

To Share or Not to Share?

Why Profit Sharing Is So Hard to Implement

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First Draft: March 2007
Comments welcome.

Abstract

It is widely recognized that a Share Economy (SE) Pareto-dominates a Fixed Wage Economy (FWE) if unions care about employment. This begs the question, why profit sharing is less than ubiquitous. In this paper, we offer a solution to this conundrum by looking at particular transition arrangements from a FWE to a SE. We analytically show that despite the Pareto-dominance of a SE, the changeover from a FWE is rather difficult if a FWE is already in place. Thus, the mere statement of the Pareto-ranking between a SE and and FWE does not suffice. We need to establish under which institutional arrangements, the transition is likely to occur.

KEYWORDS: PROFIT SHARING, SHARE ECONOMY, REMUNERATION SYSTEMS

JEL CLASSIFICATION: E24, J33

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1 Introduction

At least since the seminal book on the "Share Economy" by Martin Weitzman (1984) and the rather enthusiastic comments it received both in academic and political circles¹, economists face a conundrum. Given the alleged Pareto-improving properties of share arrangements, it is far from obvious why so many firms and workers fail to reap these efficiency gains.² It seems that there are only two ways out of this contradiction: Either Weitzman and other proponents of the Share Economy overlooked some drawbacks that explain a rational rejection of this idea by market participants; or the latter are simply irrational or at least overstrained in understanding the potential benefits of profit sharing.³ In this paper, we will put forward a third explanation of the "missing profit sharing" conundrum by arguing that *given a fixed wage solution that is already in place*, there is no trivial or obviously feasible path that leads to the Pareto-superior profit sharing solution. Thus, institutional features may prevent the full exploitation of the potential benefits of Weitzman's idea. From this, we can deduce recommendations for the design of negotiations over share arrangements. More precisely, we show that

- the relevant labor market participants will generally not be willing to agree to a split of a given fixed wage into a base and share component when these two are required to add up to the ex ante fixed wage in expectation.
- firms have no incentive to offer a positive share of profits or revenue in the hope that firms will then settle for a lower base wage.

Thus, these two rather "natural" transition paths from a Fixed Wage Economy to a Share Economy (henceforth FWE and SE, respectively), are

¹In a book review in The New York Times, the Share Economy has even been hailed as the "best idea since Keynes"; see Alexander (1985).

²See the reports by EIRO (2001) and Pendleton et al. (2001) for a comprehensive picture of profit sharing and employee share ownership in the European Union.

³In traditional economics, this last idea was safely in the realm of heresy for decades if not centuries. Recently, however, in many branches such as financial markets and consumer behavior, irrationality seems ever harder to explain away; see the report in The Economist (2006) on various attempts to deal with blatant irrationality that have been discussed at the 2006 meeting of the American Economic Association.

not going to work. Despite the Pareto-inefficiency of a FWE, it is likely to persist if no viable solution for the transition to the SE is offered. In the policy arena in Germany, the question whether and how to move from a FWE to a SE gained momentum recently. Chancellor Angela Merkel endorsed such a change and announced concrete suggestions to be discussed by the CDU convention in fall 2006. In principle, there is a broad consensus between unions and employer associations that this is indeed a good idea. Unions, however, make quite clear that a share component must be paid strictly on top of the going wage rate and must exclude the possibility of a shrinking pay package.⁴ The rest of the paper proceeds as follows. The following section 2 provides a short survey on the economics of profit sharing, ie. a list of the potential benefits (and drawbacks) of share arrangements. In section 3, we model the two transition scenarios from a FWE to a SE and check whether and under what circumstances the involved parties are willing to go along these paths. Since the answer is negative, we discuss institutional arrangements that may be more conducive to a successful transition to a SE in section 4. Section 5 offers some brief conclusions.

2 The Economics of Profit Sharing: A Short Survey

There are three major advantages that are associated with profit sharing:

- First, profit sharing may foster the incentives for workers by making them participate in the fruits of their labor. Thus, profit sharing may enhance labor productivity. If the overall cake gets bigger by letting the workers have a slice of it, there is an obvious scope for Pareto-improving arrangements.⁵

⁴See the statement of the Deutscher Gewerkschaftsbund at http://www.dgb.de/homepage_kurztexte/teilhabe02.htm. It is interesting to note in that context that micro data from the IAB Establishment Panel of Institut für Arbeitsmarkt- und Berufsforschung in Nuremberg indeed show that the introduction of profit sharing does *not* entail a reduction of the base wage; see Kraft/Ugarkovic (2005).

⁵Wadhvani/Wall (1990) and Cahuc/Dormont (1997) provide some empirical evidence

- Second, profit sharing may foster employment by reducing the marginal cost of labor. Under profit sharing, these only amount to the fixed base wage, whereas the share component is not part of marginal cost. Indeed, it was the major insight of Weitzman (1984) that a SE is a means to separate the remuneration of workers from the marginal cost of labor.
- A third argument put forward is the risk sharing property of a SE. Share arrangements can be viewed as a distribution mechanism of risk between entrepreneurs and workers. If both are risk averse – or the former face a capital market constraint that prevents them to finance a required amount of risk – it makes sense to split this risk between the two groups. Brouwer (2005) looks at this aspect of profit sharing in a host of institutional arrangements throughout history. Ichino (1994) and Koskela/Stenbacka (2004a) model the interaction between profit sharing and credit market imperfections.

Despite the empirical evidence cited above, the productivity enhancing effect of a comprehensive introduction of profit sharing is rather questionable, since it requires a direct and strong link between the effort of a worker and the share base (ie. profits or revenue of the firm). If this share base is the joint result of the entire workforce, there is an obvious free-rider problem associated with share arrangements. Let the share base be given by $S = S \left(\sum_{i=0}^N e_i \right)$, where N is the number of workers and e_i is the individual effort level of these workers. From this base, workers get a fraction λ that is split equally among workers. The incentive effect for an individual worker is thus given by $\lambda N^{-1} (\partial S / \partial e_i)$ – which may be a rather tiny number even in a small or medium-sized firm.⁶ If empirical studies nevertheless point to a positive association between share arrangements and productivity, there are two explanations left. First, a high level of productivity may be the cause for rather than the effect of a share agreement by convincing firms

from UK and French micro data, respectively, that profit sharing is indeed associated with rising productivity. Bental/Demougin (2004) look at the productivity effects of endogenous incentive contracts.

⁶The free-rider problem of share contracts is hence also known as $1/N$ -problem.

that their workforce justly "deserves" an extra payment that complements the ex ante fixed wages.⁷ Second, share arrangements may be written such that there is a clear link between individual effort (or rather: result) and payment. This, however, requires an objective quantification of individual output. Whereas this may well be possible in traditional industries and in the context of manual work, this is blatantly impossible in most sectors of a modern information or knowledge society. In this paper, we thus abstract from this possible – and desirable – side effect of a SE. The second strand of argument sparked a large literature on the macroeconomic effects following the work of Weitzman (1984, 1985). Whereas Weitzman emphasized the smoothing effect of share arrangements on employment over the business cycle, European economists quite understandably took more interest in the question whether equilibrium employment will rise in a SE relative to an otherwise identical FWE. The consensus answer to that question is a clear "yes". Hence, in a SE, the NAIRU will plausibly be lower than in a FWE, which is the major reason why economists usually endorse profit sharing arrangements. This result can best be understood in two steps: First, as shown by Pohjola (1987), share negotiations are equivalent to the joint bargaining over a fixed wage and employment, when firms have the possibility to credibly commit themselves to the negotiated employment level.⁸ Thus, share arrangements lead to a Pareto-efficient wage-employment combination, ie. to an efficient contract in the sense of Leontief (1946). Relative to a "simple" bargain of fixed wage, employment will rise and (total) wages will be lower, if workers – or the union representing them – care about employment. This rather straightforward logic only applies at the sectoral level, however. It can be shown that the wage moderating effect at the sectoral level also translates into a "less aggressive" wage setting schedule and hence to a lower equilibrium rate of unemployment (see Holmlund 1990, Jer-

⁷The findings in Piekkola/Kauhanen (2003) concerning the distribution of rent sharing contracts across firms and skill groups point into this direction.

⁸Intuitively, bargaining only over the (total) wage confines the feasible set of labor market outcomes to the labor demand schedule, whereas the additional bargaining over employment allows for efficient contracts. In the same vein, the bargaining over two other instruments – base wage and share parameter – lead to an efficient contract off the labor demand curve.

ger/Michaelis 1999). This also holds true if one allows for endogenous capital formation.⁹

3 Getting from Here to There: Two Natural Transition Paths from Fixed Wages to Profit Sharing

In this section, we first describe an economy in which fixed wages are paid to workers. This serves as a natural point of reference against which the introduction of share arrangements is going to be evaluated. The two following subsections then analyze whether both firms and workers would be willing to switch from a Fixed Wage Economy (FWE) to a Share Economy (SE) under two alternative transition assumptions. First, we look whether firms and workers will agree to a transition when the expected wage of a worker stays the same, i.e. when a single worker stands to gain (lose) relative to a FWE if the firm's revenue is higher (lower) than expected. Although this transition scenario might look rather "crude" from a theoretical perspective, it is quite natural as a "minimum condition" for incumbent workers who are asked to bear a certain income risk. The relevance of this scenario is further corroborated by the finding by Kraft/Ugarkovic (2005) cited in section 1. Second, we look whether in a two-stage wage setting process, firms have an incentive to unilaterally offer a share of profits to workers before these set the base wage (which is equal to the total wage in a FWE). Firms could gain from this on two accounts: First, total remuneration of workers is made conditional on actual performance and second, workers will demand a lower base wage in exchange for the profit share as compared to the FWE. Hence, this scenario is a rather straightforward and "spontaneous" way to get to a SE. If Pareto-improvements are feasible, it seems plausible that one party

⁹Meade (1986) pointed to the potential problem that profit sharing entails an increase in "effective" capital cost, since firms can only claim a fraction $(1 - \lambda)$ of (marginal) profits resulting from any investment. The higher employment in a SE, however, also boosts the marginal productivity of capital which more than compensates the disincentive-to-invest effect articulated by Meade; see Jerger/Michaelis (1999).

could be willing to make a first step.

3.1 Specification Issues and Fixed Wage Economy

We consider an economy in which a large number of symmetric firms in a monopolistically competitive setting produce output Y by means of labor N according to the production function $Y(N) = N^\alpha$, where $0 < \alpha \leq 1$. There is no need for indices identifying a single firm or sector since there is no possibility for confusion. In this paper, we strictly confine the analysis to the sectoral level.¹⁰ Firms enjoy a certain degree of price-setting power in their goods market, ie. they face the following demand function: $Y = P^{-\varepsilon} \cdot Y_d$, where P denotes the price set by the representative firm and $1 < \varepsilon < \infty$ is the absolute value of the price elasticity of demand. Y_d is an index of aggregate demand exogenous to the firm. The firm's revenue is thus given as

$$R \equiv P \cdot Y = Y^\kappa Y_d^{1-\kappa}, \quad (1)$$

where $0 < \kappa \equiv \frac{\varepsilon-1}{\varepsilon} < 1$. We introduce a stochastic element into the revenue function by assuming Y_d to be random according to

$$Y_d = \left(\frac{\theta}{\alpha\kappa} \right)^\varepsilon, \quad (2)$$

where θ is a random variable with $E(\theta) = 1$ and finite variance, denoted by $V(\theta)$. This assumption concerning the distribution of θ is sufficient for our purposes, ie. there is no need to limit ourselves to more specific distributional assumptions. The exact specification in (2) helps to save some notation in the rest of our analysis. Plugging (2) into (1) and observing the production technology yields the following revenue function for the representative firm:

$$R = \frac{\theta}{\alpha\kappa} \cdot N^{\alpha\kappa} \quad (3)$$

¹⁰The macroeconomic consequences of profit sharing have been analyzed elsewhere; see e.g. Weitzman (1985), Layard/Nickell (1990), Jerger/Michaelis (1999).

The timing of events in the FWE is given as follows and summarized in figure 1: In Stage I, a monopoly union sets the wage rate W , the firm then exercises its "right to manage" by employing the profit-maximizing amount of labor and setting the resulting price in Stage II. After these decisions are taken, the shock term θ materializes. In this setting, workers are completely isolated from the shock, both in terms of wages and employment. Thus, the shock is only relevant for the firm's profits. The assumption of a monopoly union is invoked for sake of simplicity. No additional insight – but an additional greek letter – would be added if we would allow for a Nash-Bargain over the wage rate. The profit maximizing employment decision by firms is given as

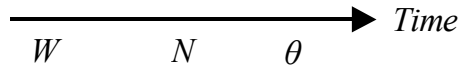


Figure 1: The Timing assumptions for a FWE

the solution to the following problem:

$$\max_N E(\Pi) = E(R) - WN = \frac{E(\theta)}{\alpha\kappa} N^{\alpha\kappa} - WN. \quad (4)$$

Observing $E(\theta) = 1$, this yields the labor demand function

$$N = W^{\frac{-1}{1-\alpha\kappa}}. \quad (5)$$

Since the firm is assumed to be risk neutral¹¹, the labor demand decision only depends on the expected value of θ and not the variance of the shock term. We further postulate a standard utilitarian objective function of the monopoly union with exogenous levels of membership M and alternative income B , respectively: $\tilde{U}(N, W) = N \cdot u(W) + (M - N) \cdot u(B)$. Subtracting the constant term $M \cdot u(B)$ and assuming a constant elasticity form of $u(\cdot)$,

¹¹Technically speaking, the condition is that $E(\theta)$ enters the firm's objective function (4) in a linear way, which it does.

we arrive at the following specification:

$$U(W, N) = N \cdot (W^{1-\gamma} - B^{1-\gamma}), \quad (6)$$

where γ is the measure of relative risk aversion. It must be noted that whereas the exact specification of union utility is of minor importance for the message of our results, the presence of a employment motive of unions as in 6) is quite decisive. In the absence of this employment motive, there is no scope for Pareto-improving solutions off the labor demand schedule as noted by Oswald (1993). Anticipating (5), maximization of (6) with respect to W yields the following wage equation

$$W = \eta \cdot B, \quad (7)$$

where $\eta \equiv (\gamma + (1 - \gamma)\alpha\kappa)^{\frac{-1}{1-\gamma}} > 1$ denotes the mark-up of the wage over alternative income. This completes the description of the FWE that is the natural point of reference for any share arrangement the firm or the workers might suggest.

3.2 Path 1: Will Firms Agree to Offer the Same (Expected) Wage?

A very natural point of departure for the inception of a profit sharing agreement at the firm level is the following: Firms might offer to split the wage into a fixed wage component ω that does not depend on the revenue and thus on θ and a share component that depends on realized revenue or profit.¹² Workers are told that the two parameters are calibrated such that the total remuneration per worker is equal to the wage that is paid in a FWE setting given by (7).¹³ Note that each *individual* employee will very likely object to this suggestion due to her risk aversion; the individual utility associated

¹²It is well known that revenue and profit sharing basically amount to the same thing; see Michaelis (1997).

¹³In this paper, we assume away any possible information asymmetry between firms and workers. Thus, workers really know that the expected equivalence of the wage under a share arrangement and the fixed wage (7) does indeed hold.

with the wage rate (7) is unambiguously higher than the utility associated with the same *expected* wage that is uncertain to some degree. Nevertheless, the *union* characterized by (6) might well find such an offer advantageous if employment rises as a consequence of a share arrangement. This is indeed the case since the marginal cost of labor declines to the base wage and hence optimal employment will rise in a SE. We consider a wage schedule of the following form:

$$W = \omega + \lambda \cdot \left(\frac{R(N, \theta) - \omega N}{N} \right) = (1 - \lambda) \cdot \omega + \lambda \cdot \frac{R(N, \theta)}{N} \quad (8)$$

Obviously, there is an infinite number of (ω, λ) -combinations that lead to an equivalence of the expected value of (8) and (7). We pin this down by assuming the base wage to be equal to the alternative income

$$\omega = B. \quad (9)$$

The reason for this choice is simply that it has some intuitive appeal for a share arrangement to guarantee to workers what they could have elsewhere in the economy and to complement this with a variable share component. Furthermore, it would result from an explicit bargain over ω and λ in case of risk neutral unions, ie. for $\gamma = 0$. Plugging (9) into (8), setting the resulting expression equal to (7) and solving for λ leads to

$$\lambda = \frac{\alpha\kappa(\eta - 1)}{1 - \alpha\kappa}. \quad (10)$$

Before looking at the consequences for union utility and profits, we have to track the effects of the proposed transition from a FWE to a SE characterized by (9) and (10) on the employment level. Clearly, labor demand and hence employment rises relative to the FWE due to the lower marginal cost of labor. Taking into account the wage equation (8) and (9), the profit maximization problem of the firm under profit sharing is given by

$$\max_N E(\Pi) = (1 - \lambda) \cdot (E(R) - BN), \quad (11)$$

which yields the labor demand equation

$$N = B^{\frac{-1}{1-\alpha\kappa}}. \quad (12)$$

Note that due to our timing assumption, employment in the SE is again insulated from the shock. Thus, the employed union members suffer only from a certain income volatility via the share component of their pay package. We now have to ask whether the union and the firm both benefit from this transition from a FWE to a SE. Clearly, this condition is needed if one is to expect "wage neutral" transitions from fixed wage contracts to share contracts to occur. Let's first consider the situation of the union. There are two counteracting effects at work. Rising employment unambiguously boosts union utility, whereas the volatility of total remuneration counteracts this effect. We summarize the result of our model in the following

Proposition 1 *a) For $V(\theta) = 0$, union utility unambiguously increases in the transition from a FWE to a SE with the same expected wage. b) There is a finite level of $\bar{V}(\theta) > 0$ above which union utility decreases in the transition from a FWE to a SE with the same expected wage.*

The proof of Proposition 1 requires a direct comparison of expected union utility in both situations. Thus, we have to evaluate (6) in a FWE and in this first version of a SE. The resulting expected utility levels are written as $E(U^{FWE})$ and $E(U^{SE})$, respectively. In doing so, the stochastic nature of total remuneration in the SE must be taken into account. Note that $E(U^{SE_1}) = E(U^{SE}(N, B, \lambda, \theta))$, where N and λ are given by (12) and (10), respectively. Expected utility of the union is also a function of $V(\theta)$. More precisely, expected union utility can be written as¹⁴

$$E(U(\theta, \dots)) \approx U[E(\theta, \dots)] + (1/2) \cdot \frac{\partial^2 U}{\partial \theta^2}[E(\theta)] \cdot V(\theta). \quad (13)$$

Clearly, the variance term matters if the wage and thus θ enters $U(\cdot)$ in a non-linear way as it is the case for risk averse unions (i.e. for $\gamma > 0$). Using

¹⁴The following approximation has been introduced by Markowitz (1959).

(13), we arrive – after some straightforward, albeit tedious manipulations – at the following result:

$$\frac{E(U^{SE})}{E(U^{FWE})} \approx \underbrace{\eta^{\frac{1}{1-\alpha\kappa}}}_{>1} \cdot \underbrace{\left(1 - \frac{\gamma(1-\gamma)(1-\eta)^2}{2(1-\alpha\kappa)^2\eta^{1+\gamma}(\eta^{1-\gamma}-1)} \cdot V(\theta)\right)}_{<1} \quad (14)$$

The first factor on the RHS of (14) reflects the utility gain by unions due to the unambiguously rising level of employment in the transition from a FWE to a SE. The second factor is equal to unity for $V(\theta) = 0$ and declining in $V(\theta)$. Thus, there is a threshold level $\bar{V}(\theta)$ above which the net effect on union utility becomes negative, despite the higher employment under profit sharing. This threshold level is readily computed as

$$\bar{V}(\theta) = \frac{2(1-\alpha\kappa)^2}{\gamma(1-\gamma)(1-\eta)^2} \eta^{1+\gamma} (\eta^{1-\gamma}-1) \left(1 - \eta^{\frac{-1}{1-\alpha\kappa}}\right) > 0 \quad (15)$$

This completes the proof of proposition 1.

Turning to the comparison of profit levels, things are less complicated in this instance. Since 1) optimal employment rises for any base wage below (7), 2) the expected total remuneration per worker stays the same and 3) expected profits are linear in θ , it follows that expected profits unambiguously decline relative to a FWE due to the declining marginal revenue of labor. This finding is summarized in

Proposition 2 *Firms will not switch from a FWE to a SE when they are required to adjust λ and ω such that the expected wage is the same as in the FWE.*

Thus, the requirement of an unchanged expected wage destroys any incentive of firms to offer share contracts. Moreover, there is the theoretical possibility that unions will suffer more from the volatility of wage income than they stand to gain from higher employment. One might argue that not very much is lost by showing that a somewhat arbitrary scenario will not be endorsed by one or even both labor market parties. Still, it is worthwhile to note that the introduction of a SE is deemed to failure if the requirement of

unchanged expected wages is kept up.¹⁵

3.3 Path 2: Will Firms Unilaterally Offer a Profit Share?

In this section we thus consider a second possibility to establish a SE. The idea here is to split the wage setting process up into two stages. The firm has the option to credibly commit itself to a positive λ – after all, it is not forbidden to give away the things one owns – *before* the (monopoly) union sets a base wage ω that takes into account the offer made by the firm. This timing assumption is shown in figure 2.¹⁶In the last decision stage, the

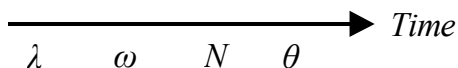


Figure 2: The Timing of a two-stage wage setting process

optimal employment level is given by

$$N = \omega^{\frac{-1}{1-\alpha\kappa}} \quad (16)$$

in complete analogy to (5) and (12), where ω is determined by the monopoly union in the stage before. It is convenient in this case to begin with Stage I in which the firm decides on some level of λ that might be offered to the union by denoting the solution of Stage II as ω^* . The firm's problem is given by

$$\max_{\lambda} E(\Pi) = (1 - \lambda) \cdot (E(R) - \omega^* N), \quad (17)$$

observing its own decision in Stage III, given by (16).

¹⁵Although not in the focus of this paper, it is important to note that even if a share arrangement with an unchanged total wage could be introduced, the positive employment effect on the firm level would *not* carry over to the aggregate level. Hence, unemployment would be unaffected in this case. See Layard/Nickell (1990).

¹⁶The same timing structure is used in Koskela/Stenbacka (2006) in the context of a profit sharing model that also includes efficiency wage considerations.

The first-order condition for this problem reads

$$\begin{aligned} \frac{\partial E(\Pi)}{\partial \lambda} &= 0 \\ \Rightarrow -(R(N) - \omega^* N) &= (1 - \lambda^*) N \frac{\partial \omega^*}{\partial \lambda}, \end{aligned} \quad (18)$$

where λ^* denotes the optimal choice of the firm and the reaction $\frac{\partial \omega^*}{\partial \lambda}$ has to be evaluated at this point. The LHS of (18) is the direct negative effect of giving up a marginal unit of the share base, whereas the RHS captures the positive effect of an induced reduction of the base wage. Solving (18) for the optimal share parameter yields

$$\lambda^* = 1 + \left(\frac{E(R(N))}{N} - \omega^* \right) \cdot \left(\frac{\partial \omega^*}{\partial \lambda} \right)^{-1} < 1, \quad (19)$$

where the difference between average and marginal labor productivity is given by $\omega^* \left(\frac{1}{\alpha \kappa} - 1 \right)$. It immediately follows that the firm will offer some $\lambda > 0$ if and only if

$$\left| \frac{\partial \omega^*}{\partial \lambda} \right| > \omega^* \left(\frac{1}{\alpha \kappa} - 1 \right). \quad (20)$$

We now look at Stage II when the union unilaterally sets its utility-maximizing base wage for a given value of λ , denoted by λ^* and anticipating labor demand (16). Using these conditions, union utility can be expressed in terms of the choice parameter ω as follows:

$$E(U) = \omega^{\frac{-1}{1-\alpha\kappa}} \cdot (E(W^{1-\gamma}) - B^{1-\gamma}), \quad (21)$$

where

$$E(W^{1-\gamma}) \approx (\omega \tilde{\eta})^{1-\gamma} \cdot \left(1 - (1/2)\gamma(1-\gamma) \cdot \left(\frac{\lambda}{\alpha \kappa \tilde{\eta}} \right)^2 V(\theta) \right) \quad (22)$$

and $\tilde{\eta} \equiv 1 + \lambda \left(\frac{1}{\alpha \kappa} - 1 \right)$.¹⁷ This makes again use of (13). Differentiating (21) with respect to ω (and ignoring the fact that (22) is "only" an approximation)

¹⁷ $\tilde{\eta}$ can be interpreted meaningfully by noting that it denotes the mark-up of total expected remuneration per worker on the base wage.

yields the following optimality condition:

$$\omega^* = \frac{\eta}{\tilde{\eta}} B \cdot \left(1 - (1/2)\gamma(1 - \gamma) \cdot \left(\frac{\lambda}{\alpha\kappa\tilde{\eta}} \right)^2 V(\theta) \right)^{\frac{-1}{1-\gamma}} \quad (23)$$

As one would expect, the base wage claim of the union is a positive function of $V(\theta)$. The intuition for this result is quite straightforward; if uncertainty matters and rises, unions will ask for a higher proportion of their pay package to be paid unconditionally.

It is also immediately clear from (23), that for any $\lambda > 0$, it follows that $\tilde{\eta} > 1$ and thus the base wage in this setting will fall short of the wage in a FWE – at least for $V(\theta) = 0$. From (20) we know, however, that the mere existence of a base wage moderating effect is not sufficient for the firm to offer a share contract. Rather, the effect must be strong enough as described in this condition. From (23), the reaction can be computed as

$$\frac{\partial \omega^*}{\partial \lambda} = \frac{\alpha\kappa\eta B (1 - \tau(\theta))^{\frac{-1}{1-\gamma}}}{(\lambda + (1 - \lambda)\alpha\kappa)^2} \cdot \left(-(1 - \alpha\kappa) + \frac{\alpha\kappa\gamma\lambda V(\theta)}{(\lambda + (1 - \lambda)\alpha\kappa)^2} \right), \quad (24)$$

where $\tau(\theta) \equiv \frac{\gamma(1-\gamma)\lambda^2 V(\theta)}{2(\lambda+(1-\lambda)\alpha\kappa)^2}$. This simplifies significantly to

$$\frac{\partial \omega^*}{\partial \lambda} = -\frac{\alpha\kappa(1 - \alpha\kappa)\eta B}{(\lambda + (1 - \lambda)\alpha\kappa)^2} < 0, \quad (25)$$

in the case of $V(\theta) = 0$. Thus a higher λ the firm might wish to offer indeed leads to a reduction of the base wage set by the monopoly union. The three equations (19), (23) and (24) together determine the three endogenous variables ω^* , λ^* and $\partial\omega^*/\partial\lambda$. Unfortunately, due to the non-linearities involved in this system, a general solution cannot be given analytically. It is, however, possible to solve the system for the special case of non-stochastic revenues, ie. for $V(\theta) = 0$. Equations (19), (23) and (25) imply the following (unique) solution:

$$\lambda = 0 \quad (26)$$

$$\omega^* = \eta B \quad (27)$$

$$\frac{\partial \omega^*}{\partial \lambda} = \eta B \left(\frac{1}{\alpha \kappa} - 1 \right) \quad (28)$$

Obviously, this is the FWE given by (7), implying that the base wage moderating effect of a share offer is too weak in this case. Thus, the firm will exclude a share arrangement in the first stage of the game. Note that the inequality condition for a positive value of the share parameter (20) is not fulfilled, but holds with equality. Thus, we have a knife-edge result that allows us to look at the general system by evaluating the behavior at $\lambda = 0$. It is easy to see from (28) that

$$\left. \frac{\partial \left| \frac{\partial \omega^*}{\partial \lambda} \right|}{\partial \lambda} \right|_{\lambda=0} < 0.$$

Thus, a marginal deviation from the equilibrium given by (26)-(28) causes the reaction of the union to fall on the "wrong" side of the knife edge. Also note by simple inspection that (26)-(28) is indeed a solution for the general system of equations (19), (23) and (24). These results establish our

Proposition 3 *In a two-stage wage setting process when the firm could in principle commit to some share parameter $\lambda > 0$, firms never find it profitable to do so. Although the base wage stipulated by the union would decline in response to a higher share, this reaction is not strong enough to be sufficiently attractive for firms.*

Thus, we conclude that firms have no incentive to initiate a share agreement by unilaterally offering some positive share element. This also closes down the second "natural" transition path from a FWE to a SE. Despite the Pareto-dominance of a SE, these efficiency gains of a SE are not easily captured.

4 Discussion

In this section, we first summarize our analysis by noting the conditions that are necessary for a successful switch to a Share Economy. We then proceed

by discussing some additional channels and alternative model specifications that may modify our results.

The negative results from our two switching scenarios imply at least four necessary conditions that must be met for a successful switch from a FWE to a SE:

- Firstly, (expected) total remuneration per worker has to decline in the transition from a FWE to a SE. A wage neutral switch is doomed to failure since firms would face a decline in their profits. This verdict, however, crucially depends on the assumption of risk neutral firms. If firms put a positive value on the lower variance of their profits, they may accept even a wage neutral switch to a SE.
- Secondly, since firms do not unilaterally offer a share contract, there has to be a firm-level bargain where the profit share and the base wage are negotiated simultaneously. A collective bargaining at the national level like in Austria or the sectoral level like in Germany is inappropriate for the implementation of a share system.
- Thirdly, unions have to care about employment. If this were not the case, unions would always stick to the wage level of the FWE. This, however, prevents firm to offer share contracts.
- Fourthly, workers or their unions must not be too risk averse and/or the variance of the share base must not be too large, respectively. Risk aversion implies higher (base) wage demands when uncertainty rises. This, in turn, will reduce the efficiency benefits of a SE.

Unfortunately, these conditions are all necessary rather than sufficient. Although there is quite an extended literature on the properties of share economies, there is – to the best of our knowledge – no formal analysis of the concrete steps that lead from a FWE to a SE. Hopefully, the two negative results in this paper are complemented by positive suggestions in the future.

Our result that a decline in marginal costs of labor is necessary but not sufficient for a switch to a SE is in line with the findings in Koskela and

Stenbacka (2006), who show that firms will offer a share contract if and only if the base wage moderating effect is accompanied by a productivity effect. In their model, profit sharing may induce workers to provide a higher level of effort. But as already argued in Section 2, this effect is highly questionable due to the $1/N$ -problem.

Given the degree of risk aversion of workers, the wage claims moderate with lower risk. Thus, it would be desirable to define a rather stable share base. One way to achieve this, is to pool firm specific risks. Union officials regularly demand such a (nation-wide) fund into which all firm contribute. It is very clear, however, that this aggravates the $1/N$ -problem. Furthermore, it is at least possible that firms might perceive contributions to this fund a second fixed cost component for workers. It is thus very important to make the contribution of individual firms to this fund independent from the firm-specific employment level. On the other hand, profit sharing would be more likely to occur if firms also were risk-averse.

Our analysis assumes a utilitarian trade union, in which all union members are identical. Compared to the most relevant alternative, the median voter model, this modeling approach entails a bias in favor of the SE. Deciding on the adoption of a SE the representative union member has to balance the higher probability of employment¹⁸ with a lower and more volatile wage. But as argued by Grossman (1983) and Blair and Crawford (1984), union members are heterogenous with respect to seniority, their fallback income, the degree of risk aversion etc.. If there is layoff by seniority, for instance, the median voter bears no individual employment risk at all. Thus, the positive employment effects of profit sharing may be simply unimportant for the median voter (Kaufman 2002).

The organizational level at which the wage bargain takes place is another issue determining the choice of the remuneration system. It does not come as a surprise that the most favorable institutional structure for a SE is a firm-level bargain. The legal framework observed in almost all market economies ensures that the property rights for profits are with the firm. Firms

¹⁸This probability is given by M/N . For an exogenous membership M , the positive employment effect of a SE leads to an increase of this probability.

are absolutely free in deciding how to spend their profits – which includes the right to say "no" to profit sharing. For this reason, any profit sharing agreement bargained at the national or sectoral level is not binding for a single firm. Moreover, no single firm will give a mandate to an employer association to bargain for a positive share; this is a straightforward implication of our results in Section 3.3. One should also note that a *mandatory* profit sharing system like in France does not really solve the problem.¹⁹ Granting legal rights for profits simply weakens the position of firms; thus, the effect on the base wage and thus on employment cannot be expected to resemble the effects of bargained solutions.

5 Summary and Conclusions

The possibility to obtain efficiency gains that benefit both workers and firms by switching from fixed wages to a share arrangement is widely acknowledged. Reducing the marginal cost of labor to the base wage will boost labor demand and thus could in principle also contribute to the fight against unemployment at the macroeconomic level. Hence, it is hardly surprising that the idea of Martin Weitzman was met with a lot of enthusiasm more than two decades ago. In stark contrast to this enthusiasm is the fact that profit sharing is not very wide-spread.

In this paper, we aim to explain this by showing that two "natural" transition scenarios from fixed wages will not work. First, firms are not willing to offer a share arrangement that leaves the expected wage unaffected. Hence, the reduction of *marginal* cost of labor is only a *necessary* condition for a SE to deliver the desirable efficiency gains. If firms are to gain – or at least not to lose – from the transition to a SE, the share component must be strictly less than what would be necessary to restore the former fixed wage. From the perspective of a firm, a reduction of *average* cost of labor is thus the *sufficient* condition to move to a share arrangement. Second, we show that firms have no incentive to offer some positive profit share to the workers

¹⁹Any French firm with more than 50 employees has to pay a well-specified fraction of its profits to a fund; see Pendleton et al. (2001).

in the hope that this will (sufficiently) lower the base wage the unions aims at. Although unions that care about employment would indeed moderate the base wage claim if offered a profit share, this effect is too small from the perspective of a firm. This holds true even if revenues were non-stochastic. Adding uncertainty about the share component further drives up the base wage claims by the union and hence makes a share arrangement even less desirable for the firm.

We thus conclude that there is no straightforward substitute for an explicit and *simultaneous* bargain about the base wage and the share parameter between firms and unions. A "rule of thumb"-switch that promises the same expected wage and a unilateral move by a firm won't do the trick. On a policy level, this is an important argument for the decentralization of wage bargains. It is only on this level that profit sharing is likely to occur and to unfold its undisputed virtues.

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