Economics Bulletin

Volume 30, Issue 3

Self-perceived age categorization as a determinant of the old age boundary

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Abstract

Using data from the European Social Survey, we investigate the influence of individuals' self-perceptions of being a member of an age group on their assessment of the beginning of 'old age'. The proper examination of this relationship calls for the consideration of the effects of age and gender as well as the fact that people who concur that a boundary for old age exists (thus provide a numerical response to the relevant survey question) constitute a non-random subsample of the population with respect to the outcome of interest. Therefore, the econometric work features a two-equation selection model that jointly estimates the 'Old age boundary' and the 'Numerical response' equations. Our finding is that the two equations are in fact correlated, and – along with age and gender – self-perceived age categorization has a significant effect on the subjective old age boundary. People who categorize themselves in younger age groups than others of the same chronological age have higher old age boundaries.

Citation: Cem Baslevent, (2010) "Self-perceived age categorization as a determinant of the old age boundary", *Economics Bulletin*, Vol. 30 no.3 pp. 1994-2001.
Submitted: May 04 2010. **Published:** July 29, 2010.

1. Introduction

Initiated in 2001 with the cooperation of the European Commission, European Science Foundation, and 26 national Research Councils, the European Social Survey (ESS) aims to monitor attitudes and behaviors across countries and over time. Four rounds of the survey have been conducted since 2002, and in addition to the core questionnaire, each round has included rotating modules that cover academic and/or policy concerns within Europe. One such module included in the 4th round of the survey fielded in 2008/09 is titled "Experiences and Expressions of Ageism", developed by a team of researchers headed by Dominic Abrams. As stated in the official documentation for the survey, the aim of the module is "to examine ageism and intergenerational relationships, from a social psychological perspective" (ESS, 2009). Since the concept of ageism has emerged as involving prejudicial attitudes towards older persons, old age, and the aging process (Butler, 1969) - though it is nowadays defined more broadly to refer to discrimination against other age groups as well -, the module is primarily concerned with evaluating "different components of prejudice to properly understand how it applies to particular groups". Considering that an aging population is a cause of concern for many European countries, it does not come as a surprise that this topic has been selected for coverage in the ESS.

In this paper, we use data drawn from the 'ageism' module of the ESS to examine the influence of individuals' self-perceptions of being a member of an age group on their subjective assessments of the beginning of old age for the population in general. The subjective (or self-perceived) age belongs in the category of social-psychological age measures that have been suggested in the literature along with other non-chronological age measures such as biological or social age. Initially defined in Blau (1956), self-perceived age measures an individual's self-perception in terms of reference age groups such as "middle-aged" or "old". In their review of the literature on self-perceived age, Barak and Schiffman (1981) note that the majority of elderly have a strong tendency to see themselves as younger than their chronological age and that women tend to see their age differently from their male counterparts. Furthermore, elderly who perceive themselves as younger are more likely to have a more positive, liberal, and less traditional outlook on life. Bowling et al. (2005) note that these generalizations are consistent with the findings of subsequent empirical studies on the relationship between subjective age and health, satisfaction with life, and quality of life.

Observing that self-perceived age provides a multi-dimensional view of the aging process and that it explains some behavioral phenomena better than chronological age, empirical literature has focused on exploring the determinants of this measure, i.e. using it as the dependent variable in econometric models (e.g. Barak and Stern, 1986; Henderson, Goldsmith, and Flynn, 1995). In a sample of respondents aged 65 or above, Bowling et al. (2005) find that physical health and functional status are the main predictors of subjective age. The Demakakos, Gjonca, and Nazroo (2007) study, on the other hand, considers self-perceived age as a potential covariate of various health outcomes. Also among the explanatory variables utilized by the authors is the perception of when old age starts, which is the outcome variable in the current study. These two indicators are found to be more related to the health outcomes being examined than the other covariates in the analysis.

According to the ESS documentation for the ageism module, 'age categorization' and 'age boundary' are two dimensions that fall under the concept of 'age categorization and identification', one of the five broader concepts utilized in the study of age-related prejudices.

In the survey, these are operationalized by measures previously tested and established in the UK context (Age Concern England, 2006; Ray, Sharp, and Abrams, 2006). To measure self-perceived age categorization, the respondents are asked to place themselves on a 9-point age-group scale ranging from 'very young' to 'very old', and to measure age boundaries, they are asked to state their perceptions of the beginning of 'old age' (and the end of 'youth') in terms of a specific chronological age figure.[1]

A closer inspection of the old age boundary variable in the data set reveals that non-response to this question takes more than one form. In addition to those who decline to provide any response, there are also a considerable proportion of respondents who state that "it depends on the person" or that "it never applies". In consequence, the relationship between age categorization and the age boundary has to be examined on the sub-sample of respondents who provide a specific numerical response. This, however, is likely to lead to biased coefficient estimates since the decision to provide a numerical response and the response itself are likely to be correlated. To be specific, individuals who more likely to state that they do not believe that an old age boundary exists are also likely to have responded with larger old age boundary figures if they were forced to provide a numerical response.

From an econometric perspective, the situation at hand is one that involves an equation with a continuous outcome variable observed only when a separate binary response equation results in a certain outcome. In case the two equations have correlated error terms, one appropriate methodology is to estimate them jointly in a standard application of the Heckman selection model (Heckman, 1974). In the empirical work that follows, we estimate the two equations both jointly and separately to be able to assess the significance of dealing with this technicality.

2. Empirical work

The data we work with in the empirical work is drawn from the second edition of the combined data from the 4th round of ESS released on 17 December 2009. It contains data from 21 of the 31 countries that took part in that round. These countries are Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Israel, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom. We begin the presentation of the empirical findings by reporting some summary statistics that motivate the econometric work (See Table 1). Since age and gender are both to be utilized as explanatory variables, the means of key indicators are provided by age groups and gender. Although the focus of the paper is on the old age boundary, subsample means are also provided for the 'young age boundary', that is, the subjective end of young age which was also inquired about in the survey.

The subsample means reveal very clearly that both the young and the old age boundaries increase with age and that they are higher among women than among men. Furthermore, the

[1] The relevant survey questions are worded as follows: "At what age do you think people generally stop being described as young? / .. start being described as old?", and ".. which box best describes the age group you see yourself as belonging to. If you see yourself as very young, pick the first box. If you see yourself as very old, pick the last box. Otherwise pick one of the boxes in between".

percentage of people who respond to the age boundary questions with “it depends on the person” also increase with age and are higher among women. Taken together, these findings imply that age and gender are two variables that need to be controlled for in the examination of both the age boundary and the decision to respond with a specific age figure. They also suggest that the two outcomes may be correlated also in terms of unobservable characteristics, which would necessitate the use of the two-equation model described earlier. Finally, the self-perceived age category, responded to on a scale from 1 (‘very young’) to 9 (‘very old’), also increases with age - as expected -, but is almost identical for women and men.

Table 1: Means of key indicators by age category and gender

	Sample share	End of young age		Start of old age		Self perceived age category
		Mean of numerical responses	Share of ‘it depends’ (%)	Mean of numerical responses	Share of ‘it depends’ (%)	
Age category						
15-24	14.5	32.5	6.1	57.7	6.0	2.2
25-34	15.0	37.2	8.8	61.2	7.9	3.1
35-44	17.0	38.9	9.6	62.6	8.4	4.1
45-54	18.2	40.7	10.5	63.4	9.6	4.9
55-64	15.9	43.0	11.7	64.3	10.1	5.6
65-74	11.7	45.0	12.1	66.2	11.3	6.5
75+	7.7	46.8	14.3	68.4	12.8	7.4
Gender						
Male	47.2	38.8	9.3	61.5	8.6	4.6
Female	52.8	40.9	10.9	64.1	9.6	4.6
Total	**100.0**	**39.9**	**10.1**	**62.9**	**9.1**	**4.6**

Notes: The sample size is 38,976. “Share of ‘it depends’” refers to the percentage of people who respond to the boundary questions with “it depends on the person” or “it never applies”. The self-perceived age category is measured on a scale from 1 (‘very young’) to 9 (‘very old’). The design weights available in the data set have been used (as in the rest of the empirical work) to obtain nationally-representative figures, but not the population weights so that the results would not be dominated by the patterns in large-population countries.

2.1 The OLS and Probit results

In the second step of the empirical work, we move on the estimation of the econometric models. One option is to ignore the selection story and estimate the old age boundary equation using the ordinary least squares (OLS) method and estimate the numerical response equation using probit, a commonly used binary choice model under the assumption that the error terms are normally distributed. Results from these models are presented in Table 2 under the 'Independent equations' column. The control variables, which are common to both equations, are age (and age-squared, to allow for the possibility that the impact of age is non-linear), gender, and self-perceived age categorization. The self-perceived age categorization variable is defined as the difference between the actual response and the average value of this measure computed for all respondents who are of the same chronological age as the respondent. The use of the deviation-from-the-mean is not only appropriate because self-perceived age categorization tends to increase with age, but it also allows the relevant coefficient to be interpreted as the impact of feeling relatively older than the average person of the same age. Finally, to control for cross-cultural variation in aging perceptions, differences in the age composition of the country samples, and the variation in life expectancies across the countries in the data, the age boundary equation also includes country dummies.[2]

The OLS and probit estimates reveal that all explanatory variables have statistically significant effects in both equations. As people get older, their old age boundaries increase, and at the same time, they become less likely to provide a numerical response to the boundary question. The square of age has the opposite sign as the age variable in both equations, which should be interpreted to mean that the influence of age decreases over the lifetimes of individuals. However, the relative magnitudes of the two coefficients imply that the impact does not drop to zero until people reach ages exceeding 100. Between the ages of 40 and 41, for example, the age boundary goes up by about 0.17.[3]

On average, females have an old age boundary that is 2.2 years higher than that of males. Women are also less likely to believe that an old age boundary exists. The estimated difference in this probability is 0.9 percentage points.[4] The coefficients on the country dummies (of which there are 20 in the age boundary equation) have been omitted from the table in the interest of brevity. Since the difference between the largest and smallest coefficients is almost 8 (years), it appears that there is plenty of cross-country variation which could be the subject of further investigation.

Self-perceived age categorization is found to be negatively related with the old age boundary, meaning that those feeling relatively *younger* than the average person of the same age have higher old age boundaries. In specific terms, a one-point deviation from the mean implies a 1.6-year change in the boundary. The coefficient on the self-perceived age categorization variable is positive in the binary response equation. This implies that those feeling relatively *older* are more likely to believe that an old age boundary exists. A one-point deviation from the mean implies a 0.35-percentage point change in the probability of a positive outcome.

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[2] The reader is referred to Löckenhoff et al. (2009) for a review of the existing literature on cross-cultural differences in aging perceptions. One finding of the authors' own extensive empirical study is that cross-country differences in aging perceptions may be related to differences in population structure.

[3] Since age-squared goes up by $81(=41^2–40^2)$ when age goes from 40 to 41, the net impact of the change in age is $0.243 + 81 \cdot (–0.090/100) \approx 0.17$.

[4] The probability change has been obtained using the *mfx* (marginal effects) routine available in statistical software package Stata.

Table 2: The OLS, Probit, and Heckman selection models results

	Independent equations		Heckman Selection model	
	Coef.	*p*-value	Coef.	*p*-value
'Old age boundary' equation				
Age	0.243	0.000	0.263	0.000
Age ^{2} / 100	-0.090	0.000	-0.096	0.000
Female	2.199	0.000	2.334	0.000
Self-perceived age category	-1.598	0.000	-1.656	0.000
Constant	54.12	0.000	54.95	0.000
'Numerical response' equation				
Age	-0.011	0.000	-0.015	0.000
Age ^{2} / 100	0.005	0.046	0.008	0.001
Female	-0.056	0.002	-0.051	0.003
Self-perceived age category	0.022	0.009	0.017	0.034
Constant	1.769	0.000	1.849	0.000

Notes: The total number of observations is 38,976. The OLS model, with the 'Old age boundary' as the dependent variable, has been estimated on the subsample of 35,344 "uncensored" observations. The R-squared for the OLS regression is 0.138. In the 'Numerical response' equation, the dependent variable equals 1 if a numerical response has been provided, and zero otherwise. The coefficients on the country dummies have been omitted from the output. In the Heckman selection model, the estimate for the correlation coefficient between the two equations is –.808 with a standard error of .0076.

2.2 Two-equation selection model results

As stated earlier, the coefficient estimates from the OLS model are biased if a sample selection issue is present. To check for the presence of and correct for this problem, we estimated a two-equation selection model using the same set of explanatory variables as above. The selection model estimates the 'Old age boundary' and the 'Numerical response' equations jointly under the assumption that the error terms of the two equations are jointly normally distributed.[5]

[5] Ideally, the two-equation model should be estimated with some explanatory variables appearing only in the binary response equation to improve the 'identification' of the model. However, as in our case, the model is also identified 'by functional form' in the absence of such variables. In light of the preciseness of the model's estimates and their robustness when experimenting with various subsets of the existing explanatory variables, this issue does not appear to be a matter of concern here.

The key finding of the selection model is that the two equations are in fact correlated. The estimate for the correlation coefficient between them is –.808. This implies that, controlling for the effects of the explanatory variables, i.e. the observable characteristics of individuals, the two outcomes are correlated in terms of unobservable characteristics. Unobservable characteristics, such as a less optimistic outlook on life in general, that make people more likely to believe that an old age boundary exists (i.e. less likely to believe that the beginning of old age depends on the person), also make them have smaller old age boundaries. Recalling that all of the explanatory variables had coefficients of the opposite sign in the two equations, the factors we have not been able to control for also work in the same way as the observable ones.

The finding of a significant correlation between the two equations is enough to defend the use of the selection model as it reveals an interesting behavioral pattern that the earlier models could not have captured. However, it is also important to examine whether the joint estimation of the equations leads to considerable changes in the coefficient estimates. As seen in the right panel of Table 2, the selection model yields estimates that are larger (that is, in absolute value) than those in the single equation OLS model. In other words, ignoring the selection issue leads to the underestimation of the effects of age, gender, and self-perceived age categorization on the old age boundary. The same can be said of the coefficient on age in the numerical response equation, but not the coefficients on gender and self-perceived age categorization. They seem to have been overestimated by the single equation probit model presented earlier.

3. Concluding remarks

The main aim of this study was to obtain reliable estimates for the effect of self-perceived age on the subjective old age boundary. Based on data for 21 countries covered by the fourth round of the European Social Survey, the econometric work revealed several interesting results regarding the relationships between the key variables in the analysis. We found that people who categorize themselves in younger age groups than others of the same chronological age have higher old age boundaries. This was also the case for older people and women. In obtaining these findings, we entertained the possibility that a sample selection problem is present since the old age boundary question was not responded to with a specific figure by those who did not believe that an old boundary exists. Estimates from a two-equation model revealed that the selection issue was in fact relevant such that unobservable characteristics that make people more likely to believe that an old age boundary exists also made them have smaller old age boundaries. The joint estimation of the two outcomes also led to larger coefficient estimates in the age boundary equation, meaning that the effects of the explanatory variables are underestimated in the single equation model.

It might be argued that the finding of a statistically significant correlation between two the equations could be reversed within a more comprehensive model that controls for what we have been referring to as 'unobservable' factors. In other words, the mysterious negative correlation could disappear once some more subtle factors are accounted for. While this might turn out to be the case with appropriate additional personal information, it must also be noted that the non-zero correlation also disappears when the old age boundary is replaced with the young age boundary, i.e. the same model is estimated using the same set of explanatory variables, but with a seemingly-similar outcome variable. Our interpretation of this result is that perceptions of old age are the product of a more personal and complex cognitive process than those relating to youth. Besides the empirical evidence just presented, what makes this a plausible explanation is that concepts such as ageism and age-based discrimination have emerged and evolved to refer mostly to prejudices against not young, but older people. It is hoped that future studies will shed more light on the formation of the subjective young and old age boundaries to make better sense of the findings of the current study.

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