



Harsh occupations, life expectancy and social security[☆]



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ARTICLE INFO

Article history:

Received 17 November 2015

Received in revised form 29 May 2016

Accepted 31 May 2016

Available online 14 June 2016

JEL classification:

H21

H55

Keywords:

Longevity

Retirement

Harsh occupations

Tagging

ABSTRACT

Should pension provisions differ by occupation? We study the optimality of allowing the pension policies to differ by occupation when individuals differ in longevity and occupation, longevity is private information but occupation is observable. There is a case for differentiating the pension policy by occupation when longevity is (imperfectly) correlated with occupation. The short-lived workers in the safe occupation are however made worse-off, more so when the social objective includes a higher social weight on short-lived individuals to redress the implicit bias towards long-lived that the unweighted utilitarian objective entails. The maximin criterion ensures equal utility for short-lived workers regardless of occupation but those in the safe occupation consume the most when young, the least when old and retire the earliest. This is achieved by taxing – often quite heavily – their savings and their earnings from prolonged activity.

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1. Introduction

Social security systems are under increased fiscal pressure due to the impact of population ageing. With increasing life expectancies it seems reasonable to expect individuals to work longer. In recent years many countries have increased the legal age of retirement and other countries are considering doing so.¹ The chances of reaching and living retirement in good health differ however significantly among individuals. Sanzenbacher et al. (2015) find that, even

though life expectancies at 65 have indeed increased for all levels of educational attainment in the last decades in the US, the gains have been much greater for those in the top quartile, widening the life expectancy gap. Most studies that try to assess life expectancy differentials focus on educational background. Cambois et al. (2011) argue, however, that occupation is the relevant criterion in the debate concerning the age of retirement. They accordingly compute life-expectancies and health-expectancies at 50 and 65 for different occupational categories and find relatively large inequalities. For instance, 50 year old male workers in manual occupations can expect to live on average 5 years less than those in highly-qualified occupations. In this paper we study the optimality of allowing the pension policies, and in particular the retirement age, to differ by occupation.

Special pension provisions are indeed a feature of many OECD economies and are the subject of an on-going public policy debate. As many as 18 OECD member countries have special pension schemes. Zaidi and Whitehouse (2009) discuss their incidence, structure and justification. They mention that such provisions have historically been justified on the grounds that individuals in hazardous jobs, such as underground mining, merit special treatment because this type of work reduces life expectancy, thus shortening the time during which retirement benefits can be enjoyed. They highlight that the most

[☆] This research was supported under Australian Research Council's Discovery Projects funding scheme (project number DP130103580). We are very grateful to two anonymous referees and the Editor of the journal for their helpful suggestions. We are also grateful to Marc Fleurbaey, Laurence Jaquet and Etienne Lehmann for comments and suggestions. We also thank participants at the Workshop on the Economics of Taxation, the XXI Encuentro de Economía Pública, the special session on "Equity, Pensions, Death" of the 2014 Social Choice and Welfare Meetings, the Public Economic Theory 2015 conference, as well as the NATSEM, NILS, Curtin University and La Trobe University seminar series, for their comments. Errors remain ours.

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¹ Several papers have evaluated the effects of such reforms - see recent contributions by Bielecki et al. (2016), Mao et al. (2014), and Sánchez Martín (2010).

common form is that of a collective concession, where a whole sector (such as underground mine workers, sailors, airline workers and artists) is granted a special treatment in the calculation of pensions and thus provisions towards early retirement.

If longevity and occupation were perfectly correlated (i.e. if all individuals in a given occupation had the same life expectancy) it would suffice to have a single special pension policy for each occupation. Unfortunately, in reality, administrators are unable to observe each individual's longevity and the correlation between longevity and occupation fails to be perfect. In this paper we accordingly study the optimal design of pension schemes in an asymmetric information framework. Individuals differ in longevity and occupation. Longevity is private information but is (imperfectly) correlated with occupation, which can be observed.

The public economics literature has not delved much into the relationship between occupation, longevity and retirement. Previous contributions have explored the link between disability and retirement. Cremer et al. (2004, 2007) study the design of optimal social security schemes when disability is not readily observable. They use two devices to elicit information on disability: costly disability tests and self-selection. A downward distortion on retirement age (i.e. earlier retirement) for those who claim to be disabled is shown to play a role in preventing healthy workers from mimicking disabled ones when disability is not observable. Cremer et al. (2007) show that this downward distortion on retirement age can be partially relaxed by introducing error-proof but costly disability tests. In a recent paper Pestieau and Racionero (2016) extend Cremer et al. (2007) by incorporating occupations, and assuming imperfect correlation between disability and occupation. They explore the possibility of differentiating the social security policy by occupation, and compare the results with those achieved with disability tests. Their numerical simulations illustrate that tagging by occupation is preferred to testing when the audit technology is relatively expensive and/or the ratio of disabled to healthy workers markedly differ across occupations.

In this paper we abstract from tests and focus on differential longevity instead of differential health status. The distinction is not innocuous. We show that the utilitarian social objective induces redistribution from short- to long-lived individuals in our setting with differential longevity. This was not the case with differential health status, where the utilitarian objective implied redistribution from healthy to disabled individuals. In order to partially redress the implicit bias towards long-lived individuals that the unweighted utilitarian objective entails, we explore the implications of increasing the social weight on the short-lived individuals.

We adopt a simple setting with two periods. During the first period, of identical length for all, the individuals work, consume and save. During the second period, of uneven length depending on longevity, individuals work, retire and consume the sum of their earnings in second period, their savings and public pension benefits (if any). To make the presentation simple, we assume that there are only two occupations and two longevity types. Each worker learns their longevity type during the first period, with a higher proportion of individuals learning that they are short-lived in the harsh occupation. We make the reasonable assumption that the disutility of prolonged activity in the second period is inversely related to longevity. In other words, a worker who expects a shorter life has a higher disutility from delaying retirement than one with a longer life expectancy. We employ an optimal non-linear taxation approach: i.e. we identify the optimal bundle of consumption in both periods and retirement age for each type of individual, and show how the optimal solution can be implemented via a non-linear tax/transfer scheme.

We consider two second-best problems: in the first case the social security policy is constrained to be the same across occupations (i.e. special pension provisions for harsh occupations are ruled out); in the second case tagging by occupation is allowed. We show that short-lived workers face marginal distortions on savings and

prolonged activity: they are induced to consume more when young than when old and to retire earlier. When the pension policies are allowed to differ by occupation the distortions are larger for the short-lived workers in the safe occupation. We also show that an increase in the social weight on short-lived individuals can make short-lived workers in the safe occupation worse off, particularly if the proportion of short-lived individuals in the safe occupation is sufficiently small. The combination of tagging and increased social weight on short-lived individuals harms the short-lived workers in the safe occupation. This result suggests that tampering with the social weight placed on short-lived individuals is a rude instrument to correct for the implicit bias towards long-lived when pension policies are allowed to differ. The maximin objective ensures that short-lived workers achieve the same utility regardless of occupation but this is achieved with relatively large distortions on short-lived workers in the safe occupation: they consume the most in the first period, the least in second period and retire the earliest (earlier than the short-lived workers in the harsh occupation).²

For most of the paper we assume that the wage is the same in both occupations and that the occupation is given. The equal wage assumption allows us to focus on the differential longevity aspect and abstract from the standard redistribution associated with heterogeneous wages. In the real world, however, wages may differ by occupation. Accordingly, we discuss the implications of allowing the wages to differ across occupations. Also, the resulting policies in the benchmark model imply in general expected utility differences across occupations. We explore the consequences of imposing equality of expected utility across occupations. This constraint ensures that the optimal policy does not favour any particular occupation.

The rest of the paper is organized as follows. In Section 2 we present the model and the laissez-faire outcome. In Section 3 we derive the first-best benchmark solution for a weighted utilitarian social objective. In Section 4 we analyze the second-best asymmetric information problem: first without tagging (i.e. when the social security policy is common across occupations), and then with tagging (i.e. when the social security policy is allowed to differ by occupation). We perform numerical simulations in Section 5 to shed more light on the results. We conclude in Section 6.

2. The model

We consider a society in which individuals differ in longevity and occupation. The longevity, represented by ℓ_i , is private information. We assume that individuals can be either long-lived or short-lived:³ $\ell_L > \ell_S$, where L and S stand for long-lived and short-lived, respectively. The occupation, represented by subscript j ($j = 1, 2$), is observable. n_j stands for the proportion of workers in occupation j and p_j represents the proportion of workers in occupation j that are short-lived. We assume that $p_1 > p_2$. Accordingly, we refer to occupation 1 as harsh and occupation 2 as safe. We take occupation as given and assume that both occupations yield the same wage w . This assumption allows us to focus on the effects of differential longevity on pension schemes and abstract from the standard redistribution associated with heterogeneous wages.⁴

² The results are in the same vein as those of Fleurbaey et al. (2016, 2014) who show that, if one takes an ex post viewpoint, priority should be given to first-period consumption.

³ At the outset all individuals are alike but as time goes by they learn their longevity type.

⁴ In the numerical illustration we explore how the results change when wages are allowed to differ across occupations. We also explore the consequences of imposing equality of expected utility across occupations. This constraint ensures that individuals are ex-ante indifferent between occupations and that it is possible to have workers in both occupations if individuals are allowed to choose. A more detailed occupational choice version will be considered in further research.

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