



Mental retirement and schooling

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ABSTRACT

We assess the validity of differences in eligibility ages for early and old age pension benefits as instruments for estimating the effect of retirement on cognitive functioning. Because differences in eligibility ages across country and gender are correlated with differences in years of schooling, which affect cognitive functioning at old ages, they are invalid as instruments without controlling for schooling. We show by means of simulation and a replication study that unless the model incorporates schooling, the estimated effect of retirement is negatively biased. This explains a large part of the “mental retirement” effects which have recently been found.

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1. Introduction

In many countries people are living longer and retiring earlier than in previous decades. They are spending a larger proportion of their lifetime in retirement, depending on earlier savings or pension benefits to finance consumption. Populations are aging and the burden of risk and provision of old age income security is shifting from public collective to private individual. Cognitive ability is important for both decision making in general and financial planning (Christelis et al., 2010) and senior saving behavior (Banks et al., 2010) in particular. Differences in cognitive performance amongst the elderly will increasingly determine their future consumption possibilities and drive inequality.

Although there is a great deal of heterogeneity in individual trajectories, cognitive ability usually increases at a declining rate until middle age and declines afterwards. It is becoming increasingly recognized (Hertzog et al., 2008) that different cognitive ability profiles in later life are associated with different behaviors from pre-school (Case et al., 2009), through compulsory school (Glymour et al., 2008), choice of leisure activities (Scarmeas and Stern, 2003) and age of retirement (Adam et al., 2007). If cognitive ability is malleable and some of these relationships are causal then cognitive ability can be usefully thought of as a form of human capital (Ben-Porath, 1967) or health capital (Grossman, 1972).

Cunha and Heckman (2007) develop a model of cognitive and non-cognitive skill acquisition through schooling investments, where the effect of schooling on cognitive ability is unambiguously positive. The relationship between retirement and cognitive functioning in a Grossman-like model is ambiguous. Bonsang et al. (2010) set up a standard Grossman model where individuals with higher cognitive functioning may perform work tasks and leisure activities more effectively. Work and leisure can involve different types of investment in cognitive functioning. Pension eligibility increases the cost of work relative to leisure investments. The net effect of retirement on cognitive functioning will depend on relative marginal productivities.

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Rohwedder and Willis (2010) follow instead the insights of the “use it or lose it” hypothesis, and the suggestions from psychological literature that cognitive ageing can be delayed by engaging in cognitively demanding activities. They argue that during retirement the brain is not stimulated to the same extent as while working in the labour market, and thereby loses cognitive ability. This argument is consistent with evidence from psychological literature if retirement from the labour market is associated with reduced mental exercise.

Empirical evidence for retirement effects on cognitive functioning is mixed and depends on how cognitive abilities are measured and on the source of identification used. Coe et al. (2012) use employer-provided early pension benefit windows in the US to provide variation in retirement ages and find no effect on word recall and numeracy, or if anything a positive effect for blue collar workers. Several papers use cross-country variation in pension eligibility ages to find significant detrimental effects of retirement on short term memory or word recall (Bonsang et al., 2010; Rohwedder and Willis, 2010; Mazzonna and Peracchi, 2012).

In this paper we study the correlation between cross-country variation in pension eligibility ages and educational attainment, and the consequences of this for estimating the effect of retirement on cognitive functioning. In Section 2 we describe our data, which resembles as closely as possible that used in the cross-country studies discussed above. Section 3 states the arguments for instrument validity, illustrates the correlations of interest and presents a bias simulation. Section 4 presents a replication study and extension of Rohwedder and Willis. Section 5 concludes.

2. Data description

In order to replicate the large effects found in Rohwedder and Willis (2010), we use the 2004 waves from the English Longitudinal Study of Ageing (ELSA), the U.S. Health and Retirement Survey (HRS) and the Survey of Health, Ageing and Retirement in Europe (SHARE), for a total of thirteen countries. We apply the sample selection as described by the authors. In particular, we keep only people aged between 60 and 64 at the time of interview. As we include schooling achievement in our analysis, compared to Rohwedder and Willis (2010) we additionally drop people for whom we have no information about their education.

However, while they draw their results from a sample of 8828 observations, our sample amounts to 8734 observations, 8702 of whom have non-missing values for education achievement. This difference is unlikely to cause large differences during estimation: as we show in Section 4 we find similar results when we replicate their analysis.

We define cognitive functioning and retirement status consistently with previous literature. We define retirement as not having worked for pay in the last four weeks, and we use a word recall test as a consistent measure of cognitive functioning across countries. During the test, the interviewer reads out a list of 10 words at a fixed speed. Right afterwards the respondent repeats as many words as can be remembered (immediate recall). Other questions about cognitive functioning follow. Then the interviewer asks the respondent to repeat as many words from the original list as can still be remembered (delayed recall). The sum of words correctly recalled immediately and after the delay together gives the total word recall measure, ranging 0–20.

Even though the surveys used are highly comparable, they code the education variables in slightly different ways. While HRS asks directly the highest grade of school or year of college attended, in SHARE and ELSA respondents declare their highest completed level of education. As a consequence ELSA and SHARE impute years of schooling as the minimum number of years required in order to achieve the declared educational qualification.

We take pension eligibility ages from the laws in force in 2004. Table 1 is a reproduction from the online appendix to Rohwedder and Willis (2010), which shows early and old age pensionable ages by gender for the thirteen countries in our sample.

3. Instrument validity

Instrumental variable estimation is useful to uncover causal effects, though often limited to a Local Average Treatment Effect (LATE) interpretation, as it solves bias arising from endogeneity of the explanatory variable. When studying the effect of retirement on cognitive functioning, endogeneity arises because of individuals retiring sooner as a consequence of faster deterioration of cognitive functioning. Therefore, retirement may be negatively correlated with cognitive functioning, even if retirement does not have any effect. Formally, given a population model

$$y = \mathbf{x}\beta + u, \quad (1)$$

we have that $E(\mathbf{x}'u) \neq 0$, thus introducing endogeneity bias.

Instrumental variable estimation methods, such as 2SLS, provide a way to solve this problem given a suitable set of instruments \mathbf{z} . The consistency of the two-stage least squares estimator $\hat{\beta}_{2SLS}$ relies on assumptions

$$(A) \quad E(\mathbf{z}'u) = 0,$$

$$(B) \quad \text{rank}(\mathbf{z}'\mathbf{z}) = L \geq \text{rank}(\mathbf{z}'\mathbf{x}) = K,$$

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