



Labor force participation and pair-wise efficient contracts with search and bargaining

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ABSTRACT

A “constant” wage is pair-wise inefficient in a standard search model when workers endogenously separate from employment. We derive a pair-wise efficient employment contract that involves workers paying a hiring fee (or bond) upon the formation of a match. We estimate the constant wage and pair-wise efficient contract assuming the hiring fee is unobservable, and find evidence to reject the pair-wise efficient contract in favor of the constant wage rule. A counterfactual experiment reveals the current level of labor force participation to be 9.6% below the efficient level, and a structural shift to the pair-wise efficient contract improves welfare by roughly 3.5%.

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1. Introduction

Transitions in and out of the labor force represent an important component of labor market activity. The movement of individuals from employment to non-participation represents one example of these transitions. For the U.S., we find that these transitions are significant and vary across the wage distribution, with those at the lower end exiting at a faster rate than those at the higher end. Specifically, the National Longitudinal Survey of Youth (NLSY), which we use in this paper, indicates that transitions from employment to non-participation represent the most common transition employed individuals make; they occur more frequently than transitions to a new job or to unemployment. Despite the importance of these flows for labor market outcomes, the literature studying equilibrium labor markets has devoted little attention to labor market participation decisions, and even less to the transition from employment to non-participation. Recent work in this area, while limited, has developed along two dimensions: one attempting to develop models to explain the transitions into and out of non-participation, and another that includes these transitions in policy experiments, allowing researchers to determine the effect of policies on the composition of the labor force.

We develop a model that contributes to the literature on both fronts. First, our model is capable of explaining how the transition from employment to non-participation changes over the wage distribution, a feature that remains relatively unexplored. Second, we find that when building a model to explain these flows, the policy implications remain unclear. Specifically, our analysis characterizes a potentially large negative externality arising from a worker's choice to transition from employment to non-participation. After recognizing the potential inefficiency, we determine if U.S. data remains consistent with employment contracts that internalize the externality, or with standard employment contracts that do not. Thus, the outcome of our analysis has important implications for the efficacy of labor market policies, especially those directed toward altering the composition of the labor force. In other words, we ask the question: Does the current level of labor force participation maximize welfare? If the answer is no, then what are the potential welfare gains from adopting alternative employment contracts?

To capture the large transitions between labor market states, we extend the search-matching model in [Engelhardt et al. \(2008\)](#). The model has an endogenous labor force participation decision where individuals receive idiosyncratic shocks affecting the value of non-market activities. Our extension of the model includes match specific productivity, resulting in a distribution of wages, transition rates that vary conditionally on the wage, and thus transition rates depending on the employment contract determining the wage.

Modeling the decision to exit employment, however, introduces theoretical complications. Specifically, when agents take actions

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affecting the duration of the match, the nature of the employment contract affects the efficiency properties of the models' equilibria. In exploring this fact, we demonstrate what a pair-wise efficient employment contract looks like, and show that a standard surplus splitting rule, or constant wage, is not pair-wise efficient.

The endogenous transition from employment to non-participation implies pair-wise inefficiency because it introduces a negative externality. In our model, while employed in a productive match, individuals receive opportunities for non-market activities. In some periods, the value of accepting these opportunities exceeds the value of retaining the match, and as a result, an individual may decide to quit and leave the labor force. The externality arises because individuals fail to internalize the cost that the separation imposes on their firm, which paid a fixed cost to post the vacancy and hire the worker. When the employment contract consists of only a constant wage, determined by a surplus splitting rule, the aforementioned externality obtains; therefore, any equilibria produced by the model fail to be pair-wise efficient. This occurs because ameliorating the externality requires firms to pay a wage equal to the productivity of the match. Of course, when the employment contract consists of only a constant wage, no active equilibrium retains this feature. We derive an alternative employment contract, one where workers receive a wage equal to the productivity of the match and pay a "hiring fee" to the firm upon the formation of the match. The introduction of the hiring fee allows the externality to be internalized and pair-wise efficiency is achieved.

In this paper, we focus on determining if the pair-wise efficient contract or the constant wage rule is more consistent with U.S. data. To make this comparison, we estimate both models using wage and duration data, assuming the hiring fee is unobservable. From the estimates, we compare the fit of the two models. While we do not measure an actual hiring fee (or other features of wage contracts resembling one, e.g. wage–tenure contracts) in the data, the two models do predict different combinations of wages and durations. Thus, despite not explicitly observing a hiring fee, observed wages and durations could be consistent with the model featuring such wage contracts. The idea is to determine whether the data remain more consistent with the implications of the pair-wise efficient contract or the inefficient constant wage rule.

With NLSY data, we estimate both models using maximum likelihood estimation. We find that under certain parametric restrictions, the likelihood function that incorporates the pair-wise efficient contract is *nested* within the likelihood function that features the inefficient constant wage rule. Given this fact, we are then able to perform a formal specification test to determine which contract best describes the U.S. data. The results indicate that the model with an inefficient constant wage rule provides a better fit than the model with the pair-wise efficient contract.

Given evidence of a pair-wise inefficient contract, we then quantify its consequences. Specifically, we perform a counterfactual exercise to determine the welfare gains of a structural shift from the constant wage contract to the pair-wise efficient one. We find that labor force participation would rise by 9.6%, employment by 17.9%, and unemployment would fall 10.8%. Overall, the adoption of the pair-wise efficient contract increases welfare by 3.5%.

This paper contributes to several strands of the labor literature, and in particular the research on labor market search.¹ First, several authors (for example Stevens, 2004; Shimer, 2005a; Bonilla and Burdett, 2005) show that if workers take actions affecting the duration of the match, then inefficiencies can arise depending on the nature of the employment contract. Menzio and Shi (2011) also examine a model with on the job search, focusing on cyclical issues. These papers focus on job-to-job transitions, and develop alternative

bargaining structures that admit efficient separations. In contrast, we focus on transitions from employment to non-participation, and compare the pair-wise efficient contract to an inefficient one. While several authors have attempted to estimate similar search models with on-the-job-search, to the best of our knowledge, our paper represents the first attempt to empirically test two competing wage structures. Also related, Albrecht et al. (2010) construct a model with endogenous participation decisions and workers who are heterogeneous with respect to their market productivity. They show that in this environment, the Hosios rule (Hosios, 1990) does not imply efficiency; instead, it implies that labor force participation remains too high, or that too many vacancies are created in equilibrium.

A few authors have also attempted to incorporate a labor market decision into search models. Gautier et al. (2009) include labor force participation in a model with variable search intensity. Similarly to our results, they find the existing labor market equilibrium in the Netherlands to be inefficient, and recommend changes to minimum wage and unemployment insurance policies to move closer to the socially optimal outcome. Garibaldi and Wasmer (2005) develop a search model with stochastic participation costs to analyze the labor force participation decision. In their model however, the wage distribution remains degenerate; as a result, it is unable to capture the flow of employed workers to non-participation across the wage distribution. Pries and Rogerson (2004) also develop a search model with matching frictions to study labor force participation decisions. Their model focuses on the dynamic nature of participation decisions, and qualitatively captures the correlation between participation rates and participation flows. Our model extends their analysis along two dimensions. First we perform a general equilibrium analysis, allowing for job creation decisions by firms. Second, we allow for a continuous distribution of idiosyncratic shocks to the relative value of non-participation. Pries and Rogerson (2004) use a two-shock case, which does not capture the variation in exit rates across the wage distribution. Finally, our work is also related to Yip (2003), who develops and estimates a search model with endogenous labor force participation decisions, driven by idiosyncratic shocks to the relative value of non-participation. Yip (2003) performs some counterfactual policy experiments, but does not derive Pareto optimal allocations. The counterfactual exercises in Yip (2003) focus on how changes in policy variables (such as unemployment benefits) affect the composition of the labor market as well as welfare. In contrast, we focus first on determining which employment contract best describes the data, and our counterfactual exercise calculates the gains from achieving pair-wise efficiency.

This work also contributes to the literature investigating the role of various labor market policies. Flinn (2006) represents one recent example of this discussion. Flinn analyzes the role of minimum wage policies in a search model with matching frictions similar to the one we use here. The focus of his analysis rests on determining whether the Hosios condition (Hosios, 1990) holds when the parameters are estimated using U.S. data. When the resulting parameters do not satisfy the aforementioned condition, the paper suggests that there may exist a role for minimum wage policies in improving welfare. In contrast, our analysis abstracts from inefficiencies arising from parametric restrictions, focusing instead on structural inefficiencies. Flinn and Mabili (2008) represent another example studying the effects of minimum wage policies in a similar model with on-the-job search. This work is similar to ours in that the specific employment contract affects the welfare properties of equilibria.

Finally, the paper contributes to the efficiency wage literature (Carmichael, 1990 contains a critical survey). For instance, we find that firms pay higher wages due to job turnover. However, we do not find efficiency wages because of a strict assumption about the job turnover to wage relationship.² Rather, we deduce higher wages

¹ The literature on search models of the labor market is extensive; consequently, we only discuss those papers most closely related to ours.

² This could be assumed and would result in even higher wages.

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