

Cognitive Functioning and Labour Market Outcomes in Later Life: A Cross-National Comparison

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October 20, 2007

Outline of my talk

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- 2 Research questions
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How this research developed and where it stands right now

- This talk is very much work in progress
- In the third paper of my PhD thesis at the University of Essex, I analysed UK data to find out how cognitive functioning (henceforth CF) affects older people's labour market transitions (SEDAP RP No. 222, currently under review at a journal)
- There, I did not find any effects; however, this may be due to data limitations
- Therefore, I embarked on a cross-national comparison with US data (and potentially also data from elsewhere—unfortunately it is difficult to find good Canadian data for such an analysis)

Why is this research interesting?

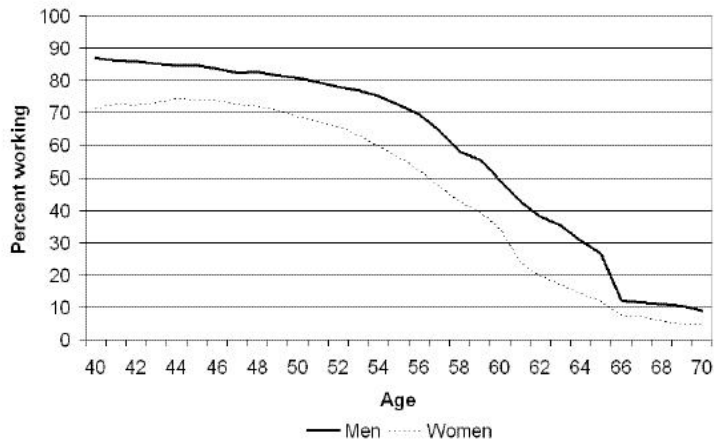


Figure: Proportion of men and women working in the UK, by age
(source: own analysis using BHPS data, cf. SEDAP Research Paper No. 197)

Which factors affect older people's labour force participation or labour market transitions?

- Increasing work among older people: important channel to finance costs of ageing
- Previous research focused on the role of physical health and on the alleged disincentive effects of disability pensions (mixed results)
- But: also CF, such as memory, is important to keep or to get a job, even if low-skilled (OECD 1998: “The present employment problems of older workers seem to be rooted in their relatively low levels of foundation skills, such as literacy and numeracy”—but no empirical evidence given)
- How CF affects employment: also a first step in assessing the economic value of programmes such as “skills for life” by the DfES
- Data on CF: rare
- I use the English Longitudinal Study of Ageing (ELSA)

Previous literature

- Very limited, nothing on older people
- A lot of research on schooling achievement and labour market entry, and a bit of research on the general working-age population:
 - Pryor and Schaffer (2000): “if functional literacy is one standard deviation higher than the mean, men and women have respectively a 3.5 and 7.2 percent greater probability of employment”
 - Cawley, Heckman, and Vytlačil (2001), Heckman and Vytlačil (2001): (log) wage premium for education/ability has risen over time (US men and women aged 15–37)
 - Anger and Heineck (2006): CF affects the unemployment probability (particularly men’s) as well as (log) earnings (German men and women aged 20–60)

So far, I have focused on labour force participation and labour market transitions (larger changes over the lifecycle, not as much residual variance as in wages or earnings)

Which questions do I want to answer?

- Is there a relationship between CF and employment?
- If so, which measures of CF show particularly strong links?
- Can we say anything about the direction of causality?

How does CF affect employment?

- Does the level of CF affect the probability to work, or does the change in CF affect the probability to exit or enter employment?
- I argue that the latter approach is advantageous
- Too strong an assumption that people with low CF are generally less likely to work
- Moreover, the changes approach helps to address unobserved individual effects and the potential endogeneity of CF (since it's difficult to think of plausible instruments)
- Implicit assumption that changes in CF may have immediate effects on labour market transitions, but not vice versa (plausible given that CF is the result of a life-long accumulation process)
- I define “work” as 16 hours of more per week (corresponds to full-time work in the UK benefit system), i.e. the zeros include those with 0–15 hours

The English Longitudinal Study of Ageing

- Sister study of the US Health and Retirement Study (HRS)
- Carried out by UCL, IFS, and NatGen
- Currently, data from the first two waves are available (2002 and 2004)
- ELSA sample: based on respondents of the Health Survey for England (HSE) 1998, 1999, and 2001
- Advantage of this method: information on “baseline” health available
- ELSA wave 1 includes 12,100 respondents, thereof approx. 11,500 people aged 50+ and approx. 600 younger partners
- I focus on the age group 50–70 in this paper, including the self-employed

The Health and Retirement Study

- Led by the Institute for Social Research (ISR) at the University of Michigan, Ann Arbor
- Sponsored by the National Institute on Aging (NIA)
- Currently, data from eight waves are available (1992–2006)
- HRS wave 1 includes 12,652 respondents
- I focus on the same age group as in my ELSA sample

Cognitive functioning in ELSA

Available measures of CF (in both waves unless mentioned otherwise):

- Self-assessed memory
- Knowledge of day of the week and date
- Immediate and delayed recall
- Mentioning as many animal names as possible within one minute
- Prospective memory (respondents have to carry out a task later on during the interview)
- Numeracy (wave 1), literacy (wave 2)

Cognitive functioning in the HRS

- Unfortunately, many changes in the CF variables over time
- Only seven of the current eight waves are included in the master ID file required for longitudinal matching
- Date score: only since wave 3
- Immediate and delayed recall: used a 20-word list in waves 1 and 2 and a 10-word list since then (difficult how to cope with this change—I use percentiles)
- No variables on verbal fluency or literacy
- Variables on numeracy only in a few waves
- Date score only available for part of the sample
- Prospective memory test only since wave 8
- Immediate and delayed recall are really the only two variables that are always available

Creating an index of CF using ELSA data

- Cronbach's alpha: only immediate and delayed recall can be meaningfully combined (0.79)
- All other CF variables: much weaker correlations with each other
- However, a simple CF index may still be useful to summarise the data in a diagram
- My index is created as the sum of the *standardised* CF variables on (1) date, (2) immediate recall, (3) delayed recall, (4) animal names, and (5) prospective memory
- I exclude self-assessed memory (subjective measure) and numeracy and literacy (not present in both waves)

The ELSA CF index

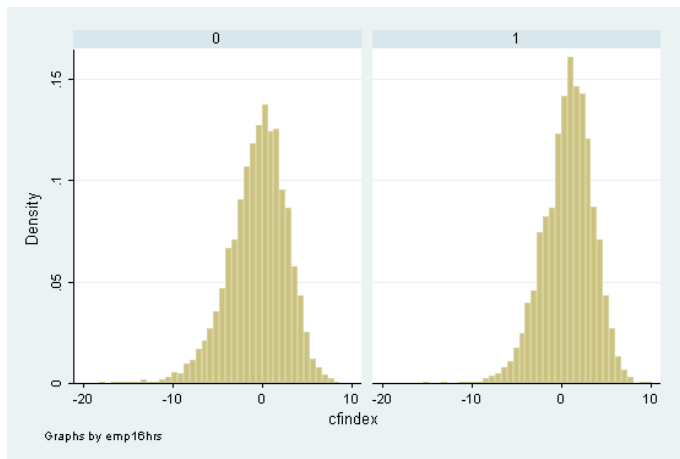


Figure: CF index by whether respondent is working full-time or not (source: own analysis using ELSA data, waves 1 and 2)

Which methods do I use?

- Probit models separately by sex, report marginal effects
- Static model with dependent variable = employment (as defined above); effects likely to be overstated because of the endogeneity
- Dynamic model with dependent variable = exit from or entry to employment
- In addition, I also run OLS models explaining the change in working hours
- I also carried out further regressions: wage change, (log) wage, and (log) earnings
- I also test for panel attrition bias using Heckman probit/selection models

How correlated are education and CF?

- Cawley, Heckman, and Vytlačil (2001), Heckman and Vytlačil (2001): educational attainment and CF are highly correlated in the US
- No college graduates from the lowest CF quartile in their data
- Therefore not identified without strong parametric assumptions
- Do I have the same problem in the ELSA data? No. Almost 10% of those with a degree are in the lowest CF quartile in my data. Need to check HRS data.

Which explanatory variables do I use?

Explanatory variables:

- Age spline (with five-year intervals)
- Physical health (health limitations: less subjective than self-assessed health status)
- CF (all variables except self-assessed memory)
- Education (not yet decided how to define US education variables to maximise comparability)
 - Degree
 - Other HE qualification
 - A levels
 - O levels
 - NVQ1 or CSE
 - Other qualification
 - Base category: no qualification

More explanatory variables

- Marital status
 - Married
 - Base category: not married
- Housing tenure
 - Outright ownership
 - Ownership with mortgage or loan
 - Base category: other
- Occupation
 - Professional, managerial, or technical
 - Skilled non-manual
 - Skilled manual
 - Base category: partly skilled or unskilled
- Wealth (housing equity plus savings)
- Number of people in the household

What do I find with respect to CF?

(I do not use the results from the Heckman models since ρ is not statistically significant: more efficient to use plain models)

- No CF variable has an effect on the probability to exit or enter work, or on the change in working hours, that is statistically significant at the 10% level
- There are some effects of CF on the wage and earnings regressions in my appendices, however, rather unsystematic and small in size

What about the control variables?

- Strong age effects
- Having a health problem which limits the possible amount or type of work reduces the exit probability by 7 (women) to 10 %P (men)
- Wealth and home ownership are only statistically significant for men: outright owners with high housing wealth and owners with a current mortgage/loan and very high housing wealth are more likely to exit, other men less
- Women with a degree or “other” education are 9 %P less likely to exit than other women
- In the entry regressions, only very few variables are statistically significant: mainly age and health limitation
- There are some odd results in the hours change regressions, indicating that measurement error may be an issue

Some robustness checks

- Even when using decile groups of the CF index as explanatory variables, there are no statistically significant effects
- When using contemporaneous CF level and including wave-CF interactions: impact of CF on participation did not change between 2002 and 2004
- Including an education-CF interaction term is hardly statistically significant
- The results also prevail when running the models by education, occupation, or education-occupation group (only possible for the biggest groups)
- I focused mainly on memory and verbal fluency; however, also the levels of wave 1 numeracy or wave 2 literacy do not show any statistically significant effects

Limitations of my ELSA results

- Key problem: only two ELSA waves
- This implies that longitudinal variation in CF is relatively small
- Moreover, it might be that it takes several years until CF declines translate into labour market outcomes
- Therefore, more waves would be necessary
- The only panel data set that provides several waves of CF data and other socio-economic variables is the HRS

HRS models estimated so far

- Static employment models using immediate and delayed recall (waves 3–7)
- Dynamic transition models using changes in immediate and delayed recall
- All these models with and without the date score (since available for waves 3–7, too)
- I have just extended the analysis to waves 1 and 2, using percentiles to translate the 20-word list results from waves 1 and 2 to 10-word list results, but did not look at results yet
- Further problem with extending the analysis to waves 1 and 2: cannot use date score anymore
- Still need to include more control variables (currently only controlling for age and education)

HRS findings so far

- Rather similar to my results using ELSA
- Statistically significant “effects” of CF in static employment models
- In dynamic models, all such effects disappear except for one:
- The change in delayed recall is associated with a higher entry probability among women (but: only 0.4 %P = approx. 4%)
- In a panel probit model with random effects, also the first lag of the change in delayed recall is associated with a higher entry probability among women (but again small effect size)
- In that sense, the shortness of the ELSA panel may conceal some small effects of CF

What can we learn from my research?

- Some statistically significant associations between CF and employment in static models: likely to be endogenous
- In transition models, changes in CF are not statistically significant (UK) or small in size (USA)
- Therefore, CF may not be as important as previously thought for older people's labour force participation
- I am currently continuing to work on the HRS to get more explanatory variables set up in the same way as for ELSA
- There may be important interactions between CF and age, or between the CF level and the CF change; therefore, it may be a good idea to condition on the initial CF level
- Also, I need to investigate in more detail how CF changes are associated with changes in physical health, and think about what I could do about that
- An avenue for future research: explore the effects of CF on, say, the take-up of benefits