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A Model of economic mobility and the distribution of wealth

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ABSTRACT

This paper introduces new techniques to obtain a closed-form rank-by-rank characterization of the equilibrium distribution of wealth in a model in which finitely lived households face uninsurable idiosyncratic investment risk. A central result is that the extent of inequality is determined entirely by two factors. The first factor, household exposure to idiosyncratic investment risk, increases inequality. The second factor, cross-sectional mean reversion of household wealth, decreases inequality. We show that economic mobility is decreasing in inequality and increasing in mean reversion, a result that is consistent with recent empirical observations about the geographic variation in mobility that exists both domestically and internationally. Our approach allows us to examine the implications of increased market completeness in the form of a risk-sharing subgroup of households. We show that a risk-sharing subgroup rises or falls in the equilibrium wealth distribution depending on the level of inequality, and that its presence raises welfare and the rate of wealth accumulation for all households in the economy.

1. Introduction

A large collection of recent research has described the substantial concentration of income and wealth that exists in many different countries around the world. According to Davies et al. (2011) and Saez and Zucman (2014), the wealthiest 1% of households in the United States hold approximately 40% of total wealth, with similar numbers observed in other countries as well. Atkinson et al. (2011) show that the wealthiest 1% of households in the United States earn nearly 25% of total income, and that many other countries have similarly right-skewed distributions of income.[1] Although right-skewed distributions of income and wealth have been the reality for generations, the extent of such skewness has varied markedly over time and across countries.

In order to explore how the economic environment and policy influence mobility and the distributions of income and wealth, we develop a model in which finitely lived heterogeneous households face uninsurable idiosyncratic investment risk and have a joy-of-giving bequest motive. Using a novel rank-based approach to wealth distribution, we are able to obtain a closed-form rank-by-rank characterization of the entire equilibrium distribution of wealth in this setting. According to this characterization, the extent of economic inequality is determined entirely by two factors—the reversion rates of household wealth (a measure of cross-sectional mean reversion) and households' exposure to idiosyncratic investment risk. Mean reversion in our model is determined by households' finite lifetimes and the lump sum government transfers paid to

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[1] Díaz-Giménez et al. (2002) provide further analysis of the distribution of income in the United States. Meanwhile, Piketty (2003), Piketty and Saez (2003), Atkinson (2005), Saez and Veall (2005), and Moriguchi and Saez (2008) present detailed analyses of income inequality in France, the United States, the United Kingdom, Canada, and Japan, respectively.

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all newborn households. In the steady-state equilibrium, inequality is increasing in household exposure to investment risk and decreasing in the reversion rates.

In addition to inequality, our solution techniques also allow for a detailed analysis of economic mobility. We show analytically that mobility is decreasing in inequality and increasing in the reversion rates, a result that is broadly consistent with both the "Great Gatsby curve" documented across countries (Krueger, 2012; Corak, 2013) and the geographical variation in mobility documented within the U.S. (Chetty et al., 2014). We also consider the implications of increased market completeness in the form of a subgroup of households that can share their individual-specific idiosyncratic investment risk with each other. Even in the absence of changes in investment and consumption in response to their increased investment opportunities, the households in a risk-sharing subgroup achieve both faster wealth accumulation and less volatile returns. In equilibrium, this faster wealth accumulation spreads to those households outside the risk-sharing subgroup via larger lump sum transfers, thus raising the welfare of all households in the economy.

Many of the first attempts to account for the right-skewness of the distribution of wealth assumed that households face uninsurable idiosyncratic labor income risk. While this approach has had some empirical success, many of these so-called Bewley models fail to generate high Gini coefficients and heavily right-skewed wealth distributions.[2] Another explanation for right-skewed distributions of wealth involves uninsurable investment risk and the multiplicative process of wealth accumulation. The assumption that households face idiosyncratic investment risk was first introduced into a macroeconomic model by Angeletos and Calvet (2006) and Angeletos (2007), and has since been incorporated into models of wealth distribution such as Benhabib et al. (2011).

The primary motivation for the inclusion of uninsurable investment risk is empirical. Indeed, ample evidence demonstrates that both private business equity and principal residence ownership are important sources of idiosyncratic investment risk for individuals and households. According to calculations by Bertaut and Starr-McCluer (2002) and Wolff (2006) using data from the 2001 *Survey of Consumer Finances* (SCF), private business equity and the gross value of principal residences make up, respectively, 27% and 28.2% of total U.S. household wealth. These investments are highly volatile, with a standard deviation for the return of housing roughly equal to 15% according to Case and Shiller (1989) and Flavin and Yamashita (2002), and an even larger volatility for the capital gains and earnings on private equity as reported by Moskowitz and Vissing-Jorgensen (2002). Taken together, these facts imply that a substantial fraction of risk associated with the returns to household wealth is not easily diversified away.

This paper joins a growing literature that embraces these empirical insights and incorporates uninsurable investment risk in a macroeconomic setting. In particular, our setup shares much in common with the subset of this literature focused on wealth distribution, such as Benhabib et al. (2011, 2016). Like these papers, our model generates an equilibrium distribution of wealth that is right-skewed and has a Pareto-like shape that matches what is observed in real-world economies.

In addition to describing the distribution of wealth, the results in this paper extend the literature in three directions. First, we adopt the general, nonparametric approach to rank-based systems introduced by Fernholz (2016a) and use this to achieve a simple analytic characterization of equilibrium in our model. In most cases, the technical challenges posed by uninsurable investment risk and the multiplicative process of wealth accumulation essentially preclude a closed-form characterization of the distribution of wealth. Even in those cases where an analytic solution is possible, the complexity of such a solution often makes it difficult to interpret or understand. The equilibrium characterization in our setup, by contrast, is both tractable and flexible. In it, there are just two factors—households' exposure to idiosyncratic investment risk and the reversion rates of household wealth—that determine the entire distribution of wealth and inequality according to the relationship[3]

$$\text{inequality} = \frac{\text{household exposure to idiosyncratic investment risk}}{\text{reversion rates of household wealth}}. \tag{1.1}$$

As this equation shows, equilibrium inequality is increasing in exposure to investment risk and decreasing in cross-sectional mean reversion (measured by the reversion rates).

This paper's second contribution is a detailed description of the extent of mobility in the economy. In our setup, we model explicitly heterogeneous households whose wealth dynamics over time are traced individually. One natural measure of economic mobility in this setting is the expected time before one household overtakes another household in terms of wealth holdings. After all, if one household overtakes another in this way, then that household has improved its economic standing, which is the usual measure of mobility. A central result in this paper characterizes the expected time before each such improvement in household economic standing occurs. In particular, we show that this measure of mobility is entirely determined by two factors according to the relationship

$$\text{mobility} = \frac{\text{reversion rates of household wealth}}{\text{inequality}}. \tag{1.2}$$

Much like inequality, then, equilibrium mobility is decreasing in cross-sectional mean reversion and increasing in inequality.

[2] Ljungqvist and Sargent (2004) and Cagetti and De Nardi (2008) provide both a discussion and survey of this extensive literature. Some authors have in fact successfully generated right-skewness in this setting by expanding the setup to include extra features such as borrowing constraints, preferences for bequests, and entrepreneurship (Cagetti and De Nardi (2006), De Nardi (2004), and Quadrini (2000)) or heterogeneous and fluctuating discount rates (Krussel and Smith (1998) and Hendricks (2007)).

[3] The reversion rates in our setup are closely related to the concept of redistributive mechanisms from Fernholz and Fernholz (2014).