# Ambiguous labour market reforms

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**Abstract**

When labour unions use first-best price discrimination, they can extract a wage above the marginal product of labour: employment is above the firm's own optimum – this is *featherbedding* or *overmanning*, and such rigidities can increase employment. While labour market reforms are usually beneficial in the long run, they can be detrimental in the short run if investment does not pick up quickly enough.

Keywords: collective bargaining, wages, structural reforms

JEL codes: E2, E3, E6, J5

## 1 Introduction

The topic of labour market reforms in Europe has gained renewed prominence since the 2008 Crisis. Despite a consensus on the long term gains of such policies, there is strong disagreement on their short run impact. When sectors with strong unions (such as state-owned companies) are liberalised or privatised, partial equilibrium predicts an increase in their employment, due to increased labour supply. Any short-run decrease should come from general equilibrium effects on the whole economy. Yet it is in these reformed sectors that employment typically falls the most in the short run: hence labour market reforms probably affect labour demand in these sectors directly.

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Many DSGE models with labour market rigidities assume that they only affect labour supply: a wage markup shifts the supply curve inwards, while firms choose labour freely, leaving the supply curve unaffected. This is the analog of monopolistic competition in the goods market: a producer has monopoly power over his own variety and charges a price markup, while the demand curve of price-taking consumers is unaffected. Assuming price-taking consumers is sensible in many goods markets: firms cannot observe individual consumers to conduct *first-best* price discrimination.

However, this assumption can be less relevant for the labour market, where firms are not anonymous. Workers or unions have more information about the company in which they work, hence first-best price discrimination – or *featherbedding* can be a more adequate model in some labour markets. With featherbedding, a worker can extract all the surplus that she generates, which is higher than his marginal product. This shifts the labour demand curve out, and leads to over-employment. Featherbedding has two opposite effects on the labour market. Setting the wage above the worker's marginal rate of substitution lowers employment. But having the wage above the marginal product of labour increases employment. The two effects can cancel each other or not. It provides a more realistic model of unions: they try to maximize wages, but not necessarily at the cost of employment. The effect of reforms on employment depends on which curve shifts most. In a depression, *increasing* featherbedding forces firms to hire more in the short run: this is a possible justification of some of the New Deal anticompetitive policies.

## Related literature

Following Blanchard and Giavazzi (2003), different papers have studied the best strategies to implement these policies (eg Bayoumi et al. 2004, or Everaert and Schule 2006). Krause and Uhlig (2012) analyse the German Hartz reforms in a DSGE macro model. More recently, Cacciatore et al. (2016) find that the timing of product and labour market reforms relative to the business cycle greatly matters in the short-run. Eggertsson et al. (2014) caution against deflationary structural reforms at the Zero Lower Bound.

This paper is also related to the labour economics literature on collective bargaining. The model of a union as a monopolist wage setter – the firm being free to choose employment – dates back to Dunlop (1944), and was generalised by Nickell and Andrews (1983) as the *right-to-manage* model. In contrast, McDonald and Solow (1981) and Manning (1987) developed models where unions bargain over both wages and employment, which can lead to *featherbedding* if employment is above what the firm would choose. The novelty of this paper is to have featherbedding in a CES setup more tractable for DSGE models, and to look at it interaction with structural reforms. Finally, this paper has links with the literature on the degree of centralisation of collective bargaining (see Calmfors and Drifill 1988, or Layard et al. 1991).

# 2 The model

This paper will compare the *right-to-manage* and *featherbedding* models with the competitive case. In the first the union sets a wage, subject to a labour demand curve from wage-taking firms. In the second, the union sets both the wage and the level of employment – subject to a participation constraint. In the competitive case both the firm and workers take wages as given.

## 2.1 Featherbedding: labour demand

I model the wage setting as a principal-agent problem. There is a continuum of workers (or worker types), indexed by $i \in [0, 1]$. The representative firm has a production function $F(L)$. The labour supply $L_i$ of each worker is aggregated into $L$ with an aggregating function $g(\cdot)$:

$$g(L) = \int_{i=0}^{1} g(L_i)di$$

Both $F(\cdot)$ and $g(\cdot)$ are increasing, concave function with $F(0) = g(0) = 0$. Concavity of production also requires that $F(g^{-1}(\cdot))$ is concave.[1]

[1]This is a stronger condition. For constant elasticities in the production function and labour aggregate, $F(L) = L^{1-\alpha}$ and $L = \left(\int_{i=0}^{1} L_i^{\frac{\epsilon-1}{\epsilon}}\right)^{\frac{\epsilon}{\epsilon-1}}$, it implies $0 < 1/\epsilon < \alpha < 1$

Under perfect competition or right-to-manage, the firm observes a wage $W_i$ and is free to choose the amount of labour $L_i$: it equalizes the marginal surplus $MS(L_i)$ with the wage.

$$W_i = MS(L_i) = \frac{\partial F}{\partial L_i} = \frac{g'(L_i)}{g'(L)} F'(L) = \frac{g'(L_i)}{g'(L)} MPL \tag{1}$$

Conversely with featherbeding, the worker/union of type $i$ chooses the wage $W_i$ and employment $L_i$ together, with a participation constraint: the firm must be better off accepting $W_i$ and $L_i$ than not employing type $i$ at all – given the behavior of all other workers.[2] The participation constraint is

$$TS(L_i) = \int_{l=0}^{L_i} MS(l)dl = \frac{g(L_i)}{g'(L)} MPL \geq W_i L_i \tag{2}$$

When this constraint binds, the wage is the *average surplus* product of labour.

**Property 1** *(1) Under perfect competition and right-to-manage, the firm observes the wages* $(W_i)$ *and chooses its labour demands* $(L_i)$ *to maximize its profits. The marginal surplus product of worker* $i$ *is equal to the wage.*

$$W_i = MS(L_i) = \frac{g'(L_i)}{g'(L)} MPL \qquad \frac{\partial \ln W_i}{\partial \ln L_i} = \frac{g''(L_i) L_i}{g'(L_i)} \tag{3}$$

*(2) Under featherbedding, the worker of type* $i$ *is able to capture all of the total surplus that he generates for the firm,* $W_i L_i = TS(L_i)$*, or*

$$W_i = AS(L_i) = \frac{g(L_i)}{g'(L) L_i} MPL \qquad \frac{\partial \ln W_i}{\partial \ln L_i} = \frac{g'(L_i) L_i}{g(L_i)} - 1 \tag{4}$$

*(3) From the concavity of* $g(\cdot)$*,* $\frac{g(L_i)}{g'(L_i)L_i} > 1$ *hence* $AS(L_i) > MS(L_i)$
*The demand elasticity,* $\epsilon = -\frac{\partial \ln L_i}{\partial \ln W_i}$ *is equal under (1) and (2) if* $g(\cdot)$ *is CES.*

Under the featherbedding case, the wage is higher for every level of employment. Or equivalently, the labor demand is higher for every level of wage.

[2]Here, the ability to earn a wage above the MPL comes from the imperfect substitutability of worker types – as opposed to Stole and Zwiebel (1996) where workers are perfectly substitutable but differ in the order of hiring.

## 2.2 Labour supply

The household of type $i$ maximize the representative utility function

$$\max \mathrm{E}_0 \sum_{t=0}^{+\infty} \beta^t \left[ u(C_t(i)) - v(L_t(i)) \right]$$

subject to a budget constraint $C_t(i) + Q_t B_t(i) = B_{t-1}(i) + W_t(i) L_t(i) + D_t$. The agent receives a dividend $D_t$ from a diversified equity portfolio, and a wage compensation $W_t(i) L_t(i)$. New bonds $B_t$ are exchanged at price $Q_t$. Under perfect competition, worker $i$ takes the wage $W_i$ as given when choosing labour $L_i$. Under right-to-manage and featherbedding, the worker takes into account the demand curve for his own labour, either eq (3) or (4).

**Property 2** *(1) Under perfect competition, the wage is equal to the marginal rate of substitution,* $W_i = MRS_i = \frac{v'(L_i)}{u'(C)}$

*(2) Under both right-to-manage and featherbedding, the wage is a markup over the MRS, with the elasticity* $\epsilon = -\frac{\partial \ln L_i}{\partial \ln W_i}$ *defined in property (1)*

$$W_i = \frac{\epsilon}{\epsilon - 1} MRS_i = \frac{\epsilon}{\epsilon - 1} \frac{v'(L_i)}{u'(C)}$$

Both the competitive and featherbedding cases have efficient employment ($MPL = MRS$). With right-to-manage, employment is inefficiently low.

**Theorem 1** *In the symmetric equilibrium*

*(1) Under perfect competition* $W = MPL = MRS$

*(2) Under right-to-manage* $W = MPL = \frac{\epsilon}{\epsilon - 1} MRS$ *with* $\epsilon = -\frac{g'(L)}{g''(L) L}$

*(3) Under featherbedding* $MPL = MRS = \frac{\epsilon - 1}{\epsilon} W$ *with* $\epsilon = \frac{1}{1 - \frac{g'(L) L}{g(L)}}$

Labour market rigidities are usually modeled as an employment tax, as it creates a wedge between demand and supply of labour. But here, these rigidities are acting instead as a capital income tax: featherbedding creates a wedge between the marginal product of capital and the returns to capital, and can be thought of as a tax on profits:

$$D = Y - WL = F(L) - \frac{\epsilon}{\epsilon - 1} MPL.L < F(L) - MPL.L$$

## 2.3 Capital intensity

Let me now introduce capital. The production function is homogeneous in capital and labour, $Y = F(K, L)$ and capital accumulation writes

$$K_{t+1} = Y_t - C_t + (1 - \delta)K_t$$

$\delta$ is the rate of depreciation. Firm owners earn the residual profits:

$$RK = F(K, L) - WL$$

If workers are paid their MPL, capital will be paid its MPK since $F$ is homogeneous. But if the wage is higher, the returns to capital are lower.[3]

**Lemma 1** *(1) Under perfect competition and right-to-manage, firms choose labour ($W = MPL$), and the rate of return is the marginal product of capital.*

$$R = \frac{\partial F}{\partial K}$$

*(2) Under featherbedding, the wage is above the $MPL$, hence returns are lower. There is a wedge between the MPK and the returns to capital*

$$R = \frac{Y}{K} - \frac{\epsilon}{\epsilon - 1}\frac{L}{K}\frac{\partial F}{\partial L} = \frac{\partial F}{\partial K} - \frac{1}{\epsilon - 1}\left(\frac{Y}{K} - \frac{\partial F}{\partial K}\right)$$

In steady state, the interest rate, net of depreciation, is equal to the rate of time preference: $R = \rho + \delta$ with $\rho = 1/\beta - 1$. Using lemmas 1–2 as well as $C = Y - \delta K$ in steady state, I can solve the equilibrium $L$, $C$ and $K$.

**Theorem 2 (proof in appendix)** *(1) Under right-to-manage, $L, C$ and $K$ are lower than under perfect competition, due to the markup*

*(2) Under featherbedding, $C$ and $K$ are lower than under perfect competition. The effect on employment $L$ is ambiguous*

[3]Wages are only bargained *after* capital has been installed, so that it leads to a hold up problem of firms by unions. This problem could in theory be avoided through ex-ante commitment (see Grout, 1984). But here, atomistic workers/unions have an incentive to renege since their individual actions do not affect the overall level of investments.

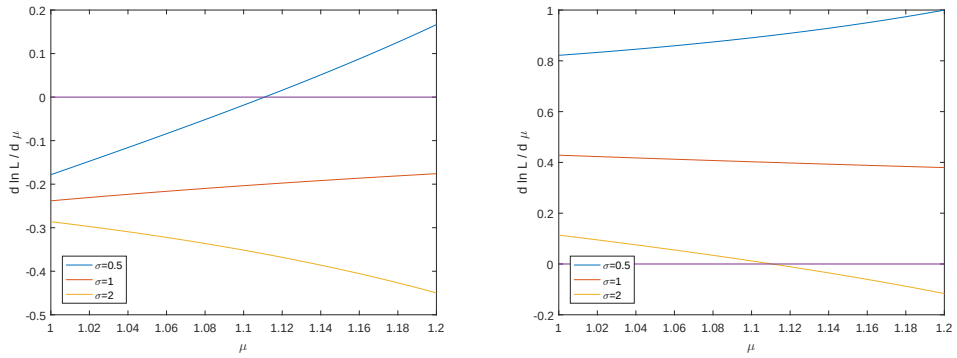
*(3) $C$ and $K$ are higher under right-to-manage than under featherbedding. The comparative impact on employment $L$ is ambiguous*

The intuition is as follows. With right-to-manage, the MRS markup reduces labour supply and consumption. This reduced labour supply lowers capital, which further reduces labour supply and consumption. Under featherbedding, the abnormally low returns to capital greatly reduce capital and hence output and consumption. For labour, there is a negative substitution effect (low wages due to low capital) and a positive income effect (due to the lower consumption). A high elasticity of consumption in the utility function makes the income effect bigger. Hence, when the consumption elasticity $\sigma$ is very low, there is little or no income effect, so that the substitution effect of lower capital and lower wages brings the featherbedding employment below the competitive and right-to-manage outcome. For very high values of $\sigma$, the high income effect dominates and there is more work than under the two alternatives. For intermediate values of $\sigma$, people work more under featherbedding than right-to-manage, but less than under perfect competition.

## 2.4 Application: labour market reforms

This framework is useful to analyse structural labour market reforms. I assume that the economy starts from a featherbedding situation, with a markup both on the MPL and MRS side. The structural reform can lower either the MPL markup alone, or both markups together. These two cases can be interpreted as two different kinds of reforms, that either preserve insider/outsider dynamics, or are more inclusive. Allowing the MPL or both markups to fall has immediate consequences on employment, but it also leads to higher investment driven by higher expected profits. In the long run capital increases and improves the economy. This improved efficiency has two effects on employment: higher capital increases the real wage while increased consumption lowers the labour supply. For a high relative risk aversion, the income effect can be stronger then the substitution effect.

As an illustration, I use an isoelastic production function $Y = K^{\alpha}L^{1-\alpha}$ and an isoelastic, separable utility function $u(C) - v(L) = \frac{C^{1-\sigma}}{1-\sigma} - \lambda\frac{L^{1+\phi}}{1+\phi}$.[4] Figure 1 shows the long run percentage change in employment caused by a marginal reduction in one or two of the markups. As expected, an inclusive reform is better at reducing unemployment. In fact, reducing only the MPL markup often reduces employment in the long run. This fall in employment is not welfare deteriorating, since consumption does increase in the long run: households consume more and work less. But this does illustrate that not all structural reforms are beneficial to employment in the long run.




(a) MPL markup only

(b) Both markups

Figure 1: Marginal (long term) percentage increase in labour with a reduction in one or two of the markups, depending on the relative risk aversion $\sigma$

How these reforms affect employment in the short run depends on investment. Capital does not reach its new long term value immediately, hence labour remains relatively unproductive in the short run, implying a lower demand than in the long run. This makes employment fall by more (or increase by less) in the short run than in the long run. On the other hand, capital accumulation also increases labour demand. Hence a positive (or moderately negative) short run employment effect requires a strong response of investment. This makes well-functioning capital markets all the more essential.

[4] I assume a wage markup $\mu = 1.1$. I assume a capital elasticity $\alpha = 0.4$, so that the labour share, including featherbedding, is $\mu(1-\alpha) = 0.66$. I set the Frisch elasticity $\phi = 2$ – but it is not crucial. The income effect is crucial, and I look at different values for the intertemporal elasticity of substitution, between 0.5 and 2.

# 3 Conclusion

In this paper I have built a model of featherbedding in the labour market, and I have argued that it can be a good description of some sectors or industries where labour unions are relatively strong. I have shown that with featherbedding, the wage is a markup over workers' marginal rate of substitution (MRS), but the wage is also a markup over firms' marginal product of labour. If these two markups are equal, the MPL and MRS are equalised. However, since the wage is above the MPL, firms' profits are abnormally low – featherbedding rigidities act as a tax on capital and not on labour. When capital is introduced, capital is inefficiently low, with ambiguous effects on employment. If structural reforms only allow firms to choose employment more freely without reducing the monopoly markup of unions, welfare improves, but the long term effects on employment are small or negative. In the short run, these reforms will be detrimental if sluggish investment does not raise labour demand quickly enough.

Using this framework in larger DSGE models is an obvious possibility of future research, to allow a more quantitative assessment, and to look at the potential role of monetary policy or gradual firm entry. While featherbedding is likely more prevalent in the labour market, some similar cases can exist in the market for goods and services. In sectors with very little competition, it is not uncommon that consumers have little choice about the amount of goods or services that they can buy, and are forced to buy more than what they would wish, making the framework of this paper relevant there as well.

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# Appendix: Proof of theorem 2

(1) write $(K, L, C)$ as a function of the markup $\mu$

$$\begin{array}{rl} MPL(K,L) - \mu MRS(C,L) & = 0 \\ MPK(K,L) - (\rho+\delta) & = 0 \\ F(K,L) - \delta K - C & = 0 \end{array}$$

Differentiating this system with a Jacobian,

$$\begin{pmatrix} \frac{KF_{KL}}{F_L} & \frac{LF_{LL}}{F_L} - \frac{Lv''(L)}{v'(L)} & \frac{u''(C)}{u'(C)}C \\ KF_{KK} & LF_{KL} & 0 \\ KF_K - K\delta & LF_L & -C \end{pmatrix} \begin{pmatrix} \frac{\partial \ln K}{\partial \ln \mu} \\ \frac{\partial \ln L}{\partial \ln \mu} \\ \frac{\partial \ln C}{\partial \ln \mu} \end{pmatrix} = \begin{matrix} 1 \\ 0 \\ 0 \end{matrix}$$

As $MPL$ and $MPK$ are homogeneous of degree 0 in $(K, L)$, we have

$$\frac{\partial \ln K}{\partial \ln \mu} = \frac{\partial \ln L}{\partial \ln \mu} = \frac{\partial \ln C}{\partial \ln \mu} = \frac{-1}{\sigma+\phi}$$

with $\sigma$ and $\phi$ the (possibly local) elasticities of consumption and work.

(2) write $(K, L, C)$ as a function of the markup $\mu$

$$\begin{array}{rl} MPL(K,L) - MRS(C,L) & = 0 \\ F(K,L) - \mu LMPL(K,L) - (\rho+\delta)K & = 0 \\ F(K,L) - \delta K - C & = 0 \end{array}$$

A similar differentiation brings

$$\begin{pmatrix} \frac{KF_{KL}}{F_L} & \frac{LF_{LL}}{F_L} - \frac{Lv''(L)}{v'(L)} & \frac{u''(C)}{u'(C)}C \\ (\mu-1) - \mu\frac{KF_{KL}}{F_L} & (1-\mu) - \mu\frac{LF_{LL}}{F_L} & 0 \\ KF_K - K\delta & LF_L & -C \end{pmatrix} \begin{pmatrix} \frac{\partial \ln K}{\partial \ln \mu} \\ \frac{\partial \ln L}{\partial \ln \mu} \\ \frac{\partial \ln C}{\partial \ln \mu} \end{pmatrix} = \begin{matrix} 0 \\ \mu \\ 0 \end{matrix}$$

Using the (possibly local) elasticities $(\alpha, \sigma, \phi)$, I get

$$\begin{array}{rl} \frac{\partial \ln K}{\partial \ln \mu} & = \left( \frac{\alpha+\phi+\sigma\frac{LF_L}{C}}{\alpha - \frac{(\mu-1)}{\mu}} \right) \frac{-1}{\phi+\sigma} < \frac{-1}{\phi+\sigma} \\ \frac{\partial \ln C}{\partial \ln \mu} & = \frac{\left[\alpha+\phi\frac{(KF_K - K\delta)}{C}\right]}{\alpha - \frac{(\mu-1)}{\mu}} \frac{-1}{\phi+\sigma} < \frac{-1}{\phi+\sigma} \\ \frac{\partial \ln L}{\partial \ln \mu} & = \left( \frac{\alpha - \sigma\frac{(\mu-1)\delta(1-\alpha)+\rho\alpha}{\mu\delta(1-\alpha)+\rho}}{\alpha - \frac{(\mu-1)}{\mu}} \right) \frac{-1}{\phi+\sigma} \gtrless 0 \end{array}$$

(3) Comparing the cases (1) and (2) above, one simply needs to look at

$$\frac{\partial \ln K}{\partial \ln \mu}|_{(2)} < \frac{\partial \ln K}{\partial \ln \mu}|_{(1)} \quad \frac{\partial \ln C}{\partial \ln \mu}|_{(2)} < \frac{\partial \ln C}{\partial \ln \mu}|_{(1)} \quad \frac{\partial \ln L}{\partial \ln \mu}|_{(2)} \gtrless \frac{\partial \ln L}{\partial \ln \mu}|_{(1)}$$