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# Rent Rigidity, asymmetric information, and volatility bounds in labor markets <sup>☆</sup>

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## ABSTRACT

Two thirds of US unemployment volatility is due to fluctuations in workers' job-finding rate. In search and matching models, aggregate productivity shocks generate such fluctuations: via inputs in the matching technology, they affect the rate at which workers and firms come into contact. Quantitatively, this mechanism has been found to be negligible in a calibrated textbook model, but also more than sufficient if wages are completely rigid. We study a weaker concept of rigidity based on worker rents (wages in excess of the value of unemployment). We show that volatility is subject to an upper bound if worker rents are weakly procyclical, thus at best rigid. Quantitatively, with *Rent Rigidity*, the mechanism accounts for at most 20% of the variance of the job-finding rate. In light of this result we reexamine the question whether asymmetric information on gains from trade amplifies fluctuations. We analyze a series of bargaining solutions, and conclude that asymmetric information at best makes rents rigid. Our analysis provides a unifying perspective on a very lively debate.

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## 1. Introduction

Recent research has shown that about two thirds of US unemployment volatility is due to fluctuations in the rate at which workers find jobs.<sup>1</sup> This has prompted quantitative investigations into mechanisms that give rise to such fluctuations. The search and matching model, the canonical framework of analysis of unemployment, features just such a mechanism. Creating job contacts and overcoming trading frictions requires two essential inputs, unemployed workers and vacant jobs. These costly resources vary over the cycle, generating fluctuations in the rate at which workers come into contact with firms, thereby in the job-finding rate. Shimer (2005) finds that this mechanism generates negligible fluctuations in the job-finding rate in response to productivity shocks in a calibrated textbook search and matching model. Replacing the textbook

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<sup>1</sup> Shimer (2007) argues this fraction is three quarters, Fujita and Ramey (2009) argue for a somewhat lower fraction based on different data and methodology.

assumption of Nash Bargaining with a fully rigid wage, Hall (2005) finds that the mechanism generates more than enough volatility. Thus, fluctuations in the contact rate can account for the empirical volatility of the job-finding rate if wages are sufficiently but not fully rigid. In this paper we identify the *qualitative properties* of wage setting that deliver sufficient rigidity in this sense. Our answer allows us to shed light on a conjecture put forward by Shimer (2005), namely that private information can induce sufficient wage rigidity.

We introduce a notion of rigidity weaker than full wage rigidity. In frictional labor markets the compensation of a worker has two components: first, an opportunity cost, the value of unemployed job search; second, a rent component, absent in frictionless labor markets. Conceptually, this leads to a distinction between two types of rigidity: *Wage Rigidity* as in Hall (2005), where the sum is acyclical; *Rent Rigidity*, where only the rent is acyclical. The latter is weaker: the unemployed find jobs more easily in booms, raising the opportunity cost of accepting a job offer; hence rigid wages imply countercyclical rents, while rigid rents imply procyclical wages. We study how Rent Rigidity amplifies fluctuations in the job contact rate. Does it suffice to account for the volatility of the job-finding rate? Or must workers rents be countercyclical?

Our first contribution is to show that if worker rents are weakly procyclical, thus at best rigid, then the general equilibrium response of the contact rate between unemployed workers and open vacancies to a productivity shock is subject to an upper bound. Evaluating this volatility bound quantitatively, we find that through the contact rate channel alone, productivity shocks generate at most 20% of the observed cyclical variance of the job-finding rate. This compares to 3% for Nash Bargaining, while Wage Rigidity substantially overshoots 100%. Empirically, the imperfect correlation of job-finding rate and labor productivity indicates that the latter cannot be the only driving force, but contributes about 40%. Thus, unlike in models with Nash Bargaining or Wage Rigidity, under Rent Rigidity the contact rate channel generates fluctuations of the right order of magnitude. But it falls short, and a quantitatively important part of fluctuations in the job-finding rate remains unexplained. The job-finding rate is the product of two factors; the contact rate, and the probability of trade once search frictions are overcome. The latter is a source of employment fluctuations already present in frictionless models. Shimer and Hall study a model with a constant probability of trade, hence their findings concern the specific contribution of variation in inputs in the matching technology to labor market volatility. In the same spirit, our bound applies to the contact rate, but does not rule out that the balance of fluctuations in the job-finding rate is due to variation in the probability of trade.

Our bound implies that all modifications of wage setting that deliver sufficient rigidity, such as Hall and Milgrom's (2008) assumption of strategic bargaining, have a common denominator: in some way they must generate countercyclical worker rents. That is to say, an unemployed worker gains more from a job contact in a recession than in a boom. We discuss the economic forces underlying countercyclical rents in modifications that have been proposed. This sets the stage for our second contribution. Taking up Shimer's conjecture, we pose the question: is private information a potential source of countercyclical rents? We analyze a series of classic bargaining models, and our results indicate that the presence of private information by itself does not give rise to countercyclical worker rents.

The mechanics underlying the volatility bound are as follows. Worker rents represent the capital gain that an unemployed worker realizes upon meeting a firm. Importantly, if rents are rigid, then this capital gain is as large in booms as it is in recessions. Now suppose a positive productivity shock induces firms to raise their recruiting effort, increasing the contact rate. Then the value of unemployed search increases, not because an unemployed worker gains more from a contact with a vacancy, but because contacts are more frequent. This increase in the opportunity cost is transmitted to wages, and absorbs a significant share of additional productivity, a *feedback effect* that limits vacancy creation. For comparison, with Nash Bargaining both worker rents and the contact rate are procyclical. Our bound isolates the limits on volatility imposed by the latter.

The feedback effect vanishes with the workers' gains from market activity. Thus, quantitatively, the size of these gains is a key determinant of our bound. Their size, in turn, depends on the value of non-market activity, derived by the unemployed from unemployment benefits and leisure. Our results rely on Hall and Milgrom's (2008) estimate of this parameter, which utilizes evidence on the Frisch elasticity of labor supply. Hagedorn and Manovskii (2008) obtain sufficient rigidity through a different calibration strategy, rather than wage setting protocol. Maintaining Nash Bargaining, they match the cyclical behavior of aggregate wages with a much larger calibrated value of non-market activity, close to wages. This has prompted criticism, due to the implication that gains from working in the market are minuscule.

To investigate Shimer's conjecture, we introduce private information about gains from trade in labor markets as follows. Upon being matched, the firm privately draws a match-specific productivity component and the worker a match-specific amenity value. The distributions are fixed and independent of (publicly observed) aggregate labor productivity, satisfy standard regularity conditions, but are otherwise unrestricted, affording many degrees of freedom. Our bound allows a *systematic* analysis whether they suffice to attain Wage Rigidity. We study a series of classic models of bargaining in this setting. For each model, we analyze its comparative statics properties, and verify that our bound applies; worker rents are weakly procyclical, hence at best Rent Rigidity but not Wage Rigidity can be attained. The simplicity of this approach affords easy extensions and applications of our comprehensive but certainly not exhaustive analysis (we discuss competitive search shortly).

We start with the monopoly (or monopsony) solution, where a privately informed party receives a take-it-or-leave-it offer. Why are worker rents procyclical in this model? If the firm is making the offer, then its increased willingness to trade in booms leads it to concede higher informational rents to the worker. If the worker is making the wage request, the firm's increased willingness to trade in booms enables the worker to extract higher rents. This basic intuition carries over when we relax the commitment assumptions associated with take-it-or-leave-it offers, and study strategic bargaining, both repeated

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