Journal of Public Economics 127 (2015) 127–136

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

A life cycle model of health and retirement: The case of Swedish pension reform

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ARTICLE INFO

Article history:
Received 28 September 2012
Received in revised form 31 October 2013
Accepted 2 November 2013
Available online 15 November 2013

JEL classification:
E24
J22
J26

Keywords:
Life cycle
Retirement
Pension reform
Disability insurance

ABSTRACT

Sweden is one of the few Western economies to have undertaken a large pension reform in recent years. This was done with great expectations, but little formal analysis. In this paper we develop a life cycle labor supply model to quantify the predicted labor supply implications of this reform. In our framework, individuals choose when to stop working and, given eligibility criteria, when/if to apply for disability and pension benefits. Agents are heterogeneous in skills and receive exogenous shocks to health throughout their life. We find that the new pension system creates large incentives for the continued employment of older workers. This is promising news for countries grappling with pension reform, and indicates that there are significant lessons to be learned from the Swedish case.

1. Introduction

Faced with aging populations and the looming insolvency of social security, governments the world over are grappling with the question of how to reform retirement programs. Understanding how changes to retirement programs affect life cycle labor supply, particularly retirement behavior, is critical for assessing the effects of these changes on allocations, welfare and government finances. Accurate assessments require a model of retirement that captures the key forces underlying retirement decisions. Various institutional features have potentially large implications for the labor supply behavior of older workers; key among them are the design of pension and disability insurance programs. Disability insurance is particularly relevant, as in many countries a large fraction of retirement occurs before the normal retirement age.

In this paper, we construct a life cycle model of labor supply, which enables us to study the interactions between health, disability insurance and old-age retirement. The key features of our framework are that individuals choose when to stop working and, given eligibility criteria, when/if to apply for disability and pension benefits. Agents are heterogeneous in skill and receive exogenous shocks to health throughout their life.

While many countries have come to understand the need for social security reform, Sweden is one of the few countries to have actually undertaken a major pension reform in recent years. While there are big expectations of the reform, to the best of our knowledge no formal analysis of the expected implications of the changes to the pension system exists to date. We use our model to study the labor supply implications of the recent Swedish pension reform and to ask what particular aspects of the reform are driving the results. Our interest in Sweden is in large part spurred by the unique nature of the large changes to social security, but also by some of the distinguishing country characteristics. Much of the existing literature on social security, particularly disability insurance claiming, has focused on the United States. Many of the institutional features in much of Europe, including Sweden, differ drastically from those in the United States.

Sweden is in the process of switching from a pay-as-you-go (PAYG), defined benefit program to a notional, pay-as-you-go, defined contribution plan. The first benefits from the new system were paid out in 2001. But due to the gradual phasing-in of the reform, not until 2040 will all benefits be paid from the new system. One implication of this is that it is difficult to empirically evaluate the effects of the reform. A more structural approach is warranted, which is how we proceed.

There are many issues inherent with the old Swedish pension system, key among them the fact that the pension benefit is based on earnings from only the 15 highest years. Not only does this have the potential to treat workers with equivalent lifetime earnings very unequally, it does not provide incentives for older individuals to remain

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0047-2727/$ – see front matter
http://dx.doi.org/10.1016/j.jpubeco.2013.11.002

employed. In fact, given that wages tend to level off in the 50s, there is no expected increase in pension benefits from continued employment for the majority of older workers. Furthermore, the system is sensitive to demographic change. The new pension scheme hopes to address these issues.

In addition to regular pension, more than 90% of Swedes are covered by so-called occupational pension schemes, which supplement their retirement benefits. The occupational pension system has also undergone major reform in recent times, most notably a transition from a defined benefit to a defined contribution scheme. As part of our analysis, we also model the changes to the occupational pension system.

We find that the Swedish pension reform creates large incentives for older workers to continue working longer. Our main findings are threefold: (1) the model predicts an increase in the average retirement age of 2.5 years from 62.1 to 64.6, (2) this predicted increase is driven exclusively by changes to the regular retirement scheme and not by changes to the occupational pension scheme, in fact the occupational pension reform dampens the labor supply effects of the regular pension reform, and (3) the pension reform has a negligible effect on disability insurance claiming, with the fraction of 60–64 year olds claiming disability declining from 18.9% to 18.3%. To understand the results, consider the incentives for continued employment faced by someone of, say, age 65. Under the old pension system, the net present value of lifetime pension benefits was only marginally higher for someone who continued working past 65 than for someone who stopped at 65. Under the new system, the net present value of lifetime pension benefits for someone who stops working at age 65 is lower than in the old system, but the net present value of lifetime pension benefits increases rather steeply from continued employment. An approximate calculation reveals that these two forces are both important in accounting for the predicted increase in the average retirement age. Only a negligible share of the increase in aggregate labor supply is coming from a decline in disability insurance incidence. While the computation of the disability insurance benefit changes as part of the reform, we find that the net present value of lifetime benefits for someone who goes on disability insurance at, for example, age 50 is roughly the same following the reform. This explains why the model does not predict any significant change in disability insurance claiming.

While reform is oftentimes a slow and painful process, our results regarding the Swedish pension reform suggest that with an appropriately designed carrot-and-stick approach it is indeed possible to reform an ailing pension system. This is good news for the world community at large and indicates that there are significant lessons to be learned from the case of Sweden.

While the focus in the quantitative exercise has been on Sweden, our framework is general in nature and can be used to address a host of policy questions pertaining to retirement. In fact, the development of such a model is an important contribution of the paper.

There is a vast literature on retirement, pertaining to both the claiming of old-age pension benefits and disability insurance. Most of it is centered on the United States.[2] The paper most similar to ours from a modeling standpoint is French (2005). The estimation in French (2005), exploiting micro-data for the U.S. and using a method of simulated moments, is clearly more involved than our approach of exploiting more aggregated data in the calibration. The richness of our framework comes from modeling additional retirement programs not present in his paper, notably disability insurance and occupational pensions. In work developed independently of us, Galaasen (2011) also stresses the importance of including disability insurance when modeling the effects of pension reform.

Our paper also contributes to the literature on the impact of tax and transfer programs on life cycle labor supply. See, e.g., Rogerson and Wallenius (2009), Wallenius (2013). The key distinction between our paper and the aforementioned ones is that we explicitly model disability insurance.

Jönsson et al. (2012) document the prevalence of disability insurance incidence in Sweden, whereas Sundén (2006) and Palmer (2003) document the Swedish pension reform and its intended consequences. These papers are, however, descriptive in nature and do not provide any quantitative analysis of the policy reform. Sundén (2002) studies the ability of the post-reform Swedish pension system to adjust to demographic change. His analysis, however, assumes that retirement is exogenous.

An outline of the paper follows. Section 2 presents the model and the solution method, while Section 3 describes the calibration procedure. Section 4 outlines the quantitative exercise that is carried out in the paper, and Section 5 describes the results from this exercise. Section 6 discusses the robustness of the results. Section 7 concludes.

2. Model

We develop a discrete time life cycle model populated by overlapping generations of individuals. Agents are heterogeneous with respect to skills. We do not model educational decisions. Therefore, model age zero corresponds to age 25 in the data. A model period is a year, and individuals live for 56 periods with certainty. Furthermore, individuals are endowed with one unit of time each period.

Letting a denote model age, an individual of skill type s has preferences over sequences of consumption (c), labor supply (l) and health (h) given by:

$$\sum_{a=0}^{55} \beta^a \left[\ln\left(c_{a,s}\right) - b\left(h_{a,s}\right) l_{a,s} + h_{a,s} \right], \tag{1}$$

where β is the discount factor. Preferences are assumed to be separable and consistent with balanced growth, thereby dictating the $\ln(c)$ choice. We assume that the disutility from working is health dependent.[3] Specifically, working is more unpleasant the worse the health of an individual. Additionally, the health of an individual enters directly in the utility function.

Following the OECD self-assessed health measure, health is discretized into five states: very good, good, fair, bad and very bad. All individuals start out in very good health. Health evolves exogenously according to the following law of motion:

$$h_{a+1,s} = h_{a,s} + \varepsilon^h_{a,s}. \tag{2}$$

$\varepsilon^h_{a,s}$ is an exogenous shock to health. We allow the shock to assume both positive and negative values. A positive health shock captures the fact that health status can improve following a negative shock to health. The probability of the health shock is age- and health-dependent.[4]

Each period there are markets for consumption, labor and capital. Let r denote the interest rate and $w_{a,s}$ the exogenous age-varying wage

[2] See for example Gustman and Steinmeier (1986), Pozzebon and Mitchell (1989), Stock and Wise (1990), Berkovec and Stern (1991), Rust and Phelan (1997), French (2005), Gruber and Wise (2004), Gruber and Wise (2009), Coile and Gruber (2007), Coile and Levine (2007), Low et al. (2010), Laun (2012), French and Song (2009).

[3] This is an alternative to assuming that productivity, or the wage, is health dependent. Both result in a distribution of retirement ages. French (2005) finds that there is surprisingly little difference in the wages of healthy and unhealthy individuals. This observation appears to hold for Sweden as well.

[4] In a working paper version of this paper, Laun and Wallenius (2012), we have a specification with endogenous health but no skill heterogeneity, where agents can partially insure against negative health shocks through monetary investments in health. In that specification, health is similar to human capital (see, e.g., Hougaard Jensen et al., 2004). The results are very similar to those presented here.