Discussion on "Optimally Sticky Prices: Foundations (by Jean-Paul L'Hullier and William R. Zame)"[1]

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L'Hullier and William R. Zame make a substantial advance in this paper. They tackle the traditional price stickiness problem by proposing a strategic microfoundation. I see their paper as primarily a contribution to the relationship between asymmetric information and price stickiness. The key conclusion of this paper is that, when many consumers are uninformed, the firm's optimal mechanism leads to sticky contracts or sticky prices. The mechanism design solution can be implemented in a natural setting in which the firm offers contracts or quotes prices. In summary, the results in this paper provide a novel explanation for the empirical evidence. In this discussion, I would like to comment two issues within the framework proposed in this paper: (1) the role of risk aversion and (2) the relationship between asymmetric information and noisy information.

Risk Aversion. In Section 2, the authors use a simple model with quadratic utility ($u(x) = x - x^2/2$) to illustrate the key mechanism of the paper: If taking incentive compatibility into account, a firm that faces uninformed consumers and has sufficiently low marginal costs will strictly prefer not to condition optimal price on the true state but rather to offer the same price in both states; as a result, sticky prices are optimal. In the subsequent sections, they also consider general utility functions. However, the authors do not address how the degree of risk aversion affects the incentive compatibility condition and the optimally set price. It seems that if we adopt different types of the utility function, these implications could be different. Specifically, if the utility function takes the form of constant absolute risk aversion (CARA),

$$v(x,y) = -\frac{1}{\alpha}\exp(-\alpha x) + y, \tag{1}$$

where x is a special good and y is an aggregate good, and there is a single firm that can produce x from y using a constant returns to scale technology: $x = Ay$. In addition, as in the paper, assume that the state of the world, $\omega\,(= H, L)$, with probabilities, ρ_H and ρ_L, represents the nominal price level of the aggregate good y, p_ω with $p_H > p_L$. Finally, it is assumed that the firm is informed of the state of the world, while the consumers are not.

Define the harmonic mean price as:

$$p_0 = \left(\frac{\rho_H}{p_H} + \frac{\rho_L}{p_L}\right)^{-1}. \tag{2}$$

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We assume that the firm is monopolist, can observe the true state, p_ω, and sets the price for good x, q. The consumers maximize the expected utility given the price of good x, q, and their perceived information about p_ω. Under the CARA utility, the uninformed consumers who do not observe and infer the true state maximize the expected utility:

$$\max_x \mathbb{E}\left[-\frac{1}{\alpha}\exp\left(-\alpha x\right) - \frac{q}{p_\omega}x\right] = \max_x \left\{-\frac{1}{\alpha}\exp\left(-\alpha x\right) - \frac{q}{p_0}x\right\}, \tag{3}$$

which implies that:

$$x^*\left(q\right) = -\frac{1}{\alpha}\ln\left(\frac{q}{p_0}\right). \tag{4}$$

The firm's objective is then to maximize the following expected profit function:

$$\max_q \Pi = \frac{q}{p_0}x\left(q\right) - y = \left(\frac{q}{p_0} - k\right)x\left(q\right),$$

where $k = 1/A$ is the marginal utility. The optimal condition for q is then:

$$\ln q^* + \frac{1}{q^*}p_0 k = 1 + \ln p_0, \tag{5}$$

which clearly shows that q^* is independent of the degree of risk aversion, α.

In contrast, if the utility function takes a form of constant relative risk aversion (CRRA), we have different results on the optimal price. Specifically, in the CRRA case, the uninformed consumers' optimization problem can be written as:

$$\max_x \mathbb{E}\left[\frac{x^{1-\gamma}}{1-\gamma} - \frac{q}{p_\omega}x\right] = \max_x \left\{\frac{x^{1-\gamma}}{1-\gamma} - \frac{q}{p_0}x\right\}, \tag{6}$$

which implies that:

$$x^*\left(q\right) = \left(\frac{q}{p_0}\right)^{-1/\gamma}. \tag{7}$$

The firm's objective is then to maximize the following expected profit function:

$$\max_q \Pi = \frac{q}{p_0}x\left(q\right) - y = \left(\frac{q}{p_0} - k\right)x\left(q\right),$$

where $k = 1/A$. The optimal condition for q is:

$$q^* = \frac{kp_0}{1-\gamma}. \tag{8}$$

To guarantee that q^* is positive, we have to impose a restriction on γ, $0 < \gamma < 1$. Within this arrange, we can see that the optimal price is increasing with the degree of relative risk aversion. In addition, it is straightforward to show that the profit at optimum,

$$\Pi^* = \left(\frac{q}{p_0} - k\right)\left(\frac{q}{p_0}\right)^{-1/\gamma} = \gamma\left(\frac{k}{1+\gamma}\right)^{1-1/\gamma},$$

is also affected by the degree of risk aversion, γ, which means that γ has an effect on the range of the marginal cost, k, that generates the firm's incentive compatibility behavior.

Learning via Private Information. This paper focuses on how the asymmetric information between the consumers and the firm generates price stickiness. The consumers in the model economy are assumed to be either informed or uninformed. However, in reality, consumers can learn the state of the world via private signals. So it seems interesting to compare the economic implications of the extreme cases (*completely* informed or uninformed consumers) with that of the intermediate case (*partially* informed consumers). Within the binary framework considered in this paper, a typical consumer may face the following learning problem. First, assume that λ is the logarithm of the likelihood ratio (LLR) between the two states (H and L) before observing a private signal s:

$$\lambda = \ln\left(\frac{\rho_H}{\rho_L}\right).$$

After observing the private signal s, the consumer will update the LLR to λ' such that

$$\lambda' = \lambda + \ln\left(\frac{\Pr(s|H)}{\Pr(s|L)}\right),$$

where the updating multiplier is:[3]

$$\frac{\Pr(s = H|H)}{\Pr(s = H|L)} = \frac{q}{1-q}.$$

This multiplier is greater than 1 if and only if $q > 0.5$. In this case, a signal $s = H$ increases the probability of the good state, H.

[3] Here the private signal is assumed to be symmetric.