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Human capital and earnings distribution dynamics ☆

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Abstract

Earnings heterogeneity plays a crucial role in modern macroeconomics. We document that mean earnings and measures of earnings dispersion and skewness all increase in US data over most of the working life-cycle for a typical cohort as the cohort ages. We show that (i) a human capital model can replicate these properties from the right distribution of initial human capital and learning ability, (ii) differences in learning ability are essential to produce an increase in earnings dispersion over the life cycle and (iii) differences in learning ability account for the bulk of the variation in the present value of earnings across agents. These findings emphasize the need to further understand the role and origins of initial conditions.

JEL classification: D3; J24; J31

Keywords: Earnings distribution; Human capital; Heterogeneity

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1. Introduction

Recent work in macroeconomics has explored the quantitative implications of dynamic models for the distribution of consumption, income and wealth. This work takes earnings or wages as an *exogenous* random process and then proceeds to characterize the distributional implications of optimal consumption-savings and labor-leisure behavior.[1] These models would appear to be attractive for assessing the distributional effects of changes in government policy since they are able to produce many of the quantitative features of the actual distribution of consumption, income and wealth.[2]

A critical issue for this research agenda is to integrate deeper foundations for the determinants of earnings and wages into these models by allowing earnings to be *endogenous*. We list two reasons for why this is important. First, we note that when earnings are exogenous there is no channel for policy to affect consumption and welfare through earnings. This channel is arguably of first order importance. In fact, a dominant theme in the earnings distribution literature is that earnings profiles are determined by the optimal investment of time and resources into the accumulation of skills. As a result, these investment decisions will not be invariant to changes in government policies. Second, a key issue for the purposes of assessing many government policies is the degree to which the variation in the present value of earnings is due to differences established early in life versus shocks received over the life cycle. If the former is responsible for the bulk of the variation in earnings, then policies directed towards these initial differences are of first-order importance.

This paper takes a first step towards developing deeper foundations by examining, at a quantitative level, the earnings distribution dynamics of a well-known and widely-used human capital model. More specifically, we document properties of how the US earnings distribution evolves for a typical cohort of individuals as the cohort ages. We then assess the ability of the model to replicate these properties. This assessment serves to highlight the potential role and importance of differences in initial conditions for understanding the dynamics of the earnings distribution.

The specific properties of the US earnings distribution that we focus on relate to how average earnings, and measures of earnings dispersion and skewness change for a typical cohort as the cohort ages. To characterize these age effects, we use earnings data for US males and employ a methodology, described later in the paper, for separating age, time and cohort effects in a consistent way for a variety of earnings statistics. Our findings, summarized in Fig. 1, are that average earnings, earnings dispersion and earnings skewness increase with age over most of the working life-cycle.

We assess the ability of the Ben-Porath (1967) human capital model to replicate the patterns in Fig. 1. This framework is the natural candidate for our study. The Ben-Porath model is well-known and widely-used, and has been the basis for both theoretical and empirical analyses of human capital. Its prominence in the literature is reflected in recent

[1]See, for example, Cagetti (2002), Carroll (1997), Castañeda et al. (2003), Deaton (1992), De Nardi (2002), Domeij and Klein (2002), Gourinchas and Parker (2002), Heathcote et al. (2003), Hubbard et al. (1994), Huggett (1996), Krueger and Perri (2002), Krueger and Fernandez-Villaverde (2001), Quadrini (2000) and Storesletten et al. (2004).

[2]These models have been widely applied. Focusing solely on the issue of social security reform, the literature includes Deaton et al. (2002), De Nardi et al. (1999), Fuster (1999), Huggett and Ventura (1999), Imrohoroglu et al. (1995), Storesletten et al. (1999) among others.