



Equilibrium matching and termination



Cheng Wang^a, Youzhi Yang^{b,*}

^a School of Economics, Fudan University, China

^b School of Economics and Key Laboratory of Mathematical Economics, Shanghai University of Finance and Economics, China

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ABSTRACT

In an equilibrium model of the labor market with moral hazard, jobs are dynamic contracts, job separations are terminations of optimal dynamic contracts. Transitions from unemployment to new jobs are modeled as a process of random matching and Nash bargaining. Non-employed workers make consumption and saving decisions as in a standard growth model, as well as whether or not to participate in the labor market. The stationary equilibrium is characterized. The model is then calibrated to the U.S. labor market to study quantitatively the worker flows and distributions, the compensation dynamics, and the effects of UI system.

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1. Introduction

An equilibrium model of the labor market is constructed where workers are risk averse and employment relationships are subject to moral hazard. Jobs are dynamic contracts with endogenous termination. Vacant firms and unemployed workers are randomly matched in the labor market to bargain over the values of the dynamic contract for each party. Following termination, firms go back to the labor market to seek new matches. Non-employed workers make optimal consumption and saving decisions and must also decide whether or not to participate in the labor market. Finally, firms freely enter and exit the labor market to endogenously determine the total number of jobs in the economy.

Such a model of the labor market, which builds on the search/matching framework, offers advantages in accounting for labor market data and improves the predictive power of the search/matching model. In particular, our model is able to generate within job wage dynamics that are consistent with data, especially in the variability of worker compensation. The model, with a single source of private information and uncertainty, also produces outcomes consistent with the observed distribution of workers across all three states of the labor market, including the state of non-participation, as well as the flows into and out of that state. Labor market data show a large fraction, about 1/3, of the adult population not in the labor force, as well as significant flows of workers into and out of the state of non-participation. This renders our model a vehicle for exploring potentially many policy related issues where private information and worker movements between participation and non-participation are important. As a specific application, the model is used to evaluate quantitatively the effects of unemployment insurance currently existing in the U.S., and it is shown that the model offers novel insights into the issues studied.

Essentially, what this paper does is to put an optimal dynamic contract with endogenous termination in the [Mortensen and Pissarides \(1994\)](#) model with risk averse workers. This allows us to combine, in a unified framework, three essential

* Corresponding author. Tel: +86 21 65902678.

E-mail addresses: wangcheng@fudan.edu.cn (C. Wang), yang.youzhi@mail.shufe.edu.cn (Y. Yang).

components of the labor market: the interaction between unemployed workers and vacant firms, the endogenous dynamics within the employment contract which leads to job separation, and the non-employed worker's decisions pertaining to labor force participation. Such a framework, described above, incorporates three existing classes of labor market models. The first is the equilibrium search-matching models (Mortensen and Pissarides, 1994) that emphasize matching and bargaining in the labor market and free entry and exit of firms. The second is the models of the labor market with private information, starting at least from the efficiency wage models (e.g., Shapiro and Stiglitz, 1984). These models emphasize the role of moral hazard and other types of information asymmetry in individual employment contracting, and in the determination of aggregate outcomes. The third is the standard neoclassical growth model for labor market analysis where risk averse agents make optimal decisions on intertemporal consumption and saving choices, as well as on labor force participation. Our model captures all the important aspects of the labor market that the above-discussed models emphasize, individually but not simultaneously. More importantly, relative to the existing benchmark models, our model, with a single source of information asymmetry and no other exogenously imposed heterogeneities, goes farther on several dimensions in accounting for the observed labor market dynamics and distributions.

Relative to Mortensen and Pissarides (1994) where an exogenous stochastic process governs job separation, by treating jobs as an optimal dynamic contract with endogenous termination, separation is an endogenous process in our model, motivated by the efficient provision of incentives and risk sharing. In addition, instead of assuming that workers and firms cannot commit to long-term relationships and wages are bargained sequentially period by period, we postulate that firms can commit to any long-term contract they agree to enter and that each pair of matched firm and worker bargains only once over the course of the employment relationship, before it begins.¹

The labor market literature has long recognized the importance of moral hazard for employment contracting. Moral hazard plays a central role in the models of efficiency wages (e.g., Shapiro and Stiglitz, 1984; MacLeod and Malcomson, 1998; Rocheteau, 2001) in generating equilibrium involuntary unemployment. In Den Haan et al. (1999), moral hazard gives rise to inefficient job destruction and helps propagate aggregate shocks. Another development of the literature studies the role of optimal termination in long-term employment contracting under moral hazard (Stiglitz and Weiss, 1983; Spear and Wang, 2005; Sannikov, 2008; Wang, 2011, 2013). Wang (2013), for example, studies the effects of firing costs in an equilibrium model of the labor market with moral hazard, long-term contracts and endogenous termination.² Our paper is the first to bring a fully optimal dynamic contract into the Mortensen–Pissarides framework to study the role of moral hazard for employment dynamics, worker flows and distributions. Moral hazard and dynamic contracting are essential to our theory in the sense that, given risk aversion, all the dynamics and flows and distributions in the model are ultimately motivated by moral hazard and generated by the optimal dynamic contract.³

A key feature of our model is that severance compensation plays a critical role in the individual worker's decision on labor market participation. Severance compensation that the worker receives upon termination is part of the optimal contract and its size depends on the worker's history with the firm. After termination the severance compensation becomes the (non-employed) worker's initial asset holding with which he then chooses optimally whether or not to return to the labor market to look for a new job. A newly terminated worker would stay in the labor market if the size of his severance compensation is sufficiently small. He would quit the labor force permanently if the size of his severance compensation is sufficiently large. And in equilibrium there are newly terminated workers whose severance compensation is neither sufficiently small to justify immediate returning back to the labor market, nor sufficiently large to justify staying permanently out of the labor force. These workers would quit the labor force temporarily, dissave, and eventually go back to the labor market once their asset holding is reduced to a sufficiently low level. Thus our model generates not only flows into the state of non-participation from the state of employment, but also flows out from the state of non-participation and into the state of unemployment.

With the design described above, our model is able to produce outcomes that account, simultaneously, for four sets of observations that characterize modern labor markets. First, our model generates the stocks and composition of all three states of the labor market (employment, unemployment and non-participation), flows between employment and unemployment, and flows between participation (employment and unemployment) and non-participation. In particular, workers who produce a sequence of low outputs are laid off involuntarily because they have become too poor to motivate; workers who produce a sequence of high outputs retire from the firm because they are too expensive to compensate and motivate.⁴ Moreover, retired workers whose severance compensation is not sufficiently large to justify permanent withdraw from the labor force will return to the labor market after being out of it for some periods of time. In addition, in each of the labor

¹ The assumption of sequential wage bargaining, although helpful in generating an ergodic wage distribution in Mortensen and Pissarides (1994), implies that wages are not sufficiently rigid for the model to match business cycle movements in the data (Hall, 2005; Shimer, 2005). Rudanko (2009) models long-term wage contracts with limited commitment in a search-matching model of the labor market to generate the observed wage rigidity/volatility. Obviously, our model offers a potential alternative accounting for the observed wage rigidity/volatility that is based on an optimal trade off between incentives and risk sharing.

² There is also a large literature on unemployment insurance with moral hazard, including Shavell and Weiss (1979), Wang and Williamson (1996), and Hopenhayn and Nicolini (1997).

³ See Guerrieri (2008), Guerrieri et al. (2010), and Moen and Rosen (2011) for competitive search models with adverse selection.

⁴ This draws upon Spear and Wang (2005), Sannikov (2008), and Wang (2011).

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