The Impact of Temporary Agency Work on Trade Union Wage Setting

A Theoretical Analysis

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Abstract

This paper aims at providing a better theoretical understanding of the effects of temporary agency work on trade union rents and the wage-setting process. Our model focuses on the cost-reducing motive behind the use of temporary agency employment, because it affects the “effective” wage-setting power of unions. It is shown that trade unions may find it optimal to accept lower wages to prevent firms from using temporary agency workers instead of regular workers. However, if firms decide to employ agency workers, trade union wage claims will increase for the (remaining) regular workers. A relatively more intensive use of temporary agency workers in high-wage firms may therefore be the cause and not the consequence of the high wage level in those firms. Even though we assume monopoly unions that ascribe the highest possible wage-setting power to the unions, it turns out that for all plausible parameter values the economic rents of trade unions decline because of the firms’ option to use temporary agency work.

JEL Classification: J51; J31; J23; J42

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1 Introduction

In this paper a theoretical model is developed to analyze how the firms’ option to employ temporary agency workers affects the wage-setting behaviour of trade unions. Usually, trade unions put up strong resistance to the employment of temporary agency workers and the perceived weakening of pay and labour standards.\(^1\) However, as pointed out by Böheim & Zweimüller (2009), in a given firm it is not necessarily clear *a priori* whether the trade union will oppose the employment of temporary agency workers. The reason is that cost savings and increases in profits could enable unions to extract higher rents in firms that employ agency workers. This paper aims at providing a better theoretical understanding of the effects of temporary agency work on trade unions rents and the wage-setting process. It will identify the conditions under which trade unions will successfully prevent the employment of temporary agency workers, and it will analyze whether unions will obtain higher rents if temporary agency workers are employed.

Temporary agency work constitutes a tripartite relationship, in which a temporary agency worker is employed by the temporary work agency and, by means of a commercial contract, is hired out to perform work assignments at a client firm. This client firm then has to pay a fee to the temporary work agency. In the following, temporary agency workers are referred to as temporary workers or agency workers. During the past few decades the share of agency workers in the total workforce has significantly increased in almost all OECD countries. Though the great recession starting in 2007 lead to a cyclical decline in temporary agency work, in many countries the agency work penetration rate seems to resume its upwards trend. For example, from 1996 to 2011, the agency work penetration rate increased from 0.9 to 1.6 percent in Europe (with a peak of 2 percent in 2007), from 0.5 to 1.5 percent in Japan (with a peak of 2.2 percent in 2008), whereas it remained on the same level of 1.9 percent in the USA (with peaks of 2.2 percent in 2000 and 2005), see Ciett (2013).

\(^1\)See, for example, Heery (2004) for the UK, Coe et al. (2009) for Australia and Olsen & Kalleberg (2004) for Norway and the US.
Various motives are behind the use of temporary agency employment (see, for example, Holst et al., 2010). Some motives have to do with the firm’s necessity to react to a changing environment under uncertainty. In this case temporary agency work is used as a “flexibility buffer”. For example, the demand for temporary workers may be induced by the needs to adjust for workforce fluctuations and staff absences and to deal with greater uncertainty about future output levels (see Houseman, 2001 and Ono & Sullivan, 2013). Other motives are more of a strategic nature and have to do with the potential of using temporary agency employment to cut wage costs and increase profits. The motive to use temporary agency work to reduce wage costs is well documented in the empirical literature. Our model focuses on this strategic use of temporary agency employment, because the cost-reduction motive behind the use of temporary agency employment affects the “effective” wage bargaining power of trade unions. For simplicity, in our model monopoly unions are assumed that by their very nature have the highest wage-setting power. It is shown, that unions may nevertheless be forced to deviate from the monopoly wage and accept lower wages if firms have the option to use agency workers instead of regular workers in some part of the production process. However, if firms decide to employ agency workers, trade union wage claims will increase for the (remaining) regular workers. A relatively more intensive use of temporary agency workers in high-wage firms may therefore be the cause and not the consequence of the high wage level in those firms.

From a methodological point of view, our theoretical model is related to papers discussing the impact of international outsourcing on trade union wage-setting. For example, in Koskela & Schöb (2010) and Skaksen (2004) the firms’ option to outsource some part of production dampens wage demands of trade unions. Lommerud et al. (2006) analyzes how international mergers might restrain the market power of unions in oligopoly markets. In those papers, the outsourcing or merging option imposes a threat to the bargaining power of trade unions, whereas in our paper the “effective” bargaining power of trade unions is eroded by the possibility to replace regular workers by temporary agency workers.

\textsuperscript{2}See, for example, Mitlacher (2007). Jahn & Weber (2012) show that temporary agency employment may indeed be used to replace regular workers.
The remainder of the paper is organised as follows. Section 2 outlines the theoretical framework and explains the components of the theoretical model. Section 3 derives the labour demand functions for regular workers for two employment regimes. In one regime only regular workers are used, whereas in the other regime agency workers are employed as well. Section 4 analyzes the rent-maximising behavior of trade unions when firms have the option to also employ agency workers. Section 5 contains a summary and some conclusions.

2 Outline of the model

We consider a simple model of a closed economy with imperfect competition in goods and labour markets. There are two types of agents in the economy. Besides workers, who supply labour and do not own capital, there are also capitalists, who own the firms and do not supply labour. There exist two types of firms: Productive firms produce final goods by using regular workers and possibly also temporary agency workers in production. Temporary work agencies lend temporary workers to productive firms. Between productive firms monopolistic competition prevails in the goods market. Because of barriers to market entry (that are, for simplicity, not explicitly modelled) the number of productive firms is given and monopoly rents are earned in the goods market. Firms and workers are given by a [0,1] continuum, implying that employment in the representative firm corresponds to the aggregate employment rate. Firm-level trade unions determine wages on behalf of employed regular workers and try to appropriate some share of the rents for their members. Agency workers, however, are not covered by trade unions.

Our model belongs to the class of the so-called “right to manage” models, in which firms retain the right to choose the employment level. In contrast, in an “efficient bargaining model” it is assumed that firms and labor unions bargain over both wages and employment. Whereas in the first class of models the equilibrium lies on the labor demand curve, in the latter case the bargaining outcome lies on a contract curve which usually is different from the labor demand curve. Since the implications of these model classes may
be quite different, we must justify our decision to base the analysis on the right-to-manage model.

Empirical studies lack a clear answer about which class of models is more relevant. If managers are asked about the issues covered in bargains with trade unions, the answers seem to unambiguously back up the right-to-manage model (Booth, 1995). This can most clearly be seen in the USA, where many collective agreements explicitly stipulate that employers retain the right to determine the level of employment. Even in countries where such a stipulation is not explicitly found in employment contracts, one gets the impression that trade unions typically do not bargain over employment.

Some economists have argued that bargaining over employment implicitly occurs through firm-union agreements on “manning” levels (by which capital-to-labor or labor-to-output ratios are meant). However, it is not clear why agreements on manning levels should be interpreted as contracts which implicitly determine the employment level. The reason is that, for instance, a fixed capital-labor ratio does not prevent firms from adjusting both capital and employment, or changing the number of shifts per machine (Layard et al., 1991, p. 96).

It is sometimes claimed that empirical studies which do not rely on survey data but focus on market outcomes would support the hypothesis that efficient bargains do, at least implicitly, occur (see, for example, Brown & Ashenfelter, 1986). However, Booth (1995, chap. 5) convincingly argues that the tests applied in these studies in order to distinguish between the right-to-manage model and the efficient bargaining model are flawed and therefore not credible. Empirical studies trying to identify the appropriate bargaining model from observed market outcomes are confronted with almost unsurmountable difficulties. In principle, each study has to make assumptions about trade unions’ preferences, technologies, other labour market imperfections, and market structure. The empirical tests then are joint tests of these assumptions. For example, the shape of the contract curve depends on the preferences of union members and may even coincide with the labor

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3 For this discussion see, for instance, McDonald & Solow (1981), Johnson (1990) and Clark (1990).
demand curve. Hence, even if one focuses on the efficient bargaining model, different results are possible depending on trade union’s preferences. The critique goes farther than that, since empirical studies have failed to significantly improve our knowledge about trade unions’ preferences (see, for example, Pencavel, 1991). The fact that efficient bargains are not observed more frequently may be due to the fact that something important is missing from theoretical considerations which claim the superiority of wage-employment bargains. For instance, efficient bargains may not be enforceable. Since the bargaining outcome lies off the labor demand curve, the firm has an incentive to cheat and may try to increase profits at the bargained wage level by choosing employment according to its labour demand curve. If trade unions are unable to enforce the labour contract, they may prefer higher wages and lower employment as predicted by the right-to-manage model.

For all these reasons, we consider the right-to-manage model to be a plausible framework for studying the impact of trade unions on labour market outcomes. Our model consists of the following core elements:

i) **Productive firms.** The technology of the representative productive firm is described by the following production function

\[
Y = S_1^\alpha S_2^\beta \quad \alpha + \beta \leq 1,
\]

where \( S_1 \) denotes the segment that can solely be produced by regular workers \( L_1 \), whereas segment \( S_2 \) can be produced by regular workers \( L_2 \) and/or by temporary workers \( \tilde{L}_2 \). It is assumed that

\[
S_1 = L_1
\]

\[
S_2 = L_2 + \delta \tilde{L}_2 \quad 0 < \delta \leq 1.
\]

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4See, for example, the “insider model” of Carruth & Oswald (1987) and the “seniority wage model” of Oswald (1993).

5If uncertainty and asymmetric information with respect to the future level of the firm’s goods demand is taken into account, the scope of incentive-compatible contracts may be severely limited due to the costs of information gathering and the problems associated with moral hazard.
Temporary workers might be less productive than regular workers, in which case \( \delta < 1 \) holds. Total regular employment is \( L = L_1 + L_2 \). The goods demand function for the productive firm is

\[
Y = p^{-\eta} Q \quad \eta > 1, \tag{4}
\]

with \( p \) denoting the firm’s price relative to the aggregate price level and \( \eta \) denoting the price elasticity of the demand for goods (in absolute values).\(^6\) \( Q \) is the share of aggregate demand (being equal to aggregate output) that would accrue to the single firm if \( p = 1 \). If a productive firm wants to employ a temporary worker, a fee \( \hat{x} \) must be paid to the temporary work agency. Real profits of the productive firm are

\[
\Pi = pY - w(L_1 + L_2) - x\delta \hat{L}_2, \tag{5}
\]

where \( w \) denotes the gross real wage rate for regular workers and \( x \) the real fee per temporary worker in “efficiency units”, i.e.

\[
x \equiv \frac{\hat{x}}{\delta}. \tag{6}
\]

More precisely, \( x \) denotes the costs of producing one unit of \( S_2 \) if temporary workers are used for production. Firms compare these costs with the costs \( w \) of producing one unit of \( S_2 \) using regular workers.

**ii) Temporary work agencies.** It is assumed that temporary workers are just on the books of the temporary work agency when they are “idle”, i.e. agency workers only receive a payment by the temporary work agency when they are assigned to a job at a client firm. This assumption captures quite well the institutional framework for temporary work in the UK, and to some extent the Netherlands or France, to name only some examples. In other countries, such as Germany and Sweden, temporary workers get an employment contract and obtain wage payments by the temporary work agency even when they are

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\(^6\)This isoelastic goods demand function of the Blanchard & Kiyotaki (1987) type is often used in the literature and can be derived from Dixit & Stiglitz (1977) preferences.
not assigned to a client firm.\textsuperscript{7} However, as pointed out by Kvasnicka (2003), hirings by temporary work agencies occur primarily on-call as a reaction to current client demand to avoid the risk of initial prolonged unproductive employment of workers. In other words, the first assignment of a worker at a client firm almost always coincides with the moment the worker is hired by the temporary work agency, whereas activities such as screening take place prior to hiring. Our assumption therefore seems to be absolutely appropriate for the analysis of temporary work in a static model as is considered in this paper.

It is assumed that the profits of a temporary work agency are equal to $(\bar{x} - \omega - s)\bar{L}$, where $\omega$ denotes the gross real wage rate of the temporary worker and $s$ denotes real screening and search costs implied by the hiring of the temporary worker. Moreover it is assumed that there is free market entry reflecting the fact that the establishment of a temporary work agency does not imply large irreversible investments as is the case for most productive firms. Since in equilibrium zero profits prevail, it must hold that

$$\bar{x} = \omega + s. \quad (7)$$

\textbf{iii) Trade unions.} It is assumed that all employed regular workers are union members. Firm-level trade unions determine the wage for regular workers by maximising the rent accruing to their members.\textsuperscript{8} The utility function of the representative union is $V = L(w_n - b_n)$, where $w_n$ and $b_n$ denote net real wages and net unemployment benefits, respectively. This specification takes into account that in many countries unemployment benefits are also subject to income taxation. Net wages and benefits are defined as $w_n \equiv (1 - \tau_w)w$ and $b_n \equiv (1 - \tau_b)b$, where $\tau_w$ and $\tau_b$ denote the tax rate for wages and benefits, respectively. As in Beissinger & Egger (2004), we consider a situation in which $(1 - \tau_b) = \phi(1 - \tau_w)$, with $\phi \geq 1$. The government often imposes a lower tax burden

\textsuperscript{7}The latter case has been analyzed in the matching models of Neugart & Storrie (2006) and Baumann et al. (2011). Alternatively, Neugart & Storrie (2006) also analyzed a model variant where workers are just on the books of the temporary work agency, which did not affect their main results (see their footnote 8).

\textsuperscript{8}We consider a monopoly union model instead of a bargaining model in order to keep the analysis as simple as possible. A Nash bargaining model would lead to the same qualitative results.
on unemployment benefits implying $\phi > 1$, whereas $\phi = 1$ holds if taxes on wages and unemployment benefits are the same. Both tax regimes are therefore taken into account by writing the trade union utility function as

$$V = L (1 - \tau_w) (w - \phi b), \quad \text{with} \quad \phi \geq 1. \quad (8)$$

iv) Temporary workers. Following the matching models of Neugart & Storrie (2006) and Baumann et al. (2011), we assume that agencies are able to set the wage $\omega$ equal to the reservation wage of workers. The temporary work agency therefore offers a wage which makes its workers at the margin indifferent to either being hired by the agency or staying unemployed. This assumption captures the fact that in many countries agency workers have a very weak bargaining position.\footnote{This is, for example, pointed out in Eurofound (European Foundation for the Improvement of Living and Working Conditions) (2008). According to this study, research findings also suggest that agency workers may have limited knowledge of their rights or the means to apply them.} From the aforementioned matching models it is known that the payment of temporary workers may be lower, equal or greater than unemployment benefits depending on whether temporary workers find regular jobs more likely than unemployed workers or not (see eqs. (16) and (17) in Baumann et al., 2011). Implicitly we assume that this job finding probability is the same for unemployed and temporary workers. As a consequence, the temporary work agency offers a gross real wage $\omega$, so that the net real wage equals net unemployment benefits, i.e. $\omega_n = b_n$. This implies

$$\omega = \phi b \quad \text{with} \quad \phi \geq 1. \quad (9)$$

v) Government budget constraint. The tax receipts of the government are solely used to finance unemployment benefits, hence in the case of a balanced budget

$$\tau_w w(L_1 + L_2) + \tau_w \omega \hat{L}_2 = (1 - \tau_b) b [1 - L_1 - L_2 - \hat{L}_2]. \quad (10)$$

The government may determine the level of net unemployment benefits by choosing $\tau_b$ and $b$. From the condition for a balanced budget then the tax rate $\tau_w$ follows.
vi) **Solution of the model**  The solution of the model consists of two stages. In the first stage, the temporary work agency determines the fee it claims for the employment of an agency worker at a client firm, and the trade union determines the wage level for regular workers. In the second stage, the firm decides on whether to use temporary workers or not and also determines the employment levels of regular workers and (possibly) temporary workers. This is taken into account by the trade union in the determination of the wage level. In order to obtain a subgame perfect equilibrium, the two-stage game must be solved by backward induction. Notice that the firm’s decision to employ temporary workers can be made quite “spontaneously” and can be easily reversed, since it does not require irreversible investment decisions. Hence, it is quite natural to assume that trade union wages are determined before the firm decides on the use of temporary agency workers and not the other way round.

### 3 The determination of labour demand

In stage 2, each productive firm chooses the number of regular and temporary workers. The fee $x$ that has to be paid to the temporary employment agency for a temporary worker (in efficiency units) and the wage rate $w$ for a regular worker are already determined (from stage 1). Taking account of eqs. (1) to (4), the profit maximisation problem of the representative firm is\(^{10}\)

$$
\max_{L_1, L_2, \tilde{L}_2} \pi = L_1^\alpha (L_2 + \delta \tilde{L}_2)^{\beta \kappa} Q^{1-\kappa} - w(L_1 + L_2) - x \delta \tilde{L}_2 \quad \text{s.t.} \quad L_2 \geq 0, \tilde{L}_2 \geq 0. \quad (11)
$$

\(^{10}\)Because of eq. (1), both segments are essential for production. The corresponding labour input conditions $L_1 \geq 0$ and $L_2 + \tilde{L}_2 \geq 0$ are not explicitly taken into account in eq. (11).
The parameter $\kappa$ is defined as $\kappa \equiv (\eta - 1)/\eta$, with $0 < \kappa < 1$. The lower $\kappa$, the higher the monopoly power of firms. The first–order conditions are:

$$\frac{\partial \pi}{\partial L_1} = \alpha \kappa L_1^{\alpha \kappa - 1}(L_2 + \delta \tilde{L}_2)^{\beta \kappa} Q^{1-\kappa} - w = 0$$

$$\frac{\partial \pi}{\partial L_2} = \beta \kappa L_1^{\alpha \kappa}(L_2 + \delta \tilde{L}_2)^{\beta \kappa - 1}Q^{1-\kappa} - w \leq 0, \quad L_2 \geq 0, \quad \frac{\partial \pi}{\partial \tilde{L}_2} = 0$$

$$\frac{\partial \pi}{\partial \tilde{L}_2} = \beta \kappa L_1^{\alpha \kappa}(L_2 + \delta \tilde{L}_2)^{\beta \kappa - 1}Q^{1-\kappa} - x \leq 0, \quad \tilde{L}_2 \geq 0, \quad \frac{\partial \pi}{\partial \tilde{L}_2} = 0.$$ 

It follows from the first-order conditions that two cases can be distinguished depending on whether the wage rate $w$ for regular workers is lower or higher than the costs $x$ of temporary workers.

**Case I:** $w \leq x$.

If $w < x$, it is cheaper to employ only regular workers, hence $L_2 > 0$ and $\tilde{L}_2 = 0$. From the first-order conditions the following labour demand functions are obtained:

$$L_1 = A_1 \cdot \left[ Q^{1-\kappa} w^{-1} \right]^{1/[1-\kappa(\alpha + \beta)]} \quad \text{and} \quad L_2 = A_2 \cdot \left[ Q^{1-\kappa} w^{-1} \right]^{1/[1-\kappa(\alpha + \beta)]},$$

with $A_1 \equiv [(\alpha \kappa)^{1-\beta \kappa} \cdot (\beta \kappa)^{\beta \kappa}]^{1/[1-\kappa(\alpha + \beta)]}$ and $A_2 \equiv [(\alpha \kappa)^{\alpha \kappa} \cdot (\beta \kappa)^{1-\alpha \kappa}]^{1/[1-\kappa(\alpha + \beta)]}$. The situation $w = x$ describes the borderline case in which the firm is indifferent between employing regular workers or temporary workers in the production of $S_2$. For the ease of exposition we will assume that in this case the firm only employs regular workers. Therefore, for $w \leq x$ total demand $L_R$ for regular workers is given by

$$L_R = L_R(w) = (A_1 + A_2) \left[ Q^{1-\kappa} w^{-1} \right]^{1/[1-\kappa(\alpha + \beta)]}, \quad (12)$$

where the index $R$ denotes the employment regime, in which only regular workers are employed.

**Case II:** $w > x$.

In this case profits are maximised by using only temporary workers in the production of
$S_2$, hence $L_2 = 0$ and $\tilde{L}_2 > 0$. The labour demand functions are:

$$L_1 = A_1 \left[ Q^{1-\kappa} w^{-(1-\beta \kappa)} x^{-\beta \kappa} \right]^{1/[1-\kappa(\alpha+\beta)]},$$

$$\tilde{L}_2 = (1/\delta) A_2 \left[ Q^{1-\kappa} w^{-\alpha \kappa} x^{-(1-\alpha \kappa)} \right]^{1/[1-\kappa(\alpha+\beta)]},$$

with $A_1$ and $A_2$ being defined as in case I. Total labour demand $L_T$ for regular workers in case II equals $L_1$, i.e.

$$L_T = L_T(w, x) = A_1 \left[ Q^{1-\kappa} w^{-(1-\beta \kappa)} x^{-\beta \kappa} \right]^{1/[1-\kappa(\alpha+\beta)]},$$  \hspace{1cm} (13)

where the index $T$ denotes the employment regime, in which only temporary workers are employed in the production of $S_2$. Notice that a higher fee for temporary workers not only reduces labour demand for temporary workers, but also demand for regular workers. The reason is that there are complementarities between the production of $S_1$ and $S_2$. If the number of temporary workers in the production of $S_2$ is reduced because those workers are getting more expensive, the demand for regular workers in the production of $S_1$ is reduced as well.

4 Union wage determination for regular workers

In stage 1, the trade union chooses the wage to maximise the economic rent for employed regular members, defined in eq. (8), taking into account that employment is determined by firms in stage 2. As a result, each union sets the wage for regular workers as a mark-up over unemployment benefits, where the mark-up depends on the wage elasticity $\varepsilon$ of labour demand for regular workers (defined in absolute values). The labour demand elasticity differs depending on whether the firm uses only regular workers or also temporary workers in production. As explained in Appendix A.1, it holds in the utility maximum that $w_j = [\varepsilon_j/(\varepsilon_j - 1)] \phi b$, where $j \in \{R, T\}$ denotes the index for the two employment regimes defined in Section 3. If the tax rate for unemployment benefits is lower than that for wages, $\phi > 1$ holds, whereas $\phi = 1$ if the tax rate for unemployment benefits and wages is the same.
If the firm only employs regular workers (corresponding to regime $R$), the labour demand elasticity is $\varepsilon_R = 1/[1 - \kappa(\alpha + \beta)]$. In this case the rent-maximising wage for regular workers is
\[
w_R = \frac{1}{(\alpha + \beta)\kappa} \phi b. \tag{14}\]

If the firm also employs temporary workers (regime $T$), the labour demand elasticity is $\varepsilon_T = (1 - \beta\kappa)/[1 - \kappa(\alpha + \beta)]$. In this case the rent-maximising wage for regular workers is
\[
w_T = \frac{1 - \beta\kappa}{\alpha\kappa} \phi b. \tag{15}\]

It is easy to show that $w_T > w_R$. The reason is that the labour demand elasticity for regular workers is lower (in absolute values) if also temporary workers are employed.

Whether the firm uses temporary workers or not depends on the size of the fee for temporary workers relative to the wage that has to be paid to regular workers. Segment $S_2$ is produced by regular workers if $w \leq x$, whereas it is produced by temporary workers if $w > x$. It turns out that for a specific range of the fee $x$ it is the best strategy for the trade union not to claim the wage $w_R$, but a lower wage $w_X$ that equals the fee $x$, in order to prevent the firm from employing temporary workers. This is denoted as regime $X$.

There are two threshold values for $x$ separating the three regimes ($R,X,T$), as shown in Figure 1.

\[\begin{array}{ccc}
\text{Regime T} & \bar{x} & \text{Regime X} & \overline{x} & \text{Regime R} \\
\begin{array}{l}
x < \bar{x} \quad w = w_T \\
w \leq x < \overline{x} \quad w = w_X = x \\
x \leq \overline{x} \quad w = w_R
\end{array} & L_2 = 0; \quad \bar{L}_2 > 0 & L_2 > 0; \quad \bar{L}_2 = 0 & L_2 > 0; \quad \bar{L}_2 = 0
\end{array}\]

\textit{Figure 1: Three wage-setting regimes for regular workers depending on the size of the fee for temporary workers}

The determination of the threshold values $\bar{x}$ and $\overline{x}$ is most easily understood by looking at Figure 2 that describes the labour market for regular workers. The curve $L^d_R$ represents labour demand in case that only regular workers are employed in the production of both
segments, whereas \( L^d_T \) is the labour demand curve (for regular workers) if temporary workers are used for the production of the \( S_2 \)-segment. Notice that the location of the \( L^d_T \)-curve depends on the fee \( x \) for temporary workers. The lower \( x \), the more shifts the \( L^d_T \)-curve to the right. The \( L^d_T \)-curve is relevant if the wage chosen for regular workers is lower than or equal to the fee \( x \) for temporary workers (i.e. in regimes \( R \) and \( X \)), whereas in the opposite case (i.e. in regime \( T \)) the \( L^d_T \)-curve is relevant.

If \( x \geq w_R \), i.e. the fee for temporary workers is higher or equal to the wage \( w_R \), the firm decides to employ only regular workers. In this case the trade union chooses the wage \( w_R \) that maximises its economic rent if only regular workers are employed. The upper threshold for \( x \) therefore is

\[
\bar{x} = w_R = \frac{1}{(\alpha + \beta) \kappa} b. \tag{16}
\]

\[w \]
\[\bar{x} \]
\[L_T(w_T, \bar{x}) \]
\[L_R(\bar{x}) \]
\[w_T \]
\[w_R = \bar{x} \]
\[w_X = x \]
\[L^d_T(x) \]
\[L^d_T(\bar{x}) \]
\[V_R \]
\[V_X(x) \]
\[V_T(\bar{x}) \]

\[L \]

Figure 2: The determination of the threshold values \( x \) and \( \bar{x} \)

Now suppose that the fee \( x \) for temporary workers is somewhat below \( \bar{x} \), as depicted in Figure 2. If the trade union still claimed the wage \( w_R \), the firm would decide to
employ temporary workers for the production of $S_2$, because $x < w_R$. In Figure 2, the corresponding labour demand curve if temporary workers are employed at fee $x$ is depicted as the dashed line $L_T^d(x)$. As is evident from the figure, the trade union then is better off by choosing a wage $w_X = x$ that makes the firm indifferent between employing temporary or regular workers. The reason is that the corresponding economic rent $V_X$ is higher than any rent the union would achieve along the $L_T^d(x)$-curve.

If the fee for temporary workers declines, the $L_T^d$-curve shifts to the right due to the complementarities in production mentioned in Section 3. As shown in Figure 2, there exists a lower threshold $\underline{x}$ defined as the wage level for regular workers that renders the trade union indifferent between the situation in which only regular workers are used and the situation, in which temporary workers replace regular workers in the production of segment $S_2$. The labour demand curve in the latter situation is given by $L_T^d(\underline{x})$. Hence, $\underline{x}$ is implicitly defined by the condition

$$V\big|_{w=w_T, L=L_T(w_T, \underline{x})} = V\big|_{w=\underline{x}, L=L_R(\underline{x})}. \quad (17)$$

Appendix A.2 derives the condition that implicitly determines the lower threshold $\underline{x}$. Of course, it has to be shown that the lower threshold $\underline{x}$ with $\underline{x} < \overline{x}$ exists. In Figure 2 the $L_T^d(\overline{x})$-curve would lie to the left of the dashed $L_T^d(x)$-curve. Hence, when the fee for temporary workers is higher than or equal to $\overline{x}$, it is clearly not in the interest of the trade union to agree to the employment of temporary workers (and, as we have explained above, the trade union will prevent the employment of temporary workers as long as $x \geq \overline{x}$ holds).

However, in the literature it is sometimes considered to be a possible outcome that unions profit from temporary agency work because of higher economic rents (see, for example, Böheim & Zweimüller, 2009). This would mean that trade unions do not resist to the employment of temporary workers if $x$ goes down below $\overline{x} = w_R$ and a lower threshold $\underline{x} < \overline{x}$ would not exist. For such a scenario to be a possible outcome, it must hold that the $L_T^d(\overline{x})$-curve lies so far to the right that the union’s economic rent for $x \geq \overline{x} = w_R$ is higher than the economic rent $V_R$ if only regular workers are employed. However, in Appendix A.3 it is shown that such a situation cannot occur, implying that there always
exists a range $x \leq x < \bar{x}$ for which the trade union tries to prevent the employment of temporary workers by lowering wages. In other words, at least in our model, it is not possible that trade unions profit from the employment of temporary workers.

In the following the wage levels, employment levels and economic rents in the different regimes are compared. If $x < \bar{x}$, it is better for the trade union to accept the employment of temporary workers in order to minimise the reduction in the economic rent. In the employment regime with temporary workers, the optimal wage $w_T$ is higher than the optimal wage $w_R$ when only regular workers are employed. This result is due to the lower wage elasticity of labour demand for regular workers if temporary workers are also employed. Hence, it holds that

$$w_T > w_R > w_X.$$  

(18)

Figure 2 suggests that equilibrium labour demand (for regular workers) in regime $R$ is higher than in regime $T$. In Appendix A.4 this is shown to hold if the fee for temporary workers is not lower than unemployment benefits. Moreover, firm’s labour demand in regime $X$ must be higher than in regime $R$, because wages in regime $X$ are lower than in regime $R$ and the labour demand curve $L^{d}_{R}$ is sloping downwards. Thus, for the employment of regular workers it holds that

$$L_X > L_R > L_T.$$  

(19)

Finally, the economic rents trade unions achieve in the different regimes have also to be compared. In Appendix A.3 it is shown that the economic rent in regime $R$ is higher than that obtained in regime $T$ if the fee for temporary workers is not lower than unemployment benefits. The economic rent related to regime $X$ is denoted by $V_X$. It can easily be seen that $V_X$ is lower than the economic rent in regime $R$ because $V_R$ denotes the highest economic rent achievable along the labor demand curve $L^{d}_{R}$. Thus, for the economic rent in different production patterns it holds that

$$V_R > V_X > V_T.$$  

(20)
5 Summary and conclusions

This paper developed a theoretical model to analyze how the firms’ option to employ temporary agency workers affects the wage-setting behaviour of trade unions. In the model, the motive behind employing temporary agency workers is the cost reduction and thereby the increase in profits when the fee for temporary workers is lower than the wage for regular workers. It is shown that depending on the size of the fee for temporary workers, trade unions have an incentive to reduce wage claims to prevent the use of temporary workers in production. In this case, firms are able to use the option to replace regular workers by temporary workers as a threat against unions, thereby lowering wage demands. Unions then only claim wages that are equal to the fee the firm would have to pay for temporary workers. However, if the fee for temporary workers is below a specific lower threshold, it is no longer the optimal strategy for trade unions to prevent the employment of temporary agency workers. Interestingly, since firms reduce the number of regular workers, it now is the best strategy for unions to claim wages that are even higher than the wage demands when the firms’ threat to replace regular workers is not credible. Hence, according to our model, the intensive use of temporary agency workers in high-wage firms may be the cause and not the consequence of the high wage level in those firms.

In the literature it is sometimes argued that the use of temporary agency work may also benefit trade unions because they would be able to appropriate higher economic rents. It would then be in the interest of unions not to resist the employment of agency workers. However, at least in our theoretical model, such a scenario is highly unlikely. Even though we assumed monopoly unions that ascribe the highest possible wage-setting power to the unions, it turned out that for all plausible parameter values the economic rents of trade unions decline because of the firms’ option to use temporary agency work.
A Appendix

A.1 Utility maximisation of the trade union

Depending on the wage-setting regime $R$ or $T$, the trade union chooses the optimal wage $w_R$ or $w_T$ by maximising its objective function (8) with respect to the labour demand function $L_R(w)$ or $L_T(w,x)$ defined in eqs. (12) and (13), respectively. From the first-order condition it follows that

$$-\frac{\partial L_j}{\partial w} \frac{w_j}{L_j} = \frac{w_j}{w_j - \phi b}, \quad j \in \{R, T\}$$

leading to

$$w_j = \frac{\varepsilon_j}{\varepsilon_j - 1} \phi b, \quad j \in \{R, T\},$$

where $\varepsilon_j$ denotes the wage elasticity of labour demand in absolute values, i.e. $\varepsilon_j \equiv |(\partial L_j/\partial w) w/L_j|$. Using the derivatives of the labour demand functions

$$\frac{\partial L_R}{\partial w} = -\frac{L_R}{[1 - \kappa(\alpha + \beta)]w}, \quad \frac{\partial L_T}{\partial w} = -\frac{(1 - \beta \kappa)L_T}{[1 - \kappa(\alpha + \beta)]w}$$

$$\frac{\partial^2 L_R}{\partial w^2} \bigg|_{w=w_R} = \frac{[2 - \kappa(\alpha + \beta)]L_R}{[1 - \kappa(\alpha + \beta)]^2 w_R^2}, \quad \frac{\partial^2 L_T}{\partial w^2} \bigg|_{w=w_T} = \frac{(1 - \beta \kappa)[2(1 - \beta \kappa) - \alpha \kappa]L_T}{[1 - \kappa(\alpha + \beta)]^2 w_T^2}$$

it can easily be shown that the second-order condition for a utility maximum holds for $\kappa < 1$ and $\alpha + \beta \leq 1$.

A.2 Threshold values for the fee for temporary workers

In Section 4 it has already been shown that $x = w_R$, with $w_R$ being determined in eq. (14). For the determination of $x$, eq. (17) must hold. Taking account of the labour demand equations (12) and (13) in the union utility function (8), eq. (17) implies

$$A_1 \left[ Q^{1-\kappa} w_T^{-1-\beta \kappa} \varphi^{-\beta \kappa} \right] \frac{1}{1 - \kappa(\alpha + \beta)} (w_T - \phi b) = (A_1 + A_2) \left[ Q^{1-\kappa} \varphi^{-1} \right] \frac{1}{1 - \kappa(\alpha + \beta)} (x - \phi b),$$

where $w_T$ is determined in eq. (15). Rearrangement leads to the following expression which implicitly defines $x$ in the scenarios depicted in Figure 2 and Subfigure ??:

$$\frac{\alpha}{\alpha + \beta} \left( \frac{w_T}{x} \right)^{-\frac{1-\beta \kappa}{1 - \kappa(\alpha + \beta)}} = \frac{x - \phi b}{w_T - \phi b}. \quad (21)$$
A.3 Proof of the existence of $x$

In Section 4 it has been stated that $x < \bar{x}$ does not exist if

$$V|_{w=w_T, L_T^d(w_T,x)} \geq V|_{w=w_R, L_R^d(w_R)}.$$  \hfill (22)

In Figure 3 the limiting case is depicted, in which for some fee $x_0$ it holds that $V_R = V_T(x_0)$. If the fee for temporary workers $x$ is lower than this value $x_0$, the $L_T^d$–curve lies farther to the right implying a higher economic rent in the regime with temporary workers, i.e. $V_T(x) > V_R$. If it could be shown that $x_0 \geq \bar{x} = w_R$ is a possible outcome, it would indeed be a possible scenario that trade unions’ rents are higher if temporary workers are employed.

We now consider the opposite case and determine the values of $x$ for which $V_R > V_T(x)$ holds. Using eqs. (8), (12), (13), (14), and (15) it can be shown that $V_R > V_T(x)$ if

$$x > \left[w_T^{-(1-\beta s)}w_R\right]^{\frac{1}{\beta s}} \equiv x_0.$$  \hfill (23)
Condition (23) determines a minimum value of \( x \) necessary for \( V_R > V_T \). Because of eqs. (6), (7), and (9), it holds that \( x = (\phi b + s) / \delta \). For the productivity parameter \( \delta \) for temporary workers it holds that \( \delta \leq 1 \). Moreover, search and screening costs \( s \) are nonnegative. As a consequence, \( x \geq \phi b \). To show that condition (23) is fulfilled, it is sufficient to show that the \( L_d^T \)-curve for \( x = \phi b \) is located on the left of the \( L_d^T \)-curve for \( x_0 \). This can formally be shown to hold if

\[
\frac{1}{\kappa(\alpha + \beta)} \left( \frac{1 - \beta \kappa}{\alpha \kappa} \right)^{-(1-\beta \kappa)} < 1. \tag{24}
\]

Parametrization of the left-hand side of eq. (24) shows this condition to hold for the permitted parameter ranges of \( \alpha \), \( \beta \), and \( \kappa \). To do so, assume \( \alpha + \beta = z \) with \( z < 1 \). The left-hand side of eq. (24) is plotted in Subfigures 4(a) and 4(b) for two extreme values of \( z \). For the permitted parameter ranges, the function value of the left-hand side is positive but smaller than one. Thus, due to \( x \geq \phi b \), situations as shown in Figure 3 are ruled out and the economic rent of trade unions is always higher in regime \( R \) for all admissible \( x \).

\begin{figure}
\centering
\subfloat[\( z = 0.95 \)]{\includegraphics[width=0.4\textwidth]{fig4a}} \hfill
\subfloat[\( z = 0.1 \)]{\includegraphics[width=0.4\textwidth]{fig4b}}
\caption{Parametrization of eq. (24)}
\end{figure}
A.4 Comparison of optimal labour demand in different regimes

It is still left to show that the equilibrium labour demand (for regular workers) is higher in regime $R$ than in regime $T$. It can be derived from Figure 3 that $L_R > L_T$ always holds if $V_R > V_T$. This can also be shown formally. Using eqs. (12), (13), (14), and (15), it turns out that $L_R > L_T$ for

$$x > \left( \frac{\alpha}{\alpha + \beta} \right)^{\frac{1-\kappa \alpha}{\beta \kappa}} \left[ w_T^{-\beta \kappa} w_R \right]^{\frac{1}{\beta \kappa}}. \quad (25)$$

Comparing the right-hand sides (RHS) of eqs. (23) and (25) it can easily be seen that RHS of eq. (25) is smaller than RHS of eq. (23). It has already been shown that eq. (23) is fulfilled because of the restriction $x \geq \phi b$. Thus, it also holds that employment in regime $R$ is higher than employment in regime $T$. 

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