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Inflation and labor market dynamics revisited ☆

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ABSTRACT

We demonstrate that the presence of an empirically plausible labor adjustment decision at the firm level rationalizes strategic complementarities in price-setting which help explain inflation dynamics. Those strategic complementarities are typically assumed away in the related existing literature. This motivates our revisiting of inflation and labor market dynamics.

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1. Introduction

Firms adjust labor both at the intensive and at the extensive margin (see, e.g., Hansen and Sargent, 1988). What does this imply for inflation dynamics? To address this question a New Keynesian model featuring two margins of labor adjustment is developed. A search and matching friction à la Mortensen and Pissarides (1994) gives rise to equilibrium unemployment and an employment adjustment cost allows us to obtain an empirically plausible split between the two margins of labor adjustment.

Our focus is the role of labor market frictions per se for inflation dynamics.[1] It is shown that plausible restrictions on employment adjustment rationalize strategic complementarities in price-setting which help explain inflation dynamics.[2]

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[1] Monetary models typically combine labor market frictions with other real rigitities. See, e.g., Walsh (2005), Krause and Lubik (2007), Gertler and Trigari (2009) and Trigari (2009).

[2] Following the lead of Walsh (2005), Trigari (2006), and Krause and Lubik (2007) those strategic complementarities are typically assumed away in the related existing literature. See, e.g., the overview article by Christoffel et al. (2009). An early exception can be found in Kuester (2007). His model features, however, only an hours margin for labor adjustment at the firm level. Other exceptions are the work by Barnichon (2008) and Thomas (2008).

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Interestingly, the model also implies a reasonably volatile marginal cost schedule. The latter feature is empirically relevant (see, e.g., Bils, 1987) and hence an inconvenient fact for those models whose ability to generate persistent inflation dynamics relies on assumptions which guarantee a smooth marginal cost, as has been emphasized by Basu (2005). We therefore conclude that the discipline imposed by the labor market facts is of crucial importance for understanding inflation dynamics.

2. The model

Our model consists of three sectors: households, firms and a monetary policy authority.[3]

2.1. Households

There is a continuum of households and, as in Merz (1995) and Andolfatto (1996), each household is assumed to be a large family consisting of a continuum of members with names on the unit interval. In equilibrium some members are unemployed, while others work for firms. The unemployment benefit for unemployed household members is denoted by B, while N_t is the fraction of employed household members. We also use the definition $U_t \equiv 1 - N_t$ for period t unemployment. The period utility function takes the form $\ln C_t - \chi H_t^{1+\eta}/(1+\eta)$, where C_t denotes a Dixit-Stiglitz consumption aggregate (with associated price index P_t), while H_t is meant to indicate hours worked. The elasticity of substitution between different varieties of goods in the consumption aggregate is denoted by ε. Households are assumed to maximize expected discounted utility subject to a budget constraint. Parameter β gives the subjective discount factor. Finally, R_t is the gross nominal interest rate on bond holdings. This structure implies a standard Euler equation which determines the real stochastic discount factor, $Q^R_{t,t+1} = \beta(C_t/C_{t+1})$, used by firms.

2.2. Firms

There is a continuum of firms and each of them is the monopolistically competitive producer of a differentiated good. Each firm i is assumed to maximize its market value subject to constraints implied by the demand for its good, the production technology it has access to, the law of motion of its employment and a Calvo-type restriction on price adjustment. Importantly, it is assumed that each firm takes the relationship between hours hired and its wage as given. Wages are determined as the outcome of a bargain between a firm and each of its workers. That bargain is assumed to take place after the simultaneous price-setting and hiring decision by the firm. Firm-level output, $Y_t(i)$, is produced using a technology which is assumed to be linear in total hours. The number of employed workers is denoted by $N_t(i)$ and $H_t(i)$ is meant to indicate average hours worked. A variable without i index is going to denote the corresponding aggregate variable.

There are two restrictions on the hiring process. First, there is a matching friction à la Mortensen and Pissarides (1994), and, second, firms face a convex adjustment cost associated with integrating a newly hired worker into the existing workforce. That cost, which is measured in terms of the composite good (defined in the same way as the consumption aggregate), is given by the function $G_t(i) \equiv G(N_t(i)/N_{t-1}(i))N_{t-1}(i)$ with $G(1) = G'(1) = 0$ and $G''(1) = \varepsilon_N$. The separation rate is denoted by s and $V_t(i)$ is the number of posted vacancies. The matching probability is given by $\Phi(V_t/U_t^s) = \omega(V_t/U_t^s)^{-\gamma}$, where ω is a constant, γ is the matching elasticity and the definition $U_t^s \equiv 1-(1-s)N_{t-1}$ is used to denote the fraction of the labor force that is searching for a job at the beginning of period t. Notice that the cost of posting a vacancy is c units of the composite good. The role of employment adjustment costs has been emphasized in the literature on labor market dynamics.[4] In the context of our model that feature allows us to obtain a reasonable split of variations in total hours between the two margins of adjustment.

Under the Calvo assumption each firm gets to reoptimize its price in any given period with probability $(1-\theta)$. This implies that a new price is chosen in such a way that over its expected lifetime the weighted average markup over the firm's marginal cost is equal to the desired frictionless markup. The real marginal cost is determined in the following way:

$$MC_t(i) = \frac{W_t(i) + H_t(i)\dfrac{\partial W_t(i)}{\partial H_t(i)}}{\dfrac{Y_t(i)}{H_t(i)N_t(i)}}. \tag{1}$$

(*footnote continued*)
Those two papers are more closely related to our framework, but have a different focus and can only be solved correctly for a somewhat narrow range of parameter values.

[3] The details of the derivations of the model equations are discussed in the appendix, which is available as supplement material.

[4] See, e.g., Nickell (1986), Hamermesh and Pfann (1996), and Cooper and Willis (2009).

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