

The effect of Lifelong Learning on European older workers' productivity

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Preliminary

Intro

The concept of lifelong learning (LLL) was introduced during the 1970s (OECD 1973 report "*Recurrent Education: A Strategy for Lifelong Learning*")

LLL→ "all learning activity undertaken throughout life, with the aim of improving knowledge, skills/competences and/or qualifications for personal, social and/or professional reasons" (European Commission 2001)

UNESCO→ "Lifelong learning principles, if systematically implemented, will be able to contribute to more just and equitable societies".

In this paper, we focus on older workers and analyse the short-term impact of training undertaken later in life ("older age training") on their individual productivity. We proxy individuals' productivity by means of their hourly wages

Theoretical foundations

According to Human capital theory (Becker 1964,1993), training activities are investments in human capital that are expected to raise future productivity. The costs of this investment are lower wages when trained and direct training costs.

The human capital theory is based on the assumption of a perfectly competitive labour market, and usually decompose training into general or specific according to whether acquired skills are portable or not across firms. The theory also predict who (firms or workers) would finance and receive the returns of general vs. specific training

However, more recently, new theoretical developments have challenged this framework and helped explain some aspects at odds with human capital theory (i.e. firms financing general training, no evidence of wage cuts during training).

Literature on the effect of training on productivity

1. Direct test through the estimation of a production function.
Requires firms' data on value added and/or turnover.
 - Ichniowski, Shaw and Prennushi (1997), Black and Lynch (2001), Dearden et al., (2006), Göbel and Zwick (2010), Heywood et al. (2010) find a **positive** effect of training
2. Indirect test through the estimation of training effect on workers' wages
 - **Positive** effect for the **US**: Lynch (1992) Loewenstein and Spletzer (1998), Parent (1999), Veum (1995) and Frazis and Loewenstein (2005)
 - **Positive** effect for the **UK**: Booth (1991), Booth (1993), Blundell et al. (1996, 1999), Arulampalam and Booth (2001)
 - **Positive** effect for **Norway** (Shone 2004), **Switzerland** (Gerfin 2004), and **Portugal** (Budria and Pereira, 2007)
 - **Unclear** effects for **Germany** (Piske 2001, Mühler et al. 2007, Kuckulenz and Zwick 2004) and **France** (Maurin 2000, Fougère et al. 2001)
 - Prevalence of **positive** effects in cross-country analyses (OECD 1999, Bassanini et al. 2007, Ok and Tergeist 2003)

Our focus on older workers

From theory = i) lower training incidence; ii) lower returns to training

Empirical evidence specifically on older workers is scarce as it is mostly singled out from general population analyses and often restricted to age ≤ 55 .

The incidence (and return) of training is often found to decrease with age (e.g. Dostie and Leger 2011, Zwick 2011, Bassanini et al. 2007 Warr and Fay, 2001).

Provided explanations:

- Training is less effective for older because it's not tailored (Gobel and Zwick 2010, Zwick 2011).
- Managers believe that older employees are less able or willing to learn (Warr and Birdi 1998).
- Institutional barriers (e.g. early retirement schemes Fouarge and Schils 2009)

Our paper is the first at looking explicitly at the impact of training on older workers' productivity (wages) in an internationally comparable setting

Data 1/2

We use data from the “Survey of Health, Ageing and Retirement in Europe” (SHARE). www.share-project.org

SHARE started in 2004 and is a multidisciplinary, cross-national bi-annual household panel survey. The target population consists of individuals 50+, plus their spouses or partners irrespective of age.

The questionnaire includes individual and household characteristics, ranging from physical, mental and psychological health to socio-economic status, from housing to social support and expectations for the future.

Four waves of SHARE are currently available, covering 12 (first wave) to 17 (fourth wave) European countries.

The common questionnaire and interview mode, and the standardization of procedures ensure cross-country comparability (Börsch-Supan, and Jürges 2005).

Data 2/2

Some data limitations force us to use only wave1 and 2 of SHARE

Training variable in SHARE

Activities in last MONTH: Attended an educational or training course (wave 1 and wave 2)

Activities in last YEAR: Attended an educational or training course (wave 4)

Wage variable in SHARE

Hourly net wage (taken home payment, net of tax, national insurance, pension and health contributions) computed from **last taken home payment**, **frequency of payments** and **hours worked** in a week

Available ONLY for wave 1 and wave 2



We exploit the panel structure of SHARE to measure the impact of training undertaken in wave 1 on the hourly wage reported in wave 2 (one to three years later)

The empirical strategy

$$\log(w_{it}) = x'_{it}\beta + \tau_{it-1}\gamma + \varepsilon_{it} \quad (1)$$

where:

$\log(w_{it})$ is the log of weekly wages of individual i at time t

x is a vector of exogenous demographic and job-related individual's characteristics (age, gender, education, tenure, sector, occupation, country, year of interview)

τ is a dummy variable equal to one if individual i participated to any training activity at time $t-1$

ε is a random term

 Endogeneity of τ

Given the data limitations described in previous slides a fixed effects panel data model to get rid of individual unobserved heterogeneity (e.g. «ability») cannot be estimated. We apply IV estimation

IV strategy

Instrumental variable: “Frequency in attending activities (excluding training) over the last 4 weeks”.

Sum of different **activities** (done voluntary or charity work; provided help to friends or neighbors; gone to a sport, social or other kind of club; taken part in activities of a religious organization; taken part in a political or community-related organization) weighted by the **frequency** in attending them (almost daily; almost every week; less often; never)

Rationale: classify individuals according to their “activism”: those more active and lively are more likely to participate also to training activities.

Villar and Cedran (2013) show on a Spanish sample that older people participating to training activities have an higher likelihood of being involved in cultural and social activities.

Descriptive 1/2

Equation (1) is estimated on a panel composed by SHARE wave 1 and wave 2 of employees receiving positive wage and working 15-70 hours per week in 11 countries (AT, SE, NL, ES, IT, FR, DE, EL, CH, BE)

Sample of 2312 individuals, 17.8% receiving training

Log weekly wage
distribution by training
status



Descriptive 2/2

| Variable | Untrained workers | | Trained workers | |
|---|-------------------|-----------|-----------------|-----------|
| | Mean | Std. Dev. | Mean | Std. Dev. |
| Log of weekly wage | 2.48 | 0.45 | 2.68 | 0.42 |
| Log of tenure | 2.84 | 0.91 | 2.93 | 0.88 |
| Female | 0.43 | 0.50 | 0.55 | 0.50 |
| Age | 54.89 | 3.63 | 54.45 | 3.30 |
| Public sector | 0.22 | 0.42 | 0.28 | 0.45 |
| Education | | | | |
| No education (ISCED 0) | 0.02 | 0.15 | 0.01 | 0.07 |
| Primary and lower Secondary education (ISCED 1-2) | 0.28 | 0.45 | 0.09 | 0.29 |
| Upper and post-Secondary education (ISCED 3-4) | 0.40 | 0.49 | 0.39 | 0.49 |
| Tertiary education (ISCED 5-6) | 0.29 | 0.46 | 0.51 | 0.50 |
| Frequency in attending activities over the last 4 weeks | 1.40 | 1.73 | 2.07 | 2.04 |
| Number of observations | 1901 | | 411 | |

Results 1/2

| VARIABLES | (i) OLS Dep. Variable= log weekly wage |
|--|---|
| training | 0.0648*** (0.0213) |
| log tenure | 0.0672*** (0.00873) |
| female | -0.167*** (0.0163) |
| public | -0.0635*** (0.0198) |
| age-50 | 0.0174*** (0.00567) |
| (age-50)^2 | -0.00170*** (0.000427) |
| No education (ISCED 0) | -0.274*** (0.0554) |
| Primary and lower Secondary education (ISCED 1-2) | -0.223*** (0.0261) |
| Upper and post-Secondary education (ISCED 3-4) | -0.161*** (0.0202) |
| Observations | 2,312 |
| R-squared | 0.431 |

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
 Estimation includes also sector, occupation, country and year of interview dummies

Results 2/2

| VARIABLES | (i) | (ii) | (iii) |
|--|--|---|-----------------------------------|
| | OLS Dep. Variable= log weekly wage | Instrumental Variables Dep. Variable= participation into training | Dep. Variable= log weekly wage |
| training | 0.0648*** (0.0213) | | 0.0919 (0.137) |
| log tenure | 0.0672*** (0.00873) | 0.0074 (0.008) | 0.0670*** (0.00870) |
| female | -0.167*** (0.0163) | 0.028* (0.016) | -0.168*** (0.0166) |
| public | -0.0635*** (0.0198) | -0.0349* (0.019) | -0.0627*** (0.0200) |
| age-50 | 0.0174*** (0.00567) | -0.0042 (0.006) | 0.0176*** (0.00566) |
| (age-50) ² | -0.00170*** (0.000427) | -0.0001 (0.000) | -0.00170*** (0.000423) |
| No education (ISCED 0) | -0.274*** (0.0554) | -0.0586 (0.054) | -0.273*** (0.0554) |
| Primary and lower Secondary education (ISCED 1-2) | -0.223*** (0.0261) | -0.0738*** (0.025) | -0.221*** (0.0278) |
| Upper and post-Secondary education (ISCED 3-4) | -0.161*** (0.0202) | -0.0284 (0.020) | -0.161*** (0.0203) |
| participation to activities | | 0.0333*** (0.004) | |
| Observations | 2,312 | | 2,312 |
| R-squared | 0.431 | | 0.430 |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Estimation includes also sector, occupation, country and year of interview dummies

Discussion on the potential endogeneity of training

- Standard test for endogeneity do not reject the null hypothesis that the training variable is exogenous

Durbin (score) $\chi^2(1) = 0.040$, $p = 0.84$

- More productive workers sort into training?**

1. Estimation of the wage equation on wage pre-training

| ----- | ----- | ----- | ----- | ----- |
|-----------------|-----------------|-----------------|-------------|--------------|
| lwage_w1 | Coef. | Std. Err. | t | P> t |
| -----+----- | ----- | ----- | ----- | ----- |
| training | .0433251 | .0407908 | 1.06 | 0.288 |
| ltenure | .0657386 | .017578 | 3.74 | 0.000 |
| female | -.1965622 | .0314201 | -6.26 | 0.000 |
| public | -.0697643 | .0381309 | -1.83 | 0.067 |
| age_50 | .0098167 | .0112178 | 0.88 | 0.382 |
| age50_2 | -.0015436 | .0008602 | -1.79 | 0.073 |
| isced_c11 | -.2882323 | .113616 | -2.54 | 0.011 |
| isced_c12 | -.2106271 | .051257 | -4.11 | 0.000 |
| isced_c13 | -.1102246 | .0399871 | -2.76 | 0.006 |

Number of obs = 2021

F(41, 1979) = 10.13 ***

Discussion on the potential endogeneity of training

- **More productive workers sort into training?**

2. Inclusion of cognitive abilities

Indicator of cognitive ability = Average of numeracy skills, verbal fluency and ability to recall a list of words. The indicator ranges 0-10

| VARIABLES | (i) | (ii) | (iii) |
|-----------------------------|--------------------------------------|--|--------------------------------------|
| | OLS | Instrumental Variables | |
| | Dep. Variable= log weekly wage | Dep. Variable= participation into training | Dep. Variable= log weekly wage |
| training | 0.0579*** (0.0212) | | 0.0339 (0.139) |
| cognitive ability | 0.0302*** (0.00725) | .09226 (.0576) | 0.0303*** (0.00726) |
| participation to activities | | .03253*** (.0044) | |
| Observations | 2,292 | | 2,292 |
| R-squared | 0.440 | | 0.444 |

Robustness checks

MOTIVATION to training:

1. To meet other people
2. To contribute something useful
3. Because I am needed
4. To earn money
5. To use my skills or to keep fit (70% of training obs.)

| lwage | Coef. | Std. Err. | t | P> t |
|-----------------|----------------|-----------------|-------------|--------------|
| training | .047042 | .0222494 | 2.11 | 0.035 |
| ltenure | .0654782 | .0087819 | 7.46 | 0.000 |
| female | -.1629214 | .0164469 | -9.91 | 0.000 |
| public | -.0594219 | .0199984 | -2.97 | 0.003 |
| age_50 | .0169137 | .0056835 | 2.98 | 0.003 |
| age50_2 | -.0016482 | .0004273 | -3.86 | 0.000 |
| isced_cl1 | -.2665571 | .0553824 | -4.81 | 0.000 |
| isced_cl2 | -.2140673 | .0263528 | -8.12 | 0.000 |
| isced_cl3 | -.155796 | .0204302 | -7.63 | 0.000 |

Number of obs = 2263
 F(41, 2221) = 40.52 ***

Robustness checks

ALTERNATIVE instruments tested: having a second job; marital status; presence of children; training at younger ages (from SHARELIFE); expected retirement age; replacement ratio

Problem of low sample size and high s.e. especially when using SHARELIFE

Unfeasible instruments: supply side (firm-level) variation in training; pre-training individual and job characteristics; personality traits.

Conclusion

For employees 50+ residing in one the eleven analyzed European countries taking training increases wages in the short-term by about 4.5% - 6.5%.

This return is comparable to moving from primary to lower secondary education and comparable to what already found in literature.

With the data at our disposal, however, we cannot rule out the possibility that return to training is overestimated, due to unobserved individual heterogeneity.

Our analysis is restricted to the effect on wages. Literature has shown that training may be more beneficial on other measures of performance of older workers like employability, early retirement, job security than wages. Such questions remain open for future research.