

# The Cyclicity of the User Cost of Labor

Dissertation Abstract

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I analyze the cost side of the job creation decision of firms, distinguishing the user cost of labor from the wage payment.

A firm employs a factor up to the point where the marginal benefit of using the factor equals its user cost. For factors hired in a spot market, the user cost is simply the factor's spot market price. If factors are purchased (like capital) or contracted for more than one period, the user cost is an implicit rental price. The rental price is the difference between the purchase price and the expected price that can be recovered from selling the un-depreciated part of the factor.

By analogy, the user cost of labor is the difference between the costs of adding a worker starting from the current period and the expected costs of replacing the worker the next period. If the labor market is a spot market, then user cost is the wage. But adding a worker is a long term investment. In the presence of contracts, the economic conditions at the time of hiring might have an impact on the future wage payments within the employment relationship. This impact is captured by the user cost.

Although the concept of the user cost has been in the literature since Keynes, it has not been applied to the contemporary analysis of labor market. In this dissertation I study the dynamics of the user costs of labor over the business cycle. In the first paper I measure the cyclicity of the user cost of labor in the data. In the second I investigate the quantitative behavior of the user cost of labor in a search and matching model.

## The Cyclical Price of Labor When Wages Are Smoothed

If individual wages are smoothed within the employment relationship, then a mild cyclicity of individual wages can conceal a substantial cyclicity of the price of labor incurred by a firm. Consider, for example, an environment where firms are risk neutral and workers are risk averse. In this case optimal contracts entail smoothed wages within the employment relationships. When the unemployment rate is high, the hiring wage is low. In addition, the wages in all subsequent periods in the contract are relatively lower than wages in contracts initiated under more favorable economic conditions. If the unemployment rate is expected to return to its lower levels, the hiring wages in the future are expected to rise. By hiring now as opposed to the next year, a firm 'locks in' a worker to a relatively lower stream of wages. In this case, the wage at the time of hiring overstates the user cost of labor incurred by the firm. The user cost is lower by the expected difference between the present values of wages to be paid starting from the next year to a worker hired in the next year and the worker hired now. The expected lower wages amplify the incentives for job creation.

In this paper I consider the wage component of the user cost of labor, or, alternatively, the user cost of labor in the environment where the wage payments are the only costs associated with adding a worker. I refer to the wage component of the user cost of labor as a price of labor. I conduct an empirical investigation of the cyclicity of the price of labor using the National Longitudinal Survey of Youth 1979.

Since the user cost of labor is not directly observed in the data, it is constructed based on the behavior of individual wages and turnover. First, I estimate an empirical model of the response of individual wages to the labor market conditions, controlling for individual-specific effects. The labor market conditions are proxied by the history of unemployment rates. As in Beaudry and DiNardo (1991), I consider the initial unemployment rate, the minimum unemployment rate from the start of the employment relationship and the current unemployment rate. Next, using the estimated empirical model for wages, the empirical separation rate, and the forecasting equation for unemployment, I construct the series of the user cost of labor. In the construction future payments are discounted to take into account separation rate and real interest rate. Finally, the constructed series of the logged user costs is projected on unemployment rate.

I find that the constructed price of labor is almost three times as cyclical as the individual wages. In particular, one percentage point decrease in unemployment generates approximately 4.5% increase in the price

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of labor. This cyclicity is also noticeably higher than the cyclicity of the wages of newly hired workers reported in the literature as summarized by Pissarides (2007). The relatively high cyclicity of the price of labor uncovers a substantial amplification of the cost incentives for job creation over the business cycle relative to the observed wages.

### **The Cyclicity of the User Cost of Labor with Search and Matching (Job Market Paper)**

In this paper I employ the user cost of labor to analyze the cyclicity of the cost incentives for job creation with search and matching. I consider an economy with search and matching frictions (Pissarides 1985) and stochastic productivity. In such an economy the user cost of labor can be decomposed into its vacancy cost and wage cost components. The vacancy cost component refers to the expected difference in expenses on vacancy creation between the current period and the next. The wage cost component is the expected difference between the present discounted values of wages. I show that, with free entry, the optimal decision of a firm is at the point where a worker's current marginal product equals the user cost of labor, that is, the sum of the vacancy and wage cost components.

To investigate the dynamics of the user cost of labor and its components, I embed alternative wage setting mechanisms in the search and matching model with risk-averse workers. In addition to continuous re-bargaining, I consider the implicit contracts of Thomas and Worrall (1988) with three different modes of commitment: full commitment, lack of commitment on the worker's side, and two-sided lack of commitment. In the quantitative investigation all four economies are hit by the same series of the productivity shocks. For each model I calculate the cyclicity of wages and the components of the user cost from the simulated data on individual wages, components of the user cost and unemployment rates.

First, I find that in the presence of implicit contracts the wage cost component is more cyclical than the wages of newly hired workers, and, the wages of newly hired are more cyclical than the wages of all workers. The cyclicity of the wage component of the user cost across economies with different wage setting mechanisms is approximately the same. However, the individual wage cyclicity varies significantly depending on the individual wage setting mechanism. The wages are only weakly procyclical in the model with implicit contracts with full commitment. The wages are more cyclical in the models with implicit contracts with lack of commitment. In the continuous rebargaining model the individual wage is as cyclical as the wage cost component of the user cost. These results highlight that judging wage rigidity from individual wages as opposed to the wage component of the user cost can be misleading.

Second, I analyze the quantitative behavior of the vacancy-unemployment ratio implied by the models using the cyclicity of the wage cost found in the companion paper. In particular, the models are calibrated so that the cyclicity of the wage cost component matches its empirical counterpart. I find that the model generates less than the half of the empirical volatility of the vacancy-unemployment ratio regardless of the wage setting mechanism.

Recent papers stress rigid wages as an amplification mechanism for the fluctuations in the vacancy-unemployment ratio. This mechanism works by reducing the cyclicity of labor's user cost. If wages are smoothed by implicit contracts, then rigidity of wages does not imply rigidity of the labor's user cost. As found in the companion paper, the wage component of the user cost is much more procyclical than the individual wages.

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