective country of birth (65 in Denmark and 67 in Norway and Iceland), i.e., when most pensions from these countries become portable (Swedish Pension Agency 2023). Taken together, these findings point towards eligibility to origin country pension being a potentially relevant mechanism for understanding our results.

Lastly, it is relevant to investigate whether the estimated effects vary based on the difference between the age regulations in the two countries. To that end, we interact the two retirement age regulation variables with two dichotomous variables indicating whether the earliest available retirement age in the country of residence is higher or lower than the earliest available retirement age in the country of origin (using cases where the two are equal as the reference category). Figure 10 reports the marginal effects of age regulations on the retirement hazard for the relevant cases. Beginning with the country of origin regulations, it is clear that while there is a significant effect for each of the cases, the coefficient is much (and significantly) larger for individuals whose country of origin have a higher earliest retirement age than their country of residence. The effect of country of residence regulations, conversely, is considerably and significantly higher when the earliest retirement age is

higher in the country of residence. Thus, the country of origin institutions affect retirement primarily when immigrants have reached/passed the earliest appropriate age of retirement in *both* countries.

6 Concluding discussion

We study how formal origin and residence country institutions shape labor market behavior among older migrant workers in Europe. The analysis builds on recently collected data on retirement regulations across the world, combined with survey micro data from a large set of European countries.

First, our study shows that stipulated retirement ages in the host country has a strong impact on specific immigrant retirement behavior. This finding aligns with previous research on the overall workforce (e.g., van Erp, Vermeer, and van Vuuren 2014; Pilipiec, Groot, and Pavlova 2021; Seibold 2021); a result confirmed for native workers in our data.

Second, and more importantly, we show that there is also an economically and statistically significant increase in the likelihood of retirement when the country of origin regulations stipulate retirement. The results are robust to a large variety of specifications and sample restrictions, and the impact is present both for expected retirement and for actual labor market withdrawal, and is considerably higher for the former. The difference between expectations and behavior is perhaps not very surprising considering the difficulties of foreseeing at an early age all the various factors—such as medical conditions, labor market conditions, spouse behavior, etc.—that may push you to retire at an age different from the one you initially planned for.

Pension systems may influence behavior directly through economic opportunities and incentives, as well as indirectly through social norms and perceptions on suitable/accepted behavior. Empirically, the mechanisms are hard to separate and may of course also interact. Our supplementary analyses indicate that both types of mechanisms seem to matter. Our finding that there is assimilation into adhering to the regulations of the country of residence, and a stronger impact of country of origin institutions among those older at migration, is consistent with both types. The fact that the less financially literate respond more to origin country institutions is at least suggestive of social norms or other reference points being a channel. The greater response to systems without changes in relevant retirement ages point in the same direction. As to the financial mechanisms, these are substantiated by the finding that our results appear to be driven by migrants covered by a social security agreement that facilitate the international portability of pension rights and benefits.

Our study also contributes to the literature on cultural traits and economic performance, typically linking outcomes to indices of social or economic structures in countries of origin (e.g., Guiso, Sapienza, and Zingales 2006; Fernández and Fogli 2009; Alesina and Giuliano 2014; Cottier 2018). Specifically, we show that also formal—and politically malleable—institutions are part of the origin country factors affecting migrant workers across the European continent. Some of our findings indicate that host and origin country institutions combined constitute lower bars for when retirement is acceptable/preferred, thus if anything extending working-life.

While we have argued that the very specific behavior prescribed by retirement age regulations is beneficial from an analytical perspective, it is likely that other formal institutions may matter as well. Given the increasing origin diversity of workers in many countries, and the major and persistent inequalities observed, further attention to this topic seems warranted.

SHARE Acknowledgment

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Appendix to "Origin country institutions and immigrant retirement timing"

Olof Åslund and Axel Cronert

Table A1: Overview of natives in the two supplementary samples

Variable	Mean	Std. Dev.	Min.	Max.	N
Sample 1: Analysis of expected retirement (Natives)					
Female	0.45	0.5	0	1	27528
Age at interview	57.58	3.74	50	85	27528
Education: Pre-primary	0.02	0.13	0	1	27248
Education: Primary or first stage basic	0.07	0.25	0	1	27248
Education: Lower secondary or second stage basic	0.14	0.34	0	1	27248
Education: (Upper) secondary	0.45	0.5	0	1	27248
Education: Post-secondary non-tertiary	0.04	0.2	0	1	27248
Education: First stage tertiary	0.27	0.44	0	1	27248
Education: Second stage tertiary	0.01	0.12	0	1	27248
Children	1.94	1.29	0	17	27500
Grand children	1.12	2.05	0	230	27462
Partner in household	0.75	0.43	0	1	27528
Self-perceived health	2.8	0.95	1	5	27520
Unemployed	0.1	0.3	0	1	27528
Expected retirement age	63.79	2.84	30	99	27528
Sample 2: Analysis of observed retirement (Natives)					
Female	0.46	0.5	0	1	94118
Age at interview	67.95	11.11	50	105	94117
Education: Pre-primary	0.04	0.19	0	1	93059
Education: Primary or first stage basic	0.17	0.37	0	1	93059
Education: Lower secondary or second stage basic	0.16	0.37	0	1	93059
Education: (Upper) secondary	0.39	0.49	0	1	93059
Education: Post-secondary non-tertiary	0.03	0.18	0	1	93059
Education: First stage tertiary	0.2	0.4	0	1	93059
Education: Second stage tertiary	0.01	0.1	0	1	93059
Children	2.05	1.4	0	19	85822
Chronic diseases	2.11	1.7	0	14	93670
Observed retirement age	60.36	4.44	49	94	57261

Calibrated individual weights applied. For the first sample, values at the last recorded interview regarding retirement expectations are reported. For the second sample, individuals' maximum values are reported.

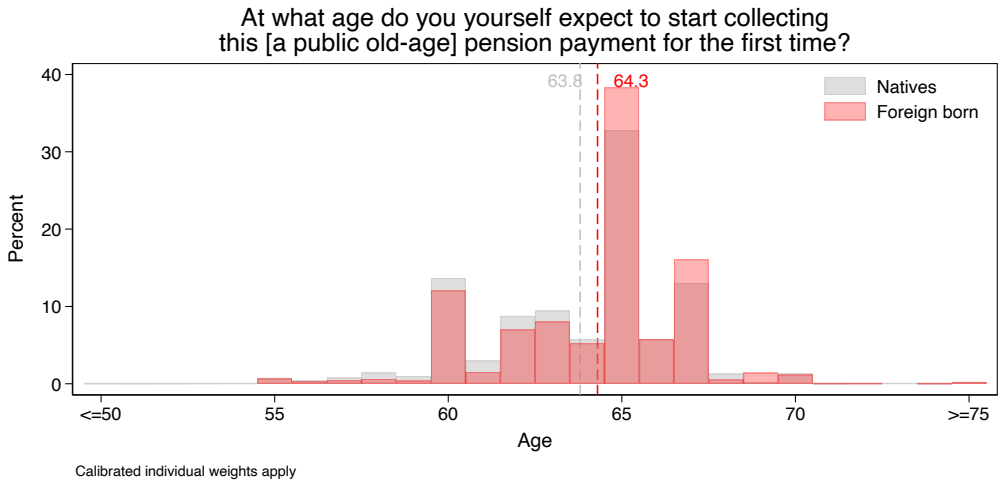


Figure A1: Distribution of expected retirement ages among SHARE respondents on the labor market

Note: Vertical lines indicate group means. For presentational purposes, answers are truncated at 50 and 75.

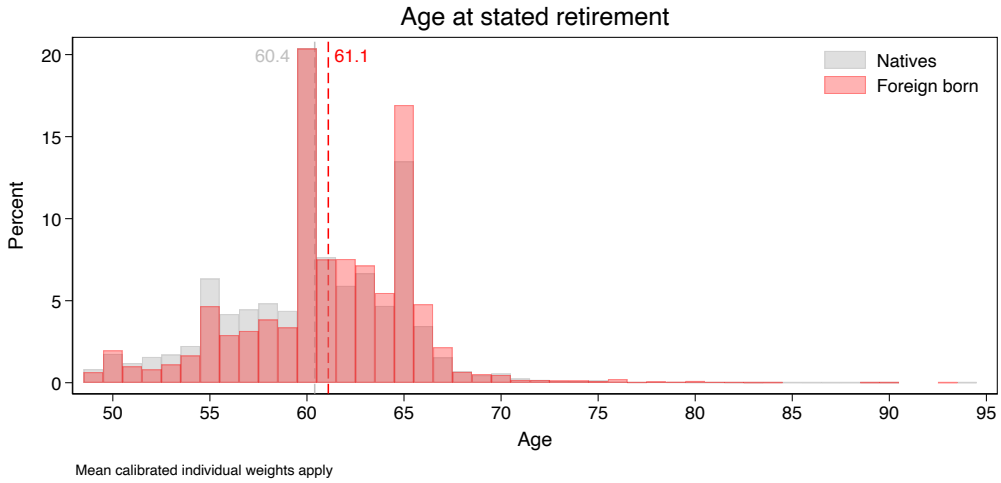


Figure A2: Distribution of observed retirement ages among SHARE respondents aged 49 or above

Note: Vertical lines indicate group means.

Table A2: Retirement Age Regulations in Country of Residence (columns) and Country of Origin (rows), Expected Retirement Sample 2004–2020

	56	60	61	62	63	64	65	66	67	68	70	Tot
50												0.17
55		3.74					4.47					11.0
56												0.32
57												0.67
58							2.18					3.06
59												0.29
60		8.18	1.54			1.06	19.2	3.40	1.77		1.76	38.2
61							1.04					1.56
62							1.47					2.53
63							3.78	1.10				5.37
64												1.57
65		7.05				1.12	15.8	1.21				28.1
66							1.46		1.38			4.14
67							1.01	1.48				3.08
70												0.01
Tot	0.27	20.30	4.12	2.43	0.80	3.10	51.1	9.63	5.47	0.58	2.21	100

Table entries show percentages of total in each cell. Cells with <1 % are left blank. Calibrated individual weights applied.

Table A3: Age Regulations in Country of Residence (columns) and Country of Origin (rows), Observed Retirement Sample 1961–2020

	55	56	57	58	59	60	61	62	63	64	65	66	67	68	70	Tot
50																0.34
55						6.85		1.07	4.42		3.24					17.8
56																0.84
57																1.48
58											1.20					1.70
59																0.75
60						12.6		1.11	11.0		13.4					41.1
61																1.31
62																2.20
63						1.44					3.44					5.78
64																1.30
65						6.41			4.77		10.3					23.8
66																0.76
67																0.85
68																0.01
70																0.04
Tot	0.86	0.30	0.62	0.21	0.26	29.6	2.08	3.46	22.6	1.02	35.1	0.94	1.74	0.57	0.64	100

Table entries show percentages of total in each cell. Cells with <1 % are left blank. Mean calibrated individual weights applied.

Table A4: Frequency of Country of Residence among Immigrants, Expected Retirement Sample 2004–2020

	Percent		Percent
Germany	36.54	Slovenia	0.47
France	25.94	Luxembourg	0.34
Israel	7.07	Estonia	0.31
Switzerland	5.88	Portugal	0.21
Spain	5.14	Poland	0.20
Sweden	4.08	Latvia	0.19
Belgium	3.81	Ireland	0.18
Netherlands	2.58	Lithuania	0.14
Austria	2.21	Finland	0.08
Denmark	1.27	Hungary	0.06
Italy	0.96	Bulgaria	0.04
Croatia	0.76	Slovakia	0.04
Greece	0.76	Cyprus	0.01
Czechia	0.72	Malta	0.01

Percentages of total. Calibrated individual weights applied.

Table A5: Frequency of Country of Residence among Immigrants, Observed Retirement Sample 1961–2020

	Percent		Percent
Germany	34.23	Estonia	0.74
France	24.81	Denmark	0.72
Israel	7.72	Slovenia	0.63
Spain	4.83	Luxembourg	0.41
Switzerland	4.16	Lithuania	0.41
Sweden	3.51	Hungary	0.36
Belgium	3.22	Ireland	0.31
Netherlands	2.71	Portugal	0.21
Italy	2.25	Bulgaria	0.11
Austria	2.21	Finland	0.09
Poland	1.67	Romania	0.07
Czechia	1.35	Slovakia	0.07
Croatia	1.25	Cyprus	0.05
Latvia	1.02	Malta	0.01
Greece	0.89		

Percentages of total. Calibrated individual weights applied.

Table A6: Frequency of Country of Origin among Immigrants, Expected Retirement Sample 2004–2020

	Percent		Percent
Poland	9.39	Ghana	0.26
Russian Federation	6.65	Mali	0.26
Algeria	5.94	Denmark	0.25
Italy	5.72	Norway	0.25
Germany	4.83	Estonia	0.24
Morocco	4.36	Lithuania	0.23
Turkey	4.00	South Africa	0.23
Portugal	3.42	Latvia	0.21
Romania	3.03	Brazil	0.17
Spain	2.80	Albania	0.17
France	2.54	Pakistan	0.16
Netherlands	2.50	Rwanda	0.16
Tunisia	2.39	Nigeria	0.15
United Kingdom	2.33	Jordan	0.14
Austria	2.25	Mozambique	0.14
Hungary	1.96	Japan	0.14
Kazakhstan	1.87	Ireland	0.14
Belgium	1.82	Georgia	0.13
Iran, Islamic Republic of	1.81	Cuba	0.12
Kyrgyzstan	1.38	Lebanon	0.12
Bosnia and Herzegovina	1.32	Bolivia, Plurinational State of	0.11
Finland	1.26	Bangladesh	0.11
Greece	1.25	Equatorial Guinea	0.11
Viet Nam	1.06	Cyprus	0.10
Croatia	1.00	Hong Kong	0.09
Colombia	0.99	Cabo Verde	0.09
Ukraine	0.94	Israel	0.08
Venezuela, Bolivarian Republic of	0.83	Turkmenistan	0.08
Indonesia	0.74	Burkina Faso	0.07
United States of America	0.74	New Zealand	0.07
Switzerland	0.67	Gambia	0.07
Argentina	0.62	Mauritius	0.07
Chile	0.62	Moldova, Republic of	0.06
Slovakia	0.59	Côte d'Ivoire	0.06
Syrian Arab Republic	0.59	Sao Tome and Principe	0.06
Uzbekistan	0.58	Azerbaijan	0.06
Belarus	0.57	Angola	0.05
Peru	0.53	Malaysia	0.05
Madagascar	0.51	Haiti	0.05
Serbia	0.51	Libya	0.04
Lao People's Democratic Republic	0.50	Iceland	0.04
Suriname	0.49	Chad	0.03
China	0.49	Sudan	0.03
Senegal	0.47	Mauritania	0.03
Czechia	0.45	Luxembourg	0.03
Bulgaria	0.41	Yemen	0.02
Sri Lanka	0.41	Ethiopia	0.02
India	0.40	Taiwan, Province of China	0.02
Sweden	0.39	Mexico	0.02
Dominican Republic	0.39	Zimbabwe	0.02
Australia	0.38	Armenia	0.01
Egypt	0.35	Singapore	0.01
Ecuador	0.35	Nicaragua	0.01
Philippines	0.34	Liberia	0.01
Cameroon	0.32	Burundi	0.01
Iraq	0.31	Congo, the Democratic Republic of the	0.01
Uruguay	0.31	Thailand	0.01
Canada	0.31	Paraguay	0.00
Guinea	0.28	Togo	0.00
Slovenia	0.28	Honduras	0.00

Percentages of total. Calibrated individual weights applied.

Table A7: Frequency of Country of Origin among Immigrants, Observed Retirement Sample 1961–2020

	Percent		Percent
Poland	9.92	Dominican Republic	0.23
Russian Federation	7.52	Nigeria	0.21
Algeria	6.78	Uruguay	0.21
Italy	5.79	Australia	0.20
Germany	5.22	Libya	0.19
Morocco	3.90	Guinea	0.18
Ukraine	3.07	Georgia	0.17
Turkey	3.06	Albania	0.17
Portugal	2.92	Ethiopia	0.17
Romania	2.89	Cabo Verde	0.16
Austria	2.61	Lebanon	0.16
Spain	2.54	Ghana	0.16
France	2.44	Ireland	0.15
United Kingdom	2.17	Lao People's Democratic Republic	0.14
Hungary	1.96	Cameroon	0.14
Tunisia	1.94	Mali	0.13
Netherlands	1.79	Pakistan	0.10
Kazakhstan	1.79	Haiti	0.09
Czechia	1.70	Yemen	0.09
Bosnia and Herzegovina	1.64	Bolivia, Plurinational State of	0.08
Belgium	1.44	Gambia	0.08
Slovakia	1.40	Côte d'Ivoire	0.07
Finland	1.21	Mauritius	0.07
Belarus	1.14	Turkmenistan	0.06
Croatia	1.04	Israel	0.06
Iran, Islamic Republic of	0.93	Cyprus	0.06
Indonesia	0.88	Mauritania	0.06
Switzerland	0.87	Japan	0.05
Viet Nam	0.75	Azerbaijan	0.05
Argentina	0.68	Bangladesh	0.05
Serbia	0.65	Cuba	0.05
Kyrgyzstan	0.64	Jordan	0.04
Iraq	0.63	Luxembourg	0.04
Greece	0.63	Hong Kong	0.04
Uzbekistan	0.59	Togo	0.04
Peru	0.58	Rwanda	0.03
United States of America	0.54	Sao Tome and Principe	0.03
Slovenia	0.48	Malaysia	0.03
Suriname	0.47	Burkina Faso	0.03
Colombia	0.44	Thailand	0.02
Venezuela, Bolivarian Republic of	0.43	New Zealand	0.02
China	0.43	Angola	0.02
Chile	0.42	Afghanistan	0.02
Egypt	0.41	Monaco	0.02
India	0.40	Burundi	0.02
Ecuador	0.40	Costa Rica	0.02
Senegal	0.39	Iceland	0.01
Bulgaria	0.39	Tajikistan	0.01
Denmark	0.38	Zimbabwe	0.01
Madagascar	0.38	Armenia	0.01
Lithuania	0.36	Grenada	0.01
Canada	0.34	Tanzania, United Republic of	0.01
Philippines	0.34	Taiwan, Province of China	0.01
Brazil	0.32	Paraguay	0.01
Sweden	0.30	Congo, the Democratic Republic of the	0.01
Syrian Arab Republic	0.28	Sudan	0.01
Norway	0.28	Liberia	0.01
Latvia	0.28	Liechtenstein	0.00
Equatorial Guinea	0.27	Singapore	0.00
Estonia	0.26	Honduras	0.00
Sri Lanka	0.26	Kenya	0.00
Moldova, Republic of	0.23	El Salvador	0.00
South Africa	0.23	Mozambique	0.00
Mexico	0.23	Congo	0.00

Percentages of total. Calibrated individual weights applied.

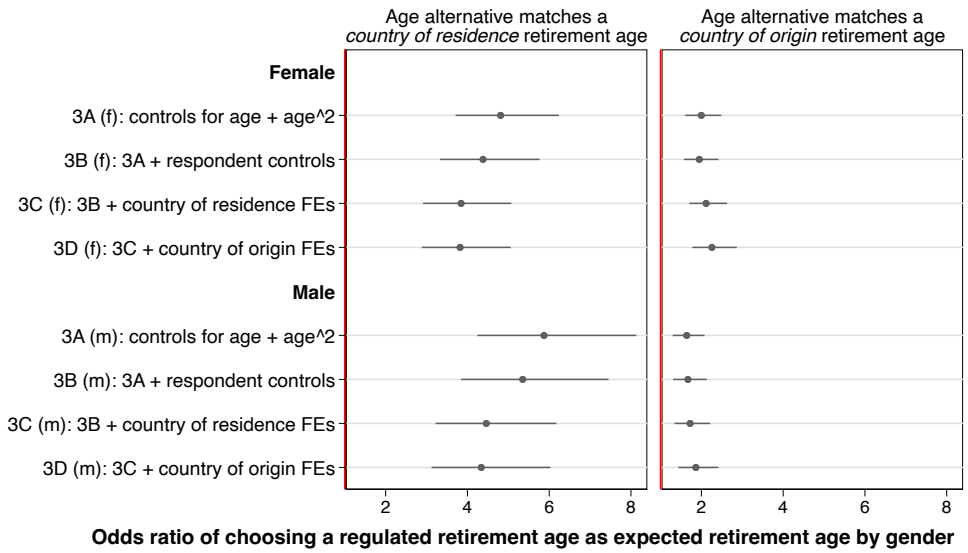


Figure A3: Results from conditional logit analysis of expected retirement age, by gender
Note: Spikes denote 95% confidence intervals.

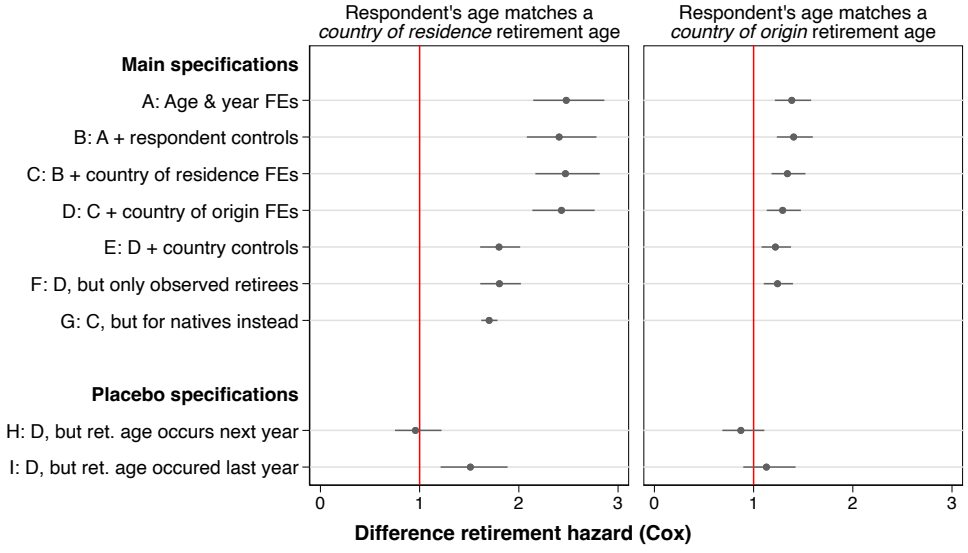


Figure A4: Results from Cox analysis of observed retirement age
Note: Spikes denote 95% confidence intervals.

Table A8: Table corresponding to Figure 3 (Clogit)

	(1) A	(2) B	(3) C	(4) D	(5) E	(6) F	(7) G	(8) H	(9) I	(10) J
Age = any country of residence retirement age	5.375***	4.851***	4.215***	4.200***	3.698***	5.289***	3.931***	4.622***	0.428***	0.766*
	(0.572)	(0.525)	(0.451)	(0.456)	(0.464)	(0.333)	(0.429)	(0.403)	(0.093)	(0.111)
Age = any country of origin retirement age	1.763***	1.775***	1.834***	1.891***	1.809***	1.837***	1.936***		0.663*	0.548***
	(0.144)	(0.150)	(0.159)	(0.166)	(0.170)	(0.109)	(0.161)		(0.164)	(0.098)
Age alternative (50-75)	1885.871***	3511.797***	26501.580***	122952.694***	330165.323***	9115.333***	60968.477***	4902.035***	478187.419***	302281.014***
	(983.081)	(2404.189)	(21197.673)	(112389.253)	(369480.813)	(4858.345)	(49863.214)	(3077.027)	(436658.287)	(253410.071)
Age alternative (50-75) × Age alternative (50-75)	0.943***	0.929***	0.914***	0.906***	0.895***	0.925***	0.910***	0.929***	0.897***	0.901***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.008)	(0.004)	(0.005)	(0.004)	(0.006)	(0.005)
Female × Age alternative (50-75)		0.929**	0.925**	0.903***	0.902**	0.885***	0.912***	0.906***	0.856***	0.854***
		(0.031)	(0.029)	(0.030)	(0.036)	(0.017)	(0.028)	(0.027)	(0.030)	(0.030)
No education × Age alternative (50-75)										
ISCED-97 code 1 × Age alternative (50-75)		1.092	1.055	1.057	0.988	0.943	1.039	1.025	1.157*	1.139
		(0.076)	(0.090)	(0.096)	(0.087)	(0.051)	(0.090)	(0.100)	(0.102)	(0.094)
ISCED-97 code 2 × Age alternative (50-75)		1.237***	1.098	1.111	1.140	0.944	1.107	0.933	1.251**	1.232**
		(0.092)	(0.095)	(0.113)	(0.118)	(0.045)	(0.108)	(0.098)	(0.127)	(0.119)
ISCED-97 code 3 × Age alternative (50-75)		1.222***	1.092	1.077	1.163*	0.946	1.077	0.935	1.158	1.141
		(0.082)	(0.083)	(0.099)	(0.100)	(0.044)	(0.094)	(0.086)	(0.103)	(0.096)
ISCED-97 code 4 × Age alternative (50-75)		1.356***	1.167*	1.158	1.183	0.953	1.161	1.028	1.267**	1.252**
		(0.100)	(0.108)	(0.129)	(0.132)	(0.047)	(0.122)	(0.122)	(0.123)	(0.115)
ISCED-97 code 5 × Age alternative (50-75)		1.314***	1.210**	1.164	1.190*	1.011	1.136	1.079	1.253**	1.233**
		(0.093)	(0.105)	(0.116)	(0.110)	(0.047)	(0.107)	(0.097)	(0.118)	(0.109)
ISCED-97 code 6 × Age alternative (50-75)		1.353***	1.489***	1.313**	1.474**	1.070	1.294**	1.326**	1.232	1.206
		(0.149)	(0.187)	(0.164)	(0.233)	(0.081)	(0.154)	(0.146)	(0.191)	(0.178)
Age alternative (50-75) × Respondent age		1.019***	1.016***	1.017***	1.024***	1.020***	1.018***	1.012***	1.019***	1.019***
		(0.004)	(0.004)	(0.004)	(0.005)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Age alternative (50-75) × Children		0.986	0.987	0.979*	0.977	0.996	0.975**	0.984	0.985	0.984
		(0.009)	(0.010)	(0.012)	(0.017)	(0.007)	(0.012)	(0.012)	(0.011)	(0.011)
Age alternative (50-75) × Grand children		1.004	1.002	1.003	1.009	1.000	1.002	1.008	1.004	1.004
		(0.005)	(0.003)	(0.003)	(0.010)	(0.001)	(0.003)	(0.007)	(0.004)	(0.004)
Partner in household × Age alternative (50-75)		0.973	0.970	0.983	0.997	0.975	1.001	0.958	0.970	0.971
		(0.035)	(0.037)	(0.037)	(0.046)	(0.018)	(0.039)	(0.032)	(0.039)	(0.039)
Age alternative (50-75) × Self-perceived health		0.960***	0.948***	0.948***	0.949**	0.969***	0.953***	0.960**	0.945***	0.945***
		(0.012)	(0.013)	(0.014)	(0.019)	(0.007)	(0.013)	(0.019)	(0.013)	(0.012)
Unemployed=1 × Age alternative (50-75)		1.071	1.091*	1.085*	1.075	1.015	1.067	1.018	1.051	1.047
		(0.051)	(0.054)	(0.048)	(0.055)	(0.022)	(0.046)	(0.050)	(0.047)	(0.046)
SHARE wave=1 × Age alternative (50-75)		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SHARE wave=2 × Age alternative (50-75)		1.134***	1.165***	1.150***	1.123	1.005	1.164***	0.965	1.156***	1.154***
		(0.040)	(0.048)	(0.049)	(0.086)	(0.031)	(0.047)	(0.062)	(0.052)	(0.051)
SHARE wave=4 × Age alternative (50-75)		1.188***	1.296***	1.285***	1.263**	1.056	1.301***	1.152***	1.248***	1.247***
		(0.059)	(0.083)	(0.079)	(0.132)	(0.038)	(0.076)	(0.061)	(0.065)	(0.064)
SHARE wave=5 × Age alternative (50-75)		1.265***	1.353***	1.369***	1.385***	1.111***	1.382***	1.278***	1.353***	1.349***
		(0.052)	(0.064)	(0.070)	(0.103)	(0.038)	(0.066)	(0.059)	(0.061)	(0.060)
SHARE wave=6 × Age alternative (50-75)		1.244***	1.316***	1.325***	1.293***	1.133***	1.329***	1.304***	1.326***	1.322***
		(0.057)	(0.072)	(0.078)	(0.096)	(0.044)	(0.074)	(0.062)	(0.066)	(0.065)
SHARE wave=7 × Age alternative (50-75)		1.471***	1.648***	1.615***	1.957***	1.327***	1.591***	1.383***	1.506***	1.496***
		(0.118)	(0.148)	(0.140)	(0.276)	(0.081)	(0.133)	(0.080)	(0.127)	(0.124)
SHARE wave=8 × Age alternative (50-75)		1.320***	1.416***	1.431***	1.489***	1.210***	1.398***	1.256***	1.514***	1.496***
		(0.074)	(0.089)	(0.088)	(0.114)	(0.050)	(0.081)	(0.075)	(0.097)	(0.096)
Observations	139100	135018	135018	135018	76466	136422	135018	131898	135018	135018

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Table corresponding to Figure A3 (Clogit by gender)

	(1) A(f)	(2) B(f)	(3) C(f)	(4) D(f)	(5) A(m)	(6) B(m)	(7) C(m)	(8) D(m)
Age = any country of residence retirement age	4.812***	4.381***	3.845***	3.822***	5.874***	5.352***	4.461***	4.338***
	(0.638)	(0.612)	(0.543)	(0.547)	(0.974)	(0.904)	(0.740)	(0.728)
Age = any country of origin retirement age	1.998***	1.949***	2.115***	2.257***	1.641***	1.670***	1.723***	1.864***
	(0.222)	(0.215)	(0.234)	(0.274)	(0.197)	(0.209)	(0.220)	(0.248)
Age alternative (50-75)	5571.317***	16900.231***	91811.936***	617344.911***	980.236***	1670.020***	31999.317***	381413.839***
	(3607.170)	(14908.082)	(94262.386)	(768622.351)	(751.845)	(1586.821)	(40823.993)	(601830.749)
Age alternative (50-75) × Age alternative (50-75)	0.935***	0.918***	0.902***	0.887***	0.948***	0.935***	0.915***	0.901***
	(0.005)	(0.006)	(0.007)	(0.008)	(0.006)	(0.007)	(0.009)	(0.010)
No education × Age alternative (50-75)								
ISCED-97 code 1 × Age alternative (50-75)		1.190	1.147	1.119		1.010	0.924	0.905
		(0.144)	(0.167)	(0.186)		(0.087)	(0.089)	(0.096)
ISCED-97 code 2 × Age alternative (50-75)		1.084	0.938	0.926		1.399***	1.245**	1.182
		(0.136)	(0.137)	(0.142)		(0.131)	(0.136)	(0.170)
ISCED-97 code 3 × Age alternative (50-75)		1.261*	1.108	1.020		1.212**	1.110	1.077
		(0.158)	(0.157)	(0.157)		(0.099)	(0.107)	(0.146)
ISCED-97 code 4 × Age alternative (50-75)		1.358**	1.146	1.065		1.410***	1.232*	1.248
		(0.184)	(0.183)	(0.197)		(0.124)	(0.136)	(0.181)
ISCED-97 code 5 × Age alternative (50-75)		1.379***	1.212	1.099		1.287***	1.230*	1.158
		(0.171)	(0.172)	(0.174)		(0.116)	(0.143)	(0.163)
ISCED-97 code 6 × Age alternative (50-75)		1.488**	1.610**	1.453**		1.329**	1.552***	1.485**
		(0.279)	(0.342)	(0.260)		(0.175)	(0.254)	(0.274)
Age alternative (50-75) × Respondent age		1.019***	1.019***	1.022***		1.019***	1.012*	1.015**
		(0.006)	(0.007)	(0.007)		(0.005)	(0.006)	(0.006)
Age alternative (50-75) × Children		0.981	0.986	0.982		0.988	0.987	0.964**
		(0.015)	(0.018)	(0.021)		(0.012)	(0.015)	(0.017)
Age alternative (50-75) × Grand children		1.012	1.011	1.010		1.003	0.999	1.000
		(0.009)	(0.011)	(0.012)		(0.003)	(0.003)	(0.002)
Partner in household × Age alternative (50-75)		0.942*	0.928**	0.948		1.019	1.072	1.100
		(0.033)	(0.034)	(0.036)		(0.064)	(0.072)	(0.076)
Age alternative (50-75) × Self-perceived health		0.964*	0.952**	0.967		0.957***	0.944***	0.928***
		(0.020)	(0.021)	(0.022)		(0.016)	(0.017)	(0.018)
Unemployed=1 × Age alternative (50-75)		0.970	1.007	0.979		1.108*	1.144**	1.149**
		(0.046)	(0.049)	(0.052)		(0.064)	(0.072)	(0.071)
SHARE wave=1 × Age alternative (50-75)		1.000	1.000	1.000		1.000	1.000	1.000
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
SHARE wave=2 × Age alternative (50-75)		1.121*	1.152**	1.136		1.145***	1.181***	1.179***
		(0.070)	(0.080)	(0.090)		(0.050)	(0.062)	(0.069)
SHARE wave=4 × Age alternative (50-75)		1.167**	1.266**	1.266**		1.205***	1.324***	1.346***
		(0.080)	(0.116)	(0.122)		(0.078)	(0.109)	(0.113)
SHARE wave=5 × Age alternative (50-75)		1.271***	1.368***	1.384***		1.272***	1.367***	1.407***
		(0.080)	(0.102)	(0.122)		(0.069)	(0.085)	(0.103)
SHARE wave=6 × Age alternative (50-75)		1.278***	1.345***	1.364***		1.233***	1.322***	1.366***
		(0.092)	(0.112)	(0.141)		(0.072)	(0.098)	(0.115)
SHARE wave=7 × Age alternative (50-75)		1.606***	1.727***	1.737***		1.321***	1.562***	1.600***
		(0.202)	(0.239)	(0.288)		(0.100)	(0.180)	(0.173)
SHARE wave=8 × Age alternative (50-75)		1.372***	1.423***	1.423***		1.299***	1.437***	1.493***
		(0.106)	(0.127)	(0.141)		(0.099)	(0.124)	(0.130)
Observations	71032	69108	69108	69108	68068	65910	65910	65910

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Table corresponding to Figure 4 (OLS)

	(1) A	(2) B	(3) C	(4) D	(5) E	(6) F	(7) G
Age = any country of residence retirement age	0.124***	0.127***	0.124***	0.124***	0.097***	-0.014**	0.036***
	(0.010)	(0.011)	(0.011)	(0.011)	(0.015)	(0.007)	(0.011)
Age = any country of origin retirement age	0.028***	0.028***	0.027***	0.027***	0.039***	-0.005	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.012)	(0.004)	(0.006)
Female		0.001	0.001	0.002	0.003	0.003*	0.003
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Highest education (ever)=0							
Highest education (ever)=1		0.002	0.007	0.007	0.013*	0.008	0.008
		(0.005)	(0.005)	(0.005)	(0.007)	(0.005)	(0.005)
Highest education (ever)=2		-0.009**	0.001	0.001	0.007	0.002	0.001
		(0.004)	(0.005)	(0.005)	(0.007)	(0.005)	(0.005)
Highest education (ever)=3		-0.007*	0.003	0.003	0.007	0.005	0.005
		(0.004)	(0.004)	(0.005)	(0.006)	(0.005)	(0.005)
Highest education (ever)=4		-0.009*	0.004	0.005	0.012*	0.005	0.005
		(0.005)	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)
Highest education (ever)=5		-0.009**	0.002	0.002	0.007	0.003	0.003
		(0.004)	(0.004)	(0.005)	(0.007)	(0.005)	(0.005)
Highest education (ever)=6		-0.013**	-0.014**	-0.015*	-0.006	-0.014*	-0.014*
		(0.007)	(0.007)	(0.008)	(0.016)	(0.008)	(0.008)
Children		0.000	0.001	0.000	-0.000	0.000	0.000
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Chronic diseases		0.005***	0.005***	0.006***	0.004***	0.006***	0.006***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.026***	0.020***	0.011**	0.010**	0.009	0.018***	0.015***
	(0.001)	(0.004)	(0.004)	(0.005)	(0.007)	(0.005)	(0.005)
Observations	118449	108423	108423	108423	86716	108423	108423
Adjusted R^2	0.117	0.125	0.129	0.130	0.424	0.115	0.116

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A11: Table corresponding to Figure 5 (OLS)

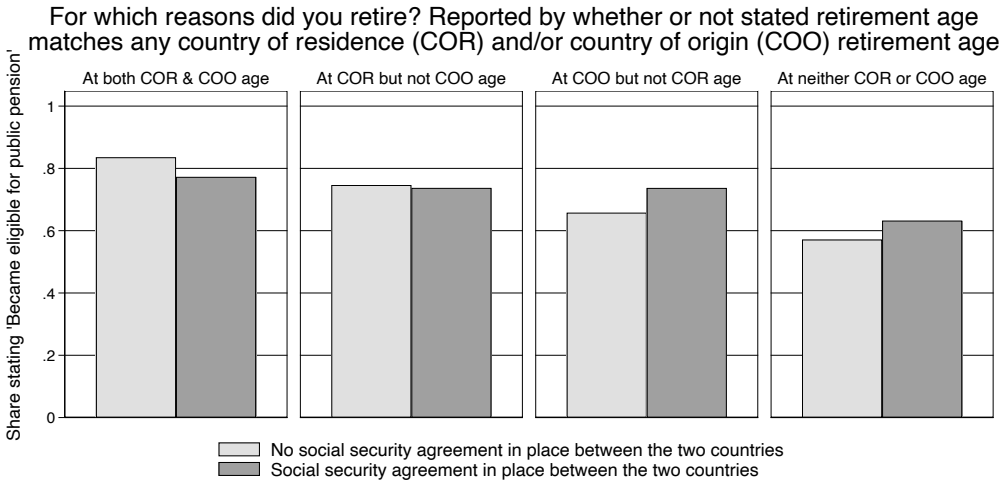
	(1) A	(2) B	(3) C	(4) D	(5) E	(6) F	(7) G	(8) H
Age = any country of residence retirement age	0.124***	0.128***	0.114***	0.136***	0.107***	0.133***	0.117***	0.101***
	(0.012)	(0.017)	(0.014)	(0.017)	(0.011)	(0.015)	(0.008)	(0.005)
Age = any country of origin retirement age	0.024***	0.022***	0.032***	0.043***	0.012*	0.033***	0.032***	
	(0.006)	(0.009)	(0.009)	(0.010)	(0.006)	(0.010)	(0.005)	
Female	-0.002			0.002	0.002	0.008**	0.005***	0.001
	(0.006)			(0.002)	(0.002)	(0.004)	(0.002)	(0.001)
Highest education (ever)=0								
Highest education (ever)=1	0.011*	0.005	0.007	0.007	0.008	-0.001	0.009***	0.006***
	(0.006)	(0.006)	(0.008)	(0.005)	(0.005)	(0.008)	(0.003)	(0.002)
Highest education (ever)=2	0.004	-0.004	0.003	0.001	0.001	-0.007	0.014***	0.009***
	(0.006)	(0.007)	(0.008)	(0.005)	(0.005)	(0.009)	(0.004)	(0.002)
Highest education (ever)=3	0.009*	0.003	0.003	0.004	0.004	-0.008	0.008**	0.007***
	(0.005)	(0.006)	(0.008)	(0.005)	(0.005)	(0.008)	(0.003)	(0.002)
Highest education (ever)=4	0.008	0.008	-0.002	0.005	0.005	-0.009	0.012***	0.006**
	(0.006)	(0.007)	(0.009)	(0.006)	(0.006)	(0.011)	(0.004)	(0.003)
Highest education (ever)=5	0.004	0.004	-0.002	0.002	0.003	-0.014*	0.003	0.003**
	(0.005)	(0.006)	(0.007)	(0.005)	(0.005)	(0.008)	(0.003)	(0.002)
Highest education (ever)=6	-0.015*	-0.029***	0.002	-0.014*	-0.015*	-0.039**	-0.012**	-0.012***
	(0.009)	(0.007)	(0.013)	(0.008)	(0.008)	(0.016)	(0.006)	(0.003)
Children	-0.000	0.000	0.001	0.000	0.000	-0.002	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Chronic diseases	0.005***	0.006***	0.006***	0.006***	0.006***	0.001	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Country of origin male/female LFP rate (55–64)	-0.000							
	(0.000)							
Country of residence male/female LFP rate (55–64)	-0.000							
	(0.000)							
Country of residence statutory ret. age	-0.001							
	(0.001)							
Country of origin statutory ret. age	0.000							
	(0.001)							
Country of residence earliest ret. age	0.001							
	(0.001)							
Country of origin earliest ret. age	-0.000							
	(0.001)							
Country of origin GDP per capita, PPP	-0.000							
	(0.000)							
Country of residence GDP per capita, PPP	0.000**							
	(0.000)							
Constant	0.005	0.012**	0.009	0.013***	0.013***	0.068***	0.015***	0.019***
	(0.067)	(0.006)	(0.008)	(0.005)	(0.005)	(0.009)	(0.003)	(0.002)
Observations	80507	56561	51861	108423	108423	65935	108423	1031190
Adjusted R^2	0.145	0.140	0.125	0.128	0.123	0.225	0.101	0.122

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Table corresponding to Figure A4 (Cox)

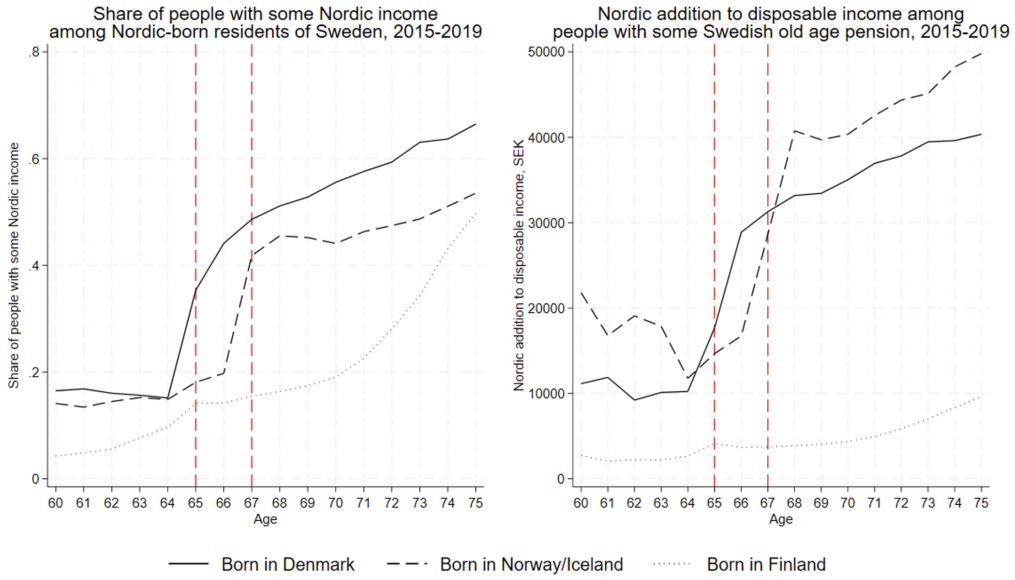
	(1) A	(2) B	(3) C	(4) D	(5) E	(6) F	(7) G	(8) H	(9) I
Age = any country of residence retirement age	2.478***	2.406***	2.470***	2.430***	1.800***	1.804***	1.701***	0.958	1.512***
	(0.182)	(0.178)	(0.165)	(0.160)	(0.103)	(0.104)	(0.042)	(0.118)	(0.171)
Age = any country of origin retirement age	1.385***	1.404***	1.341***	1.293***	1.220***	1.241***		0.872	1.129
	(0.093)	(0.092)	(0.087)	(0.087)	(0.076)	(0.075)		(0.107)	(0.133)
Female		1.101*	1.098*	1.127**	0.722**	1.210***	1.105***	1.080	1.082
		(0.061)	(0.056)	(0.063)	(0.093)	(0.067)	(0.020)	(0.059)	(0.058)
Highest education (ever)=0									
Highest education (ever)=1		1.016	1.224*	1.199	0.967	0.981	1.014	1.235*	1.230*
		(0.104)	(0.132)	(0.136)	(0.113)	(0.108)	(0.030)	(0.141)	(0.140)
Highest education (ever)=2		0.820*	1.100	1.080	1.086	0.929	1.076**	1.091	1.086
		(0.094)	(0.141)	(0.141)	(0.131)	(0.117)	(0.037)	(0.141)	(0.140)
Highest education (ever)=3		0.839*	1.133	1.139	0.971	0.910	1.071**	1.172	1.165
		(0.082)	(0.131)	(0.136)	(0.104)	(0.104)	(0.036)	(0.138)	(0.138)
Highest education (ever)=4		0.808*	1.181	1.174	0.980	0.876	1.039	1.202	1.203
		(0.100)	(0.172)	(0.180)	(0.148)	(0.131)	(0.064)	(0.188)	(0.189)
Highest education (ever)=5		0.769***	1.088	1.060	0.864	0.812*	0.913**	1.107	1.100
		(0.074)	(0.123)	(0.129)	(0.095)	(0.093)	(0.033)	(0.134)	(0.133)
Highest education (ever)=6		0.721	0.688*	0.660*	0.582**	0.580**	0.647***	0.667*	0.665*
		(0.156)	(0.150)	(0.159)	(0.141)	(0.138)	(0.045)	(0.160)	(0.160)
Children		1.006	1.021	1.014	0.972	0.978	0.977***	1.017	1.016
		(0.016)	(0.016)	(0.016)	(0.018)	(0.016)	(0.005)	(0.017)	(0.017)
Chronic diseases		1.120***	1.130***	1.144***	1.020	1.022	1.010***	1.152***	1.152***
		(0.014)	(0.015)	(0.015)	(0.014)	(0.014)	(0.004)	(0.015)	(0.015)
Country of origin male/female LFP rate (55–64)					0.995*				
					(0.003)				
Country of residence male/female LFP rate (55–64)					0.984***				
					(0.005)				
Country of residence statutory ret. age					0.945***				
					(0.016)				
Country of origin statutory ret. age					0.976				
					(0.018)				
Observations	120551	109795	109795	109795	50384	65939	693001	109795	109795

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$



Note: Refers to all retired foreign-born respondents included in the second sample.

Figure A5: Stated reason for retirement, by SSA coverage and relation between stated retirement age and retirement age regulations in the two countries



Note: Due to the multilateral Nordic SSAs, pension rights earned in one of the five Nordic countries are fully exportable to the others. As of very recently, pensions and other incomes earned in Nordic countries have been added to Statistics Sweden's income registry, for all residents in Sweden from 2015 onward. For data availability reasons, the income measure reported here includes both labor income and pension income. The vertical line at age 65 denotes the statutory retirement age in Denmark and Finland. The vertical line at age 67 denotes the statutory retirement age in Norway and Iceland. The left-hand plot is based on 432,000 observations of 109,000 individuals. The right-hand plot is based on a sub-sample of 329,000 observations of 87,000 individuals with some Swedish old age pension income.

Figure A6: Import of Nordic pension and labor incomes among Nordic-born residents in Sweden 2015–2019, reported by age