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Wage posting and business cycles: A quantitative exploration ☆

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ABSTRACT

We provide a quantitative exploration of business cycles in a frictional labor market under contract-posting. The steady-state random search and wage-posting model of Burdett and Mortensen (1998) has become the canonical structural framework for empirical analysis of worker turnover and equilibrium wage dispersion. In this paper, we provide an efficient algorithm to simulate a dynamic stochastic equilibrium version of this model, the Stochastic Burdett–Mortensen model, and evaluate its performance against empirical evidence on fluctuations in unemployment, vacancies and wages.

1. Introduction

Why are similar workers paid differently? In his 2003 book of this title, Dale Mortensen (2003) takes stock of a few decades of investigation of this question, that he had jumpstarted and then developed. His answer is simple: imperfect competition in labor markets. Information and other frictions, which make the outcome of job search time-consuming and random, endow firms with monopsony power that they exploit, in the spirit of Coase (1972), by committing to wage offers. This force depresses all wages towards the opportunity cost of work. But workers cannot commit to their current terms of employment and, while employed, search for better outside offers. In this environment, firms choose a wage policy that balances labor costs with hiring and retention. As a result, in equilibrium, wages *must* differ among identical firms and workers. In the presence of heterogeneity in productivity and in demand conditions among workers and firms, equilibrium wages still fall short of marginal products, and contain a non-fundamental component of "frictional" inequality. If workers could freely reallocate across heterogeneous firms, they would arbitrage away any wage differences.

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Burdett and Mortensen (1998) formalized this powerful insight. Their working paper, first circulated in the 1980s, spurred the vast theoretical and empirical literature culminating in Dale Mortensen's 2003 book. The Burdett and Mortensen (1998) "wage posting" model quickly emerged as the canonical framework for the analysis of wage inequality, labor turnover, and unemployment. Each of the three exists in conjunction with the other two. Naturally, the scope of this line of research eventually transcended wage inequality alone.

In a series of articles (Moscarini and Postel-Vinay, 2009, 2012, 2013, forthcoming) we explored, both theoretically and empirically, the business cycle implications of the wage posting paradigm. Progress in this direction had been stunted by technical difficulties in finding equilibrium in an economy where the law of one price fails. The other canonical model of the labor market now known as "DMP" (Diamond, 1982; Pissarides, 1985; Mortensen and Pissarides, 1994) bypassed this hurdle by assuming that trading partners bargain over their match surplus, which takes any allocative role away from wages. The DMP model still encodes the leading theory of equilibrium unemployment, but runs into difficulties when applied to business cycles. As Shimer (2005) demonstrated, this model cannot reconcile the large cyclical swings in job finding and unemployment rates with the tiny ones in Average Labor Productivity (ALP) that we observe in the US economy. The perfectly competitive labor market model had failed this test, because it required an implausibly elastic aggregate labor supply. The same issue came back to haunt the search-cum-bargaining model (Hagedorn and Manovskii, 2008). The attention then turned to other sources of amplification. We add to this range of new hypotheses. The simple Coasian assumption of commitment to wage offers to exploit market power, here conferred by frictions and tempered by on-the-job search, is a natural source of wage rigidity, in an environment that can also explain wage inequality and reallocation and that is very well understood in steady state since Burdett and Mortensen (1998).

In our past theoretical work, we outlined the scope and limitations of wage posting models with random search in the presence of aggregate shocks to labor productivity. Our main empirical focus was on the cyclical reallocation of employment among heterogeneous firms (Moscarini and Postel-Vinay, 2012). Our contribution here is to evaluate the quantitative performance of our Moscarini and Postel-Vinay (2013) business cycle wage-posting model against empirical evidence regarding not only wage inequality and the pace of reallocation, as is standard in this approach, but also business cycle fluctuations in unemployment and wages. To this end, we propose a tractable, stochastic equilibrium version of the Burdett and Mortensen (1998) model — we will refer to it as the "Stochastic BM" (SBM) model — and an operational algorithm to simulate its equilibrium.

Different varieties of wage-posting models with on-the-job search introduced aggregate shocks and maintained tractability by making one key change to the environment. Menzio and Shi (2011) assume perfect information about posted wages, in the tradition of directed or competitive search, and study business cycle movements in labor market quantities, but not in wages. Closer to our exercise, Robin (2011) maintains random search, but relaxes the full commitment and equal treatment assumptions, to adopt Postel-Vinay and Robin (2002)'s sequential auctions, in which firms can respond individually to outside offers received by their employees. This change greatly simplifies the analysis of business cycles. Robin addresses empirical evidence on both labor market flows and wages. Relative to these two contributions, in our SBM model computation of equilibrium wages is less straightforward. However, we show that it is still feasible, and we propose a reasonably fast algorithm to achieve this end. We build on the simple structure of the stochastic equilibrium, which is Rank-Preserving, as first defined in Moscarini and Postel-Vinay (2009): more productive and larger firms always offer higher values to all workers, independently of the history of aggregate shocks. Thus, workers always move in the same direction between jobs: given the distribution of firm recruiting effort, equilibrium turnover is trivial to simulate and generates empirically accurate predictions about job ladder movements over business cycles (Moscarini and Postel-Vinay, forthcoming). Our more demanding task now is to compute the equilibrium recruiting policies and contracts (or state-contingent wages) that implement this equilibrium allocation.

The broader goal of this project is to provide a unified explanation, based on a stochastic job ladder, for worker turnover and individual earnings dynamics, residual wage inequality unexplained by worker characteristics, and business cycle fluctuations in unemployment and average earnings. This is a very ambitious goal. In this first quantitative step, to give our model a reasonable chance to perform well over business cycles, we introduce a seemingly minor but important change relative to Moscarini and Postel-Vinay (2013). Following Pissarides (2009)'s suggestion, we model adjustment frictions on the firm side as a cost that depends on the volume of hires and not, as is customary, of vacancies or job adverts. Search for trading partners is still mediated by a matching function, but the firm pays for the output of its recruiting activity, not for the inputs into it. As such, hiring costs are best thought of as training costs. This feature of the model tames congestion effects that facilitate hiring in recessions, when unemployment is abundant, and thus mute the negative impact of aggregate shocks on job creation (see Christiano et al., 2013). This change in the model requires a new argument to prove that equilibrium retains the RP property, essential for tractability. We find that this property requires a restriction on the convexity of the hiring/training cost function.[2]

We gauge the quantitative performance of our SBM model along three main dimensions. First, we assess the model's ability to amplify TFP shocks, based on its predictions about the volatility and covariances of unemployment, the job finding

[2] Coles and Mortensen (2011) adopt a hiring cost function and impose on it even more structure, as explained in footnote 5, to extend the scope of our early work on transitional dynamics (Moscarini and Postel-Vinay, 2009). They establish existence and characterization of one RP equilibrium also in the presence of idiosyncratic, firm-level TFP shocks.