



Helsinki
Center
of
Economic
Research

Discussion Papers

Can Committed Profit Sharing Lower Flexible Outsourcing?

Erkki Koskela
University of Helsinki and HECER

and

Jan König
Freie Universität Berlin

Discussion Paper No. 310
December 2010

ISSN 1795-0562

Can Committed Profit Sharing Lower Flexible Outsourcing?

Abstract

We analyse the following question associated with flexible outsourcing under an imperfect domestic labour market: How does the implementation of profit sharing for low-skilled workers influences flexible outsourcing? We show that in general the implementation of a profit sharing scheme leads to a substitution effect which results in a low-skilled wage. Since outsourcing and the domestic wage level are negative correlated, profit sharing has an outsourcing decreasing character. However, the labour union determination of effort leads to a constant effort level, in which case a firm's optimal choice of profit sharing is zero.

JEL classification: E24, J33, J51

Keywords: flexible outsourcing, profit sharing, wage bargaining, employee effort.

Erkki Koskela

Department of Economics
University of Helsinki
P.O. Box 17 (Arkadiankatu 7)
FI-00014 University of Helsinki
FINLAND

e-mail: erkki.koskela@helsinki.fi

Jan König

School of Business & Economics
Freie Universität Berlin
Boltzmannstr. 20
DE-14915 Berlin
GERMANY

e-mail : jan.koenig@fu-berlin.de

* Koskela also thanks the Academy of Finland (grant No. 1217622) for further financial support and Freie Universitaet Berlin for good hospitality. König thanks University of Helsinki for good hospitality.

1. Introduction

Marginal cost differences are a main argument on a firm's decision for or against outsourcing. It is without controversy that the high wage and labour costs, especially in Western European countries, are the driving forces for their marginal cost disadvantage. Therefore the wage differences are the central explanation for the growing business practice of offshoring and international outsourcing to Eastern European or Asian countries. One reason for the observed wage gap is the difference in the process of wage determination. While in most Western European countries wages are determined by bilateral bargaining between firms or employer federations and trade unions, in Eastern European or Asian countries wages are determined by market forces, because unions here are much weaker (see e.g. Du Caju et al., 2008).

In this paper we assume that outsourcing is flexible, which means that it is determined after the domestic wage formation. Therefore we are in line with Skaksen (2004), who analyses potential (non-realized) and realized international outsourcing. He distinguishes three cases: First, if the outsourcing costs are very low, the union will desist from wage dumping to avoid outsourcing. Second, the firm will desist from outsourcing if costs are very high. In this case, the union can set a relatively high wage without the fear of substitution of domestic employment by external procurement. Third, for an intermediate cost level, the union can avoid outsourcing if the wage is equal to the outsourcing costs. Thus, the wage level depends positively on the outsourcing costs. In contrast, Braun and Scheffel (2007) find that the costs of outsourcing have an ambiguous effect on wage sets by the labour union.

Due to the threat of flexible outsourcing, the opportunity of the labour union to realize a high wage level will be dampen. However, the labour union wants to realize a high income for its members and therefore lower wages are not possible. To solve this puzzle another instrument has to be implemented that realize a high work income and lower the incentive for outsourcing by decreasing the wage.

Such an instrument can be profit sharing, which can substitute wage income by profit income, without losing total remunerations. Thus, there can be an incentive for a lower base wage and domestic labour becomes advantageously, without losses for the union or worker.

From the firms point of view the domestic marginal costs are determined by the base wage. Since the domestic wage decreases, profit sharing will decrease outsourcing. However, due to the profit participation another advantages for the firm has to be realized. This advantage can be a productivity effect, since the profit participation setting incentives to increase worker's effort, while improving the working atmosphere.¹ However, if profit sharing is used to increase the individual effort there is a moral hazard or free-riding problem. This problem can be solved, if effort is interpreted as working conditions such as the speed of the production line, and therefore it can be part of wage negotiations.

For that case the literature mainly focuses on comparing the effort level set by a union and the effort level in a competitive market or analysis the effect of bargaining power on effort level and efficiency properties.² Also, the implementation of profit sharing schemes is analysed with collective bargaining. Pohjola (1987) and Anderson and Devereux (1989) show that an efficient but unenforceable bargaining outcome, since direct negotiation on the total employment is precluded, can be made enforceable by introducing bargaining over wages and profit share. Additionally, Anderson and Devereux (1989) show that for efficient bargaining over wages and employment, implementing profit sharing has no effect on wages, employment and profit, if profit sharing is exogenously increased by the legislator or if it is a part of the optimal contract.

In this paper we use the approach where the union sets the wage and the effort, while the firm sets the profit share, and analyse: How does profit sharing influence flexible outsourcing? Based on this, due to comparative statics, we further show how

¹ Introducing a profit sharing scheme can increase the motivation of a worker and thus effort, see Cable and FitzRoy (1980). On the other hand Jones and Pliskin (1991) and Kruse (1993) find negative productivity effects of profit sharing.

² Bulkley (1992) shows that a monopoly union will reduce the specified effort level below that which would be demanded by the firm in its absence. Moreover, Bulkley and Myles (1996) showed that the popular wisdom that unions reduce effort is generally false. The effect of bargaining power if effort is negotiable has also been analysed by Sampson (1993) and Bulkley and Myles (1997). They show that in a generalized Nash bargaining between a labour union and a firm over employment and effort, the higher bargaining power of the firm can increase the effort level.

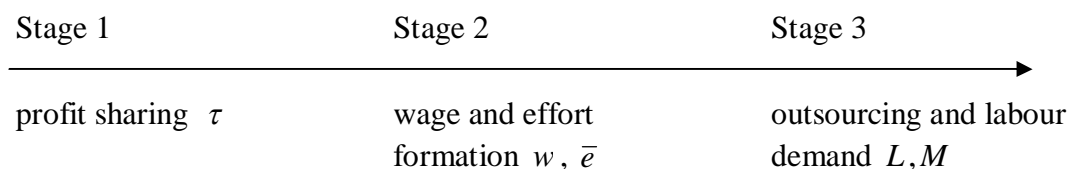
outsourcing costs influence the wage level. The analysis shows that the union sets an effort level, which is unaffected by the wage and profit sharing. However, profit sharing can decrease the wage and thus outsourcing. For the optimal profit share we find that the firm will not implement any profit sharing scheme. For our minor question we find that in the presence of outsourcing, due to a more elastic labour demand, the base wage is lower than in the absence of outsourcing.

We proceed as follows. The basic structure of the theoretical framework is briefly presented in section 2. In section 2.1, we derivate the optimal labour and outsourcing demand. Section 2.2 investigates the effort and wage formation by the monopoly trade union. Finally, we sum up our conclusions in section 3.

2. Basic Framework

We assume that output depends not only on domestic labour and international outsourcing, but also on the average effort by workers, i.e. the worker's productivity. This lies in conformity with the efficiency wage hypothesis form (see Akerlof and Yellen 1986). The timing captures the idea that the representative firm is flexible in deciding about the amount of outsourcing simultaneously with domestic labour demand, but commits to profit sharing before wage and effort determination. After the firm has made its decision on profit sharing, the monopoly trade union sets the wage and effort with respect to the profit share level. Knowing the base wage, the representative firm determines outsourcing and employment. The timing of events is depicted as in Figure 1.

Figure 1: sequence of events



The decisions at each stage are analysed by using backward induction.

1.1 Optimal Outsourcing and Labour Demand

In this section, we characterize the optimal labour demand and outsourcing by the representative firm by taking profit sharing, wage and effort as given. The revenue function is presented as

$$Y(L, M) = \left((\bar{e}L)^{\frac{\sigma-1}{\sigma}} + M^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\alpha\sigma}{\sigma-1}}, \quad (1)$$

where the price of the output is normalized to unity, L is the amount of domestic labour, \bar{e} characterizes the average effort level and M is the firm's labour input acquired from external suppliers through outsourcing.³ The parameter $0 < \alpha < 1$ indicates decreasing returns to scale and σ denotes the elasticity of substitution between effective labour and outsourcing. Following the empirical evidence of Munch and Skaksen (2009), we assume that there is a substitutability between effective labour and outsourcing, by focusing on $1 < \sigma < \infty$.

The firm decides on domestic labour and outsourcing to maximize the profit function

$$\underbrace{\text{Max}}_{(L, M)} (1 - \tau)\pi = (1 - \tau)[Y - w \cdot L - cM], \quad (2)$$

by taking the negotiated effort \bar{e} , wage w , and the profit share τ , as given. Furthermore, we assume that the costs of outsourcing c includes other costs as transport and communication costs or costs for monitoring and quality control. To be simple, we sum these kinds of costs and assume that the unit costs of outsourcing are constant.

The first-order conditions of equation (2) can be expressed as

$$\begin{aligned} w &= \alpha \cdot \bar{e}^{\frac{\sigma-1}{\sigma}} \cdot Y^{1-\frac{\sigma-1}{\alpha\sigma}} \cdot L^{-\frac{1}{\sigma}}, \\ c &= \alpha \cdot Y^{1-\frac{\sigma-1}{\alpha\sigma}} \cdot M^{-\frac{1}{\sigma}}. \end{aligned}$$

The solution of the first order conditions by using equation (1) yields the conditional labour and outsourcing demand:

³ We follow the efficiency wage literature and assume that effort is labour augmenting. Consequently, $\bar{e}L$ can be interpreted as effective labour.

$$L = \left[(w/\bar{e})^{1-\sigma} + c^{1-\sigma} \right]^{\frac{\sigma}{1-\sigma}} \cdot w^{-\sigma} \cdot \bar{e}^{\sigma-1} \cdot Y^{\frac{1}{\alpha}}, \quad (3a)$$

$$M = \left[(w/\bar{e})^{1-\sigma} + c^{1-\sigma} \right]^{\frac{\sigma}{1-\sigma}} \cdot c^{-\sigma} \cdot Y^{\frac{1}{\alpha}}. \quad (3b)$$

Resulting from our assumption of substitutability, we have $Y_{LM} < 0$ respectively $Y_{ML} < 0$. From the production function (1), one get that this is only true for $\sigma > \frac{1}{1-\alpha}$, which will be assumed in the following analysis. As one can see from the conditional demand functions, domestic labour demand is a negative function of wage and a positive function of outsourcing costs and effort. Thus, higher outsourcing cost will decrease domestic labour demand, which lies in conformity with empirics as shown by e.g. Görg and Hanley (2005). However, labour demand does not directly depend on profit sharing, which in line with empirical studies as Wadwani and Wall (1990) and Cahuc and Dormont (1997). For outsourcing, we find that external procurement is a positive function of domestic wage rate and a negative function of outsourcing costs and effort (see Appendix 1).

The wage elasticity of labour demand, can be expressed as

$$\eta \equiv -\frac{L_w w}{L} = \sigma(1-s) + \frac{s}{1-\alpha}, \quad (4)$$

where $s = \frac{(w/\bar{e})^{1-\sigma}}{(w/\bar{e})^{1-\sigma} + c^{1-\sigma}}$ characterizes the cost share of labour. In the absence of outsourcing, the wage elasticity is constant and smaller, i.e. $\eta|_{M=0} = \frac{1}{1-\alpha} < \eta$.

1.2 Wage and Effort Formation by Monopoly Labour Union

As we mentioned in the introduction, effort could be interpreted as a working condition, which can be determined in bargaining rounds between labour unions and firms. In this analysis we assume a simultaneous setting of wage and effort by the employee federation.

Wage and Effort Determination

The individual utility function for the employed worker is (5a) and for the unemployed worker (5b)

$$v = w + \frac{\tau}{L} \pi^* - g(\bar{e}), \quad (5a)$$

$$\bar{v} = b, \quad (5b)$$

so that utility is assumed to be linear in income, where π^* characterizes the indirect profit function. In addition we assume that provision of effort is associated with a disutility for the worker, which is assumed to satisfy the convex function $g(\bar{e}) = \gamma \bar{e}^{1/\gamma}$ with $0 < \gamma < 1$, i.e. $g'(\bar{e}), g''(\bar{e}) > 0$.

Following the standard literature, it is assumed that a monopoly labour union is interested in the income of union members, so that the objective function is $V = vL + (N - L)\bar{v}$. Therefore, we can rewrite the union utility as

$$\underbrace{Max V}_{(w, \bar{e})} = (w - b)L + \tau \pi^* - g(\bar{e})L + b \cdot N \text{ s.t. } \pi_L = \pi_M = 0, \quad (6)$$

where b captures the exogenous minimum income for labour union members N .

Maximizing in terms of the base wage and effort subject to labour and outsourcing demand gives

$$V_w = L + L_w(w - b) + \tau \pi_w^* - g(\bar{e})L_w = 0, \quad (7)$$

which by using $\pi_w^* = -L$ can be solved as $w \cdot [\eta - (1 - \tau)] = \eta(b + g)$, so that we have

$$w = \left[\frac{\eta}{\eta + \tau - 1} \right] (b + g). \quad (8)$$

This is an implicit form concerning wage formation, because the numerator and denominator of the mark-up depend in a non-linear way on the wage rate according to equation (4).

The first-order condition for the optimal effort level is

$$V_{\bar{e}} = L_{\bar{e}}(w - b) + \tau \pi_{\bar{e}}^* - g(\bar{e})L_{\bar{e}} - Lg'(\bar{e}) = 0. \quad (9)$$

By using $\pi_e^* = \frac{w}{\bar{e}} \cdot L$ and $\frac{L_e \bar{e}}{L} = \eta_e = \eta - 1$, the first-order condition (9) can be expressed as follows

$$w = \left[\frac{\eta - 1}{\eta + \tau - 1} \right] (b + g) + \frac{\bar{e}^{1/\gamma}}{\eta + \tau - 1}. \quad (10)$$

A simultaneous solution of (8) and (10) gives the optimal effort

$$\bar{e} = \left[\frac{b}{1 - \gamma} \right]^\gamma. \quad (11)$$

Our analysis shows that the optimal effort level, decided by the monopoly labour union, is independent of profit share or base wage. Thus, we see that profit sharing does not affect effort provision and, therefore, does not increase productivity. This result is plausible in our framework for two reasons. The first is that higher effort provision leads to higher disutility for the worker and therefore lowers the union utility, which can be avoided by a constant effort. Of course, one may argue that this will negatively affect the worker's income, since higher effort leads to higher profit and thus increases worker's income. But the labour union has a second instrument to influence a firm's profit and thus the worker's income. Therefore, the second reason is that the labour union can affect worker's income by its wage setting, which indicates the wage effect of profit sharing.

Knowing that effort is unaffected by profit sharing, we can show in which way the wage is influenced, which helps us to answer our research question. In the introduction, we mentioned that implementing profit sharing can have a wage moderation effect. To verify this, we can take a look at the equations above. The equations (8) and (11) show that profit sharing has only a direct effect on the wage level, which can be seen in the denominator. We call this effect the substitution effect, since it decreases the base wage, meaning that a former part of the base wage is substituted by profit income. Analytically, this can be shown by using the total differential of (8)

$$\frac{dw}{d\tau} = -\frac{w}{\eta + \tau - 1 + (1-\tau)\frac{\partial\eta}{\partial w} \cdot \frac{w}{\eta}} < 0, \quad (12)$$

with $\frac{\partial\eta}{\partial w} = \frac{\partial s}{\partial w} \left(\frac{1}{1-\alpha} - \sigma \right)$ and $\frac{\partial s}{\partial w} = \frac{1-\sigma}{w} s(1-s)$. Due to our assumptions $\sigma > 1$ and $\sigma > \frac{1}{1-\alpha}$ we get $\frac{\partial s}{\partial w} < 0$ and therefore $\frac{\partial\eta}{\partial w} > 0$. The wage effect of profit sharing can be explained by the union's marginal costs of an increasing wage. However, we only focus on the part of the marginal costs that are affected by profit sharing. This means we are only interested in the impact of wages on the total profit (see (7)). Since a higher wage will decrease profit income, a higher profit share increases this utility loss. Due to this increasing effect on the union's marginal costs, higher profit sharing will induce a less aggressive wage setting (see Weitzman 1987, Jackman 1988, Wadhwani 1988, Fung 1989, Holmlund 1990).

Although we find that profit sharing has a complementary character for the base wage, in the empirical literature there is also evidence for a supplementary property of profit sharing.⁴ In the absence of outsourcing we have $\frac{\partial\eta}{\partial w}\Big|_{M=0} = 0$, so that base wage does not affect the wage elasticity of labour demand. In that case, we get

$$\text{qualitatively the same result } \frac{dw}{d\tau}\Big|_{M=0} = -\frac{w\Big|_{M=0}}{\frac{1}{1-\alpha} + \tau - 1} < 0.$$

In a similar way we can also look at the wage reaction concerning changes in outsourcing costs. The reaction of the wage elasticity is described by $\frac{\partial\eta}{\partial c} = \frac{\partial s}{\partial c} \left(\frac{1}{1-\alpha} - \sigma \right) < 0$ since we found that $\frac{\partial s}{\partial c} = \frac{\sigma-1}{c} s(1-s) > 0$. Higher outsourcing costs reduce ceteris paribus the demand for outsourcing. On the other side, due to the substitutability of inputs, domestic labour demand increases and makes the labour demand more inelastic (as shown by e.g. Hasan et al. 2007,

⁴ By using US data, Black and Lynch (2004) show that profit sharing results in lower regular pay for workers, which implies a compensatory character, but in Wadhwani and Wall (1990) by using UK data and also in Kraft and Ugarkovic (2005) by using German panel data, it is shown that introducing profit sharing does not reduce the wage, which implies a supplementary character.

Slaughter 2001 and Senses 2010), which open the opportunity for the union to set a higher wage. Algebraically the wage effect of changing outsourcing costs is given by

$$\frac{dw}{dc} = - \frac{(1-\tau) \frac{\partial \eta}{\partial c} \frac{w}{\eta}}{(\eta - 1 + \tau) + (1-\tau) \frac{\partial \eta}{\partial w} \frac{w}{\eta}} > 0, \quad (13)$$

so that in the presence of flexible outsourcing, higher outsourcing costs will increase the wage. This holds, as lower outsourcing costs means higher outsourcing demand, so that the labour demand elasticity becomes more elastic and the wage has to fall accordingly to avoid higher outsourcing with lower in-house costs and make integrated production more attractive. We summarize our findings in

Proposition 1:

In the presence of flexible outsourcing,

- a) union bargaining over effort is unaffected by base wage and profit sharing,*
- and*
- b) profit sharing is a complementary part of income, and*
- c) lower outsourcing costs will lower the wage.*

We now analyse the effect of implementing profit sharing in a firm that engages in outsourcing. The working channel of committed profit sharing on the amount of outsourcing can be derived from the conditional outsourcing demand (3b). Here we find that

$$\frac{dM}{d\tau} = \underbrace{\frac{dM}{dw}}_{+} \cdot \underbrace{\frac{dw}{d\tau}}_{-} < 0, \quad (14)$$

so that the effect of implementing profit sharing is negative.

Proposition 2:

Since profit sharing decreases domestic marginal costs, outsourcing activities becomes less attractive and decrease.

As we know from (3b), the outsourcing demand depends on the outsourcing costs, effort and wage. However, the outsourcing costs and the effort level are constant, so

that only wage changes affect the amount of outsourcing. Since profit sharing leads due to a less aggressive wage setting to a lower wage, this reduction alone induces lower outsourcing. The reason for this is intuitive. Due to a lower wage level, the domestic marginal costs decrease, thereby increasing the advantage of integrated production and inducing a higher labour demand.

Although it is known that lower domestic marginal costs work in favour of domestic production and that profit sharing has a decreasing wage effect, to our knowledge, ours is the first analysis which incorporates outsourcing, wage bargaining and direct worker participation in a firm's success via profit sharing.⁵

Committed Profit Sharing

In the previous analysis, we have shown the effects of profit sharing on the base wage and outsourcing demand. Since, in our framework, profit sharing is a commitment by the firm, we have to analyse the grounds on which a firm will introduce it or not. To close the model, we therefore concentrate in this section on the optimal profit share.

The representative firm commits to profit sharing to maximize its profit subject to labour demand (3a), outsourcing (3b), wage formation (8) and effort determination (11), so that

$$\underbrace{\text{Max}}_{(\tau)} \bar{\pi} = (1 - \tau) \cdot \pi^* = (1 - \tau)[Y - w \cdot L - cM] \quad (15)$$

$$\text{s.t. } \pi_L^* = \pi_M^* = 0$$

$$\bar{e} = \left(\frac{b}{1 - \gamma} \right)^\gamma$$

$$w = \frac{\eta}{\eta - 1 + \tau} (b + g(\bar{e})).$$

⁵ Empirically, Budd et al. (2005), show that affiliate wages also depend positively on the profit of the parent firm. This can be understood as profit sharing within a multinational firm and explains partly why a multinational affiliate pays higher wages than a purely domestic firm. In other studies as Antras (2003 and 2005) or Grossman et al. (2005) profit sharing is incorporated, too. However, their focus is on bargaining between the outsourcing partners to distribute the rent, which is created from the contractual relationship.

The first-order condition is $-\pi^* + (1-\tau)\pi_\tau^* = 0$. Using this, we can solve the optimal committed profit sharing set by the firm by the rewritten first order condition to

$$1-\tau = \frac{\pi^*}{\pi_\tau^*}. \quad (16)$$

Since $\pi^* > 0$ and $\pi_\tau^* > 0$ is true, we can conclude that the left hand side of (16) has to be positive and therefore the share, which is deviated to the workforce fulfils $\tau < 1$. It is intuitive that the workforce gets either only the wage or the wage plus a share of the profit. Thus, we have to check that $0 < \tau < 1$ is fulfilled, which means that the firm will implement a profit sharing scheme.

According to (16) for $0 < \tau < 1$ we have to show that $\pi^* / \pi_\tau^* < 1$. Using the former results, we get for the first derivative with respect to profit sharing

$$\pi_\tau^* = -\frac{dw}{d\tau} \cdot L > 0. \text{ Thus the relationship to analyse is } \pi^* / L < -dw/d\tau, \text{ where } \pi^* / L$$

can be expressed by $\frac{\pi^*}{L} = \frac{1-\alpha}{\alpha} \frac{w}{s}$.

At first we will solve (16) for the optimal profit share in the absence of outsourcing. Using the knowledge that $s=1$ and $\frac{dw}{d\tau} = -\frac{w}{1/(1-\alpha)-1+\tau}$ we can

rewrite (16) to $\frac{1-\tau}{1/(1-\alpha)-1+\tau} = \frac{1-\alpha}{\alpha}$. Solving this expression leads to $\tau|_{M=0} = 0$.

Thus, the firm will desist from a profit sharing scheme in the absence of outsourcing.

In the presence of outsourcing, the optimal profit share expression is more complicated, but in Appendix 2 it is shown that $\tau < 0$ results and thus, we yield in the presence of outsourcing the corner solution of a zero profit share system, too.

We can summarize our main finding and formulate it as

Proposition 3:

If the labour union sets the effort level, the firm optimally desists from profit sharing.

To give an explanation for this result, we have to look back on our findings. Concerning the effort level, we demonstrate that it is independent of profit sharing,

since for an exogenous profit share the labour union can negotiate the wage level to realize an adequate income. For a given wage level, through the unchanged decision about effort provision, even if the firm sets some incentives by introducing profit sharing, the firm only contributes a part of its profit to the workers. Thus, it is beneficial for the firm to avoid profit sharing. Notice that this argumentation ignores the wage decreasing effect obtained from profit sharing. Although the profit increases with the implementation of such a compensation scheme, the firm has to share the whole profit with the workforce. As we show, the firm will abandon this instrument despite the wage reducing effect. For a profit maximizing firm, this can only be explained by the fact that the profit the firm owner gets without a profit sharing scheme is always higher than the share of profits he gets in the presence of such a remuneration system. Therefore, the wage decreasing effect, respectively profit increase of any positive profit share is too small and does not compensate the firm owner for the loss of profit by implementing a sharing system. This means that the loss due to sharing is for any positive profit sharing higher than the gain due to the wage decrease and thus the wage reduction realized by the union is lower than the needed wage reduction by the firm.

We can therefore answer our main research question as follows: If the union sets the effort level, there is a wage moderation effect due to profit sharing, which leads to a lower outsourcing demand. Despite the existence of this effect, a profit maximizing firm will abstain from profit sharing, since it creates no enhancing productivity effect and the wage decreasing effect is too small and cannot increase the profit the firm gets compared to a situation without a sharing system.

From our findings we can derive an important policy implication. If the firm has the power to unilaterally set the profit share, there will be no sharing system. Thus, if the union sets the effort level, using a profit sharing system to induce wage moderation and prevent outsourcing can only be realized if profit sharing is also a part of the wage negotiation. Alternatively the effort can also be individually determined, where profit sharing creates a positive effect on effort provision and thus an increase in productivity can be realized as shown by Koskela and Stenbacka (2006).

Knowing the optimal effort level, relying on comparative statics, we can give a statement about the wage effect of outsourcing. Since in the absence and presence of

outsourcing the effort level is the same, we only focus on the mark-up $A = \frac{\eta}{\eta - 1}$,

with $\eta = \sigma(1 - s) + \frac{s}{1 - \alpha}$ and $\eta|_{M=0} = \frac{1}{1 - \alpha} < \eta$. Since the mark-up is decreasing with higher labour demand elasticity it follows that $w < w|_{M=0}$. We can sum this up in

Proposition 4:

Outsourcing has a wage decreasing effect.

This holds, since higher outsourcing demand results from lower outsourcing costs. As we have shown in (13) this reduces the base wage due to a more elastic labour demand. Thus, setting a high wage increases the loss for the union and leads to a less aggressive union behaviour, resulting in a lower wage, whereby the union can avoid outsourcing and makes integrated production more attractive.

3. Concluding Remarks

We have focused on the question: How does profit sharing influence flexible outsourcing? In our framework we show that the union fixed effort level is independent of profit sharing. This is due to the fact that effort provision is connected with a disutility, which can be avoided. Also, the loss of income via this constant effort level can be neglected, since with its second instrument, the wage, the labour union can affect the income. Thus, no productivity effect, only a wage moderation effect may occur by implementing a profit sharing scheme. Since outsourcing and domestic labour are substitutes, this wage effect affects the outsourcing demand. Since the amount of outsourcing depends positively on the domestic wage, in general, profit sharing can lead to lower outsourcing due to decreasing domestic marginal costs.

However, we demonstrate that the optimal committed profit share is zero. Ignoring the wage effect, this can be explained by the constant effort level. By introducing profit sharing, the firm only redistributes profit from itself to the workforce, without any profit increasing incentives on productivity. Since despite the wage moderation, the firm does not implement a profit sharing scheme, we can thus

conclude that the wage reduction is too small to compensate the firm's owner for sharing part of the profit with the workforce. Thus, our analysis shows that there has to be not only a wage moderating but also an additional positive effort effect of profit sharing. In combination of the mentioned unclear empirical impact of profit sharing on effort and the problem of monitoring the effort provision of workers, we show that it is not profitable for the firm to implement such a compensation scheme, and thus we give an explanation why only few of these remuneration packages for non-managers will be observed.

Moreover, we also find result that lower outsourcing costs and thus higher outsourcing will decrease the base wage. This follows, since we assume that outsourcing and domestic labour are substitutes.

References

- Anderson, S. and M. Devereux (1989): Profit-Sharing and Optimal Labour Contracts, *Canadian Journal of Economics* 22, 425-433.
- Antras, P. (2003): Firms, Contracts, and Trade Structure, *Quarterly Journal of Economics* 118, 1375-1418.
- Antras, P. (2005): Property Rights and the International Organization of Production, *American Economic Review* 95, 25-32.
- Akerlof, G. A. and J. L. Yellen (1986) (eds.): *Efficiency Wage Models of the Labor Market*, Cambridge University Press, MA.
- Black, S. E. and L.-M. Lynch (2004): What's Driving the New Economy: The Benefits of Workplace Innovation, *Economic Journal* 114, F97-F116.
- Braun, F. D. and J. Scheffel (2007): A Note on the Effect of Outsourcing on Union Wages, Humboldt Universität Berlin, SFB 649 Discussion Paper, No. 34.
- Budd, J. W., J. Konings and M. J. Slaughter (2005): Wages and International Rent Sharing in Multinational Firms, *Review of Economics and Statistics* 87, 73-84.
- Bulkley, G. (1992): Does a Trade Union Set a Lower Effort Level than would be Determined in a Competitive Labour Market?, *Bulletin of Economic Research* 44, 153-160.
- Bulkley, G. and G. D. Myles (1996): Trade Unions, Efficiency Wages, and Shirking, *Oxford Economic Paper* 48, 75-88.

- Bulkley, G. and G. D. Myles (1997): Bargaining over Effort, *European Journal of Political Economy* 13, 375-384.
- Cable, J. R. and F. R. FitzRoy (1980): Cooperation and Productivity: Some Evidence from West Germany's Experience, *Economic Analysis and Workers Management* 14, 163-190.
- Cahuc, P. and B. Dormont (1997): Profit Sharing: Does It Increase Productivity and Employment? A Theoretical Model and Empirical Evidence on French Micro Data, *Labour Economics* 4, 293-319.
- Du Caju, P., E. Gautier, D. Momferatou and M. Ward-Warmedinger (2008): *Institutional Features of Wage Bargaining in 23 European Countries, the US and Japan*, IZA Discussion Paper, No. 3867.
- Fung, K. C. (1989): Profit Sharing and European Unemployment, *European Economic Review* 33, 1787-1798.
- Görg, H. and A. Hanley (2005): Labor Demand Effects of International Outsourcing: Evidence from Plant-Level Data, *International Review of Economics and Finance* 14, 365-376.
- Grossman, G. M., E. Helpman and A. Szeidl (2005): Complementarities between Outsourcing and Foreign Sourcing, *American Economic Review* 95, 19-24.
- Hasan, R., D. Mitra and R. W. Ramaswamy (2007): Trade Reforms, Labor Regulations, and Labor-Demand Elasticities: Empirical Evidence from India, *Review of Economics and Statistics* 89, 466-481.
- Holmlund, B. (1990): Profit Sharing, Wage Bargaining, and Unemployment, *Economic Inquiry* 28, 257-268.
- Jackman, R. (1988): Profit Sharing in a Unionised Economy with Imperfect Competition, *International Journal of Industrial Organization* 6, 47-57.
- Jones, D. C. and J. Pliskin (1991): *The Productivity Effects of Profit Sharing and Worker Representation on the Board*, Working Paper Hamilton College, No. 91.
- Koskela, E. and R. Stenbacka (2006): Flexible and Committed Profit Sharing with Wage Bargaining: Implications for Equilibrium Unemployment, *Journal of Economics* 87, 159-180.
- Kraft, K. and M. Ugarkovic (2005): Profit-Sharing: Supplement or Substitute?, Dortmund University, Working Paper.
- Kruse, D. L. (1993): *Does Profit Sharing Affect Productivity?*, NBER Working Paper, No. 4542.

- Munch, J. R. and J. R. Skaksen (2009): Specialization, Outsourcing and Wages, *Review of World Economics* 145, 57-73.
- Pohjola, M. (1987): Profit-Sharing, Collective Bargaining and Employment, *Journal of Institutional and Theoretical Economics* 143, 334-342.
- Sampson, A. A. (1993): Bargaining over Effort and the Monitoring Role of Unions, *European Journal of Political Economy* 9, 371-381.
- Senses, M. Z. (2010): The Effects of Offshoring on the Elasticity of Labor Demand. *Journal of International Economics*, 81, 89-98.
- Slaughter, M. (2001): International Trade and Labor-Demand Elasticities, *Journal of International Economics* 54, 27-56.
- Skaksen, J. R. (2004): International Outsourcing When Labour Markets Are Unionized, *Canadian Journal of Economics* 37, 78-94.
- Wadhwani, S. (1988): Profit Sharing as a Cure for Unemployment, *International Journal of Industrial Organization* 6, 59-68.
- Wadhwani, S. and M. Wall (1990): The Effects of Profit Sharing on Employment, Wages, Stock Returns and Productivity: Evidence from U.K. Micro Data, *Economic Journal* 100, 1-17.
- Weitzman, M. L. (1987): Steady State Unemployment under Profit Sharing, *Economic Journal* 97, 86-105.

Appendix 1: wage impact on factor demand

Using (3a) and (3b) we can solve for the cost function by substituting the conditional demand system (3a) and (3b) in $K = wL + cM$, where we get

$$K = \left((w/\bar{e})^{1-\sigma} + c^{1-\sigma} \right)^{\frac{\sigma}{\sigma-1}} \cdot Y^{\frac{1}{\alpha}} = k \cdot Y^{\frac{1}{\alpha}} \quad (A1)$$

Thus the cost share of labour and outsourcing can be expressed as

$$s = \frac{wL}{k \cdot Y^{\frac{1}{\alpha}}} = \frac{(w/\bar{e})^{1-\sigma}}{(w/\bar{e})^{1-\sigma} + c^{1-\sigma}}, 1-s = \frac{cM}{k \cdot Y^{\frac{1}{\alpha}}} = \frac{c^{1-\sigma}}{(w/\bar{e})^{1-\sigma} + c^{1-\sigma}}. \quad (A2)$$

For the wage impact on labour demand, we use (3a). The derivative of concerning the wage can be formulated as

$$\begin{aligned} \frac{dL}{dw} = L_w &= \frac{1}{\alpha} Y^{\frac{1}{\alpha}-1} \frac{Y_w}{w} \cdot \left((w/\bar{e})^{1-\sigma} + c^{1-\sigma} \right)^{\frac{\sigma}{\sigma-1}} \cdot (w/\bar{e})^{1-\sigma} \\ &+ Y^{\frac{1}{\alpha}} \frac{\sigma}{w} \cdot \left((w/\bar{e})^{1-\sigma} + c^{1-\sigma} \right)^{\frac{\sigma}{\sigma-1}-1} \left(\frac{w}{\bar{e}} \right)^{1-\sigma} \cdot w^{-\sigma} \bar{e}^{-\sigma-1} - Y^{\frac{1}{\alpha}} \cdot \left((w/\bar{e})^{1-\sigma} + c^{1-\sigma} \right)^{\frac{\sigma}{\sigma-1}} \cdot \sigma \cdot (w/\bar{e})^{1-\sigma}. \end{aligned}$$

Substituting (3a) and (A2), this expression can be simplified to

$$L_w = \frac{1}{\alpha} \frac{L}{Y} Y_w + \frac{\sigma}{w} \cdot sL - \frac{\sigma}{w} \cdot L. \quad (\text{A3})$$

Rewritten the profit function to $\pi = Y - K$ the first order condition for a profit maximum is $1 = \frac{k}{\alpha} Y^{\frac{1-\alpha}{\alpha}}$ can be solved to $Y = \alpha^{\frac{\alpha}{1-\alpha}} k^{\frac{-\alpha}{1-\alpha}}$, which gives

$Y_w = -\frac{\alpha}{1-\alpha} \frac{s}{w} Y$. Inserting this in (A3) we get

$$L_w = \frac{L}{w} \left(-\frac{s}{1-\alpha} + \sigma(s-1) \right) < 0. \quad (\text{A4})$$

Analogously, we have $L_c > 0$, $L_{\bar{e}} > 0$, $M_c < 0$, $M_w > 0$ and $M_{\bar{e}} < 0$.

From (A4) one can determine the labour demand elasticity

$$\eta = -\frac{L_w \cdot w}{L} = -\frac{s}{1-\alpha} + \sigma(s-1) = \sigma(1-s) + \frac{s}{1-\alpha}. \quad (\text{A5})$$

Appendix 2: optimal committed profit share

From equation (16), we know that for $0 \leq \tau < 1$ the condition $\pi^* / \pi_{\tau}^* \leq 1$ has to be true. To check this condition, we use the result $-\frac{dw}{d\tau} \cdot L = \pi_{\tau}^*$. Thus we have to check

$\pi^* / L \leq -dw / d\tau$. Implementing (12) and $\frac{\pi^*}{L} = \frac{1-\alpha}{\alpha} \frac{w}{s}$ we have to check

$$\frac{1-\alpha}{\alpha} \frac{w}{s} \leq \frac{w}{\eta + \tau - 1 + (1-\tau) \frac{\partial \eta}{\partial w} \cdot \frac{w}{\eta}}. \quad (\text{A6})$$

Substituting (A5) the condition can be rewritten to

$$(1-\tau) \frac{\partial \eta}{\partial w} \cdot \frac{w}{\eta} \leq (1-s) \cdot (1-\sigma) - \tau. \quad (\text{A7})$$

Due to $\frac{\partial \eta}{\partial w} > 0$ and $\tau \leq 1$ the left hand side of (A7) is positive. However, we assume that $\sigma > 1$ and therefore, the right hand side can only becomes positive if at least $\tau < 0$ is true. Since implementing a negative profit share is impossible, we can conclude that $\pi^* / \pi_{\tau}^* > 1$ and thus we obtain a corner solution, where the firm desists from profit sharing.