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Retirement, home production and labor supply elasticities

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ABSTRACT

A standard life cycle model with home production implies a tight relationship between key preference parameters and the changes in time allocated to home production and leisure at retirement. We derive this relationship and use data from the ATUS to explore its quantitative implications. The key finding is that the intertemporal elasticity of substitution for leisure and the elasticity of substitution between time and goods in home production are approximately equal, in contrast to what is commonly assumed.

1. Introduction

Labor supply elasticities are critical for many analyses, including, for example, business cycles and optimal tax policy. Two key determinants of labor supply elasticities are an individual's willingness to substitute leisure over time, and an individual's willingness to substitute between home and market produced goods. To fix ideas, consider an individual with period utility function of the form:

$$u(ag_t^{1-1/\eta}+(1-a)h_{nt}^{1-1/\eta})+\alpha l_t^{1-1/\gamma}$$

where g is expenditure on goods, h_n is time spent in home production, and l is leisure. In this specification these two elasticities are constant and equal to the parameters γ and η, respectively.

The literatures that structurally estimate these two elasticity parameters exist independently of each other, in the sense that papers that estimate one of them do not have anything to say about the other. While there are issues in each literature, applied work often adopts values around $\gamma=.40$ and $\eta=2.00$, on the grounds that these are supported by the available empirical evidence. This paper derives a simple relation that links the values of these two key structural parameters to the changes in time use and consumption expenditure at retirement. When evaluated using data from the American Time Use Survey (ATUS) we find that it is inconsistent with these commonly adopted values of γ and η. Specifically, our benchmark specification implies that these two values are roughly equal, so that either γ is much larger than 0.4, or η is much smaller than 2.0.

The expression that delivers this implication is robust to many aspects of the economic environment. For example, one need not make assumptions about human capital accumulation while working, credit constraints when young, restrictions

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on choices of working hours, or how to interpret wage payments. Many standard procedures for identifying these structural parameters are known to be sensitive to each of these aspects.[1] The presence of a home production decision is critical in this analysis: absent a home production margin, all of the increased time available at retirement necessarily goes to leisure, and this is independent of the individual's willingness to substitute leisure over time.

Beyond the implications for the values of two key preference parameters, we note two other contributions of our analysis. First, it shows how behavior at retirement, even when it takes the form of a discrete jump from full time work to no work can be used to generate information about parameters that dictate marginal responses. Second, because it studies behavior in a different context (i.e., retirement) from which many previous estimates of γ and η are derived, the analysis constitutes an important validation exercise. Such a validation exercise is especially relevant for preference parameters that shape labor supply elasticities precisely because many of the issues noted above have generated controversy regarding estimates of γ. Our general method can potentially be applied to other settings, for example, looking at how workers who move from employment to unemployment allocate the time previously allocated to market work.

This paper is directly related to the two literatures that provide estimates of γ and η. Key papers from these literatures are summarized in Section 4. By virtue of using data on retirement to learn about preference parameters that shape labor supply elasticities, this paper is perhaps most related to Rogerson and Wallenius (2013). However, although both papers focus on retirement as a source of information, the underlying sources of identification are very different. In Rogerson and Wallenius (2013), there is no home production, and inference is based on the requirement that the retirement decision is optimal, i.e., that individuals optimally choose to adjust annual hours worked from around 2000 to zero despite the presence of intermediate options. In contrast, this paper does not base any inference on the optimality of the retirement decision per se, but instead focuses on how time is allocated between leisure and home production conditional on a worker transiting from full time work to no work. In a model with home production, the changing time allocation between leisure and home production provides information on preference parameters without requiring that the retirement decision is optimal.

An outline of the paper is as follows. Section 2 specifies a simple model of choices before and after retirement and derives the key equation linking changes in allocations at retirement to the ratio of the two key elasticity parameters. Section 3 presents data from the ATUS and characterizes the typical changes in allocations that accompany retirement. Section 4 uses these estimates to explore the implications for the two elasticity parameters, and Section 5 considers how health and income shocks affect our conclusions. Section 6 considers two extensions and Section 7 concludes.

2. Retirement in a life cycle model with home production

Consider an individual who lives for a_T periods and has preferences over sequences of consumption (c) and leisure (l) at each age a given by:

$$\sum_{a=0}^{a_T} \beta^t \left[u(c_a) + \frac{\alpha}{1-\frac{1}{\gamma}} l_a^{1-1/\gamma} \right] \tag{1}$$

where u is strictly increasing, strictly concave and twice continuously differentiable, and $\gamma > 0$.[2] The functional form for the utility from leisure is a commonly used specification and the parameter γ will be one focal point of our analysis. In the spirit of Becker (1965), home production is included and it is assumed that c_a is an aggregate of market purchased goods (g_a) and home production time (h_{na}). Following much of the literature, a CES aggregator is assumed:

$$c_a = \left[\theta g_a^{1-1/\eta} + (1-\theta) h_{na}^{1-1/\eta} \right]^{(\eta/\eta-1)}. \tag{2}$$

where η is the elasticity of substitution between time and goods. Following Gronau (1977), this specification distinguishes between leisure and working time, so that $l_a = 1-(h_{ma}+h_{na})$, where the total time endowment has been normalized to unity and h_{ma} is time devoted to market work at age a.

Our analysis focuses on how time allocation and expenditure change at the time of retirement, assuming that retirement occurs. Rogerson and Wallenius (2013) argue that the dominant form that retirement takes in the data is an individual moving from full time work to no work, so we focus on this type of transition and use the term “retirement” to specifically refer to this type of transition.

Consider an individual who retires at age a_R, i.e., moves from full time market work at age a_R-1 to no market work at age a_R. The key equation to be derived will depend only on choices made at ages a_R-1 and a_R, and as a result it is not necessary to specify much of the detail concerning the evolution of variables over the life cycle prior to this point and the various

[1] See Imai and Keane (2004) and Wallenius (2011) regarding human capital accumulation, Domeij and Floden (2006) regarding credit constraints for younger workers, Chang and Kim (2006) and Rogerson (2011), regarding restrictions on working hours, and Ham and Reilly (2013) regarding the effect of implicit contracts.

[2] This specification abstracts from mortality risk. As is well-known, mortality risk produces an effective discount factor that differs from the true discount factor. In the empirical application our focus is only on the choice between two periods, in which case β can be thought of as representing the composite effect.