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Wealth inequality and employment fluctuations

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ABSTRACT

This paper is concerned with the business cycle dynamics in search and matching models of the labor market when agents are ex-post heterogeneous. We focus on heterogeneity caused by different labor market histories and the resulting wealth inequality they generate. We show that this inequality implies wage rigidity relative to a complete insurance economy. The fraction of wealth poor agents prevents real wages from falling too much in recessions, since small decreases in income imply large losses in utility. Analogously, wages rise less during expansions than in models with homogeneous workers as small increases are enough for poor workers to accept job offers. This mechanism reduces the volatility of wages but generates more volatile employment levels.

1. Introduction

The pool of unemployed individuals at any point in time and across countries displays considerable heterogeneity. Workers searching for jobs are different in terms of skill, age, wealth or health, and these differences affect both their search behavior and their bargaining position when, after meeting with a prospective employer, they negotiate the terms of their employment contract.¹ This paper focuses on one dimension along which the working and the unemployed differ—their level of wealth. Much of the existing literature on the macroeconomics of labor markets, makes wealth heterogeneity irrelevant by assuming either complete financial markets or preferences that make individuals neutral to income fluctuations. We construct an environment which features risk-averse agents who are subject to unemployment shocks; they can either have a job from which they can be displaced or find a job in case they are looking for one. Transitions in and out of unemployment generate income fluctuations against which agents can only self-insure by adjusting their stock of physical capital. Different unemployment histories generate different income histories, resulting in different wealth levels across agents. We find that accounting for *individual* wealth heterogeneity matters for *aggregate* fluctuations in employment, output, and wages.

More specifically, we find that the shape of the distribution of wealth, and in particular the fraction of agents close to the borrowing constraint, matters for aggregate fluctuations and most importantly for

the degree of wage rigidity. Higher wage rigidity implies larger fluctuations in employment and vacancies: increases in the productivity of workers will lead to more hiring the less wages adjust to productivity increases. The reason why a large fraction of wealth-poor agents would lead to relatively more rigid wages is quite intuitive. When the negotiation of wages takes place, a large fraction of agents close to the borrowing constraint prevents wages from falling too much during a recession. The reason is that small decreases in the real wage imply large losses in utility. Analogously, during an expansion a mild increase in wages is enough for very poor agents to accept a job offer, as their utility increases substantially. Firms react by posting more vacancies during booms and fewer during downturns than they would otherwise.

The model economy we present is a version of the stochastic growth model with labor search and matching frictions. Firms post job vacancies and workers search when they are unemployed hoping to get matched to a job offer. Employed workers are at risk of losing their jobs and becoming unemployed. However, we assume that there is no insurance mechanism that can perfectly eliminate the employment risk: agents have to self-insure using their holdings of physical capital only. Without additional frictions, our results show that, quantitatively, the ability of agents to smooth consumption effectively, precludes a large mass of them from being borrowing constrained. Fluctuations in the labor market look similar to those that obtain in a model with homogeneous agents. This feature of the

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E-mail addresses: enchuan.shao@usask.ca (E. Shao), pedro.silos@temple.edu (P. Silos).¹ Empirical analysis provided by Chetty (2008) has shown that, for instance, the effect of unemployment insurance on unemployment durations is larger for borrowing-constrained than for unconstrained individuals.<http://dx.doi.org/10.1016/j.econmod.2016.11.009>Received 12 May 2016; Received in revised form 25 September 2016; Accepted 16 November 2016
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wealth distribution in our model is consistent with [Krusell and Smith \(1998\)](#) work, where the lack of perfect insurance in a version of the stochastic growth model generates too few poor agents and many rich individuals. However, it is inconsistent with the actual wealth distribution in many developed countries, in particular that of the United States. Empirical studies have shown that the fraction of borrowing constrained households could be as high as 25% to 30% of all households. Given that the power of the mechanism outlined here is directly related to the mass of agents that are close to the borrowing constraint, we explore features that prevent agents from smoothing out shocks effectively and which result in a wealth distribution which is similar to its empirical counterpart. Specifically, we evaluate the effects of introducing (separately) the following features in the model: an irreversibility constraint on investment, heterogeneous discount factors, and different productivity levels across workers. All these versions imply very different dynamics of aggregate variables. In some cases, the improvement is quite significant. For instance, assuming a labor income distribution by augmenting the wage rate with a random productivity shock almost triples the volatility of the vacancy–unemployment ratio in comparison to the full insurance model.

There is by now a large literature on search and matching in the labor markets, having become the standard way of thinking about labor markets in models of aggregate fluctuations. That literature began with [Andolfatto \(1996\)](#) and [Merz \(1995\)](#) who assume that all workers belong to a household in which some agents work and others search. However, they all insure each other against being fired or not finding a job. [Acemoglu and Shimer \(1999\)](#) focus on the optimal unemployment insurance contract in a search environment with capital accumulation and where agents are risk averse. However, they do not introduce aggregate shocks. In a line of research more related to our paper, although developed independently, [Rudanko \(2009, 2011\)](#) build an economy in which agents face idiosyncratic and aggregate shocks. She introduces search and matching frictions in the labor market, and long term contracts in wages where the firm provides insurance to the worker against drops in productivity. She also assesses how changes in risk aversion or in the value of being unemployed affects the quantitative implications of heterogeneity for explaining the labor market business cycle facts. A key difference between hers and our paper is that there is no capital accumulation (or any form of savings) in her model. The worker consumes the wage and the unemployed consumes the unemployment benefit. Our model complements hers by introducing heterogeneity in a stochastic growth model with labor market search and production, therefore making our results more comparable to the real business cycle literature. Other close competitors to our paper are [Costain and Reiter \(2005\)](#), [Krusell et al. \(2010\)](#), and [Nakajima \(2012\)](#). They all introduce market incompleteness and self-insurance into the Mortensen–Pissarides framework, and assess their effects on aggregate fluctuations. Results are similar but there are interesting differences in modeling. For instance, [Krusell et al. \(2010\)](#) assume individual bargaining, whereas [Costain and Reiter \(2005\)](#) assume a form of “sectoral” bargaining, and we assume collective (aggregate) bargaining. Costain and Reiter's economy does not use capital and interest rates are fixed. Moreover, their focus is different, emphasizing the role of counter-cyclical fiscal policy. We, on the other hand, stress the implications of the shape of the wealth distribution for business cycle dynamics. In terms of financial markets, [Krusell et al. \(2010\)](#) distinguish between *ex-ante* return properties of capital holdings and firm shares. Alternatively, we model entrepreneurs as owners of firms and households making the capital investment decisions, therefore there are no firm shares available to the household to speak of. [Nakajima \(2012\)](#) highlights the importance of labor-leisure choice while in our paper, the labor supply is inelastic and we emphasize the importance of wealth inequality among workers. Nevertheless, results seem to be robust

to these modeling differences.²

The work by [Shimer \(2005\)](#) has been followed by numerous studies that hope to improve the ability of the Mortensen–Pissarides framework to be consistent with the labor market business cycle facts. For example, [Hagedorn and Manovskii \(2008\)](#) have shown that the model presented in [Shimer \(2005\)](#) matches the volatility of the market tightness if it is calibrated in a particular way. Specifically, they show how making the outside option for a worker very valuable can improve the model's implications along several dimensions. However, other authors have pointed out additional problems with the Hagedorn and Manovskii's calibration (see, for example, the survey by [Hornstein et al., 2005](#)). [Hall \(2005\)](#) shows how wage stickiness affects the cyclical behavior of unemployment in a Mortensen–Pissarides framework. In his study, wage stickiness is an equilibrium outcome in the sense that it does not affect the efficiency of the bargaining process between workers and firms.

2. The model

2.1. Economic environment

The model is a version of the one-sector stochastic growth model with labor market search frictions and where opportunities for perfect insurance are absent. There is a continuum of agents distributed uniformly on the unit interval. They are all endowed with one unit of time and maximize expected lifetime utility of consumption $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(c_t)$, where U satisfies the usual conditions and β is a factor of time preference. Each agent faces different opportunities for exchanging labor services. In particular, individuals either have a job opportunity or they do not, and job opportunities arrive at random as is typical in the standard labor market search model. The absence of a full set of contingent claims implies that an agent's employment status determines his income. To smooth consumption across states and time, agents can only use physical capital k and they are all endowed with k_0 of it to start with. The initial employment status $i \in \{u, e\}$ is also given, where u denotes unemployed and e being employed.

There is a continuum of risk neutral entrepreneurs who maximize $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \phi_t$, where ϕ is the sum of current period cash flows from firms that they own.³ Firms use capital K and labor N to produce output Y subject to a constant returns-to-scale production technology $Y = zF(K, N)$. The aggregate productivity z of firms evolves according to a stochastic process known by agents.

In order to produce output, each job requires a worker. Let N_t denote the number of jobs that are matched with a worker at the beginning of period t ; hence, N_t is the measure of current period employed workers and $1 - N_t$ is the measure of unemployed workers currently available for work. Let V_t denote the total number of new jobs made available by firms during period t . Following [Pissarides \(2001\)](#), the rate at which new job matches are formed is governed by an aggregate matching technology, $M(V_t, 1 - N_t)$, so that the employment evolves according to:

$$N_{t+1} = (1 - s)N_t + M_t,$$

where $s \in (0, 1)$ is the exogenous separation rate of job-worker pairs.⁴ The probability for a worker to find a job offer is $\pi_t = M(V_t, 1 - N_t)/(1 - N_t)$ and the probability for a firm to match a worker with a vacancy is $p_t = M(V_t, 1 - N_t)/V_t$.

The timing of events can be summarized as follows.

² A similar paper from the modeling perspective but with a different focus is [Bils et al. \(2012\)](#). In an economy without capital, they analyze the exiting and search behavior of workers with different levels of human capital.

³ In principle, ϕ_t could be negative. However, this was not the case in any of our simulations.

⁴ The separation rate s does not depend on the stage of the business cycle. [Shimer \(2012\)](#) using CPS data finds that separation rates are approximately acyclical.

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