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## Wealth and labor supply heterogeneity

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## ABSTRACT

This paper examines the importance of ex-ante heterogeneity for understanding the relationship between wealth and labor supply when markets are incomplete. An infinite horizon model is estimated where labor supply is indivisible and households are ex-ante heterogeneous in their labor disutility and market skills. The model replicates key features of the distribution of employment, wages, and wealth observed in the data. Importantly, it reverses the prediction that employment falls with wealth, a pervasive feature of models without ex-ante heterogeneity. A byproduct of the model's empirical performance is that it implies labor supply responses to unanticipated wage changes (e.g., Frisch elasticities) that are a half to two-thirds of those recovered from models with only ex-post heterogeneity.

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## 1. Introduction

Heterogeneous agent models have become the workhorse of macroeconomics in answering quantitative questions where wealth helps shape individual decisions. Focusing on the labor supply decision, a large literature has burgeoned incorporating it to the standard Bewley–Huggett–Aiyagari model.<sup>2</sup> While successful in reproducing some features of wealth and labor supply, these models counterfactually predict that employment falls with wealth.<sup>3</sup> This prediction arises because infinitely lived agents accumulate enough precautionary savings to avoid working when their productivity is low. Equivalently, in these models wealthy individuals have reservation wages that are too high to reconcile the data. This paper examines modifications to these models that reverse this prediction and their implications for the inferred responsiveness of labor.

An incomplete markets model is presented with the following elements: (1) indivisible labor, (2) two-person households, (3) ex-ante heterogeneity in the labor disutility and market skills, (3) asset-based, means-tested social insurance, and (4) shocks to employment opportunities. Indivisible labor is assumed since worker movements in and out of employment

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<sup>2</sup> See Krusell and Smith (1998), Chang and Kim (2006, 2007) for infinite horizon frameworks with competitive labor markets and Low (2005) and French (2005) for life cycle economies. Krusell et al. (2011), Bils et al. (2012), and Nakajima (2012) incorporate search frictions in the labor market to infinite horizon models.

<sup>3</sup> See Chang and Kim (2007). Relatedly, Castañeda et al. (1998) also show the difficulty in jointly accounting for salient features of the income, wealth, and unemployment distributions.

account for a large fraction of fluctuations in aggregate hours.<sup>4</sup> Two-person households capture insurance within the household.<sup>5</sup> Heterogeneity in skills reflects educational or ability differences across individuals and allows the model to reproduce empirically reasonable wage dispersion. However, under balanced growth preferences, skill differences alone cannot generate empirically valid employment patterns because income and substitution effects cancel. Hence, heterogeneity in the disutility of work, which captures permanent differences in labor supply, is required. Correlation between skills and disutility allows the model to generate dispersion in reservation wages beyond what is suggested by wealth differences. Asset-based, means-tested transfers capture social insurance programs such as Supplemental Security Income (SSI) and help the model replicate the employment patterns of asset-poor households by distorting their incentives to work and save. Lastly, shocks to employment opportunities capture search frictions in the labor market and help the model match the frequency and duration of nonemployment observed in the data.

The model is estimated with data from individuals in the National Longitudinal Survey of the Youth (NLSY). The estimates imply a negative correlation between skills and the disutility of work. Importantly, the model replicates the observed labor supply patterns of asset-rich households by requiring them to be formed by individuals with high returns to employment because of their high market skills and low labor disutility. Meanwhile, asset-poor households choose to participate less in the market given the availability of social insurance and their comparatively lower returns to employment.

Aside from helping the model reconcile salient empirical features, ex-ante heterogeneity has implications for the responsiveness of labor to unanticipated wage changes. Simulations of the baseline model imply employment elasticities to wage changes of 0.18 and 1.46, respectively for men and women. Removing all ex-ante heterogeneity implies wage elasticities between 1.5 and 2 times larger. Removing skill heterogeneity implies wage elasticities very similar to the baseline model, suggesting labor disutility differences are key for these results.

The computed elasticities for men are within the range of estimates considered by [Chetty et al. \(2013\)](#). However, the current elasticities reflect preferences of a particular prime age cohort, rather than the entire U.S. economy. Additionally, the current model abstracts from other features that shape labor supply decisions. For example, the current model ignores the life cycle and human capital accumulation, which are the focus of [Imai and Keane \(2004\)](#). Rather than incorporating these elements, the current model instead focuses on permanent labor supply differences. This is a feature that life cycle models, like [Erosa et al. \(2011\)](#), abstract from in favor of matching other important empirical observations. Relative to those papers, the elasticities in this paper are smaller not only due to the consideration of ex-ante heterogeneity, but also because the current model misses the elastic labor supply decisions of the young and old. Alternatively, neither of the aforementioned studies considers social insurance or two-person households.

More closely related is the work of [Chang and Kim \(2006\)](#) (hereafter CK06) and [Gourio and Noual \(2009\)](#). Like CK06, this paper allows for incomplete markets, an explicit extensive margin, and two-person households. Calibrating to aggregate observations, they recover employment elasticities for men slightly below 1 and female elasticities above 1. Their model, however, implies a negative relationship between household wealth and individual employment. [Gourio and Noual \(2009\)](#) also focus on the extensive margin, however, their model precludes any discussion of the relationship between wealth and labor supply.

The estimated model also sheds light on an issue raised by [Keane and Rogerson \(2011\)](#), about whether models similar to CK06 and [Chang and Kim \(2007\)](#) (hereafter CK07) can produce empirically reasonable patterns for transitions between employment and nonemployment. The present analysis suggests shocks to employment opportunities are required as in [Krusell et al. \(2011\)](#). However, the results also suggest a role for ex-ante heterogeneity in simultaneously matching the frequency and duration of nonemployment for married men and women.

This paper also contributes to labor supply studies that structurally estimate heterogeneity in preferences. In a life cycle model, [Heathcote et al. \(2014\)](#) find that preference dispersion helps account for about one-third of cross-sectional dispersion in consumption and hours worked. Preference dispersion also explains the strongly positive empirical correlation between consumption and hours. [Kaplan \(2012\)](#) finds that heterogeneity in preferences for leisure helps account for the observed joint distribution of consumption, wages, and hours over the life cycle observed in U.S. data. In the current infinite horizon framework, preference dispersion helps explain the correlation between wealth and employment and generates dispersion in employment unrelated to wages. By abstracting from the life cycle, this paper may be overestimating the role of preference heterogeneity in labor supply. The work of [Heathcote et al. \(2014\)](#), [Rupert and Zanella \(2012\)](#), and [Casanova \(2013\)](#) suggests this is not the case. The former find that the bulk of cross-sectional preference dispersion is predetermined at age 27. Meanwhile, the latter two find increasing distaste for work later in the life cycle (ages 60+) helps generate retirement unrelated to changes in wages. Thus, preference heterogeneity may be even more relevant later in life.

This paper proceeds as follows. The next section describes the baseline model. Section 3 presents the NLSY sample used for the empirical analysis. Section 4 discusses the estimation procedure. Section 5 presents the estimation results and the model's fit to the data. Section 6 presents the simulated elasticities, while Section 7 concludes.

<sup>4</sup> See [Heckman \(1984\)](#) and [Coleman \(1984\)](#).

<sup>5</sup> See, for example, [Attanasio et al. \(2005\)](#). [Guner et al. \(2012\)](#) show the relevance of female labor supply for understanding taxes, while [Guler et al. \(2012\)](#) show the importance of female labor supply for search behavior of married couples.

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