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**Minimum Wages and Union Bargaining
in a Dual Labour Market**

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Minimum Wages and Union Bargaining in a Dual Labour Market

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Abstract:

The paper analyses the links between a binding minimum wage and union bargaining. A dual labour market model is developed where the first sector outcome is characterised by bargaining between unions and firms, while in the second sector firms have to pay a statutory minimum wage. It is shown that a minimum wage increase has negative employment effects only if the bargaining outcome is described by the Nash solution. However, this result does not hold if the Kalai-Smorodinsky solution is applied to model union bargaining. A higher minimum wage can then lead to more employment in the unionised sector and to a lower unemployment rate.

JEL-Classification: C78, J30, J51

Keywords: Minimum wages, union bargaining, Nash approach, Kalai-Smorodinsky solution

1 Introduction

The consequences of minimum wages have been widely and controversially discussed among economists and policymakers. Common wisdom suggests that minimum wages lead to higher unemployment rates. This consensus, however, was unhinged by the groundbreaking studies by Card & Krueger (1994, 1995). They present quasi-experimental evidence claiming that minimum wage increases do not cause negative employment effects. These findings launched an intense discussion and started to change the opinion within the economics profession. Fuller & Geide-Stevenson (2003) report that in 1990, 62% of academic economists in the USA agreed with the statement that minimum wages increase unemployment among young and unskilled workers, 19.5% partly agreed while 17.5% disagreed. One decade later, these numbers have changed significantly. Now only 46% of respondents agreed while 28% partly agreed and 27% disagreed.

As a response to Card & Krueger (1994, 1995), a growing body of literature finds very mixed evidence about the minimum wage effects on employment.¹ Neumark & Wascher (2006) review evidence from a large number of minimum wage studies and rehashed the discussion. Altogether, it can be stated that the empirical evidence about minimum wage effects on employment is not conclusive. Thus, there is a need for theoretical models explaining the fact that higher minimum wages may lead to higher employment. Simple textbook analysis predicts that introducing a wage floor above the equilibrium wage in a competitive labour market causes unemployment. More comprehensive theoretical contributions to this debate build on the monopsony model (Stigler 1946). However, the empirical findings do not support neither the assumption of a pure competitive labour market nor of employers acting as monopsonists. Alternative approaches being empirically more relevant

¹Considerable studies include, amongst others, Deere et al. (1995), Dolado et al. (1996), Kennan (1995), Portugal & Cardoso (2006), and the discussion between Neumark & Wascher (2000) and Card & Krueger (2000).

particularly introduced efficiency wages (Jones 1987, Manning 1995, Rebitzer & Taylor 1995) or search and matching models (Berg 2003, Flinn 2006, Masters 1999, Swinnerton 1996) into a minimum wage framework. But somewhat surprisingly, the impact of minimum wages in unionised labour markets has rarely been analysed.² Since both minimum wages and union bargaining power coexist in most European labour markets, this paper aims at combining these two facts in a dual labour market model and shows that a higher minimum wage can yield higher employment.

The focus of the paper is to shed some light on the specific bargaining framework. In order to model union wage bargaining, labour economics literature has emphasised the solution concept proposed by Nash (1950). Other bargaining solutions, e. g. the approach by Kalai & Smorodinsky (1975), have been mostly neglected although exhibiting some interesting features. This axiomatic approach builds on the criticism of some of Nash's axioms, especially the independence of irrelevant alternatives. Kalai & Smorodinsky (1975) replaced this axiom with the property of monotonicity and prove that there is only one bargaining rule satisfying their axioms. Their solution consists of equalizing the parties' sacrifice relative to the maximum benefit they can expect. Although McDonald & Solow (1981) considered both the Nash and the Kalai-Smorodinsky (henceforth KS) solutions, subsequent work on wage bargaining has ignored the latter one.³ One possible reason to explain this ignorance is the difficulty of doing comparative statics, whereas the Nash approach exhibits mathematical convenience and a well-known game-theoretic foundation by Binmore et al. (1986). However, this ignorance seems hard to defend mainly because of two reasons. First, there exists a game-theoretic foundation by Moulin (1984) implementing the KS bargaining solution in a non-cooperative game. Second, current bargaining situations can be often described by mutual relative concessions of, say,

²The most notable exception is Cahuc et al. (2001). To some extent, Cardona & Sánchez-Losada (2006) and Roberts et al. (2000) also deal with the topic.

³Exceptions are Alexander (1992) and Gerber & Upmann (2006).

a union and a firm (Economist 2002). Furthermore, economic experiments provide evidence for the view that people compare relative payoffs (Nydegger & Owen 1974, Roth & Malouf 1979). The Nash approach cannot capture this stylised fact because of the independence of irrelevant alternatives axiom. Replacing this axiom by the monotonicity axiom, as it has been done by Kalai & Smorodinsky (1975), allows individuals to compare relative payoffs and is thus in line with the experimental evidence (Alexander 1992).

The paper addresses these differences by constructing a dual labour market model with a unionised and a minimum wage sector where bargaining in the union sector is analysed under both the Nash and the KS solution. It can be shown that the policy conclusions derived from the model depend significantly on the underlying bargaining approach. Applying the Nash solution yields clear policy implications. A higher minimum wage increases wages and decreases employment in both sectors. Following this result it can be argued that unemployment can be reduced by lowering the minimum wage. However, these policy implications are not as straightforward if the KS solution is applied. Then the overall unemployment effect is ambiguous and depends on the specific form of firm's production and worker's utility functions. Hence, both bargaining approaches might imply diametrical policy implications.

The paper is organised as follows. The basic framework of the model is outlined in section 2. Section 3 analyses the wage and employment determination under the Nash and the KS solution. The comparative static results of a minimum wage increase are discussed in section 4, while section 5 contains final remarks.

2 The Structure of the Economy

2.1 Firms

I consider an economy with a dual labour market. Wage and employment in the first sector are determined by bargaining between unions and firms. Firms in the second sector must pay a statutory minimum wage.⁴ There are λ homogeneous firms and the same number of unions in the unionised sector, while the number of firms in the minimum wage sector is normalised to unity. Let N denote the available workforce per firm in the union sector and $Z = \lambda N$ the total number of workers in the economy. The production technology of a representative firm in the unionised sector can be described by the function $f(L)$, while production in the minimum wage sector is characterised by $g(M)$. Both production functions obey the usual Inada conditions, i.e. $f'(L) > 0$, $f''(L) < 0$, $g'(M) > 0$ and $g''(M) < 0$, while $L \leq N$ and M denote employment per firm, respectively. All firms sell their output in a competitive goods market, where the output price is normalised to unity. Hence, the profit of a representative firm in the unionised sector can be written as

$$\Pi = f(L) - wL, \tag{1}$$

with w denoting the bargained wage.

The second sector is a competitive labour market where firms have to pay a statutory minimum wage w^m . Unemployment arises since the minimum wage is assumed to be binding, i.e. $w^m > g'(Z - \lambda L)$. Employment is adjusted according to the marginal productivity condition

$$M = g'^{-1}(w^m). \tag{2}$$

⁴Therewith I cover the stylised fact that in many European labour markets sectors with and without union coverage coexist with minimum wage sectors.

2.2 Unions and Workers

Each worker supplies inelastically one unit of labour. The union covers all workers at the firm-level and is assumed to maximise the expected utility of a representative member:⁵

$$EU(w, L) = lu(w) + (1 - l)Eu(\bar{w}), \quad (3)$$

where $u(\cdot)$ characterises the state-independent individual utility function, with $u'(\cdot) > 0$ and $u''(\cdot) < 0$. With probability $l = \frac{L}{N}$, a union member can find a job in the first sector, while the probability of getting an alternative income \bar{w} is given by $1 - l = \frac{N-L}{N}$. The expected utility from this alternative income $Eu(\bar{w})$ equals the utility of getting a job in the minimum wage sector or becoming unemployed. This can be expressed by

$$Eu(\bar{w}) = pu(w^m) + (1 - p)u(b), \quad (4)$$

with b denoting unemployment benefit. Both, the union and the firm, take the probability of getting a job in the second sector, $p = \frac{\sum_{i=1}^{\lambda} M_i}{Z - \sum_{i=1}^{\lambda} L_i}$, as given. This implies that $\frac{\partial p}{\partial w} = \frac{\partial p}{\partial L} \rightarrow 0$, i.e. neither the union nor the firm has any impact on the outcome in the second labour market.⁶

⁵This formulation has been popular in recent theoretical work on union bargaining (Booth 1995). Empirical evidence is provided, amongst others, by Pencavel (1991).

⁶Endogenising the probability p would not change the qualitative results but only calculations get more complicated.

3 Wage and Employment Determination

3.1 The Nash Solution

I first analyse the bargaining outcome of the generalised Nash solution (Nash 1950, Binmore et al. 1986). The firm and the union are assumed to bargain simultaneously over both the wage and the level of employment (McDonald & Solow 1981).⁷ Empirical evidence for the efficient bargaining can be found, amongst others, in MaCurdy & Pencavel (1986) and Svejnar (1986). MaCurdy & Pencavel (1986) show for the American newspaper industry and its primary labour union, the International Typographical Union, that the efficient bargaining model comes closer to reality. Svejnar (1986) states for the U.S. industry that for many firms and unions the outcome can be better characterised by efficient bargaining.

Wages and employment are chosen as to maximise the weighted product of each party's net return from reaching an agreement. Since there is bargaining over both the wage and the level of employment, the outcome is not constrained to the labour-demand curve. Hence, the general maximisation problem can be written as

$$\max_{w,L} \Omega = \delta \ln [E U - E \bar{U}] + (1 - \delta) \ln [\Pi - \bar{\Pi}] , \quad (5)$$

where $\delta \in [0, 1]$ denotes union's bargaining power. In case of a disagreement, each union member finds a job in the second sector with probability p or receives unemployment benefit with probability $1 - p$. That is, the union's outside option in the bargaining $E \bar{U}$ is given by (4). Firm's profit ($\bar{\Pi}$) is assumed to be zero in the case when bargain breaks down. Hence, the Nash maximand can be written as

$$\max_{w,L} \Omega = \delta \ln [l(u(w) - pu(w^m) - (1 - p)u(b))] + (1 - \delta) \ln [f(L) - wL] . \quad (6)$$

⁷See Booth (1995) for a comprehensive analysis of union behaviour.

The labour market equilibrium can be derived from the first-order conditions of (6). Differentiating (6) with respect to w and L and reformulating yields the contract curve and the rent-division curve. The contract curve describes the Pareto-efficient outcomes:

$$w = f'(L) + \frac{u(w) - pu(w^m) - (1-p)u(b)}{u'(w)}. \quad (7)$$

Due to worker's risk aversion, the right-hand side of (7) increases in w . The slope of the contract curve (7) has a positive sign and the bargained wage exceeds the marginal product of labour.

The rent-division curve

$$w = \delta \frac{f(L)}{L} + (1 - \delta)f'(L) \quad (8)$$

indicates that the bargained wage equals the weighted sum of the average and the marginal product of labour, where the weights are given by the bargaining power of both parties. Equilibrium wage and employment levels (w^N, L^N) are determined by the intersection of the contract curve and the rent-division curve.

3.2 The KS Solution

In the following, the labour market outcome is analysed under the assumption that bargaining is determined by the KS solution. Kalai & Smorodinsky (1975) suggest a solution where both parties make equal proportional concessions from their respective favoured points. Furthermore, this solution must be Pareto-efficient. That is, the KS solution is determined by the intersection of the so-called KS curve and the Pareto curve.

The KS curve is defined as

$$\delta \frac{v_1 - \bar{v}_1}{v_1^* - \bar{v}_1} = (1 - \delta) \frac{v_2 - \bar{v}_2}{v_2^* - \bar{v}_2}, \quad (9)$$

with v_i denoting the utility from bargaining for each party (with $i = 1, 2$). The utopia point, i.e. the maximally attainable utility, is denoted by v_i^* and the utility if bargaining breaks down by \bar{v}_i . In order to introduce different bargaining strengths for both parties, I follow the asymmetric axiomatic solution proposed by Dubra (2001). As in the Nash approach, δ and $1 - \delta$ denote union's and firm's bargaining power, respectively.

The Pareto curve defines all individually rational outcomes such that union's indifference curves and firm's isoprofit curves are tangent to each other. It can be obtained by total differentiation of firm's profit function (1) and union's utility function (3):

$$\frac{u(w) - pu(w^m) - (1 - p)u(b)}{u'(w)L} = \frac{w - f'(L)}{L}, \quad (10)$$

being equivalent to the contract curve (7) in the Nash solution.

In order to describe the labour market outcome, the formal concept of the KS solution is applied to the union bargaining model. Therefore, (9) has to be specified as follows. The utility from reaching a bargain for both parties is described by union's utility (3) and firm's profit function (1):

$$\begin{aligned} v_1 &= lu(w) + (1 - l)(pu(w^m) + (1 - p)u(b)) \\ v_2 &= f(L) - wL, \end{aligned}$$

where the subscripts 1 and 2 stand for the union and the firm, respectively. The

respective utility in the case of disagreement is given by

$$\bar{v}_1 = pu(w^m) + (1-p)u(b)$$

$$\bar{v}_2 = 0.$$

In a next step, the utopia points of both parties have to be obtained. That is, I calculate the respective optimal wage and employment levels the union and the firm want to achieve. First, union utility is maximised subject to the condition that firm's profit is at least zero:

$$\begin{aligned} \max_{w,L} U &= lu(w) + (1-l)(pu(w^m) + (1-p)u(b)) \\ \text{s. t. } f(L) - wL &= 0. \end{aligned} \tag{11}$$

The maximising values for v_1^* can be obtained from the first-order conditions of (11). It is easy to see that the solution lies on the contract curve (7). Furthermore, since firms are left with zero profits, the solution equals the average product of labour. That is, the optimal wage and employment levels from the union's point of view (w^*, L^*) are implicitly given by the intersection of the contract and the average product of labour curve.

The utopia point of the firm v_2^* results from maximising profit subject to union utility reaching at least the conflict point:

$$\begin{aligned} \max_{w,L} \Pi &= f(L) - wL \\ \text{s. t. } u(w) &= pu(w^m) + (1-p)u(b). \end{aligned} \tag{12}$$

The first-order conditions of (12) yield a solution on the marginal product of labour curve, i. e. $w = f'(L)$. Moreover, the union will not accept a wage below the outside

option. This implies the lower wage level $\bar{w} = u^{-1}(pu(w^m) + (1-p)u(b))$. Together with $w = f'(L)$, it defines the firm's optimal wage and employment levels (\bar{w}, \bar{L}) .

Substituting the values for v_i , \bar{v}_i and v_i^* into (9), I finally end up with the asymmetric KS curve:

$$\delta \frac{l(u(w) - pu(w^m) - (1-p)u(b))}{l^*(u(w^*) - pu(w^m) - (1-p)u(b))} = (1-\delta) \frac{f(L) - wL}{f(\bar{L}) - \bar{w}\bar{L}} \quad (13)$$

with $l^* = \frac{L^*}{N}$. Hence, the equilibrium outcome of the bargaining (w^{KS}, L^{KS}) is implicitly defined by (10) and (13).

Figure 1 pictures wages and employment in the unionised sector under both, the Nash and the KS approach. Both solutions lie on the contract curve (CC) between the utopia points of the firm (\bar{w}, \bar{L}) and the union (w^*, L^*) . The Nash result (w^N, L^N) is described by the intersection with the rent-division curve (RDC), while the intersection of the contract curve with the KS curve (KSC) characterises the outcome under the KS solution (w^{KS}, L^{KS}) .

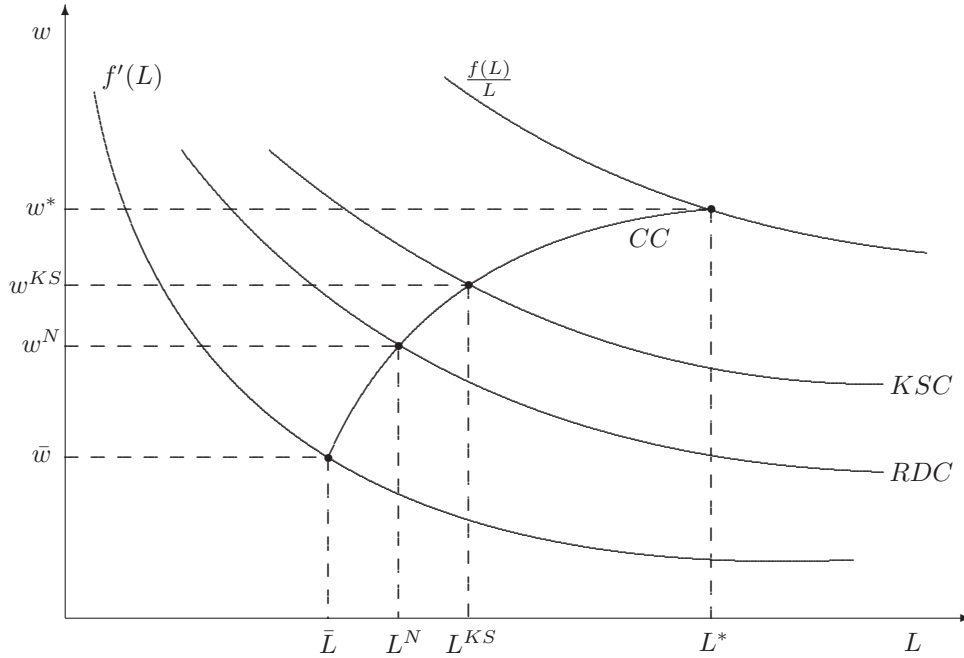


Figure 1: Labour market outcomes of the Nash and the KS solution.

A priori, it is not clear which bargaining approach generates a higher wage or employment level. In general, the solution depends on the specific form of worker's utility and firm's production function. However, it can be pointed out that both approaches lead to the same result if the range between the respective utopia points and the outside options is the same for the union and the firm. Then the denominators in the KS curve (13) are equal on both sides. The relative gains of both parties weighted with the respective bargaining power change to weighted absolute gains. Furthermore, the outcome of the KS and the Nash solution might equal in that case only if workers are risk-neutral.⁸ Comparing the rent-division curve (8) and the KS curve (13) shows that the degree of risk-aversion plays an important role in the KS solution while it does not in the Nash solution.

4 Comparative Statics and Discussion

The main focus of the paper is on the labour market effect of a minimum wage increase. Therefore, I analyse the changes in the union wage, in employment in both sectors and in the total unemployment rate due to a change in the minimum wage in both the Nash and the KS bargaining solution. Considering the minimum wage sector, the first and most obvious result is expressed in

Proposition 1. *A minimum wage increase causes less employment in the minimum wage sector.*

This can easily be shown by differentiating the marginal productivity condition in the second sector (2) with respect to the minimum wage:

$$\frac{\partial M}{\partial w^m} = g''^{-1}(w^m) < 0.$$

⁸See Gerber & Upmann (2006) for an example with linear utility functions yielding the same result under both approaches.

The Nash Solution

First, I study the effects of a marginal minimum wage increase under Nash bargaining. The results are summarised in

Proposition 2. *A minimum wage increase leads to a higher wage and to a lower employment level in the unionised sector under Nash bargaining over wages and employment.*

Proof. Rewriting the contract curve (7) and the rent-division curve (8) yields:

$$\psi^{CC} = u(w) - pu(w^m) - (1-p)u(b) - u'(w)(w - f'(L)) = 0 \quad (14)$$

$$\psi^{RDC} = \delta \frac{f(L)}{L} + (1-\delta)f'(L) - w = 0 \quad (15)$$

The partial derivatives of (14) and (15) are as follows:

$$\begin{aligned} \psi_w^{CC} &= -u''(w)(w - f'(L)) &> 0 \\ \psi_w^{RDC} &= -1 &< 0 \\ \psi_L^{CC} &= u'(w)f''(L) &< 0 \\ \psi_L^{RDC} &= \frac{\delta}{L} \left(f'(L) - \frac{f(L)}{L} \right) + (1-\delta)f''(L) < 0 \\ \psi_{w^m}^{CC} &= -pu'(w^m) &< 0 \\ \psi_{w^m}^{RDC} &= 0. \end{aligned}$$

Thus, the Jacobian has a negative sign:

$$|J^N| = \begin{vmatrix} \psi_w^{CC} & \psi_L^{CC} \\ \psi_w^{RDC} & \psi_L^{RDC} \end{vmatrix} < 0.$$

The wage and employment effects in the unionised sector due to a minimum wage

increase are obtained by using Cramer's rule:

$$\frac{d w}{d w^m} = \frac{\begin{vmatrix} -\psi_{w^m}^{CC} & \psi_L^{CC} \\ -\psi_{w^m}^{RDC} & \psi_L^{RDC} \end{vmatrix}}{|J^N|} > 0$$

$$\frac{d L}{d w^m} = \frac{\begin{vmatrix} \psi_w^{CC} & -\psi_{w^m}^{CC} \\ \psi_w^{RDC} & -\psi_{w^m}^{RDC} \end{vmatrix}}{|J^N|} < 0.$$

■

Let $\varphi \equiv 1 - \frac{\lambda L + M}{Z}$ denote the rate of unemployment in the economy. Its change with respect to a change in the minimum wage is given by

$$\frac{d \varphi}{d w^m} = -\frac{\lambda \frac{d L}{d w^m} + \frac{d M}{d w^m}}{Z}. \quad (16)$$

Hence, I end up with

Proposition 3. *Under Nash bargaining, a higher minimum wage increases unemployment.*

This is straightforward, since according to Propositions 1 and 2 a minimum wage increase reduces employment in both sectors, i. e. $\frac{d L}{d w^m} < 0$ and $\frac{d M}{d w^m} < 0$ and thus, from (16), $\frac{d \varphi}{d w^m} > 0$.

Figure 2 pictures the above results indicating the labour market outcome in both sectors under Nash bargaining. First, a minimum wage increase from w^m to $w^{m'}$ causes an employment reduction from M to M' in the second sector. Second, the workers' outside option rises to \bar{w}' . Thus, the contract curve is shifted to CC' . Since the rent-division curve remains constant, the new wage and aggregate employment

levels in the unionised sector are given by $w^{N'}$ and $\lambda L^{N'}$. Hence, the number of unemployed rises to $\Phi^{N'}$ due to a minimum wage increase because of the direct effect in the second sector and the indirect effect in the unionised sector. The latter one occurs because the union sets a mark-up on the minimum wage.

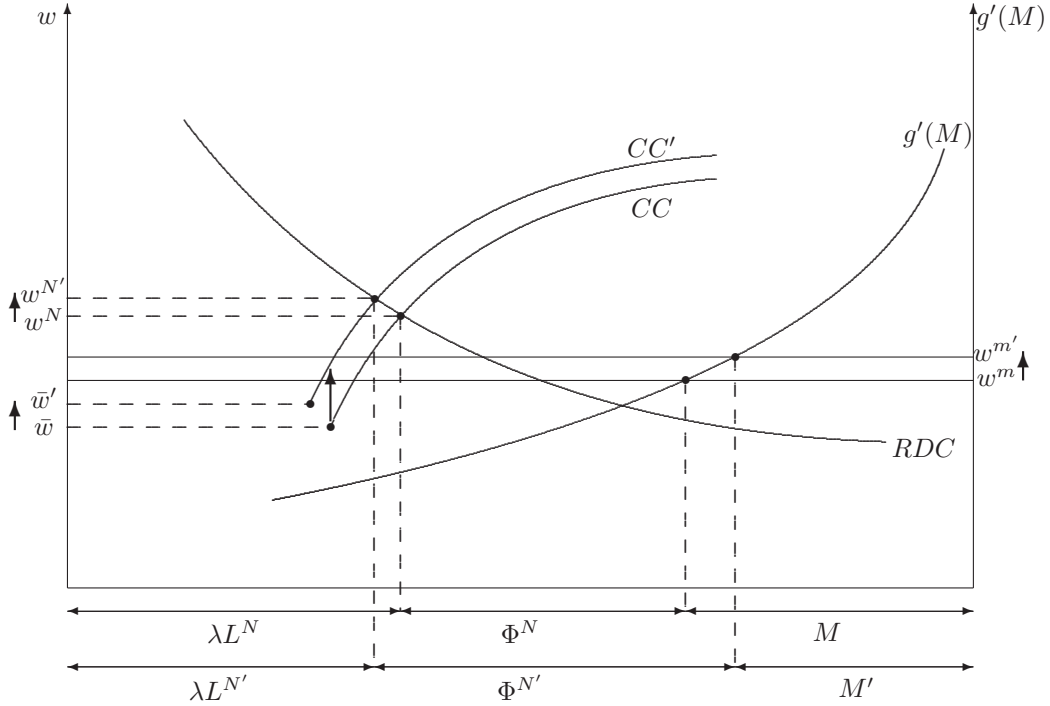


Figure 2: Labour market effects of a minimum wage increase in the Nash solution.

The KS Solution

In a next step, the comparative static effects are analysed if the bargaining outcome is characterised by the KS solution.

Proposition 4. *Under the KS solution, a minimum wage increase leads to a higher union wage while the employment effect in the unionised sector is ambiguous.*

Proof. Rearranging the KS curve (13) yields the following implicit function:

$$\psi^{KSC} = \delta L [u(w) - pu(w^m) - (1-p)u(b)] [f(\bar{L}) - \bar{w}\bar{L}]$$

$$- (1 - \delta)L^* [u(w^*) - pu(w^m) - (1 - p)u(b)] [f(L) - wL] = 0. \quad (17)$$

The partial derivatives are

$$\begin{aligned} \psi_w^{KSC} &= \delta L u'(w) [f(\bar{L}) - \bar{w}\bar{L}] \\ &\quad + (1 - \delta)L L^* [u(w^*) - pu(w^m) - (1 - p)u(b)] > 0 \\ \psi_L^{KSC} &= \delta [u(w) - pu(w^m) - (1 - p)u(b)] [f(\bar{L}) - \bar{w}\bar{L}] \\ &\quad - (1 - \delta)L^* [u(w^*) - pu(w^m) - (1 - p)u(b)] [f'(L) - w] > 0 \\ \psi_{w^m}^{KSC} &= -pu'(w^m) \left[\delta L \frac{u(w) - pu(w^m) - (1 - p)u(b)}{u'(\bar{w})} \right] \\ &\quad - pu'(w^m) [\delta L [f(\bar{L}) - \bar{w}\bar{L}] - (1 - \delta)L^* [f(L) - wL]] < 0. \end{aligned}$$

The negative sign of $\psi_{w^m}^{KSC}$ follows from the last term in brackets being positive, i.e. $\delta L [f(\bar{L}) - \bar{w}\bar{L}] - (1 - \delta)L^* [f(L) - wL] > 0$. This is straightforward when the expression is written as $\delta \frac{L}{L^*} > (1 - \delta) \frac{f(L) - wL}{f(\bar{L}) - \bar{w}\bar{L}}$. A comparison with the KS curve indicates that the inequality must hold since in (13) there is $(u(w) - pu(w^m) - (1 - p)u(b)) < (u(w^*) - pu(w^m) - (1 - p)u(b))$. The wage and employment effects can now be calculated using (14) together with (17). The sign of the Jacobian follows from

$$|J^{KS}| = \begin{vmatrix} \psi_w^{CC} & \psi_L^{CC} \\ \psi_w^{KSC} & \psi_L^{KSC} \end{vmatrix} > 0.$$

Using Cramer's rule yields

$$\frac{dw}{dw^m} = \frac{\begin{vmatrix} -\psi_{w^m}^{CC} & \psi_L^{CC} \\ -\psi_{w^m}^{KSC} & \psi_L^{KSC} \end{vmatrix}}{|J^{KS}|} > 0$$

$$\frac{dL}{dw^m} = \frac{\begin{vmatrix} \psi_w^{CC} & -\psi_{w^m}^{CC} \\ \psi_w^{KSC} & -\psi_{w^m}^{KSC} \end{vmatrix}}{|J^{KS}|} \leq 0.$$

■

The difference in the comparative statics between KS and Nash follows from $\psi_{w^m}^{KSC}$ being negative while $\psi_{w^m}^N$ equals zero. In the Nash approach, a minimum wage increase neither changes the marginal product nor the average product of labour. The distribution given by the rent-division curve remains constant. Otherwise, in the KS solution, a higher minimum wage changes the union's outside option and the firm's utopia point thus shifting the KS curve. Overall, I obtain

Proposition 5. *If bargaining is characterised by the KS solution, the unemployment consequences of a rise in the minimum wage are ambiguous.*

This follows directly from Proposition 4 and equation (16). Employment in the second sector declines due to the higher minimum wage. Employment in the first sector may rise if the shift of the KS curve is large enough to countervail the shift of the contract curve.⁹ If this positive employment effect is larger than the negative effect in the second sector, overall unemployment declines.

Geometrically, a higher minimum wage shifts both the contract and the KS curve upwards yielding to an ambiguous employment effect in the unionised sector. These results are illustrated in figure 3, where I concentrate on the case of a positive employment effect in the first sector. It is easy to see that the change in overall unemployment ($\Phi^{KS'} - \Phi^{KS}$) depends on the elasticities of the contract and the rent-division curve in the first sector and the labour demand curve in the second sector.

⁹See Gerber & Upmann (2006) for a general mathematical analysis of this effect.

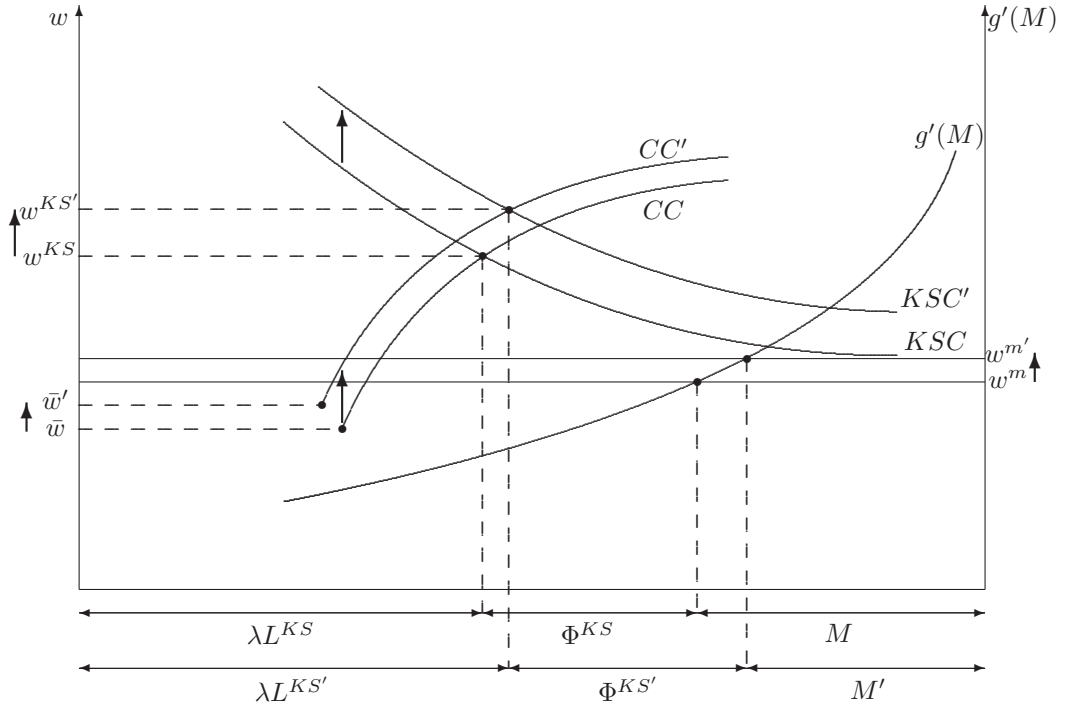


Figure 3: Labour market effects of a minimum wage increase in the KS solution.

Finally, the wage and employment changes due to a minimum wage increase in both bargaining settings are summarised in table 1.

	w	L	M	φ
Nash	+	-	-	+
KS	+	+/-	-	+/-

Table 1: Comparative statics of the Nash and the KS solution.

5 Conclusion

The paper addressed the effects of a statutory minimum wage in a dual labour market model. Wage and employment in the first sector are determined by bargaining between unions and firms. Though the minimum wage binds only in the second sector, it also affects the unionised sector by serving as part of worker's outside option in the bargaining. The crucial feature of the model is the impact of a minimum wage increase under two different bargaining approaches, the Nash and the KS solution. The paper pointed out quantitative wage and employment differences under both solutions. However, more important with regard to policy implications are the different qualitative effects. A higher minimum wage always leads to a higher union wage, but the employment effect may be ambiguous in the two solutions depending on the elasticities of worker's utility and firm's production function. Hence, the statement that higher minimum wages cause more unemployment might be wrong if bargaining is characterised by the KS solution.

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