On the Association between Parenthood, Number of Children and Expectations of Old-Age Welfare

Tomass Kristian Nielsen*

Abstract

This paper explores the association between having children and expected subjective old-age welfare within a European context. Data for 31 countries from the European Social Survey are used to model the respondents' concern about their expected old-age well-being and welfare. Having children and the number of children are the primary explanatory variables but a broad set of controls including gender, age, education level, household income and health, as well as others are included. Regional variation in this association within Europe is discussed using four larger groups of countries. The results indicate that those with a higher number of children report that they are less worried about old-age welfare compared to those who have fewer children. In general, those without children had lower concerns regarding their old-age than those with children.

Keywords: fertility, social security, old-age welfare, intergenerational transfers.

Introduction

The European population is experiencing a profound demographic change, which in various stages has been occurring since the early nineteenth century and continues today (Coale, 1989; Balbo, Billari & Mills, 2013). The overall characteristic of this transition is decreasing fertility and increasing life expectancy. The post-World War II period in particular stands out, as fertility rates in Western Europe dropped and have stayed below replacement level since the early 1980s. Gradually, this pattern spread across the continent. The later stages of the fertility transition can be explained through the 'Second Demographic Transition' hypothesis put forward by Van de Kaa (2002) and Lesthaeghe (2010). Other factors, such as growing costs related to child raising and shifting incentive structures at a personal and societal level, also contribute to shifting fertility patterns (Becker, 1981). Following the demographic transition, fertility has not only evolved and stabilised at a low level, but has actually continued to decline. The demographic transition model with its four stages currently does not account for presently observed low and lowest low fertility patterns as seen across many developed countries. What drives fertility in post-transition societies is difficult to ascertain in general, as the explanations are complex and range from broad cultural to narrow economic interpretations. The focus of this paper is on a specific hypothesis to explain low fertility: the decline of the old-age security motivation for childbearing.

In traditional societies, old-age welfare was guaranteed by intergenerational transfers from young to old family members. Consequently, the economic motivation for fertility, in terms of the opportunity costs of having children, was strong. This being the case for both old-age welfare but also broader social security, which was not institutionalised outside the family or local community. With the extension of state-provided social security, these dependencies of family members and the immediate social circle weakened, and this, if we assume children are investable goods, supported lower fertility. To this end, this article will attempt to cast further light on the decision-making rationale surrounding fertility as well as how this interlinks with social security. Using European Social Survey data, we test empirically whether people's expectations about old-age security are associated with their fertility.

* E-mail: tomass@live.dk

Although similar in their long-term trend, there are considerable variations in fertility levels across European countries. Since 1970, it is notable that following a period of rapid decline from the 1960s to the 1980s, fertility rates generally have stabilised at or around a certain level with some regional variations (OECD, 2019). These cross-national differences are often explained in terms of deviating welfare regimes and family policies (Mayer, 2001). The theoretical explanations for these differences can best be understood by looking at both micro-economic theories and more social deterministic hypotheses such as Gender Equity Theory (Arpino et al., 2015), as in reality, decision-making regarding childbearing is a highly complex process. To reduce the complexity, this article will group countries into four regions.

This article is organised as follows: the next section provides a brief overview of current literature on the decision-making behind fertility and the relationship between fertility and social security mechanisms. Following this, hypotheses regarding children and old-age concerns are put forward and the methods used in the regression models are explained. Hereafter empirical results are presented and used to address the research hypotheses. Finally, the last section concludes the paper by summarising the findings and placing them in the context of current research.

Childbearing and old-age security motivation: literature review

The explanations for the continuing contemporary fertility decline can be better understood through the lens of decision-making. That is, what internal and external factors influence individuals to have and raise children. Childrearing and old-age well-being as a research topic has received relatively little empirical attention. The following sections will first outline how fertility is linked to decision-making and thereafter how this is connected to social-security setups and old-age welfare in particular.

Fertility decision-making

In traditional societies, most notably before the contraceptive revolution, reproduction and sexuality were incrementally connected, and evidence from previous research shows that active family limitation was largely absent (Knodel, 1978; Henry, 1961). Therefore, reproductive decisions are implied to not have been influenced by external factors to the immediate household. However, other researchers have more recently found evidence to suggest that families indeed might have responded to short-term economic stress, as fertility patterns were indirectly influenced by their proximate determinants (Amialchuk & Dimitrova, 2012; Bengtsson & Dribe, 2006). Consequently, decision-making in the form of family limitation may have functioned somewhat even in pre-transitional societies.

The above-mentioned research has several assumptions, namely that both men and women make childbearing decisions and that they account for their expected future circumstances and plan ahead as much as possible when doing so. In the terminology of Elder (1994), they have 'linked lives' – and thus, couples are mutually dependent. It is of note that these decision-making processes would have to be assumed to be more automatic in traditional couples than what we see today in modern couples. This is the case as pre-transitional societies were governed by stronger norms and values that dictated crucial life events, such as marriage and childbearing, both from a socio-cultural perspective but also an economic one, and these were self-evident and expected (Giddens, 1991; Beck-Gernsheim, 2002). The distinction between implicit and explicit decision-making here becomes relevant (Sillars & Kalbflesch, 1989), as it directly shows the difference between decision-making in pre-transitional and post-modern societies: fertility patterns were historically mostly influenced by implicit decisions whereas today they are the result of explicit decision-making. Today's childbearing decisions depend on parents reflecting, planning and coordinating aspects, such as future division of household tasks, readiness to enter parenthood and expected financial constraints (Hobcraft & Kiernan, 1995; Hochschild, 1989; Komter, 1989).

Looking at modern fertility patterns, the above helps us understand how women's increased education and labour market participation rate, when incompatible with career and care ambitions,

causes birth postponement and fewer desired children. In a similar manner, increased individualism and consumer-centric behaviour in younger cohorts also induces fertility postponement and lower desired fertility, as a decision is made to focus more on enjoyment or self-realisation (Leitner, Ostner, & Schmitt, 2008). Thomson and Hoem (1998) show how these decisions for couples in practice mean that one part can delay or 'veto' childrearing. The implication of these findings for modern fertility research must, therefore, be that factors influencing fertility decisions, at both an individual and couple level, should be seriously considered.

The socioeconomic drivers, as put forward by Becker (1981), link fertility with the direct and indirect costs of rearing children. The rationality of having children can also be considered within the frame of what the intrinsic rewards of children themselves are to parents, that is, what emotional and financial benefits they bring. Given that children today are not required to secure old-age welfare for their parents, the primary benefit of children is emotional. This is shown in research that outlines how parents ascribe the rewards of children to be primarily psychological, while their costs in turn are financial (Fawcett, 1988).

Childbearing, well-being and old-age welfare

In recent decades, a growing body of literature has established that the well-being of parents is generally lower than among childless adults (Glass, Simon & Andersson, 2016). This is predominantly explained by the higher number of stressors that parents are exposed to compared to non-parents. In more welfare-heavy states, however, parents report higher levels of happiness than non-parents (Glass et al., 2016). Cetre, Clark and Senik (2015) also find that this overall association between children and life satisfaction is negative, but that this correlation is often positive when countries have lower fertility and higher incomes. Their research shows that there is a selection element for parenthood, where happier individuals are more likely to have children in rich countries, but they still experience a drop in life satisfaction. In developing countries there is a negative self-selection into parenthood, whilst it is positive in developed countries. More generally, we see that the effect of parenthood on quality of life is highly dependent on individuals' own resources and the wider economic context of their life (Neuberger & Preisner, 2018). However, childless individuals do not generally fare worse than parents in terms of economic, social and psychological well-being (Hank & Wagner, 2013).

In today's society, Becker's *family economic view* (Becker, 1981) stresses how fertility developments are influenced by both parental income, but also the derived pleasure from having and raising children. This view assumes that there can be both positive and negative net benefits with regards to having children both for economic utility, but also emotional satisfaction. As people increasingly rely on institutional social security mechanisms and benefit less from income generated by children, the net benefit of children in this regard has diminished and turned into costs. In standard micro-economic terminology concerning utility functions, children of today are seen as a consumer good in a bundle that an individual can allocate a certain amount of his or her income to. Balbo et al. (2013) provide a comprehensive review of various avenues of fertility research, and they discuss both the positive angle of Becker's family economic view, but also the negative one. The latter stresses that a negative fertility-income relationship can exist given that there is a quality-quantity trade-off dimension. This view is proposed initially by Becker and Lewis (1973) and argues that increased income might not result in more, but rather actually fewer children, as parents increase their expenditure level towards children's human capital. Several scholars, such as Happel et al. (1984) and Cigno and Ermisch (1989), have extended Becker's static model and conclude that higher human capital accumulation postpones the timing of motherhood.

Easterlin's (1976) theory of economic deprivation argues that the level of general economic uncertainty and employment will affect the rate at which people marry and have children. Similarly, Oppenheimer's work (1988, 2003; Oppenheimer et al. 1997) pertains to the impact that social and economic uncertainty have on fertility and family planning. Increasingly, we see that studies associate adverse labour market situations with parenthood postponement. Mills and Blossfeld (2005) develop a schema of three uncertainty types, namely economic, temporal and employment related, to measure the impact of uncertainty with respect to fertility. This uncertainty element is,

however, highly affected by national and social institutions, or by extension the prevailing welfare regime in a given setting (Mills & Blossfeld, 2005).

Studies, such as the one by Mills and Blossfeld (2005), show that different welfare regimes link themselves to fertility, as policies shape some of the decision-making regarding having children. Welfare regimes that favour universal support through the state, such as the Scandinavian welfare model, generally show higher fertility. This is likewise the same for the more liberal Anglo-Saxon market-provision-based models. Yet, the conservative and family-based systems (primarily seen in Southern Europe) seem to constrain fertility to lower levels. This might intuitively be surprising, as the institutions in these countries support more traditional divisions of domestic labour, and overall place greater economic and caring responsibilities on the family, but this can be explained by a lack of a balance between work and family for women, hence forcing them into choosing between career and motherhood (Mayer, 2004).

Social security systems in general and various reforms have been discussed broadly as determinants of fertility. Cigno and Rosati (1992) argue that social security coverage stimulates aggregate household savings and depress fertility. Increases in the generosity of public pension systems especially appear to be negatively associated with fertility as Galasso et al. (2009) show. In fact, it can be argued that social security interplays with fertility choices by substituting for children, who may have otherwise also provided security for parents in their old age, also in advanced societies (Rendall & Bahchieva, 1998; Mills & Begall, 2010).

Regarding public pension plans and fertility, two models dominate the academic discourse, namely that of Barro and Becker (1989) and Boldrin and Jones (2002). Barro and Beckers' model assumes that parents inherently desire children, whereas Boldrin and Jones hypothesise that children will provide for their parents when they retire, thus providing old-age security. This latter view sees children as a component in the hypothetical optimal retirement portfolio, hence providing a financial rationale for procreation and childbirth (Boldrin et al., 2015). The implication of this is that as public pension spending increases, the benefit of children becomes less important to old-age security motivations. This logic could apply to the overall drop in fertility seen in both America and Europe over the past 50 years (Frejka & Westoff, 2006).

The empirical studies on the effects of public pension schemes on fertility can be grouped into two categories: cross-country (Ehrlich & Zhong, 1998; Boldrin et al., 2015) and country-specific studies (Cigno & Rosati, 1992; Billari & Galasso, 2009). Cigno and Werding (2007) provide an overview of the impact of pension systems on fertility and when read together with the aforementioned studies and put into the contemporary context of fertility decline (Guinnane, 2011), it is found that there is a negative link between the generosity of pension systems and fertility.

The underlying intuition behind this is that parents use children as old-age insurance policies, which is less relevant in societies with developed pension systems. More advanced financial markets also allow for better inter-temporal savings, which in more traditional societies is mostly done through human capital investments in one's children (Galasso et al., 2009). The impact of both pension systems and capital market development on fertility was studied by Cigno and Rosati (1992) who concluded that both factors had a negative effect on fertility. Moreover, Hohm (1975) used data from 1960 to 1965 across 67 countries to show that public pension systems had an equally negative effect on fertility as other long-term factors such as infant mortality, income per capita and educational level. More recently, Boldrin, De Nardi and Jones (2015) tried to estimate the effect of social security schemas on fertility decisions by combining and calibrating several theoretical models. Their findings show that 50% of the fertility drop in the USA and Europe from the 1960s onwards is explained by the growth in national public pension systems. The difference between European and American fertility is even better covered in this research, as up to 80% of the differences between the two is explained by diverging pension schemes. The authors show that increasing the social security setup by 10% of GDP results in a fertility reduction between 0.7 and 1.6 children.

An element in addressing the potential link between old-age security motivations for childbearing and fertility is the net financial benefit people derive from children supporting parents during retirement. Rendal and Bahchieva (1998) concluded that for the poorest 50% of the population, children are a net economic benefit in spite of existing old-age pensions and various welfare programmes. Other scholars (Ortuno-Ortin & Romeu, 2003) reached a similar conclusion when they looked at micro-level data for parental health care expenditures. In light of these findings, it could be hypothesised that the higher fertility rate amongst poorer population segments, in general, reflect that they use children more as '*natural insurance*' mechanisms regarding their own retirement. This would explain, alongside other factors, why lower income families have a higher fertility rate than similar higher income families (Jones et al., 2008). It should also be noted that lower income segments often use capital markets less for their retirement planning (Galasso et al., 2009), which could further explain the diverging fertility levels between income segments in that children are a substitute for intertemporal capital investments.

Research question and hypotheses

The previous sections have described how economic theories of fertility have considered both the cost of children and the demand for children. As direct and indirect costs of childbearing increase, such models predict a decline in fertility rates, although children in general are viewed as desired *'goods*' that provide value for parents. Other theories have suggested that different institutional arrangements can alleviate such costs, which could explain differences in fertility across developed countries. A less addressed question is what benefits children bring to parents, given that benefits are difficult to quantify. The utility of children can be considered to mainly be intangible or emotional; nonetheless, as noted above, some theories relate the advancement of pension systems to fertility decline. This would be the case as stronger societal support mechanisms reduce the reliance on children to support the elderly. As pension systems become the source of old-age income, based on this theoretical view, the importance of children in old-age welfare should decline. Although this association may be observed at the macro level, analysing it at the micro level is more difficult since childbearing and retirement are generally processes that are very far apart for the same individual.

In addition, it is difficult to analyse and make tangible the expected future benefits from children and how they may affect the decision adults make to have children. This concern especially applies to the possible future economic or emotional support given to parents in old age by their children. Although the motivation to have a child can be addressed with surveys, they are unlikely to address this specific problem. However, it is also possible to reverse this question and ask whether people who currently have children feel more secure about their future old-age situation than people who do not have children as well as the surrounding mechanisms at play that influence such perceptions.

Based on the previously outlined theories about pensions and fertility, it would be assumed that in a society that has a relatively weak pension system, parents with higher numbers of children report feeling more secure about their old-age welfare, while people without children feel less secure. In contrast, in a society with a well functioning pension system, there should be no difference between adults with and without children in terms of how they feel about their retirement income. The generosity and affluence of states can likewise influence the social security setup that elderly people operate in.

Alternatively, considering the cost of children and how this is distributed over a long period, the difference between adults with and without children may emerge due to the ability to accumulate for old age. Since childless people do not bear the cost of raising children, they would have more resources for accumulation and could therefore feel more secure about their retirement. This would be more pronounced in a society where parents do not rely on children's support in old age. Based on these theoretical considerations, this paper formulates the following hypotheses about the association between parental status and subjective opinions about retirement welfare:

H1: Having no children is positively associated with higher levels of concern about old-age welfare.

H2: Among parents, number of children is negatively correlated with higher levels of concern about old-age welfare.

H3: Number of children and expectations of old-age welfare have a stronger correlation in lower-income regions (Eastern and Southern Europe) compared with high-income regions (Western and Northern Europe).

Data and methods

This paper uses data from the European Social Survey (ESS) round 3. In this dataset, one of the questions is "*how worried are you that income in old age will not be adequate to cover later years*" (variable labelled '*wrinco*' in the dataset), to which respondents were asked to indicate on a 10-point scale how worried they were, 10 representing the most concern regarding old-age income and 1 the least. A response to this question constitutes the dependant variable, which is fitted to multiple regression models. Our main explanatory variable is the number of children reported by the respondent. This variable is entered in regression models in two ways. First, to test hypothesis 1, we use dichotomous coding only taking into account whether the respondent has any children or not. Second, to test hypothesis 2, using only observations of people with children, the number of children is entered as a categorical variable distinguishing those with 1, 2, 3, 4 or more children.

ESS covers a large number of European countries. As one of our hypotheses is about differences between countries that represent different social security systems, we divide the survey countries into four major regions that roughly distinguish different welfare systems.[1] The selected control variables include sex, age, marital and partnership status as well as educational, health and economic characteristics. The sample data was adjusted by restricting the age of respondents to between 40 and 60 years, as these age groups have largely completed childbearing. A more comprehensive modelling of the age groups between 20 and 50 is included in the appendix for reference. The choice to restrict the dataset to individuals aged 40–60 is to account for the sensitivity of choices that many younger individuals who have not yet completed their fertility cycle might have.

We use linear regression modelling to estimate the association between the dependent variable and explanatory variables. The first set of models treats parenthood as a binary variable and includes all observations in the study sample. The second set focuses on the number of children and only includes those who have at least one child. Each set includes one model that covers all countries in the dataset and one model for each region separately. Finally, to test hypothesis 3, a model that includes all countries and only parents is fitted so that it includes an interaction term between the number of children variable and the region variable.

Descriptive results

In this descriptive part we examine the mean value of the dependent variable according to some key predictor variables, namely age, sex, education, and number of children. In addition, we break down the results into four larger regions. Table 1 also shows descriptives with percentage distributions of the dependent, main independent and control variables for the entire study population for the four regions.

1 Regions: East (Czechia, Hungary, Slovakia, Slovenia, Poland, Latvia, Lithuania, Estonia, Bulgaria, Romania, Russia, Ukraine), West (Austria, Belgium, Switzerland, Germany, France, United Kingdom, Ireland, Luxembourg, the Netherlands), South (Spain, Portugal, Italy, Cyprus, Greece), North (Denmark, Norway, Sweden, Finland, Iceland).

Observing Figure 1, we see the mean values of the dependent variable by sex, age and region. Across all ages and both genders, the countries in the region North have on average the lowest worry. Women in the region East have the highest average levels of worry across almost all ages, with lower ages having mean values close to or at the same level of those in the region South. For men, the regions East and South have similar mean values, with respondents in East having the highest worry from 45 to 55 whilst men in South have the largest means from ages 55 to 60. Women in the region South do not have the same trend in worry as men. It is notable that region North and West both have low mean values that furthermore decrease gradually. This decrease in worry in later years is likewise present for both men and women in the region West whilst in North the worry for women is flat.

In Figure 2, across all groupings, respondents with primary and secondary education have higher levels of worry than those with tertiary or post-secondary education. The mean values of worry decrease more for men than women as the respondents have additional children, with men in the regions East and South with tertiary and post-secondary education driving this pattern. For men in the West and North, the level of worry is broadly stable when looking at the number of children, as educational background has a stronger association. Women in the region East have the most converged level of worry when looking at educational background, whilst it is more generally of note that the fluctuations in worry are more pronounced for those with post-secondary or tertiary education. This reflects itself in that those respondents with primary or secondary education have mostly flat levels of worry across genders and irrespective of number of children.

Table 1. Descriptive overview of main and control variables per regional grouping

	East N = 4,058	**North** N = 2,351	**South** N = 1,535	**West** N = 5,679
Dependent variable	7.0 (2.8)	4.4 (2.8)	6.5 (2.6)	5.5 (2.9)
Age	50.2 (5.4)	50.1 (5.6)	49.7 (5.5)	49.4 (5.5)
Number of children				
None	11%	14%	12%	20%
1	20%	15%	20%	18%
2	46%	40%	44%	37%
3	15%	22%	16%	17%
4+	7.9%	8.8%	7.8%	7.6%
Educational level				
Prim. & Sec.	75%	57%	80%	67%
Tert. & post-sec.	25%	43%	20%	33%
Gender				
Female	56%	50%	59%	53%
Male	44%	50%	41%	47%
Ever married				
Yes	91%	82%	91%	84%
No	9.4%	18%	8.7%	16%
Missing	6	0	1	0
Has partner				
Yes	76%	77%	80%	70%
No	24%	23%	20%	30%
Missing	77	1	6	20

	East N = 4,058	North N = 2,351	South N = 1,535	West N = 5,679
Subj. HH income				
Comfortable	9.0%	52%	20%	38%
Coping	43%	39%	51%	46%
Difficult	32%	6.4%	22%	12%
Very difficult	16%	1.9%	6.4%	3.8%
Missing	42	7	6	24
Unemployed				
No	65%	67%	69%	69%
Yes	35%	33%	31%	31%
Missing	51	3	10	16
Subj. health				
Very good	6.1%	29%	13%	23%
Good	40%	47%	46%	50%
Fair	42%	20%	33%	21%
Bad	10%	4.0%	6.8%	4.9%
Very bad	2.0%	0.6%	1.2%	0.8%
Missing	3	0	2	7
Saving				
Yes	46%	66%	51%	74%
No	54%	34%	49%	26%
Missing	205	4	27	86

Note: mean and standard deviation for continuous variable; percentage distribution for categorical variables; number of missings for each variable.
Source: ESS, own estimation.

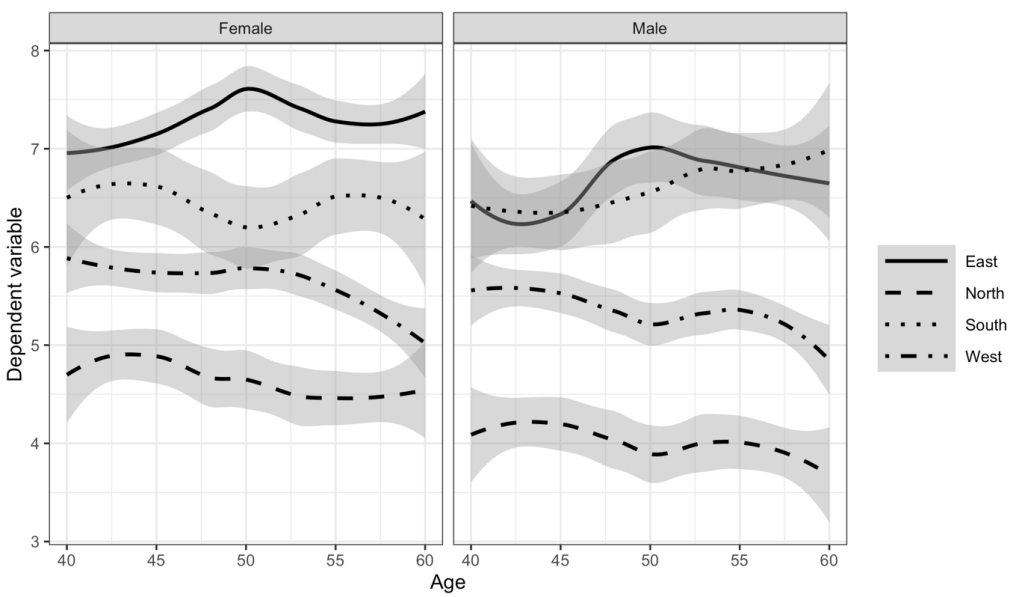

Figure 1. Mean value of the dependent variable by sex, age, and region
Note: Shaded area denotes 95% confidence bands of estimated values.
Source: ESS, own estimation.

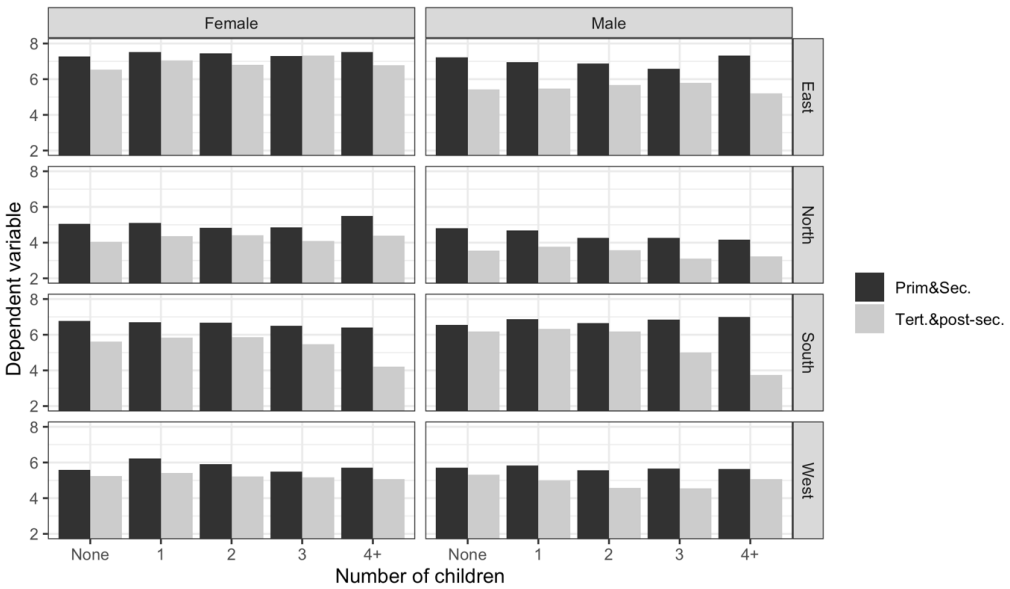

Figure 2. Mean value of the dependent variable by sex, education, number of children, and region
Source: ESS, own estimation.

Regression results

In this section, we estimate the association between the subjective level of concern about expected retirement welfare and parenthood/children status. First, models that only distinguish between being a parent or not are shown in Table 2. The indicator variable of not having children is associated with decreased expectations of subjective old-age worry in all four regions, albeit with the results for region West being almost flat. In all regions as well as for the entire sample of all countries, the association is not statistically significant. If the analysis is extended to a broader age group, such as 20–50, then it is notable that the mean values only change slightly but that the results for regions South and North become statistically significant. Regardless, none of these results support hypothesis 1. Quite the opposite, in almost all regions and countries, across age group filtering, no children associates with less worry about old-age welfare. This is not a surprising finding when considering the previously reviewed research on the 'parental paradox' and the negative association between children and happiness. This analysis gives support to the notion that this established negative relationship continues into future assessment of individuals about their expected old-age well-being. Regions South and North have the largest negative coefficients whilst regions East and West and closer to zero.

Regarding control variables in these models, higher levels of education, subjective household income and health are all strongly associated with lower levels of old-age worry. Those with tertiary or post-secondary education report lower levels of old-age worry, with the effect of this being the strongest in region West. Estimates for the subjective household income and general health are both in the expected direction – an economically more difficult situation and lower-rated health condition are both positively associated with higher levels of worry. Exceptions are South and North regions, where subjectively worse health does not imply linearly increasing level of worry. Regionally, subjective household income has a similar effect on the predicted value of worry, only in the South region is the difference between subjective income groups smaller. Looking at past recent unemployment it is notable but not unsurprising that this has an increasing effect on expected old-age worry as it would be a key source of uncertainty at the individual level.

Table 2. Linear regression, parents and non-parents, age group 40–60

	All	East	West	South	North
No children	-0.052	-0.024	-0.004	-0.226	-0.124
	(0.075)	*(0.173)*	*(0.108)*	*(0.264)*	*(0.178)*
Male	-0.253***	-0.386***	-0.230***	-0.047	-0.585***
	(0.047)	*(0.086)*	*(0.073)*	*(0.130)*	*(0.110)*
Age	0.111	0.562***	0.050	-0.123	-0.060
	(0.085)	*(0.161)*	*(0.131)*	*(0.244)*	*(0.202)*
Age squared	-0.001	-0.006***	-0.001	0.001	0.0004
	(0.001)	*(0.002)*	*(0.001)*	*(0.002)*	*(0.002)*
Never married	-0.037	-0.135	-0.010	-0.644**	0.201
	(0.085)	*(0.213)*	*(0.122)*	*(0.318)*	*(0.166)*
Tertiary & post-sec. education	-0.268***	-0.226**	-0.225***	-0.516***	-0.307***
	(0.053)	*(0.113)*	*(0.080)*	*(0.157)*	*(0.116)*
Without partner	0.042	0.092	0.007	0.140	0.060
	(0.061)	*(0.111)*	*(0.093)*	*(0.207)*	*(0.145)*
Subjective HH income					
- Coping	1.097***	1.298***	1.151***	0.579***	1.222***
	(0.059)	*(0.213)*	*(0.085)*	*(0.162)*	*(0.129)*
- Difficult	1.918***	2.389***	1.844***	1.406***	2.017***
	(0.082)	*(0.223)*	*(0.129)*	*(0.223)*	*(0.246)*
- Very difficult	2.604***	2.921***	2.746***	1.592***	3.558***
	(0.123)	*(0.252)*	*(0.208)*	*(0.369)*	*(0.434)*
Unemployed past 3 months	0.490***	0.152*	0.598***	0.502***	0.495***
	(0.050)	*(0.091)*	*(0.079)*	*(0.138)*	*(0.121)*
Subj. Health					
- Good	0.346***	0.541***	0.327***	0.002	0.611***
	(0.068)	(0.187)	(0.098)	(0.228)	(0.131)
- Fair	0.629***	0.980***	0.567***	0.188	0.837***
	(0.076)	(0.191)	(0.113)	(0.239)	(0.167)
- Bad	0.912***	1.037***	1.086***	-0.122	0.500*
	(0.107)	(0.221)	(0.169)	(0.332)	(0.303)
- Very bad	0.686***	0.452	0.992**	-0.015	1.160
	(0.230)	(0.347)	(0.393)	(0.691)	(0.739)
Not saving for retirement	-0.034	-0.064	0.068	-0.543***	0.040
	(0.053)	(0.092)	(0.085)	(0.138)	(0.129)
Constant	2.094	-8.972**	3.747	7.762	5.270
	(2.116)	(4.009)	(3.257)	(6.058)	(5.024)
Observations	13,072	3,715	5,536	1,485	2,336
R2	0.188	0.147	0.157	0.088	0.156
Adjusted R2	0.186	0.142	0.153	0.076	0.150

Note: country dummy variables included but not shown. Reference category for the subjective household income variable is 'Comfortable' and for the subjective health variable 'Very good'. Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01
Source: ESS, own estimation

Table 3. Linear regression, only parents, age group 40–60

	All	East	West	South	North
Children (ref = 1)					
2	0.029	-0.008	0.004	0.147	-0.003
	(0.064)	(0.119)	(0.101)	(0.175)	(0.171)
3	-0.204***	-0.151	-0.303**	0.119	-0.084
	(0.079)	(0.149)	(0.124)	(0.220)	(0.192)
4+	-0.300***	-0.239	-0.330**	-0.286	-0.311
	(0.099)	(0.164)	(0.161)	(0.314)	(0.239)
Male	-0.272***	-0.402***	-0.246***	-0.024	-0.594***
	(0.050)	(0.091)	(0.081)	(0.136)	(0.119)
Age	0.068	0.554***	-0.061	-0.094	0.068
	(0.092)	(0.170)	(0.147)	(0.254)	(0.221)
Age squared	-0.001	-0.005***	0.0003	0.001	-0.001
	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)
Never Married	0.024	0.091	-0.078	-0.022	0.360*
	(0.113)	(0.326)	(0.165)	(0.484)	(0.194)
Tertiary & post-sec. education	-0.332***	-0.208*	-0.337***	-0.472***	-0.240*
	(0.057)	(0.119)	(0.089)	(0.167)	(0.125)
Without partner	0.062	0.164	-0.004	-0.001	0.074
	(0.067)	(0.118)	(0.106)	(0.226)	(0.162)
Subjective HH income (ref = good)					
- Coping	1.122***	1.274***	1.184***	0.594***	1.248***
	(0.064)	(0.227)	(0.096)	(0.170)	(0.140)
- Difficult	2.034***	2.420***	2.011***	1.358***	2.068***
	(0.089)	(0.238)	(0.143)	(0.235)	(0.272)
- Very Difficult	2.740***	2.918***	2.940***	1.733***	3.787***
	(0.136)	(0.271)	(0.240)	(0.399)	(0.475)
Unemployed past 3 months	0.472***	0.168*	0.598***	0.449***	0.489***
	(0.055)	(0.096)	(0.089)	(0.145)	(0.133)
Subj. Health (ref = very good)					
- Good	0.325***	0.459**	0.355***	-0.145	0.552***
	(0.073)	(0.201)	(0.109)	(0.241)	(0.141)
- Fair	0.555***	0.847***	0.507***	0.057	0.788***
	(0.082)	(0.205)	(0.126)	(0.253)	(0.183)
- Bad	0.896***	1.027***	1.076***	0.017	0.544*
	(0.118)	(0.240)	(0.191)	(0.345)	(0.329)
- Very Bad	0.641***	0.302	0.941**	0.125	1.474*
	(0.237)	(0.361)	(0.412)	(0.705)	(0.821)
Not saving for retirement	0.031	0.002	0.163*	-0.531***	-0.052
	(0.057)	(0.098)	(0.095)	(0.143)	(0.140)
Constant	3.122	-8.873**	6.567*	6.822	1.961
	(2.295)	(4.247)	(3.646)	(6.312)	(5.491)
Observations	11,044	3,333	4,400	1,311	2,000
R^2	0.200	0.148	0.172	0.081	0.153
Adjusted R^2	0.197	0.142	0.167	0.067	0.144

Note: country dummy variables included but not shown. Reference category for the subjective household income variable is 'Comfortable' and for the subjective health variable 'Very good'. Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01
Source: ESS, own estimation

Table 3 shows the findings for the model that tests hypothesis 2. This model differs from the previous one, in that we now look at the number of children and only those people who are parents. In doing so, we see a general pattern across all regions in which the number of children reduces old-age worry the more children people have. The reduction in worry is most prominent for those who have 4 and more children (coefficient –0.3). However, parents with two, or three children in region South, also report less worry compared to those having only one child. Looking at regions separately, it is universal that parents with four or more children report significantly less worry than those with one child. Parents of two and three children report significantly less worry only in region West. Against the overall picture of more children being related to less worry, in region South three-child parents stand out with a higher level of worry compared to single child parents. We cannot offer a good explanation for that. Overall, we find some support to hypothesis 2, although it is not consistent across regions and with the exception of region West, mostly concerns the higher number of children.

Control variables in Table 3 are generally in line with our expectations. In all regions, except region South, male parents report less worry than women. Age differences in the reported level of worry are statistically significant only in region West. Tertiary education reduces worry universally. Worse subjective income and health are associated with heightened worry, as is recent unemployment experience.

In order to capture regional differences in the effect of having a certain number of children, we also fitted an interaction model using the entire study sample. In this model, a categorical variable indicating the number of children is interacted with the region variable and the gender of the respondent, while still controlling for single country differences (model results not shown here). The model was used to predict the outcome, value of *wrinco*, according to the three interaction variables shown in Figure 3. The results shown in the graph illustrate what was already found in the models in Table 3. There is only a steady decrease in worry in region West on the basis of each additional child after the first child. In the regions East and South, parents with two or three children have the same or even higher level of worry compared to one-child parents. In the region North, the overall worry is the lowest among all regions and the decline in reported worry can be observed for those having more than two children. The difference between male and female respondents in terms of the average level of concern about old-age welfare is smallest in region South while it is substantially larger in regions East and North. Hypothesis 3, which stated that the reported worry and number of children would be more negatively associated in regions East and South, does not find support. The results suggest that such negative association is more characteristic to region West.

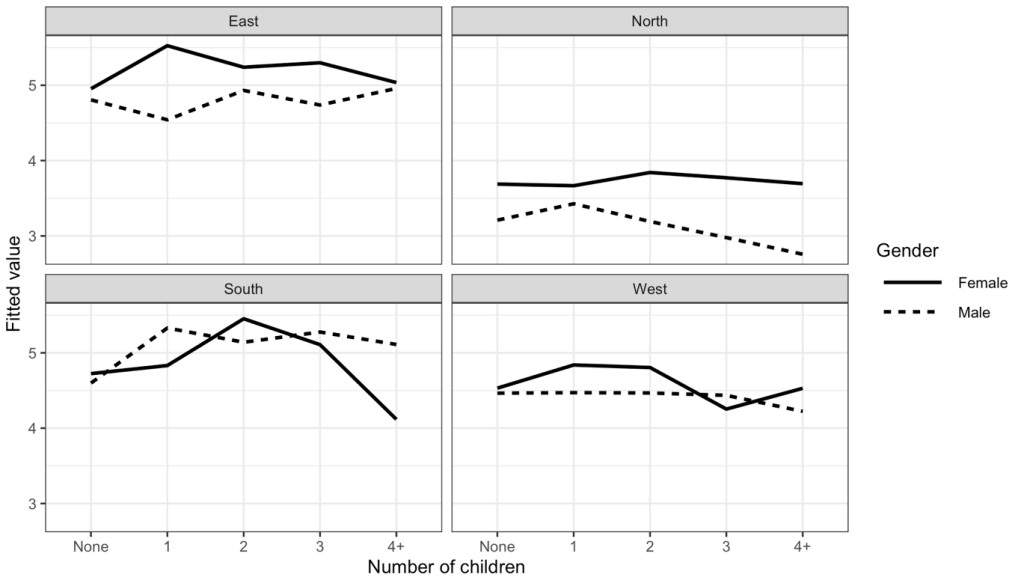

Figure 3. Predicted values by region and number of children
Source: interaction model based on full dataset of parents and non-parents

Summary and discussion

The literature review of this paper suggested that children today still can be, albeit much less than in the past, considered an additional hedge against old-age economic insecurity. To put the conclusions of this paper into a wider research context, we should first consider that in modern societies fertility decisions are made based on reflection, planning and coordination. Countless idiosyncratic factors combine at an individual level to influence these couple-based decisions. Several systematic factors nonetheless exert institutional influences that affect the decision-making processes for almost all couples. These systematic factors can, for the ease of our understanding, be grouped as linking to either life-cycle welfare or societal and cultural prisms and frames. Within this context, this paper has examined whether children and their number is associated with reducing concerns about old-age security, which should be considered as a sub-set of the overall expected future social security setup.

The results of this analysis suggest that childless people report less worry for their expected old-age welfare than those with children. Since our analysis is limited in its ability to control for various qualitative differences between adults with and without children, it is difficult to say why childless people are more likely to report less worry about old-age welfare. The result, however, indicates that the presence of children *per se* does not increase the feeling of future individual security, but may even lower it. This is broadly in line with the research from the literature review, as parents typically are exposed to a higher number of stressors compared to non-parents. In addition, the cost of raising children might also contribute to less financial security, as less savings might go to capital accumulation for old age, however, this particular link has not been within the scope of this paper. That the childless report relatively less decreased worry in region East and basically flat levels in region West compared to regions South and North also means that it is difficult to draw strong conclusions backing the findings of Glass et al. (2016) and Cetre, Clark and Senik (2015). Had the findings of the mentioned research been fully supported by this paper, we would have expected to find that parents have lower levels of worry in the higher income regions of North and West compared to non-parents. Similarly, in the relatively lower income regions of East and South, the reverse should be the case. The reasons why we do not see this connection could be that subjective old-age worry is not strongly associated with happiness or that the models in this

analysis cannot adequately capture it. Likewise, it could also be that this dynamic does exist, but at an insufficiently strong level to compensate for the additional stressors that are region specific.

Among parents, we found that a higher number of children reduces perceived worry, which is in line with our hypothesis. In all studied regions, parents having four or more children were associated with lower levels of reported old-age worry. A significant restriction to this finding is the fact that the sample size for this sub-group is relatively small, but also that this group might be considered an outlier in several other aspects. It is important to note that we did not find a consistent effect for the number of children. That is, the result cannot be generalised in a way that each additional child lowers the parent's worry about old-age welfare. Only in the countries of Western Europe were there signs that each child contributes to a more secure feeling. This is in line with current research expectations, as it was noted that parents report a higher level of happiness in more welfare-heavy states (Glass et al., 2016). In addition, we should recall that there is often a positive fertility and life satisfaction correlation for higher income countries, which could potentially explain this difference as life satisfaction in the present might influence respondents' worry about future old-age. Happiness as a selection element for parenthood could likewise play a role, as we see a pattern expected by Cetre, Clark and Senik (2015): happier individuals are more likely to have children in rich countries, but they still experience a drop in life satisfaction when compared to those that forego childbearing. This notion, again, assumes that happiness and life satisfaction is linked to old-age worry.

In most countries and all regions, there is a notable difference in the levels of worry for those having one and two or even sometimes three children, with the association to the dependent variable being as we hypothesised. In contrast, four or more children associate with less worry in all regions. While this is an important finding, we need to remember that families with four or more children are a small and thus quite specific group in Europe today. This is probably the main reason why one should be careful when interpreting the results as evidence about the link between fertility and expected old-age security without further study. Nonetheless, we also note a similar, but weaker, effect from having three children in all regions except region South. Further research into specifically higher order births and its association to old-age well-being could be undertaken by focusing further on how this phenomenon links to the costs of raising children. The research by Becker and Lewis (1973) would imply a negative fertility-income ratio and a quality-quantity trade-off dimension to modern fertility, but this seems to not be the case for the respondents with three, four or more children. Understanding the characteristics of this group with regard to how their child raising expenditures are, could provide a basis for understanding when and how higher human capital accumulation encourages fertility and how this might be associated with reduced expected old-age worry.

The argument that old-age social security mechanisms negatively interplay with fertility provides an interesting reflection with regard to the model results in this paper. As seen above, the countries that more clearly exhibit an association between number of children and expected old-age security are those with more strongly established pension systems in Western Europe (European Commission, 2018). This is an interesting finding in the sense that people with more children are reporting more positive expectations about old-age welfare. One way to interpret this is that people in bigger families see themselves as more cushioned against potential welfare problems in the future. On the other hand, it is not possible to rule out that a higher number of children is correlated with current wealth that is not observed in our data, which in turn would also make people feel more secure about old-age income. The cross-country differences are not in line with the research presented in the literature review section (Jones et al., 2008), as here it was established that lower income population segments had higher fertility than similar higher income families. Moreover, we also see that individuals in Western Europe in general invest more in capital markets. Both of these observations would lead us to the hypothesis that it would be in the poorer economies of Eastern and Southern Europe that children reduce old-age worry the most, which, as we saw, is not the case. One potential explanation for this could be that the stronger and more encompassing welfare regimes of Western Europe encourage decision-making behaviour that favours higher fertility in combination with a perception of more old-age security.

This paper does not conclude whether pension and social security setups influence fertility overall. Yet, if we assume that the cost of children decreases per additional child relatively, this would tilt the net economic benefit of having children in favour of those having a larger number of children. That a larger number of children is associated with reduced old-age worry could be due to the notion that multiple children help ensure parents have a more comfortable old-age, whether this be from a purely financial perspective or also in terms of provided services.

References

Amialchuk, A., & Dimitrova, E. (2012). Detecting the evolution of deliberate fertility control before the demographic transition in Germany. *Demographic Research, 27,* 507–542. https://doi.org/10.4054/DemRes.2012.27.19

Arpino, B., Esping-Andersen, G., & Pessin, L. (2015). How do changes in gender role attitudes towards female employment influence fertility? A macro-level analysis. European Sociological Review*, 31*, 370–382. https://doi.org/10.1093/esr/jcv002

Balbo, N., Billari, F. C., & Mills, M. (2013). Fertility in advanced societies: A review of research

[La fe´condite´ dans les socie´te´s avance´es: un examen des recherches]. *European Journal of Population / Revue Européenne de Démographie, 29,* 1–38. https://doi.org/10.1007/s10680-012-9277-y

Barro, R., & Becker, G. S. (1989). Fertility choice in a model of economic growth. *Econometrica, 57*, 481–501. https://doi.org/10.2307/1912563

Beck-Gernsheim, E. (2002). *Reinventing the Family: In search of New Lifestyles (Chapter 1)*. Polity Press.

Becker, G. S. (1991). *A Treatise on the Family*. Harvard University Press.

Becker, G. S., & Lewis, H. (1973). On the interaction between the quantity and quality of children. *Journal of Political Economy, 8,* 279–288. https://doi.org/10.1086/260166

Bengtsson, T., & Dribe, M. (2006). Deliberate control in a natural fertility population southern Sweden, 1766–1864. *Demography, 43,* 727–746. https://doi.org/10.1353/dem.2006.0030

Billari, F. C., & Galasso, V. (2009). What explains fertility? Evidence from Italian pension reforms. *A CESifo Working Paper Series No. 2646*.

Boldrin, M., De Nardi, M., & Jones, L. E. (2015). Fertility and social security. *Journal of Demographic Economics, 81,* 261–299. https://doi.org/10.1017/dem.2014.14

Cetre, S., Clark, A., & Senik, C. (2015). Happiness and the Parenthood Paradox. *Paris School of Economics*.

Coale A. J. (1989). Demographic Transition. *Social Economics*. The New Palgrave. Palgrave Macmillan. https://doi.org/10.1007/978-1-349-19806-1_4

Cigno, A., & Ermisch, J. (1989). A microeconomic analysis of the timing of births. *European Economic Review, 33*, 737–760. https://doi.org/10.1016/0014-2921(89)90023-8

Cigno, A., & Rosati, F.C. (1992). The effects of financial markets and social security on saving and fertility behaviour in Italy. *Journal of Population Economics, 5,* 319–341. https://doi.org/10.1007/BF00163064

Cigno, A., & Werding, M. (2007). Children and pensions. *Journal of Economics, 95*, 87–91.

D'Addio, A., & d'Ercole, M. (2005). Trends and determinants of fertility rates. The role of policies. *OECD Social, Employment and Migration Working Papers 27*, OECD Publishing. https://doi.org/10.1787/880242325663

Easterlin, R. (1976). Population change and farm settlement in the northern United States. *The Journal of Economic History, 36,* 45-75. https://doi.org/10.1017/S002205070009450X

Ehrlich, I., & Zhong, J. (1998). Social security and the real economy. An inquiry into some neglected issues. *American Economic Review, 88*, 151-157.

Elder, G. H. (1994). Time, human agency, and social change. Perspectives on the life course. *Social Psychology Quarterly*, *57*, 4–15. https://doi.org/10.2307/2786971

Ermisch, J. (1988). Econometric analysis of birth rate dynamics in Britain. *The Journal of Human Resources, 23*, 563–576. https://doi.org/10.2307/145814

Esping-Andersen, G., & Billari, F. C (2015). Re-theorizing family demographics. *Population and Development Review, 41,* 1–31. https://doi.org/10.1111/j.1728-4457.2015.00024.x

European Commission (2018). Pension Adequacy Report 2018. Current and future income adequacy in old age in the EU: Volume 1 and II. *Publications Office of the European Union*.

Fawcett, J. T. (1988). The value of children and the transition to parenthood. *Marriage & Family Review, 12*, 11–34. https://doi.org/10.1300/J002v12n03_03

Frejka, T., & Westoff, C. F. (2006). Religion, Religiousness and Fertility in the U.S. and in Europe. *Max Planck Institute for Demographic Research*: Working paper 2006-013. https://doi.org/10.1007/s10680-007-9121-y

Galasso, V., Gatti, R., & Profeta, P. (2009). Investing for the old age. Pensions, children and savings. *International Tax and Public Finance Journal, 16*, 538-559. http.//dx.doi.org/10.1007/s10797-009-9104-5

Giddens, A. (1991). *Modernity and Self-Identity. Self and Society in the Late Modern Age*. Stanford University Press.

Glass, J., Simon, R. W., & Andersson, M. A. (2016). Parenthood and happiness. Effects of work-family reconciliation policies in 22 OECD countries. *American Journal of Sociology, 122*, 886–929. https://doi.org/10.1086/688892

Guinnane, T. (2011). The historical fertility transition. A guide for economists. *Journal of Economic Literature, 49*, 589–614. http.//doi.org/10.1257/jel.49.3.589

Hank, K., & Wagner, M. (2013). Parenthood, marital status, and well-being in later life: Evidence from SHARE. *Social Indicators Research, 114*, 639–653.

Happel, S.K., Hill, J. K., & Low, S. A. (1984). An economic analysis of the timing of childbirth. *Population Studies – A Journal of Demography, 38*, 299–311. https.//doi.org/10.1007/s11205-017-1665-6

Henry, L. (1961). Some data on natural fertility. *Eugenics Quarterly, 8*, 81–91. https://doi.org/10.1080/19485565.1961.9987465

Hobcraft, J., & Kiernan, K. (1995). Becoming a parent in Europe: Welfare State Programme Discussion Paper 116. *Centre for Analysis of Social Exclusion, The London School of Economics and Political Science*.

Hochschild, A., & Machung, A. (1989). *The Second Shift: Working Parents and the Revolution at Home.* University of Michigan and Viking Publishing.

Hohm, C. F. (1975). Social security and fertility. An international perspective. *Demography, 12*, 629–644. https.//doi.org/10.2307/2060718

Jones, L. E., Schoonbroodt, A., & Tertilt, M. (2008). Fertility Theories. Can They Explain the Negative Fertility-Income Relationship. National Bureau of Economic Research Working Paper 14266, Cambridge. https.//doi.org/10.3386/w14266

Knodel, J. E. (1978). Natural fertility in pre-industrial Germany. *Journal of Population Studies*, *32*, 481–510

Komter, A. (1989). Hidden power in marriage. *Gender and Society, 3,* 187–216. https.//doi.org/10.1177/089124389003002O0

Leitner S., Ostner I., & Schmitt C. (2008). Family policies in Germany. In I. Ostner & C. Schmitt (Eds), *Family policies in the context of family change* (pp.175–202). Verlag für Sozialwissenschaften. https.//doi.org/10.1007/978-3-531-90895-3_9

Lesthaeghe, R., & Kaa, van de, D. (1986). Twee demografische transities? *Bevolking. Groei en Krimp*, 9–24.

Lesthaeghe, R. (2010). The unfolding story of the second demographic transition. *Population and Development Review*, *36*, 211–251. https.//doi.org/10.1111/j.1728-4457.2010.00328.x

Neuberger, F. S., & Preisner, K. (2018). Parenthood and quality of life in old age. The role of individual resources, the welfare state and the economy. *Social Indicators Research, 138*, 353–372. https://www.jstor.org/stable/24720268

Mayer, K. U. (2001). The paradox of global social change and national path dependencies. In M. Kohli & A. Woodward (Eds.), *Inclusions and exclusions in European societies (1st ed.),* (pp. 89–110). Routledge Publishing. https://doi.org/10.4324/9780203167366

Mayer, K. U. (2004). Whose lives? How history, societies, and institutions define and shape life courses. *Research in Human Development*, *1*, 161–187. https://doi.org/10.1207/s15427617rhd0103_3

Mills, M., & Begall, K. (2010). Preferences for the sex-composition of children in Europe. A multilevel examination of its effect on progression to a third child. *Population Studies - A Journal of Demography, 64*, 77–95. https://doi.org/10.1080/00324720903497081

Mills, M. & Blossfeld, H.-P. (2005). Globalization, uncertainty and the early life course. In H.-P. Blossfeld, E. Klijzing, M. Mills & K. Kurz (Eds.), *Globalization, uncertainty and youth in society: The losers in a globalizing world* (pp.0–23). Routledge Imprinter. https://doi.org/10.4324/9780203003206

OECD (2019). Fertility rates (indicator). https://data.oecd.org/pop/fertility-rates.htm

Oppenheimer, V. K. (1988). A theory of marriage timing. *American Journal of Sociology*, *94*, 563–591. https://doi.org/10.1086/229030

Oppenheimer, V. K. (2003). Cohabiting and marriage during young men's career-development process. *Demography*, *40,* 127–149. https://doi.org/10.2307/3180815

Oppenheimer, V. K., Kalmijn, M., & Lim, N. (1997). Men's career development and marriage timing during a period of rising inequality. *Demography, 3,* 311–330. https://doi.org/10.2307/3038286

Ortuño-Ortín, I., & Romeu, A. (2003). Are children investment of consumption goods? Evidence from child health and parental care. *Universidad Carlos III de Madrid*.

Rendal, M., & Bahchieva, R. (1998). An old-age security motive for fertility in the United States? *Population and Development Review*, *24*(2), 293–307.

Sillars A.L., & Kalbflesch P.J. (1989). Implicit and explicit decision-making styles in couples. *Dyadic Decision Making*, 179–215. https://doi.org/10.1007/978-1-4612-3516-3_8

Thomson, E., & Hoem, J.M. (1998). Couple childbearing plans and births in Sweden. *Demography*, *35*, 315–322. https://doi.org/10.2307/3004039

Van de Kaa, D. (2002). The idea of a second demographic transition in industrialized countries. *Japanese Journal of Population, 1*.

Tomass Kristian Nielsen is a PhD student at the University of Tallinn with the Estonian Institute of Demography. He has received a bachelor's degree in International Business and a master's degree in Applied Economics and Finance from Copenhagen Business School. His current research interest are in fertility developments and predictors as well as their links to institutional, economic and cultural factors.

Acknowledgement

This research benefited from support from the Estonian Research Council (research theme PRG71).