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Does retirement affect cognitive functioning?

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ABSTRACT

This paper analyses the effect of retirement on cognitive functioning using a longitudinal survey among older Americans, which allows controlling for individual heterogeneity and endogeneity of the retirement decision by using the eligibility age for social security as an instrument. The results highlight a significant negative effect of retirement on cognitive functioning. Our findings suggest that reforms aimed at promoting labour force participation at an older age may not only ensure the sustainability of social security systems but may also create positive health externalities for older individuals.

1. Introduction

In most developed countries, the proportion of older individuals has substantially increased over the last few decades. This demographic shift has increased the focus on health in ageing. At the same time, increased life expectancy combined with a decline in average retirement age has increased the proportion of an individual's life spent in retirement. This structural change imposes many challenges for the financial sustainability of social security systems. Moreover, this extended retirement period raises questions about its potential consequences on the physical and mental health of the elderly, which may in turn affect long-term care expenditures (Dave et al., 2008).

In a recent study using cross-sectional data from the United States and Europe,[1] Adam et al. (2007a) found that retirees attained lower cognitive functioning than working individuals. Furthermore, using a stochastic frontier methodology, the authors showed that the longer the retirement period, the lower the cognitive test score, and this suggests an acceleration of cognitive decline during retirement. However, the difference observed between workers and retirees may have explanations other than a causal effect between retirement and cognition. First, impairments in cognitive functioning may prevent people from working, may increase disutility from work, or may lower productivity. Moreover, unobservable factors associated with cognitive functioning and retirement may be interrelated with both. Individuals with higher innate ability (and thus cognitive functioning) may invest more in human capital and retire at a later age than individuals with low innate ability.

Based on the descriptive evidence from Adam et al. (2007a), Coe and Zamarro (2011), Mazzonna and Peracchi (2010), and Rohwedder and Willis (2010) have also investigated the relationship between retirement and cognitive functioning. In order to address potential endogeneity bias, they used cross-national data[2] and the differences in the legal age of retirement across countries as

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[1] The Health and Retirement Study 2004 (HRS, United States); the English Longitudinal Study on Ageing 2004 (ELSA, United Kingdom); the Survey of Health, Ageing, and Retirement in Europe 2004 (SHARE, Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, and Switzerland).

[2] Coe and Zamarro (2011) use the first wave of SHARE and Mazzonna and Peracchi (2010) the first two waves of SHARE. Rohwedder and Willis (2010) complement SHARE data with comparable data from the ELSA and the HRS.

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instruments for the retirement decision. The results were mixed: while Rohwedder and Willis (2010), and Mazzonna and Peracchi (2010) found a significant and quantitatively important negative effect of retirement on cognitive functioning,[3] Coe and Zamarro (2011) did not find a significant effect.

Although using cross-country differences in the eligibility age for retirement benefits as instruments can provide a powerful empirical strategy in order to identify the causal effect of retirement, it is not without its limitations. Individuals from different countries face different institutional settings, constraints and cultural differences beyond retirement schemes. This heterogeneity is likely to partly shape the level and the age-related profile of cognitive functioning, and to be correlated with the institutional settings of retirement schemes. For instance, there is a clear North-South gradient for many health outcomes beyond cognitive test scores, with Northern countries usually performing better than Southern countries (Börsch-Supan et al., 2005). At the same time, eligibility age for retirement tends to be higher in Northern than in Southern European countries. It is unlikely that the cross-country differences in retirement rules fully explain this pattern across European countries. Those differences might thus invalidate the exclusion restrictions and result in an over-estimation of the effect of retirement on cognitive functioning.

In this paper we estimate the causal impact of retirement on cognitive functioning using panel data from the Health and Retirement Study (HRS), a longitudinal survey among individuals aged 50+ living in the United States. These data allow us to control for individual heterogeneity and to circumvent the issue of the endogenous retirement decision by using the eligibility age for social security as an instrument. The panel dimension of the data allows us to control for time-invariant heterogeneity, such as the cohort effect, and thus strengthens the validity of the conditional independence and exclusion restrictions underlying instrumental variable (IV) estimation. Moreover, contrary to the previous studies investigating the effect of retirement on cognitive functioning, our analysis focuses on data from a single country with individuals facing basically the same institutional settings and constraints. Furthermore, we find suggestive evidence that the effect of retirement on cognitive functioning is not instantaneous, but appears with a lag.

The paper is organised as follows. Section 2 presents a review of the neuropsychological literature regarding cognitive ageing and the relationship between activities and cognitive functioning. Section 3 describes the econometric approach used to address the empirical issues and Section 4 presents the data and our measure of cognitive functioning, used in the empirical model. Section 5 details the results from the empirical analysis. Finally, Section 6 concludes and draws out implications from the analysis.

2. Cognitive ageing and the relationship between activity and cognitive functioning

Older individuals face many challenges associated with physical and mental deterioration. Among these, the age-related decline in some important components of cognitive functioning, i.e. fluid abilities,[4] has been well documented: a large amount of evidence suggests that ageing is associated with a decline in the ability to perform several cognitive tasks (Dixon et al., 2004; Schaie, 1994). More particularly, ageing has a salient effect on episodic memory tasks[5] (Petersen et al., 1992; Small, 2001), episodic memory deficits being also largely considered as a hallmark symptom of Alzheimer's disease (Adam et al., 2007b; Dubois et al., 2007).

However, this decline in fluid abilities is not homogenous across the population, with some people maintaining cognitive vitality even into extreme old age (Berkman et al., 1993; Silver et al., 1998, 2001). At the same time, age-related cerebral modifications that are at the root of Alzheimer's disease have been observed to have heterogeneous effects on cognitive functioning. For example, Katzman et al. (1989) described cases of cognitively normal elderly women who were discovered (by means of post mortem analysis) to have advanced Alzheimer's disease pathology in their brains. Stern (2002, 2003) and Scarmeas and Stern (2003) propose the concept of cognitive reserve to explain this apparent absence of a direct relationship between the severity of the factor that disrupts performance (such as the degree of brain modification with age, or brain pathology associated with Alzheimer's disease) and the degree of disruption in performance or of dysfunction in daily life activities. This suggests that some individuals are able to more efficiently use their cognitive resources and are thus less susceptible to disruption in their cognitive functioning. Individual heterogeneity may stem from innate or genetic differences, or from different life experiences, such as occupational attainment or leisure activities.

The degree of resilience to these biological changes, i.e. the cognitive reserve, has been found to depend on several factors. Among these, education undoubtedly plays an important role (Evans et al., 1993; Le Carret et al., 2003). Moreover, differential susceptibility to age-related cognitive decline or to Alzheimer's disease has also been shown to be related to occupation (Evans et al., 1993; Letenneur et al., 1994; Schooler et al., 1999; Stern et al., 1994), professional or leisure activities (Capurso et al., 2000; Scarmeas et al., 2001; Wilson et al., 2002; Newson and Kemps, 2005), and lifestyle (for a review, see: Fillit et al., 2002; and Fratiglioni et al., 2004).

In summary, this literature suggests that individual heterogeneity in the level of cognitive functioning and the rate of age-related change in cognitive functioning is associated with an individual's lifestyle, such as his/her engagement in mentally stimulating activities (Salthouse, 2006). This hypothesis is quite appealing, as it suggests that individuals have some control over the evolution of their cognitive functioning, and that there is scope for policy interventions, mainly in the field of active ageing policies promoting participation (WHO, 2002), to affect the pattern of cognitive ageing.

However, the way the causality runs between activities and the brain remains an open question in neuropsychology. Do activities improve cognitive functioning or are brighter people more often engaged in cognitively demanding activities? While there is some kind of consensus regarding the effect of cognitive functioning on activities,[6] the effect of activities on cognitive functioning is more open to debate. One argument favouring this latter hypothesis can be found in the neurobiological literature, where several experimental studies on animals have shown that rats bred in an enriched environment present a greater dendritic density in the hippocampus and an increased number of glial cells than animals bred in standard conditions (Rosenzweig and Bennett, 1972). Moreover,

[3] Rohwedder and Willis's (2010) results suggest that retirement causes a drop close to 40% in average cognitive score.

[4] Fluid abilities include skills such as processing speed, working memory, and long-term memory. It is worth noting that other aspects of cognitive functioning, known as crystallised abilities (such as verbal abilities or knowledge), have been shown to remain stable, or even to improve with age (Dixon et al., 2004; Park et al., 2002; Schaie, 1994).

[5] Episodic memory refers to memory of information about specific past events that involved the self (i.e. events personally lived) and occurred at a particular time and place (e.g. a previous holiday).

[6] Several studies have shown that cognitive impairment is associated with an increase in limitations on activities of daily living (Agüero-Torres et al., 1998; Bennett et al., 2002; Moritz et al., 1995).