



## Full length article

## Ageing and the skill portfolio: Evidence from job based skill measures



Audra J. Bowlus, Hiroaki Mori, Chris Robinson\*

Department of Economics, Social Science Centre, University of Western Ontario, London, Ontario N6A 5C2, Canada

## ARTICLE INFO

## Article history:

Available online 2 March 2016

## Keywords:

Ageing  
Skills  
Human capital

## ABSTRACT

The evolution of human capital over the life-cycle, especially during the accumulation phase, has been extensively studied within an optimal human capital investment framework. Given the ageing of the workforce, there is increasing interest in the human capital of older workers. The most recent research on wage patterns has adopted a new multidimensional skills/tasks approach. We argue that this approach is also well suited to the investigation of the evolution of the human capital of older workers. There is clear evidence that the typical concave Ben-Porath shape for a wage based single dimension human capital measure masks different shapes for the individual components in a multi-dimensional skill portfolio. Not all components evolve in the same way over the life-cycle. Some components of the skill vector are particularly sensitive to ageing effects for older workers, but this sensitivity is underestimated using occupation level rather than individual level skill observations. The evidence suggests that workers can and do adjust their skill portfolios in various ways as they approach retirement and that the decline in skills is not purely driven by selection.

© 2016 Elsevier B.V. All rights reserved.

## Introduction

The evolution of human capital over the life-cycle has been extensively studied within an optimal human capital investment framework. The focus, however, has mainly been on the path of human capital investments in the accumulation phase. Given the ageing of the workforce, there is increasing interest in the human capital of older workers. The most recent research on wage patterns and human capital in the accumulation phase has adopted a new multidimensional skills/tasks approach.<sup>1</sup> We argue that this approach is also well suited to the investigation of the evolution of the human capital of older workers. Workers adjust what they do in the workforce as they age. This adjustment takes various forms, and may be in response to a variety of influences. A multidimensional skills/tasks framework is well suited to gain a deeper understanding of this process.

Depreciation has not been a major focus in conventional life-cycle human capital models which often assume a constant rate for homogeneous (at least within education group) human capital. However, evidence from various disciplines suggests that the components of a multidimensional vector of skills do not all depreciate at the same rate.<sup>2</sup> General ageing effects as well as specific health

issues may differentially affect different components of a worker's skill vector. This likely influences how the skill portfolio of older workers evolves, both in a mechanical sense of the actual depreciation and in the optimal behavior sense of what investments will be made to maintain or change skills as workers age. In addition, there is increasing evidence of partial retirement that appears to involve changes in the skill vector from that used in the jobs held for much of the worker's career into a different portfolio of skills associated with the jobs held in partial retirement.<sup>3</sup> All these adjustments workers make as they age have wage consequences, but to understand the sources of the wage path requires an understanding of the evolution of the worker's human capital during this phase.

This paper makes four contributions. First, it constructs and uses multidimensional skill portfolio measures similar to those developed in the multidimensional skills/tasks framework literature to contrast the evolution pattern in the (net) de-cumulation phase with the pattern in the higher investment accumulation phase. These measures are obtained from estimates of a low dimension portfolio of skills based on analyst ratings of job based skills and tasks in the Dictionary of Occupational Titles (DOT). The measures are then assigned to workers in the monthly Current Population Surveys (CPS) and their age profiles are examined for workers from a wide range of birth cohorts. While it is informative to contrast the path of these skill "types" for older workers with

\* Corresponding author. Tel.: +1 519 661 2111x85047.

E-mail addresses: [abowlus@uwo.ca](mailto:abowlus@uwo.ca) (A.J. Bowlus), [hmori@uwo.ca](mailto:hmori@uwo.ca) (H. Mori), [robinson@uwo.ca](mailto:robinson@uwo.ca) (C. Robinson).<sup>1</sup> See, for example, Acemoglu et al. (2011) and Yamaguchi (2012).<sup>2</sup> See Desjardins et al. (2012).<sup>3</sup> See Ruhm et al. (1990).

that for younger workers, they were not specifically constructed to allow for a focus on the later part of the working life where depreciation, the relative costs of maintaining specific skills and general ageing effects on these skills may be particularly important. The second main contribution of the paper is to examine other skill portfolio measures from the UK Skills Survey that may be more readily linked to ageing issues, and to use them to improve our understanding of the influence of these issues on the evolution of human capital at later ages.

The primary measures of job based skills (or tasks) used in this paper, as in most of the previous literature, are constructed from a data source (DOT), that records skill data at the job or occupation level, not at the individual level. As a result, all individuals coded into the same occupation have to be assigned the same skill portfolio based on these measures. For an analysis of ageing, or a more general life-cycle analysis this is a potentially serious drawback since the only way an individual can be observed changing their skills is by changing their occupation. The third main contribution of the paper is to use the individual level data in the UK Skills Survey to assess the importance of this problem.

An important question that cannot be addressed with the observed age patterns from the cross section data in the UK Skills Surveys or from the cohort analysis of the working population using the CPS data is the extent to which these patterns are due to continuing labor force participants adjusting their skill portfolios and how much to selection on the type of workers that tend to stay longer in the labor market. The final contribution of the paper is the use of panel data to provide evidence on this question.

The outline of the paper and a preview of the results are as follows. Section “Measures of human capital or skills” discusses the alternative approaches to measuring human capital or skills for life-cycle analysis. Standard approaches use efficiency units methods based on a combination of mainly wage data and education and experience measures. The jobs based approach uses measures of skills or tasks used on the job obtained either from analyst ratings of the skills or tasks, as in the DOT, or from self reports from surveys of employees, as in the UK Skills Surveys or the German Qualification and Career Survey (GQCS). The DOT based skill portfolio measures constructed in this paper are related to the earlier literature, especially [Poletaev and Robinson \(2008\)](#). This section also includes a discussion on the interpretation of the measures as skill portfolios.

In Section “Life-cycle skill profiles” life-cycle human capital profiles using both wage based methods and job based methods are estimated and compared. The profiles using wage based methods follow [Bowlus and Robinson \(2012\)](#). These represent the evolution of a single dimension skill or human capital “type” within each education group. These profiles are contrasted with the individual components of estimated life-cycle multi-dimensional job based skill portfolios for the same education groups. We find clear evidence that the typical concave Ben-Porath shape for a wage based single dimension human capital measure masks different shapes for the individual components in a multi-dimensional skill portfolio. Not all components evolve in the same way over the life-cycle and the patterns are different by education. The component designed to measure cognitive-analytic skills has a relatively rapid upward path at early ages for all groups after which it slows down. For all but college graduates there is a substantial decline over the life-cycle in the component designed to measure fine motor skill, beginning relatively early in the career. This is a relatively abundant skill for the non-college group so that this early decline may have important implications for the wage path for these groups. There are also cohort effects that show shifts typically towards a component designed to measure strength related skills and away from fine motor and cognitive-analytic skills for the non-college group in recent cohorts.

The measures for the multidimensional job based skill portfolios derived in Section “Measures of human capital or skills”, following the previous literature, were not specifically designed to capture features of ageing. Section “Detailed age related skills measured at the worker level” examines three detailed skills in the UK Skills Survey that show strong age patterns. An important difference in the skill measures in the UK Skills Survey is that they are available at the individual worker level. This provides an opportunity to at least partially address a significant shortcoming in the analysis of Section “Life-cycle skill profiles” and, more generally, in much of the previous literature based on the DOT in which the skill portfolio has to be assigned to the workers on the basis of their three digit occupation code. This rules out, for example, a lawyer being observed to increase (or decrease) their skills at different points in the life-cycle if they are always coded into a single “lawyer” occupation code. It does not allow for any variation in the portfolio within occupation code, for example, by age. Thus, any adjustment a worker may make to their skill portfolio at later ages within an occupation to deal with differential rates of depreciation of the individual components cannot be observed. Using the UK Skills Surveys, age patterns are examined using both the individual worker level skill data and using skills assigned to the worker based on their occupation code. The results show that for some of potentially age sensitive skills an observed large decline towards the end of the life-cycle observable at the individual level data cannot be picked up when skills are assigned on the basis of occupation as in studies using the DOT.

The analysis in Sections “Life-cycle skill profile” and “Detailed age related skills measured at the worker level” uses large data sets on synthetic cohorts (CPS) or cross sections (UK Skills Surveys), and shows clear patterns of changes in the balance of the components of a multidimensional skill portfolio as workers age. However, because of the pattern of declining participation at later ages there remains the issue of how much the patterns observed in Sections “Life-cycle skill profile” and “Detailed age related skills measured at the worker level” is due to continuing participants adjusting their skill portfolios and how much to selection on the type of workers that tend to stay longer in the labor market. One possibility is that skill portfolios are hard to adjust and workers with those skills that depreciate more rapidly with age retire earlier. An alternative is that workers can adjust their skill portfolios in various ways to minimize any negative consequences on their overall productivity or earnings. This issue is examined in Section “Skill portfolio adjustment and selective retirement”.

Section “Skill portfolio adjustment and selective retirement” first presents estimates of the participation rates at each stage of the life-cycle for males and females, and by education level. For males, in the earlier and mid-career periods of accumulation of human capital there is little potential for significant selection effects. After 60 the potential for selection effects is significant for all education groups. This is true for all birth cohorts observed in the data. For females, as has been well documented in the previous literature, the picture is a lot more complicated. Section “Skill portfolio adjustment and selective retirement” then examines the relative importance of the participation margin on the observed age patterns for skills using the National Longitudinal Survey of Older Men (NLSM) panel, part of the NLS Original Cohort project. The evidence indicates that workers can and do adjust their skill portfolios in various ways as they approach retirement and that the decline in skills is not purely driven by selection. Finally Section “Discussion and conclusion” provides some discussion and conclusions.

### Measures of human capital or skills

In the original Ben-Porath model of optimal life-cycle investment, human capital is general and homogeneous. In [Heckman et](#)

Download English Version:

<https://daneshyari.com/en/article/957819>

Download Persian Version:

<https://daneshyari.com/article/957819>

[Daneshyari.com](https://daneshyari.com)