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The fixed wage puzzle: Why profit sharing is so hard to implement

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The Fixed Wage Puzzle: Why Profit Sharing Is So Hard to Implement

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Abstract

It is well known that profit sharing arrangements Pareto-dominate fixed wage contracts. Share agreements are (far) less than ubiquitous, however. This paper offers a solution of this „fixed wage puzzle“ by adopting a perspective of bounded rationality. We show that share arrangements that fulfill „plausible“ constraints are not generally acceptable to both firms and unions.

1 Introduction

It is well known that profit sharing arrangements Pareto-dominate fixed wage contracts. In particular, profit sharing schemes may give rise to higher productivity of workers (Bental and Demougin 2006); allow for an efficient risk distribution (Brouwer 2005); and foster employment by reducing the marginal cost of labor (Weitzman 1985; Jerger and Michaelis 1999). Despite these arguments, share agreements are more the exception than the rule (Pendleton et al. 2001).

The inconsistency between the desirability of profit-sharing schemes in theory and their rare use was already noted in Weitzman (1985) and termed the „fixed wage puzzle“ by Kirstein and Kirstein (2007). Weitzman's explanation of this puzzle invokes an externality. Whereas the excess labor demand created by share contracts is beneficial for a society, individual firms have an incentive to revert back to a fixed-wage contract if everyone else maintains profit sharing. This externality, however, vanishes when there is a negotiation over the parameters of a share contract (Holmlund 1990).

In this paper, we show that the fixed wage puzzle can be understood by invoking a mild form of bounded rationality. Specifically, we assume that instead of thinking through the whole bargaining and adjustment processes of a changeover from fixed wages to share contracts, unions and firms consider to implement a share solution with some plausible properties to be detailed below. A share contract is reached if and only if both parties prefer it relative to the fixed wage solution.

In the next section, we present the basic model and the fixed wage solution that serves as a benchmark. Section 3 presents three changeover scenarios, section 4 concludes.

2 Basic Model and Fixed Wage Solution

We consider an economy populated by a large number of monopolistically competitive and symmetric firms producing revenue R by means of labor N according to $R = \theta \cdot N^{\alpha}$, where $0 < \alpha < 1$. $\theta \sim (1, \sigma_{\theta}^2)$ denotes a revenue shock. Since we confine ourselves to the sectoral level and the analysis of symmetric firms, we can do away with firm indices.[1]

Each firm faces a monopoly union whose behavior is driven by the maximization of the utilitarian Stone-Geary function

$$U = N \cdot \left(\frac{W^{1-\gamma}}{1-\gamma} - \frac{B^{1-\gamma}}{1-\gamma} \right), \tag{1}$$

where W denotes the real wage, B the exogenously given alternative income, and $\gamma > 0$ the Arrow-Pratt measure of relative risk aversion.

The sequence of events is as follows. First, the union sets the wage rate W after which the revenue shock θ is revealed. Then the firm decides about the level of employment. This sequence ensures that fixed wage contracts do not completely isolate workers from uncertainty since employment will depend on the realization of θ.

Solving the dynamic game, we have first to consider the firms' decision, which is summarized by the labor demand schedule

$$N = \left(\frac{\alpha\theta}{W} \right)^{\frac{1}{1-\alpha}}. \tag{2}$$

Expected employment is thus given by

$$E(N) = \left(\frac{\alpha}{W} \right)^{\frac{1}{1-\alpha}} \cdot \Theta, \tag{3}$$

where $\Theta = 1 + \frac{\alpha \cdot \sigma_{\theta}^2}{2(1-\alpha)^2}$. Note that $E(N)$ depends positively on σ_{θ}^2 due to the convexity of the labor demand schedule (2).

Maximizing the expected value of (1), observing (3), yields $W = \eta \cdot B$, where $\eta \equiv \mu^{1/(\gamma-1)}$ and $\mu \equiv \alpha + (1-\alpha)\gamma$. The optimal wage does not depend on σ_{θ}^2, i.e. the revenue shock shows up in employment only.[2] For further reference, expected utility and expected profits in the fixed wage solution are given as follows:

$$E(U) = \frac{1-\alpha}{\mu} \left(\frac{\alpha}{\eta B^{\mu}} \right)^{\frac{1}{1-\alpha}} \Theta \tag{4}$$

$$E(\Pi) = (1-\alpha) \left(\frac{\alpha}{\eta B} \right)^{\frac{\alpha}{1-\alpha}} \Theta \tag{5}$$

---

[1] Our focus on the incentives to arrive at a share agreement also allows us to ignore the macroeconomic consequences.

[2] This property, however, is due to the fact that the labor-demand schedule is iso-elastic (MacDonald and Solow 1981).

3 Changeover Scenarios

3.1 Three Plausible Suggestions

The „straightforward“ comparison between fixed and flexible wage arrangements looks at the differential, both in union utility and profits, between the two bargaining outcomes (Jerger and Michaelis 1999). However, since the theoretical possibility of a Pareto-improvement via a bargaining process might be difficult to evaluate, firms and unions might consider „plausible“ instead of optimal share arrangements. Clearly, the difficulty is the specification of plausibility. In this paper, we offer three different scenarios. First, we look at a share contract that ensures that the total wage is equal to the fixed wage „on impact“ , i.e. when employment is still at the level that prevails under a fixed wage contract. Second, we analyze a contract that leaves the wages of incumbent workers unchanged after the adjustment of employment under the share contract took place. Finally, we consider whether it makes sense for a firm to offer a share contract unilaterally.

A share contract specifies workers' remuneration as some base wage ω that is complemented by a share λ of the difference between revenue per worker and the base wage.[3] Formally: $W = \omega + \lambda(\theta R(N) - \omega N)/N$. Clearly, a given level of total remuneration can be achieved via an infinite number of combinations of ω and λ. To pin things down, we assume $\omega = B$.

3.2 Total Wage Equivalence on Impact

A plausible minimum requirement from the viewpoint of workers for a change from fixed wages to a share contract is that incumbent workers' wages remain the same as long as employment is unaltered. This requirement implies $\lambda = \frac{\alpha(\eta-1)}{\eta-\alpha}$. Expected employment is given by $E(N) = (\alpha/B)^{1/(1-\alpha)}\Theta$. Clearly, total remuneration is lower than under a fixed wage contract after the adjustment to this employment level. Expected utility and expected profits are readily computed as

$$E(U) = \frac{1}{1-\gamma}\left(\psi^{1-\gamma}-1\right)\left(\frac{\alpha}{B^{\mu}}\right)^{\frac{1}{1-\alpha}}\Theta \tag{6}$$

$$E(\Pi) = (1-\alpha)^2\frac{\eta}{\eta-\alpha}\left(\frac{\alpha}{B}\right)^{\frac{\alpha}{1-\alpha}}\Theta, \tag{7}$$

where $\psi \equiv (\eta(2-\alpha)-1)/(\eta-\alpha)$. Comparing (4)-(5) to (6)-(7) leads to the following result:

Proposition 1 *Unions will agree to a share contract* $(\omega, \lambda) = \left(B, \frac{\alpha(\eta-1)}{\eta-\alpha}\right)$ *if and only if the degree of relative risk aversion* γ *is less than unity. Firms will always accept this share contract since profits are higher than under fixed wages.*

[3] This revenue sharing is economically equivalent to profit sharing (Michaelis 1997).

We are only aware of two empirical studies that directly estimate the crucial parameter, i.e. the unions' degree of relative risk aversion. Farber (1978) in a study of the US United Mine Workers over the period 1948-1973, finds a γ of about 3. Carruth and Oswald (1985) derive an estimate of 0.8 – slightly below the benchmark of proposition 1 – from the behavior of unions in the coal and steel industries in the United Kingdom over the period 1950-1980. The literature on the degree of relative risk aversion of households arrives at values of γ between 1 and 5 (Watt 2002, Dohmen et al. 2010). Hence, risk aversion might well explain the reluctant use of share contracts.

3.3 Total Wage Equivalence after Employment Adjustment

Incumbent workers may object to the changeover scenario of the last subsection for the simple reason that in equilibrium, i.e. after the adjustment of employment, their total wage will be lower than the fixed wage. Thus, the next plausible suggestion is a share contract that leaves wages unchanged after employment is adjusted to the profit-maximizing level. With $\omega = B$, this requires $\lambda = \frac{\alpha(\eta-1)}{1-\alpha}$. The algebraic solution can be omitted because the intuition is rather straightforward. It is summarized in the following

Proposition 2 *Unions will always agree to a share contract* $(\omega, \lambda) = \left(B, \frac{\alpha(\eta-1)}{1-\alpha}\right)$. *Firms, however, will not accept this share contract since profits are lower than under fixed wages.*

Unions benefit unambiguously since employment rises, whereas total remuneration per worker remains the same (by assumption). This clearly implies declining profits.

3.4 Share Offer of Firms

The two previous scenarios looked at specific share contracts. Now we ask whether it may benefit a firm to unilaterally offer some positive share λ to the union. The rationale for that may be that the union is willing to reduce the base wage component in order to foster employment. This in turn might lead to higher profits. The sequence of events thus is $\lambda - \omega - \theta - N$, where the monopoly union sets ω. Looking at the firms' problem, we start from the expected profit function $E(\Pi) = (1-\lambda)(1-\alpha)(\alpha/\omega)^{\frac{\alpha}{1-\alpha}}\Theta$. Maximizing with respect to λ yields the first-order condition

$$\frac{\partial E(\Pi)}{\partial \lambda} = 0 \quad \Rightarrow \quad \frac{\partial \omega}{\partial \lambda} = -\frac{\omega(1-\alpha)}{\alpha(1-\lambda)}. \tag{8}$$

If the ω requested by the monopoly union declines in λ according to (8) or faster, firms have an incentive to offer such a share component to their workers. Writing union utility as a function of both ω and λ and maximizing with respect to ω, treating λ as given, leads to the optimal base wage demand $\omega = \frac{\alpha\eta B}{\alpha(1-\lambda)+\lambda}$. From this, it is clear that unions reduce

their base wage claim according to

$$\frac{\partial \omega}{\partial \lambda} = -\frac{\omega(1-\alpha)}{\alpha(1-\lambda)+\lambda}. \tag{9}$$

By comparing this result to (8), it is immediately clear that for any positive λ, the reduction of the base wage claim is lower than what firms would need in order to offer share contracts. This establishes

Proposition 3 *Firms have no incentive to offer a positive share of profits to workers, although unions would react by lowering the base wage.*

Only if the moderation of the base wage is complemented by an increase in labor productivity, a unilateral offer of a share contract might be possible (see Koskela and Stenbacka 2006).

4 Conclusions

In most firms, fixed wage contracts are in effect and serve as a natural benchmark for a share contract. From this benchmark, however, plausible changeover suggestions are likely to be refused by one party involved. Fixed wage contracts thus exert quite some „normative power of the factual“ – and this power may well prevent more efficient share agreements. We show that plausible share arrangements are unlikely or impossible to be accepted. Only if workers display a relatively moderate degree of risk aversion and agree to a share contract under which total remuneration declines relative to the fixed wage contract, there is a possibility for a mutually acceptable changeover from fixed wages to a share arrangement.

One should note that this analysis is an application of the general and recently very fruitful analysis of bounded rationality. Under unbounded rationality (and the assumptions concerning technology and union utility in this paper), a share agreement clearly Pareto-dominates a fixed wage agreement. We thus offer a new perspective on the well-known fixed wage puzzle.

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