UNIVERSITY OF HOHENHEIM

FACULTY OF BUSINESS, ECONOMICS AND SOCIAL SCIENCES

HOHENHEIM DISCUSSION PAPERS

IN BUSINESS, ECONOMICS AND SOCIAL SCIENCES

Institute of Economics

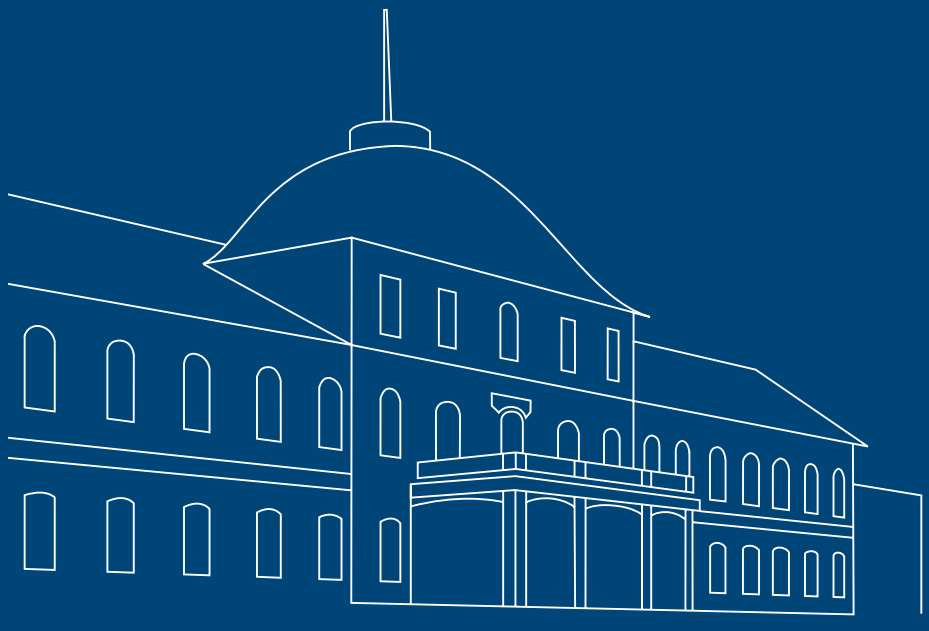
DISCUSSION PAPER 06-2016

DEREGULATION OF TEMPORARY AGENCY EMPLOYMENT IN A UNIONIZED ECONOMY: DOES THIS REALLY LEAD TO A SUBSTITUTION OF REGULAR EMPLOYMENT?

Philipp Baudy

Dario Cords

University of Hohenheim



State: May 2016

www.wiso.uni-hohenheim.de

Discussion Paper 06-2016

Deregulation of Temporary Agency Employment in a Unionized Economy: Does This Really Lead to a Substitution of Regular Employment?

Philipp Baudy, Dario Cords

Download this Discussion Paper from our homepage:

https://wiso.uni-hohenheim.de/papers

ISSN 2364-2076 (Printausgabe)
ISSN 2364-2084 (Internetausgabe)

Deregulation of Temporary Agency Employment in a Unionized Economy: Does This Really Lead to a Substitution of Regular Employment?*

Philipp Baudy†
University of Hohenheim, Germany

Dario Cords‡
University of Hohenheim, Germany

May 10, 2016

Abstract

There have been continuous deregulation efforts concerning temporary agency employment in almost all European countries aiming at an increasing flexibility in the European labor markets. This paper theoretically investigates the effects of a legal deregulation of temporary agency employment on wage setting and the employment structure in a unionized economy with labor market frictions. Multiple-worker firms bargain simultaneously with temporary agencies and labor unions to determine the respective labor costs. It is shown that there is a hump-shaped relationship between the degree of legal deregulation of temporary agency employment and the rate of temporary employment used in the production process. Temporary agency employment may even decrease despite its deregulation. Furthermore, regular employment monotonically increases, while individual workers and labor unions suffer from deregulation due to declining wages and a reduction in labor union's utility.

JEL Classification: C78, J51, J21, J31

Keywords: Matching Theory, Labor Unions, Temporary Agency Work, Wage-Setting Process

---

*We especially thank Thomas Beissinger for his helpful and valuable comments and suggestions.

†Corresponding author: University of Hohenheim (520G), Schloss Hohenheim 1C, 70593 Stuttgart, Germany. Email: p.baudy@uni-hohenheim.de

‡University of Hohenheim (520G), Schloss Hohenheim 1C, 70593 Stuttgart, Germany. Email: dario.cords@uni-hohenheim.de

1 Introduction

During the last two decades, the use of temporary agency work has tremendously increased in almost all OECD countries. For example, in Germany the number of temporary agency workers increased sevenfold (Jahn & Weber, 2015). Even if the great recession starting in 2007 led to a minor decrease in the agency work penetration rate, it resumed its upwards trend afterwards (Ciett, 2013). This increase was particularly supported by the ongoing institutional deregulation of temporary work agencies aiming at the flexibility of the countries' labor markets. For instance, in Germany the deregulation of temporary agency employment was part of the labor market reform "Agenda 2010" of the former social-democratic chancellor Gerhard Schröder in 2003. The aim of increasing the attractiveness of temporary employment was, next to other labor market instruments, to reduce unemployment and increase flexibility. The political idea behind the deregulation of temporary agency employment is to bring more people to work that are not able to find a job in the regular labor market, e.g. long-term unemployed. By using temporary workers in the production, firms may "test" the workers and, afterwards, convert their employment relationship to regular employment. From the firm's perspective, there are various motives for using temporary agency workers in the production process (see, e.g. Holst et al., 2010). One of them is that using temporary workers in the production allows to easily adjust the workforce to uncertainty about future output levels, workforce fluctuations, worker absence etc. since temporary workers are not covered by employment protection (see Houseman, 2001; Ono & Sullivan, 2013). Another argument for replacing regular by temporary workers is that the use of the latter may lead to cost savings and increasing profits (see, e.g. Jahn & Weber, 2015).

In most European countries, wages are determined by collective bargaining agreements between firms and labor unions. The use of temporary agency employment may lead to a substitution of part of the regular workforce that is represented by the unions. Thus, labor unions have to take the behavior of temporary agency employment into account in the negotiation process. Otherwise, the firms' increasing attractiveness of

using temporary agency work may induce substantial replacement of regular employment and, hence, deteriorate the labor unions' position in the economy.

Despite the important role of labor unions in almost all European economies, up to now there has been limited attention on the investigation of temporary agency employment on labor union's behavior. Beissinger & Baudy (2015) give a first theoretical contribution analyzing the firm's strategic use of potential temporary agency employment in the wage-setting process to dampen labor union's wage claims. However, the model neglects the general equilibrium effects of increasing temporary agency employment. One of the main arguments of opponents of temporary agency work is that ongoing labor market flexibility leads to a change in the employment structure towards more precarious employment and a decrease in union coverage. Thus, it is left to analyze the effects of temporary agency work on overall employment and the employment structure in the economy in a dynamic set-up.

To close this gap, we analyze the general equilibrium effects of temporary agency employment in a frictional labor market à la Mortensen & Pissarides (1994) and Pissarides (2000). We assume that there are large firms producing differentiated goods with labor being the only production factor. Workers can either be hired directly by the firms or, alternatively, the firm may borrow workers from temporary employment agencies. Both types of work are modeled as perfect substitutes. Regular workers are organized in firm-level labor unions. Agencies are small (one-worker) and bargain individually with the firm over the fee a firm has to pay for using temporary workers in its production. Using this model framework, we are able to reveal the employment structure in the economy and its adjustment to shocks like institutional changes in the regulation of temporary work agencies. Furthermore, it is possible to analyze how union coverage in the economy evolves and examine the flows in the different labor market states. Legal (de)regulation is modeled by regulatory costs arising from institutional barriers like limitations regarding the maximum period of assignment of temporary workers, re-employment bans, synchronization bans or equal pay obligations for regular and temporary workers. Higher legal regulation leads to increasing regulatory costs.

The main result of the model is that there is a hump-shaped relationship between temporary agency employment used in the production and its degree of legal deregulation. At first sight, this may be counterintuitive as it means that progressive legal deregulation does not inevitably lead to an increase in temporary employment but it may even decline. Furthermore, regular employment monotonically increases in deregulation of temporary employment. Thus, there is no reduction in the degree of union coverage but, on the contrary, it even increases. Unions and single workers both suffer from temporary agency employment due to declining wage rates and labor union utility.

The structure of the paper is as follows. Section 2 gives a brief discussion of related literature on labor unions and temporary agency employment. Section 3 describes the outline of the model and its components in more detail before the model is solved in Section 4. Section 5 defines the equilibrium. In Section 6, the model is calibrated to German data and its predictions considering the employment structure in the economy are presented. Section 7 examines the key insights of the model, i.e. the changes in the wage-setting and employment structure triggered by legal deregulation of the temporary employment sector. Finally, Section 8 summarizes the results and concludes.

2 Related Literature

Before the model will be elaborated, a short review of related literature on labor unions and temporary employment agencies will be given. Even if the behavior of labor unions has already been widely discussed (for an overview see Booth, 1995; Boeri et al., 2001; Addison & Schnabel, 2003), little attention was paid on modeling unionized labor markets in the framework of search and matching for a long time. A first contribution to labor unions in the matching framework was given by Delacroix (2006). He introduces a multi-sectorial model with a varying degree of union coverage and monopolistic competition in the goods market and investigates the union's reaction to changes in the unemployment insurance. Based on this framework, Ebell & Haefke (2006) study the effect of product market deregulation on the formation of labor unions by endogenizing the choice of

the bargaining institution. Krusell & Rudanko (2012) analyze the intertemporal effect of unions' commitment to future wages, while Bauer & Lingens (2013) investigate the efficiency in search models with large firms and collectively bargained wages. In another recent contribution, Ranjan (2013) examines the general equilibrium effects of decreasing offshoring costs. He identifies a non-monotonic relationship of unemployment and offshoring costs in the domestic, offshoring country. Decreasing costs of offshoring increase unemployment first, but a further reduction leads to a decrease in unemployment afterwards.

Theoretical work on temporary agency employment is rather limited. The very first theoretical contributions are given by Autor (2001, 2003). While the first paper investigates the role of employment agencies in the screening for regular jobs, the latter describes that firms relinquish to substitute the whole workforce by temporary agency employment due to distinct capital investments related to specific workers. The first contribution to temporary agency employment in the framework of search and matching is provided by Neugart & Storrie (2006). The authors analyze the increase of temporary employment based on an improved matching efficiency that is induced by temporary work agencies working as intermediaries in the matching process of workers and firms. Baumann et al. (2011) use the same framework enriching the model set-up by endogenous job destruction. However, the majority of research on temporary agency employment is based on its empirical investigation and focuses on its strategic use in the production (e.g. Vidal & Tigges, 2009; Holst et al., 2010), its effect on the employment structure (Jahn & Bentzen, 2012; Haller & Jahn, 2014), the wage differential of temporary agency work (Garz, 2013) and the question if temporary agency employment may be used as a stepping stone into regular employment (e.g. Amuedo-Dorantes et al., 2008; Kvasnicka, 2009; Autor & Houseman, 2005, 2010; Jahn & Rosholm, 2013, 2014).

3 Outline of the Model

3.1 Labor Market Flows

All workers are assumed to be identical. Following Neugart & Storrie (2006), the workforce is segmented into four different groups. As in the standard matching literature, workers are either unemployed (U) or directly employed at a firm (regular employment, R). Furthermore, workers can be employed at temporary employment agencies. Temporary employment agencies hire workers and have them in their pool (unassigned temporary work, T) with the aim at lending them to firms that use them in their production (assigned temporary work, A).[1] Unemployed may either find a regular job or become unassigned temporary workers. Once in the pool of the temporary employment agency, the job in state T may either be destroyed to unemployment with an exogenous rate δ or the temporary worker becomes assigned to a firm. Moreover, temporary workers (assigned and unassigned) search on-the-job for regular employment. It is assumed that their effectiveness of search is higher compared to that of unemployed. This is reflected by parameter γ_T and γ_A for unassigned and assigned temporary workers, respectively. Assigned temporary workers may find regular jobs or their current position is destroyed with the exogenous rate χ, meaning that they fall back to state T just being in the pool of the temporary employment agency. Employment of regular workers is destroyed to unemployment by the exogenous rate δ coinciding with the job destruction rate of unassigned temporary jobs.[2]

Search is undirected, i.e. workers accept the first job offer they get whatever type it is. Matching of firms and workers/agencies is formally described by the matching function

$$M_i = M(V_i, S_i). \tag{1}$$

The matching function exhibits constant returns to scale, is increasing in both arguments,

[1] This labor market set-up fits well to Central European countries such as France, Germany, the Netherlands, and Sweden (Arrowsmith, 2006).

[2] It is assumed that $\chi > \delta$. Due to its flexibility and a lack of employment protection instruments, temporary agency employment is more affected by exogenous shocks than regular jobs.

at least twice differentiable, and satisfies the Inada conditions. M_i denotes the instantaneous flow of hires for the different employment states $i = T, A, R$. The number of vacancies posted in state i is denoted by V_i. The number of job-searchers in the respective state is given by S_i. Firms post vacancies for regular and assigned temporary jobs, while temporary agencies post vacancies only for unassigned temporary workers. Vacancies posted in state i are filled with the rate $M(V_i, S_i)/V_i \equiv m(\theta_i)$, while workers' finding rate for a job in state i is $M(V_i, S_i)/S_i \equiv \theta_i m(\theta_i)$. Variable $\theta_i \equiv V_i/S_i$ reflects the labor market tightness in state i. The number of job-searchers differs across the states. Unemployed search for both, regular and temporary employment, while temporary workers are allowed to search for regular employment on-the-job. Thus, there is an overlap in the groups searching for different types of jobs. The total number of job-searchers for unassigned temporary employment equals the number of unemployed, $S_T = U$. Unassigned temporary workers look for assignments, $S_A = L_T$, where L_i denotes the amount of employed workers in the respective state. Moreover, all workers in states U, T, and A search for regular jobs, i.e. $S_R = U + \gamma_T \cdot L_T + \gamma_A \cdot L_A$. As temporary workers' search effectiveness differs from the search effectiveness of unemployed, $\gamma_T \cdot L_T$ and $\gamma_A \cdot L_A$ describe the *effective* number of unassigned and assigned temporary workers looking for regular employment, respectively.[3] There is no overall labor market tightness but for each "submarket" separately. Thus, unemployed workers find jobs in regular employment with rate $\theta_R m(\theta_R)$, while unassigned and assigned temporary workers find regular jobs with probabilities $\gamma_T \theta_R m(\theta_R)$ and $\gamma_A \theta_R m(\theta_R)$, respectively. Unemployed find unassigned temporary jobs with probability $\theta_T m(\theta_T)$ and, once in the pool of the agency, become assigned with probability $\theta_A m(\theta_A)$. The labor market flows are depicted in Figure 1.

With help of Figure 1, the flows in and out of the different labor market states can easily be stated formally. From the perspective of the firm, the flows at each instantaneous

[3]Total labor force N is normalized to unity. Hence, $U + L_T + L_A + L_R = 1$, with U, L_T, L_A, and L_R denoting the unemployment and employment rates, respectively.

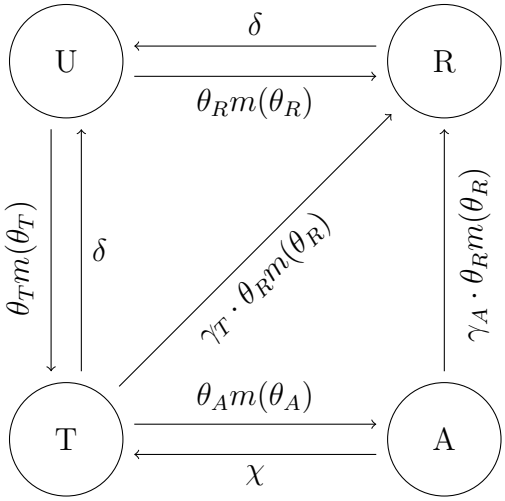


Figure 1: Labor Market Flows

time interval are

$$\dot{L_T} = m(\theta_T) \cdot V_T + \chi \cdot L_A - \theta_A m(\theta_A) \cdot L_T - \gamma_T \theta_R m(\theta_R) \cdot L_T - \delta \cdot L_T \tag{2}$$

$$\dot{L_A} = m(\theta_A) \cdot V_A - \chi \cdot L_A - \gamma_A \theta_R m(\theta_R) \cdot L_A \tag{3}$$

$$\dot{L_R} = m(\theta_R) \cdot V_R - \delta \cdot L_R. \tag{4}$$

In the steady state, the in- and outflows for the different states coincide, i.e. $\dot{L_T} = \dot{L_A} = \dot{L_R} = 0$. Thus, the flows can be rewritten to[4]

$$[\delta + \theta_A m(\theta_A) + \gamma_T \theta_R m(\theta_R)] \cdot L_T = m(\theta_T) \cdot V_T + \chi \cdot L_A \tag{5}$$

$$[\chi + \gamma_A \theta_R m(\theta_R)] \cdot L_A = m(\theta_A) \cdot V_A \tag{6}$$

$$\delta \cdot L_R = m(\theta_R) \cdot V_R. \tag{7}$$

Similar to the employment flows, the flows into and out of unemployment are

$$\dot{U} = \delta \cdot L_R + \delta \cdot L_T - \theta_T m(\theta_T) \cdot U - \theta_R m(\theta_R) \cdot U. \tag{8}$$

[4]The flow equations given here represent the firm's perspective. They can easily be converted to the respective flow equations from the workers side of view. To do so, use the respective job-searchers of each state and the condition that the total labor force equals the sum of the workers of each state. The equations are provided in Appendix A.1.

As the change in the amount of unemployed is zero in steady state, i.e. $\dot{U} = 0$, equilibrium unemployment is formally represented by

$$U = \frac{\delta(L_R + L_T)}{\theta_T m(\theta_T) + \theta_R m(\theta_R)}. \tag{9}$$

Equilibrium unemployment does not directly depend on the labor market tightness in state A, as the amount of assigned temporary workers only influences the structure of employment, but not its rate. There is no direct channel from assigned temporary work to unemployment or vice versa.

3.2 Goods Market

Households act as consumers in the goods market and, at the same time, as workers in the labor market. Consumers are risk neutral in the aggregate consumption good. It is further assumed that they have Dixit & Stiglitz (1977) preferences over a continuum of differentiated goods. The goods demand function can be derived from the following optimization problem households are facing:

$$\max_{c_{j,k}} \left(\int c_{j,k}^{\frac{\eta-1}{\eta}} dj \right)^{\frac{\eta}{\eta-1}} \quad \text{with} \quad j = 0, ..., n \quad \text{and} \quad \eta > 1, \tag{10}$$

subject to the resource constraint

$$I_k = \int c_{j,k} \cdot \left(\frac{P_j}{P} \right) \cdot dj, \tag{11}$$

where j denotes the differentiated good and k the household. Further, $c_{j,k}$ denotes household k's consumption of good j, while I_k is the real income of household k. Parameter η gives the elasticity of substitution across the differentiated goods, while $p_j = P_j/P$ is the firm's price relative to the aggregate price level. The solution to the aforementioned maximization problem and, thus, aggregate demand for good j is given by

$$Y_j \equiv \int c_{j,k} \cdot dk = p_j^{-\eta} \cdot I, \tag{12}$$

with $I \equiv \int I_k \cdot dk$ being aggregate real income and $P \equiv (\int P_j^{1-\eta})^{\frac{1}{1-\eta}}$ denoting the price index.

3.3 Firms

In contrast to the basic matching model of Mortensen & Pissarides (1994) and Pissarides (2000), we are dealing with large firms employing multiple workers. Each firm j produces a single, differentiated final good. There are two reasons for using large firms instead of one-worker firms. First, in models of monopolistic competition the optimal firm size and output level are determined endogenously. Hence, restricting the firm size to one worker conflicts with monopolistic goods market competition (for more details see Ebell & Haefke, 2006). Second, assuming firm-level labor unions representing more than one worker, it is natural to assume bargaining with large firms. Considering the production technology of the firm, final goods are produced by using labor as the only input factor. Workers can either be employed directly at the respective firm (regular workers), or they are borrowed from temporary work agencies (assigned temporary workers). The amount of regular workers employed at firm j is denoted by $L_{j,R}$, while $L_{j,A}$ gives the amount of temporary agency workers used in the production. The firm's production technology is described by

$$Y_j = \tau \cdot [L_{j,R} + L_{j,A}]^{\rho} \quad \text{with} \quad \rho \in (0,1), \tag{13}$$

where τ denotes an efficiency parameter and ρ captures diminishing returns to scale in the production. Using this type of production technology reflects the idea that regular workers and temporary agency workers are perfect substitutes. This is a reasonable assumption because temporary agency employment is used in almost all branches, in particular in blue-collar, low-skilled jobs to replace regular workers doing simple tasks. The reason to replace regular workers doing simple tasks is all about lowering costs.

The instantaneous profit of a firm is given by[5]

$$\pi_j = p_j(Y_j)\, Y_j - w_R\, L_{j,R} - \varepsilon x\, L_{j,A}^{\sigma} - h\,(V_{j,A} + V_{j,R}), \tag{14}$$

with $p_j(Y_j)$ representing the firm's inverse goods demand function that can be derived from eq. (12) and w_R denoting the wage rate of regular workers. The fee the firm has to

[5]Appendix A.2 shows that this profit function is strictly concave and, hence, a profit maximum exists.

pay to the temporary work agency is depicted by x, while h denotes the costs of posting a vacancy in state A and R. Parameter ε describes regulatory costs or rather institutional barriers associated with firm's use of temporary employment, e.g. employment protection, the maximum period of assignment, synchronization ban and re-employment ban. Next to institutional regulations there often are voluntary firm-level agreements between employers and employee representations regulating the use of temporary agency employment. For instance, such agreements limit the share of temporary agency workers on all employees within a firm or specify a maximum duration of assignment undercutting the legal time limit. Furthermore, they may include commitments for transferring temporary workers to regular contracts after a specific assignment period or expand the rights of the employees representative committee with increasing temporary agency employment used within the firm.[6] Such non-institutional firm-level costs of temporary agency work are increasing and convex in the number of employed temporary workers and reflected by parameter $\sigma > 1$. $V_{j,R}$ and $V_{j,A}$ denote the number of vacancies firm j posts for regular and temporary workers, respectively.

3.4 Workers

From the perspective of the workers, keeping in mind the labor market flows, the expected value of regular employment is given by

$$r\Psi_R = w_R + \delta \cdot (\Psi_U - \Psi_R). \tag{15}$$

Wage rate w_R reflects the instantaneous inflow of being employed regularly, while the second term depicts the loss from becoming unemployed weighted by its probability of occurrence δ. The expected value of being unemployed is given by

$$r\Psi_U = z + \theta_T m(\theta_T) \cdot (\Psi_T - \Psi_U) + \theta_R m(\theta_R) \cdot (\Psi_R - \Psi_U). \tag{16}$$

[6] An overview of such voluntary firm-level agreements used in Germany are provided by R. Krause (2012).

Parameter z denotes the net income of being unemployed. The last two terms at the right-hand-side (RHS) describe the expected gain from possible changes in the labor market state. Similarly, the present discounted value of being in the pool of the temporary work agency is

$$r\Psi_T = w_T + \delta \cdot (\Psi_U - \Psi_T) + \theta_A m(\theta_A) \cdot (\Psi_A - \Psi_T) + \gamma_T \cdot \theta_R m(\theta_R) \cdot (\Psi_R - \Psi_T). \quad (17)$$

Parameter w_T denotes the payment temporary agency workers receive for being in the pool of the temporary work agency. By searching on-the-job they may improve their position in the labor market and find regular employment with probability $\gamma_T \theta_R m(\theta_R)$. The worker's expected value of assigned temporary agency employment is

$$r\Psi_A = w_A + \chi \cdot (\Psi_T - \Psi_A) + \gamma_A \cdot \theta_R m(\theta_R) \cdot (\Psi_R - \Psi_A), \quad (18)$$

with w_A denoting the wage temporary workers receive being assigned to a firm. Following Neugart & Storrie (2006), it is assumed that the agency sets w_T and w_A in a way that makes the worker at the margin indifferent between being unemployed, being in the pool of temporary employment agencies or being assigned to a client firm, such that

$$\Psi_U = \Psi_T = \Psi_A. \quad (19)$$

Even if this assumption is quite strong, it reflects the fact that temporary workers usually have a rather weak bargaining position. Finally, applying this assumption, the value functions (15) to (18) simplify to

$$r\Psi_R = w_R + \delta \cdot (\Psi_U - \Psi_R) \quad (20)$$

$$r\Psi_T = w_T + \gamma_T \, \theta_R m(\theta_R) \, (\Psi_R - \Psi_T) \quad (21)$$

$$r\Psi_A = w_A + \gamma_A \, \theta_R m(\theta_R) \, (\Psi_R - \Psi_A) \quad (22)$$

$$r\Psi_U = z + \theta_R m(\theta_R) \, (\Psi_R - \Psi_U). \quad (23)$$

3.5 Labor Unions

It is assumed that all regularly employed workers are members of a union. Firm specific, symmetric labor unions determine the wage rate for regular workers by maximizing the

rent of its members. The rent of a union member equals the difference between the expected value of regular employment and the outside option, which is the value of being unemployed. Thus, the rent of a union member is given by $\Psi_R - \Psi_U$. As the union is bargaining for all regular workers that are employed at firm j, the utility of the respective labor union is formally represented by

$$U_j = [\Psi_R - \Psi_U] \cdot L_{j,R}. \tag{24}$$

3.6 Temporary Employment Agencies

Temporary employment agencies pay a wage rate w_A to temporary workers that are assigned to a client firm and a wage w_T to unassigned temporary workers that are only in the pool of the agency. Further, the agency receives a fee x from a client firm for each assigned temporary worker.

In contrast to firms, it is considered to have one-worker agencies. Each agency offers one vacancy V_T that can be filled by an unemployed. In case of a successful match, the unemployed switches to the worker pool of the agency and waits for an assignment at a client firm. The agency's expected profit of posting a vacancy is

$$r\Omega_V = -\tilde{h} + m(\theta_T)[\Omega_T - \Omega_V], \tag{25}$$

where $\tilde{h}$ denotes the cost of a vacancy.[7] Variable Ω_T is the expected profit of having a worker on hold, which is

$$r\Omega_T = -w_T + \theta_A m(\theta_A)[\Omega_A - \Omega_T] + \gamma_T \theta_R m(\theta_R)[\Omega_V - \Omega_T] + \delta[\Omega_V - \Omega_T]. \tag{26}$$

Even in case of a filled vacancy, eq. (26), there is no positive flow income from filling a vacancy. Having a vacancy filled is only worthwhile for the agency due to the potential

[7] Agency's vacancy costs $\tilde{h}$ differ from the firm's vacancy costs h with $h > \tilde{h}$. This reflects the fact that firms usually look for workers with specific human capital, since they are more interested in long-term employment relationships and stronger rules of employment protection apply, while agencies are able to quit the employment relationship easier.

assignment of the worker to a client firm. This is reflected by the second term at the right-hand-side. In general, the last three terms denote the expected gains/losses due to changes in the different labor market states. Finally, the agency's expected profit of assigning a worker to a client firm is given by

$$r\Omega_A = x - w_A + \gamma_A \theta_R m(\theta_R)[\Omega_V - \Omega_A] + \chi[\Omega_T - \Omega_A], \tag{27}$$

where $x - w_A$ denotes the flow profit in this state. Using eqs. (25) to (27), the agency's job creation can formally be described as

$$\frac{\tilde{h}}{m(\theta_T)} = \frac{\theta_A m(\theta_A)(x - w_A) - w_T[r + \chi + \gamma_A \theta_R m(\theta_R)]}{[r + \theta_A m(\theta_A) + \gamma_T \theta_R m(\theta_R) + \delta] \cdot [r + \chi + \gamma_A \theta_R m(\theta_R)] - \chi \theta_A m(\theta_A)}. \tag{28}$$

4 Solution of the Model

Recalling the assumption that the value of being unemployed, being in the pool of the temporary employment agency and being assigned to a client firm coincide, the wage rates of assigned and unassigned temporary workers can be derived using the workers' asset functions. The bargaining problems between firms and unions and firms and agencies are interrelated due to the substitutability of regular and temporary employment in the firms' production technology. Hence, the whole bargaining game consists of two stages involving the three bargaining parties firms, unions, and temporary employment agencies.

1. In the first stage, there are two simultaneous bargaining games. On the one hand, the firm bargains with the agency over the fee the firm has to pay to the agency to use temporary agency workers in the production process. As we are dealing with one-worker agencies, the bargaining problem is of type individual bargaining. On the other hand, the labor union determines the wage rate of regular workers. As the union is responsible for all regular workers in a firm, the bargaining problem is a collective one. For both bargaining games we use the so-called right-to-manage model. The negotiation games are further specified in the respective subsections.

2. In the second stage, the firm uses its "right to manage" to set the respective employment levels for regular and temporary workers.

In order to obtain a subgame perfect Nash equilibrium for the whole bargaining game, the two stages have to be solved by backward induction.

4.1 Wage Determination for Agency Workers

It has been stated that temporary workers are indifferent between being unemployed or in either state of temporary agency employment, as represented by eq. (19). Thus, the wage rates temporary workers receive can easily be computed by combining the asset functions of temporary workers. Using eqs. (20), (21), and (23), the wage for unassigned temporary workers turns out to be

$$w_T = z + (w_R - z) \cdot \Gamma_T(\theta_R) \quad \text{where} \quad \Gamma_T(\theta_R) = \left[\frac{(1-\gamma_T)\theta_R m(\theta_R)}{r + \delta + \theta_R m(\theta_R)} \right]. \tag{29}$$

Similarly, using eqs. (20), (22), and (23), the wage for assigned temporary workers can be computed as

$$w_A = z + (w_R - z) \cdot \Gamma_A(\theta_R) \quad \text{where} \quad \Gamma_A(\theta_R) = \left[\frac{(1-\gamma_A)\theta_R m(\theta_R)}{r + \delta + \theta_R m(\theta_R)} \right]. \tag{30}$$

Wages are set as a mark-up over net unemployment income. The mark-up is denoted by $\Gamma_l(\theta_R)$ with $l = A, T$. As the wage rate for regular workers is larger than the net income of being unemployed, it is easy to see that the mark-up is only positive if the search effectiveness parameters γ_T and γ_A are smaller than unity. Parameters γ_T and γ_A being equal to unity means the search effectiveness of temporary workers to coincide with that of unemployed. In this case, the wage rates of both types of temporary workers simplify to the net unemployment income, i.e. $w_T = w_A = z$. It seems plausible to assume the search effectiveness of unassigned and assigned temporary workers to be larger than the search effectiveness of an unemployed. In this case, the resulting wage rates are smaller than the net income of being unemployed. At first sight, this sounds counterintuitive. However, it reveals the idea that unassigned and assigned temporary workers temporarily accept a lower wage income since they hope to find a regular job with larger probability compared to looking for regular employment while being unemployed. This is in line with the idea of temporary agency work being a stepping stone into regular employment.

4.2 Firm's Labor Demand

The firm's intertemporal profit maximization problem is given by

$$\max_{\substack{V_{j,R}(s),V_{j,A}(s)\\ L_{j,R}(s),L_{j,A}(s)}} \int_t^\infty e^{-r(s-t)}\Big\{p(Y_j)\,Y_j - w_R(s)\,L_{j,R}(s) - \varepsilon x(s)\,L_{j,A}^{\sigma}(s) - h\,[V_{j,A}(s)+V_{j,R}(s)]\Big\}ds, \tag{31}$$

subject to the laws of motion for assigned temporary and regular workers, eqs. (3) and (4), and the goods demand and production function, given by eqs. (12) and (13), respectively. Thus, the current-value Hamiltonian solving this intertemporal maximization problem can formally be stated as

$$\begin{aligned} H =& \tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa} I^{1-\kappa} - w_R\,L_{j,R} - \varepsilon x\,L_{j,A}^{\sigma} - h\,(V_{j,A}+V_{j,R}) \\ &+ \lambda_1[m(\theta_R)V_{j,R} - \delta L_{j,R}] + \lambda_2[m(\theta_A)V_{j,A} - \chi L_{j,A} - \gamma_A\theta_R m(\theta_R)L_{j,A}], \end{aligned} \tag{32}$$

with eqs. (3) and (4) denoting the equations of motion for the state variables $L_{j,R}$ and $L_{j,A}$, $\lambda_1 \equiv \mu_1 e^{-r(s-t)}$ and $\lambda_2 \equiv \mu_2 e^{-r(s-t)}$ being the current-value Lagrange multipliers and $V_{j,A}$ and $V_{j,R}$ denoting the control variables of the intertemporal maximization problem. Parameter $\kappa \equiv (\eta-1)/\eta$, with $\kappa \in (0,1)$, reflects the firm's monopoly power in the goods market. The lower κ, the higher the firm's monopoly power. The relevant first-order conditions of the intertemporal maximization problem are

$$\frac{\partial H}{\partial V_{j,R}} = -h + \lambda_1 m(\theta_R) = 0 \tag{33}$$

$$\frac{\partial H}{\partial V_{j,A}} = -h + \lambda_2 m(\theta_A) = 0 \tag{34}$$

$$\frac{\partial H}{\partial L_{j,R}} = \rho\kappa\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-1} I^{1-\kappa} - w_R - \delta\lambda_1 = r\lambda_1 - \dot{\lambda_1} \tag{35}$$

$$\frac{\partial H}{\partial L_{j,A}} = \rho\kappa\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-1} I^{1-\kappa} - \sigma\varepsilon x L_{j,A}^{\sigma-1} - \lambda_2[\chi + \gamma_A\theta_R m(\theta_R)] = r\lambda_2 - \dot{\lambda_2}. \tag{36}$$

In the steady state it has to hold that $\dot{\lambda_1} = \dot{\lambda_2} = 0$ and $\dot{L_{j,R}} = \dot{L_{j,A}} = 0$. By substituting eqs. (33) and (34) in eqs. (35) and (36), respectively, the first-order conditions turn out to be

$$\rho\kappa\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-1} I^{1-\kappa} - w_R = (r+\delta)\frac{h}{m(\theta_R)} \tag{37}$$

$$\rho\kappa\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-1}I^{1-\kappa}-\sigma\varepsilon x L_{j,A}^{\sigma-1}=[r+\chi+\gamma_A\theta_R m(\theta_R)]\frac{h}{m(\theta_A)}. \tag{38}$$

Eqs. (37) and (38) determine the firm's labor demand for regular and assigned temporary workers. Theoretically, it may be possible that firms produce by using only one type of labor. Appendix A.3 discusses the conditions for such corner solutions to appear. However, in the following we assume that parameters are such that regular and temporary employment are both positive, i.e. there is an interior solution.

It can be easily shown that

$$\frac{dL_{j,R}}{dw_R}<0, \frac{dL_{j,R}}{dx}>0, \frac{dL_{j,A}}{dx}<0 \text{ and } \frac{dL_{j,A}}{dw_R}>0.$$

The first and the third derivative follow directly from the first-order conditions (37) and (38), respectively. In order to derive the cross derivatives, the two first-order conditions have to be combined. Detailed calculations are provided by Appendix A.4.

4.3 Wage Determination for Regular Workers

The wage rate for regular workers is determined by collective bargaining. Since the union represents all regular employed workers in a firm, it has a very strong bargaining position. Thus, it is assumed that wages are determined by a special variant of the right-to-manage model, namely the monopoly union model. Furthermore, it simplifies the formal analysis of the model. Having monopoly power, the union has the exclusive right to set the wage rate of regular workers. In response, the firm sets the corresponding employment level. Thus, the union has to take into account the firm's labor demand for regular workers, that decreases in the wage of regular workers, as well as the labor demand for assigned temporary workers that increases in the wage of regular workers.

The monopoly union maximizes its objective function, eq. (24), subject to the total labor demand of the firm, given by eqs. (37) and (38). Using eqs. (20) and (23), the rent of a single worker can be stated as

$$\Psi_R-\Psi_U=\frac{w_R-z}{r+\delta+\theta_R m(\theta_R)}. \tag{39}$$

The union's maximization problem can formally be stated by the following Lagrangian function:

$$\mathscr{L} = \frac{w_R - z}{r + \delta + \theta_R m(\theta_R)} \cdot L_{j,R} + \xi_1 \left[\frac{r+\delta}{m(\theta_R)} h - \rho\kappa\tau^{\kappa}(L_{j,R} + L_{j,A})^{\rho\kappa-1} I^{1-\kappa} + w_R \right] + \xi_2 \left[\frac{r + \chi + \gamma_A \theta_R m(\theta_R)}{m(\theta_A)} h - w_R - \frac{r+\delta}{m(\theta_R)} h + \sigma\varepsilon x L_{j,A}^{\sigma-1} \right]. \tag{40}$$

The first-order conditions are

$$\frac{\partial \mathscr{L}}{\partial L_{j,R}} = \frac{w_R - z}{r + \delta + \theta_R m(\theta_R)} - \xi_1 \cdot \rho\kappa(\rho\kappa - 1)\tau^{\kappa}(L_{j,R} + L_{j,A})^{\rho\kappa-2} I^{1-\kappa} = 0 \tag{41}$$

$$\frac{\partial \mathscr{L}}{\partial L_{j,A}} = -\xi_1 \cdot \rho\kappa(\rho\kappa - 1)\tau^{\kappa}(L_{j,R} + L_{j,A})^{\rho\kappa-2} I^{1-\kappa} + \xi_2 \cdot (\sigma - 1)\sigma\varepsilon x L_{j,A}^{\sigma-2} = 0 \tag{42}$$

$$\frac{\partial \mathscr{L}}{\partial w_R} = \frac{L_{j,R}}{r + \delta + \theta_R m(\theta_R)} + \xi_1 - \xi_2 = 0. \tag{43}$$

Combining eqs. (41) to (43), the wage rate for regular workers is given by

$$w_R = z + L_{j,R} \left(\frac{(\rho\kappa - 1)\rho\kappa\tau^{\kappa}(L_{j,R} + L_{j,A})^{\rho\kappa-2} I^{1-\kappa} \cdot (\sigma - 1)\sigma\varepsilon x L_{j,A}^{\sigma-2}}{(\rho\kappa - 1)\rho\kappa\tau^{\kappa}(L_{j,R} + L_{j,A})^{\rho\kappa-2} I^{1-\kappa} - (\sigma - 1)\sigma\varepsilon x L_{j,A}^{\sigma-2}} \right). \tag{44}$$

Evaluation of the RHS of eqs. (44) reveals that the term in brackets is positive. Thus, the union sets the wage rate for regular workers as a mark-up over the net income of being unemployed. In Appendix A.5 it is shown that the wage rate set by the labor union indeed maximizes its utility.

4.4 Determination of the Fee for Firm's Use of Temporary Employment

The wage of assigned temporary workers is determined by bargaining between the firm and the temporary work agency. As each agency employs only one worker, the bargaining problem is similar to individual bargaining. In contrast to the monopoly union model, which is used for the determination of the union's wage claims, we assume that firms and agencies bargain over the fee. This right-to-manage bargaining framework is used since

the agency is, compared to the union, less powerful in the negotiation. Furthermore, firms that hire more than one agency worker have to bargain with several temporary employment agencies separately.

The decisive part of the individual bargaining problem is the modeling of the rent of the firm in the Nash product. The firm treats each additional assigned temporary worker as a marginal worker. Hence, the contribution of an additional assigned temporary worker is just the partial derivative of the firms profit with respect to $L_{j,A}$. Since it has to be taken into account that the labor demand of regular and assigned temporary workers are mutually best responses, the firm's profit is evaluated at the optimal labor demand for regular workers, $L^*_{j,R}$. Thus, the generalized Nash-bargaining problem between the firm and the agency can be stated as

$$\max_x \Big[\Omega_A - \Omega_T\Big]^{\beta} \cdot \Big[\frac{\partial \pi(L^*_{j,R})}{\partial L_{j,A}}\Big]^{1-\beta} \quad \text{with} \quad \beta \in (0,1), \tag{45}$$

where β denotes the agency's bargaining power. The agency's rent, $\Omega_A - \Omega_T$, can be computed using eqs. (25) to (27) and the free entry condition, $\Omega_V = 0$. It is formally given by

$$\Omega_A - \Omega_T = \frac{x - w_A + w_T + \frac{\tilde{h}}{m(\theta_T)} \cdot [\gamma_T \theta_R m(\theta_R) + \delta - \gamma_A \theta_R m(\theta_R)]}{r + \chi + \theta_A m(\theta_A) + \gamma_A \theta_R m(\theta_R)}. \tag{46}$$

Taking into account that the number of regular workers is chosen to maximize the firm's profit, the marginal contribution of an additional assigned temporary worker for the firm is given by

$$\frac{\partial \pi(L^*_{j,R})}{\partial L_{j,A}} = w_R - \sigma \varepsilon x L_{j,A}^{\sigma-1}. \tag{47}$$

Thus, the first-order condition of the bargaining problem in eq. (45) is

$$\beta \cdot \big(w_R - \sigma \varepsilon x L_{j,A}^{\sigma-1}\big) = (1-\beta) \cdot \left[x - w_A + w_T + \frac{\tilde{h}}{m(\theta_T)} \cdot \big[\gamma_T \theta_R m(\theta_R) + \delta - \gamma_A \theta_R m(\theta_R)\big]\right] \cdot \sigma \varepsilon L_{j,A}^{\sigma-1}. \tag{48}$$

After some rearrangement, the optimal fee for temporary workers can be obtained as

$$x = \beta \frac{w_R}{\sigma \varepsilon L_{j,A}^{\sigma-1}} + (1-\beta)\left[\left(w_A + \frac{\tilde{h}}{m(\theta_T)} \gamma_A \theta_R m(\theta_R)\right) - \left(w_T + \frac{\tilde{h}}{m(\theta_T)} [\gamma_T \theta_R m(\theta_R) + \delta]\right)\right]. \tag{49}$$

In the case that the whole bargaining power is on the side of the agency, the fee equals the first term on the RHS. Thus, the agency sets the fee in order to equate the unit costs of regular and assigned temporary employment. In the case that the whole bargaining power is on the firm's side, the fee equals the term in corner brackets. It would therefore hold, that the firm's fee is exactly the difference between the agency's total costs of an assigned temporary job and the agency's total costs of an unassigned temporary worker. As the bargaining power is shared between the firm and the agency, the optimal fee is the weighted sum of the aforementioned described terms.

5 Steady-State Equilibrium

The key endogenous variables θ_i, w_i, x, L_i and U for $i = T, A, R$ are determined by the flow equations (5) to (7) and (9), labor demand equations (28), (37) and (38), the equations for workers wage rates (29), (30) and (44), and the fee firms have to pay for using temporary agency employment in the production, eq. (49). Furthermore, in equilibrium the resource constraint, that aggregate demand and aggregate production coincide, holds. Hence,

$$Y \equiv \int_0^n Y_j \left(\frac{P_j}{P} \right) dj \tag{50}$$

is fulfilled. Due to symmetry of the firms in equilibrium, the firm's price coincides with the aggregate price level, hence, $p_i = 1$, and eq. (50) simplifies to $Y = n\, Y_j$.

6 Numerical Simulation

Even if the equilibrium of the model can be depicted, it can not be solved analytically but has to be solved numerically. We calibrate our model for Germany. Considering the matching function, we use the following Cobb-Douglas type function

$$M = \zeta \cdot V_i^{1-\alpha} \cdot S_i^{\alpha}, \tag{51}$$

where α indexes the matching elasticity and ζ is a scale parameter denoting the efficiency of the matching process. Following Petrongolo & Pissarides (2001), the matching elasticity

is set to $\alpha = 0.5$. Similar to M. U. Krause & Uhlig (2012), the scale parameter of the matching function is $\zeta = 0.3$.

As described in the outline of the model, unions are modeled to embody the full wage-setting power. In contrast to that, we assume that in firm-agency bargaining over the firm's fee for using temporary agency employment, agencies have a rather low bargaining power, set to $\beta = 0.2$. This is mainly based on two reasons. First, contrary to unions who embody specific human capital and clearly differ from each other, firms may be rather indifferent between the agencies to bargain with since the workers that are represented by temporary work agencies perform more or less simple tasks. Second, the agencies' relatively low bargaining power reflects the existing imbalance in the size of firms using temporary agency employment and its supplier. While the workforce of almost all German firms using temporary agency employment comprises more than 50 employees (Crimmann et al., 2009), 82% of the temporary agencies have less than 20 employees in their pool (Bundesagentur für Arbeit, 2016a).

Reflecting the idea of temporary agency work being a stepping stone to regular employment, it is assumed that the search effectiveness of temporary agency workers is larger compared to that of unemployed. Furthermore, we consider that the search effectiveness of assigned temporary workers even exceeds that of unassigned temporary workers, because they already work at regular firms albeit they are not under their contract. This idea is captured by the parameterization of $\gamma_A = 1.2$ and $\gamma_T = 1.15$.

Regular jobs and unassigned temporary jobs are destroyed with exogenous rate $\delta = 0.02$ (M. U. Krause & Uhlig, 2012), while assigned temporary jobs are hit by exogenous shocks with a rate twice as high, i.e. $\chi = 0.04$. This reflects the fact that the average duration of temporary jobs is quite short. For instance, Haller & Jahn (2014) report the average duration of the majority of temporary jobs in Germany to be less than six months. In the calibration exercise, net income of being unemployed is assumed to be related to the wage rate of regular workers with a standard value of the replacement ratio of 60%. The interest rate is $r = 0.05$, goods demand elasticity is chosen equal to $\eta = 2.5$, resulting in $\kappa = 0.6$, and the production function parameter is $\rho = 0.9$. Parameter σ, assuring

convexity of the cost function of assigned temporary agency employment and reflecting firm-level costs of voluntary restrictions of temporary employment, is chosen to be $\sigma = 1.2$. This ensures that the cost function is not too convex. The size of the labor force N and the scale parameter of the production function τ are normalized to unity. According to Christoffel et al. (2009), the costs of posting a regular or temporary job vacancy at the regular firm are equal to $h = 0.058$, while its counterpart for unassigned temporary jobs is assumed to be 80% of the costs of a regular vacancy. The value of regulatory costs of temporary agency employment ε in firm's production is chosen to be free, taking values in the domain 0.5 to 1.4. Parameter ε can be considered as regulatory costs of temporary employment compared to regulatory costs of regular employment, which are normalized to unity. The reason for ε varying in a rather wide range is as follows: regulatory costs of temporary employment may be smaller than for regular employment ($\varepsilon < 1$), because there is either no or rather a weak employment protection. On the other hand, they may be higher ($\varepsilon > 1$), e.g. due to the synchronization ban and re-employment ban. For the calibration in this Section, regulatory costs of temporary agency employment are assumed to be slightly higher than for regular workers, $\varepsilon = 1.1$. This reflects still existing legal regulations, such as the maximum period of assignment or the equal pay obligation for regular and temporary workers. Table 1 provides the full list of parameter values used in the calibration.

The parameter values chosen fit well with the employment structure observable in Germany. Temporary employment in almost all OECD countries is around 2% (Ciett, 2013). The currently observed unemployment rate in Germany is about 6.5% (Bundesagentur für Arbeit, 2016b). The model predicts an unemployment rate of 6.7%, almost coinciding with the current value observed for Germany. Temporary employment (being the sum of assigned and unassigned temporary work) equals 2.7%, while the rate of regular employment is 90.6%.

Table 1: Calibration parameter values for Germany

Parameter	Description	Value
α	Matching elasticity	0.5
β	Bargaining power of the agency	0.2
γ_A	Search effectiveness of assigned temporary workers	1.2
γ_T	Search effectiveness of unassigned temporary workers	1.15
δ	Job destruction rate of regular and unassigned temporary jobs	0.02
ε	Regulatory costs of temporary workers	0.5-1.4
ζ	Matching efficiency	0.3
η	Goods demand elasticity	2.5
ρ	Production function parameter	0.9
σ	Non-institutional, firm-level costs of using temporary workers	1.2
τ	Efficiency of the production technology	1
χ	Job destruction rate of assigned temporary workers	$2 \cdot \delta$
h	Firm's costs of posting a vacancy	0.058
$\tilde{h}$	Agency's costs of posting a vacancy	$0.8 \cdot h$
N	Size of the labor force	1
r	Interest rate	0.05
z	Net income of being unemployed	$0.6 \cdot w_R$

7 Decrease in Regulatory Costs of Using Temporary Workers in Firm's Production

As indicated in Section 1, in recent decades there have been continuous deregulation efforts concerning temporary agency work aiming at more flexible European labor markets. This Section takes a closer look at the effects of such a deregulation, which is modeled as a reduction in regulatory costs ε. Following the numerical simulation of Section 6, the effects of legal deregulation on the workers' wage rates and the firm's fee for using temporary agency employment, depicted in Figure 2, can be summarized in the following proposition:

Proposition 1. *Workers' wage rates decrease with increasing deregulation, while the firm's fee for using temporary employment increases in the degree of deregulation.*

Furthermore, employment adjustments are depicted in Figure 3 and can be summarized as follows:

Proposition 2. *Legal deregulation of temporary employment leads to a monotonic reduction in unemployment as it lowers firm's production costs and, thus, induces a higher*

overall labor demand. At the same time, it increases regular employment and, hence, the degree of employment covered by union bargaining. Unassigned temporary employment also increases monotonically. However, there is a hump-shaped relationship between regulatory costs and temporary agency employment used in firm's production.

The firm's decision of using regular or temporary employment in the production is based on the marginal costs of the respective worker. Due to the substitutability of both types of workers, in equilibrium marginal costs of regular and temporary workers have to coincide and, furthermore, have to be balanced with marginal revenue. The optimality conditions of the firm's intertemporal optimization problem, eq. (37) for regular workers and (38) for temporary agency workers, can be rearranged such that the left-hand-side (LHS) gives firm's marginal revenue and the right-hand-side denotes the marginal costs of the respective type of worker:

$$\rho\kappa\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-1}I^{1-\kappa}=w_R+(r+\delta)\frac{h}{m(\theta_R)} \tag{52}$$

$$\rho\kappa\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-1}I^{1-\kappa}=\sigma\varepsilon x L_{j,A}^{\sigma-1}+[r+\chi+\gamma_A\theta_R m(\theta_R)]\frac{h}{m(\theta_A)}. \tag{53}$$

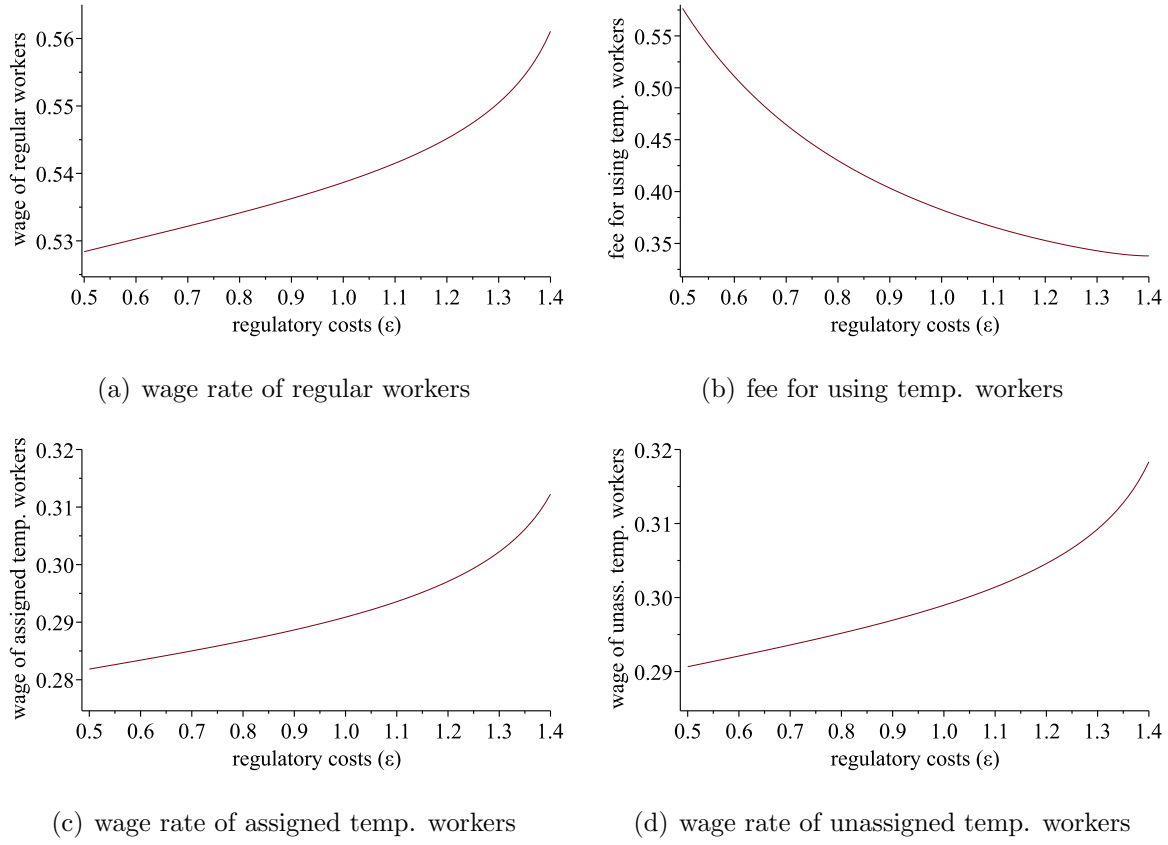
The marginal costs of both groups of workers consist of two parts each. The first term of the respective marginal cost function reflects the unit costs of an additional worker, while the second term represents the costs of posting a vacancy that are taken into account in the intertemporal maximization problem.

Recall that the wage rate for regular workers, the fee, and the employment rates are determined in two stages. In the first stage, unions set the wage rate w_R and, simultaneously, agencies and firms bargain over the fee x. In the second stage, firms respond by choosing the optimal employment levels of the respective type of worker based on the determined wage rate and the fee. While unions take the employment responses for regular and temporary employment into account, the one-worker agency neglects the effects of its behavior on the employment level of assigned temporary workers.

A reduction in regulatory costs leads to a ceteris-paribus decrease in unit costs of temporary agency workers which, in principle, increases the firm's demand for this type

of workers. The resulting increase in L_A decreases the firms' marginal revenue. Due to the substitutability of regular and temporary workers, unions have to reduce their wage claims as a reaction to the legal deregulation to prevent a substitution of regular employment by temporary workers. This can also be seen from eq. (44). The resulting reduction in union's wage claims maintains the attractiveness of using regular employment compared to temporary agency employment. Furthermore, the decrease in unit costs increases the firm's labor demand for regular workers. The increase in regular employment cushions the firm's increasing demand for temporary agency employment initialized by the shock in ε. To state it differently, legal deregulation leads to an overall increase in firms' labor demand, which is not fully served by temporary agency employment but (partly) substituted by an increase in regular employment. Figure 2a shows that w_R decreases monotonically, but with decreasing rate. Furthermore, Figure 3a shows that L_R increases monotonically, but with decreasing rate. The concavity of regular employment stems from the convex costs of temporary agency employment. The higher the rate of assigned temporary employment, the larger its impact on the marginal costs of temporary workers. As the union considers the employment effects for both types of labor input in the wage determination, it anticipates that the lower legal regulation and, ceteris paribus, the higher assigned temporary employment, the higher its impact on the marginal costs of assigned temporary workers. Thus, the substitution of regular employment by temporary agency workers declines in L_A as its impact on the marginal costs of temporary agency employment increases. The resulting changes in the wage claims and, thus, employment rate of regular workers are, therefore, weaker.

As stated above, the reduction in regulatory costs directly affects the marginal costs of temporary workers, LHS of eq. (53), and ceteris paribus increases the labor demand for this production factor. Although, as can be seen directly from eq. (49), the decrease in regulatory costs encourages the agencies to increase the fee x and, by this, the agencies profit. This increase cushions the reduction in marginal costs as it opposes the effect initialized by the shock in regulatory costs. As agencies and firms bargain individually and agencies are small (one-worker), the agency does not consider the firm's employment



(a) wage rate of regular workers

(b) fee for using temp. workers

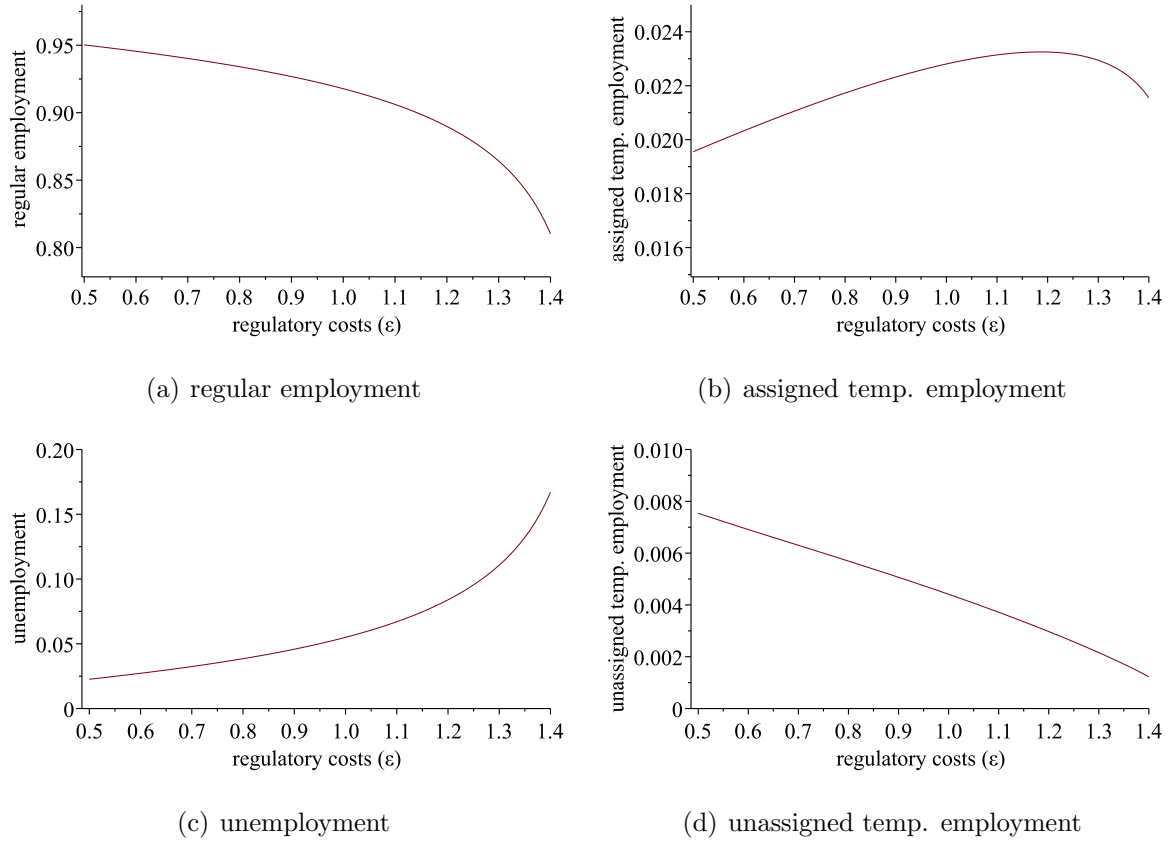
(c) wage rate of assigned temp. workers

(d) wage rate of unassigned temp. workers

Figure 2: Reaction of fee and wages to changing regulatory costs of temporary employment

response considering temporary agency work to changes in the fee x. Even if the employment response of temporary employment may still be positive overall, the increase in the fee x dampens the firm's increasing labor demand for this employment type induced by legal deregulation.

Furthermore, as the agency considers the firm's demand for regular employment in the determination of the fee x, it anticipates that the lower legal regulation, the lower the firm's adjustment of regular employment to changes in regulatory costs. The agency assumes that with decreasing ε its scope to adjust x upwards increases. Thus, the fee x increases convexly in decreasing legal regulation of temporary agency work. This is depicted in Figure 2b. However, the agency does not take into account that the lower legal regulation and, thus, the higher the demand for temporary agency workers, the higher its impact on the convex unit costs of this production factor, see RHS of eq. (53).



(a) regular employment

(b) assigned temp. employment

(c) unemployment

(d) unassigned temp. employment

Figure 3: Employment reaction to changing regulatory costs of temporary employment

These two reasons, the increase in x and L_A's increasing impact on marginal costs, finally lead to the marginal costs of temporary agency employment being higher than the firm's marginal revenue and, furthermore, the marginal costs of regular employment. Thus, firms react to the agencies behavior by a reduction in temporary agency employment in order to balance marginal revenue and marginal costs, eq. (53). Overall, the aforementioned mechanisms lead to the hump-shaped relationship of temporary agency employment and regulatory costs, as shown in Figure 3b.[8]

Using the argumentation above, the adjustments of the wage rates of temporary agency

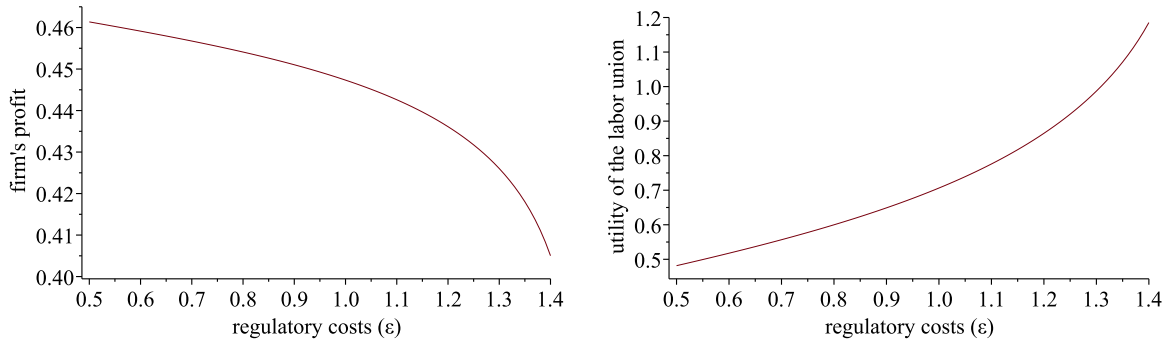
[8]Next to the effects on unit costs, the agency's and union's behavior also affects the second part of the marginal costs, the vacancy costs that are taken into account in the intertemporal maximization problem. For simplicity reasons, these effects are not considered in more detail in the argumentation provided above.

workers can be explained. The wage rates of temporary workers, given in eqs. (29) and (30), positively depend on the wage rate of regular workers. The higher the wage rate of regular workers, the higher the mark-up on unemployment income and, thus, the wage rates of temporary agency workers. Hence, the behavior of the wages qualitatively coincide with that of regular workers' wages. This is depicted in Figures 2c and 2d.

Furthermore, Figure 3c gives the steady-state unemployment rate for varying values of ε. Even if the composition of the firm's increased labor demand is a priori unclear, it is obvious that legal deregulation leads to an overall increase in total employment as it decreases the costs of both inputs, regular and temporary workers. Thus, based on the behavior of the employment rates of regular and assigned temporary workers, legal deregulation of temporary agency employment leads to a monotonic decrease in overall unemployment.

Figure 3d shows that unassigned temporary employment monotonically increases in legal deregulation. Having in mind that there is a hump-shaped relationship of assigned temporary employment and regulatory costs, this may be counterintuitive at first sight. The reason is that legal deregulation leads to an increase in the fee x, which increases the expected profit of the agency, eq. (27). More agencies will enter the market leading to an increase in employment of unassigned temporary workers. Thus, legal deregulation of temporary employment drives agencies to hoard idle labor waiting for an assignment in a client firm.

Finally, we take a closer look at the evolution of firm's profit and union's utility due to changing regulatory costs. This is depicted in Figure 4. Legal deregulation of temporary agency employment leads to a more profitable production alternative for firms and dampens union's wage claims. Furthermore, it decreases the costs of using temporary agency employment in the production. Thus, it is intuitive that the firm's profit monotonically increases in the degree of legal deregulation, as depicted in Figure 4a. Even if regular employment increases monotonically in legal deregulation, the wage rate for regular workers and, hence, the rent of a single worker, decreases. The increase in regular employment does not balance the loss in individual workers' rent. Thus, the utility of the labor union



(a) firm's profit

(b) utility of the labor union

Figure 4: Evolution of firm's profits and union's utility due to changing regulatory costs of temporary employment

decreases in legal deregulation, see Figure 4b. Even if the rate of regular employment and, as a consequence, the degree of union coverage in the economy increase, unions suffer from a more intensive use of temporary employment.

8 Summary and Conclusions

This paper develops a theoretical model to analyze the general equilibrium effects of a legal deregulation of temporary agency employment on negotiated wages and the employment structure in a unionized economy. Large firms produce differentiated goods using labor as the only production factor. Workers can either be hired directly by the firm (regular workers) or by temporary employment agencies that lend the workers to the firms for the production process. Both types of work are perfect substitutes. Regular workers are represented by firm-level labor unions, which are assumed to be monopoly unions. Temporary employment agencies are small (one worker) and bargain individually with the firm over the fee the agency receives from the firm for borrowing temporary workers. In response to the determined fee and the claimed wage, the firm chooses the respective employment levels used in its production.

While there already exist contributions on labor unions and temporary employment

agencies in the literature, our model is the first that combines temporary agency employment and the wage-setting behavior of labor unions in a frictional labor market to discuss the agency's impact on regular employment and the overall employment structure in the economy.

The most striking result is that our model predicts that legal deregulation of temporary agency employment does not lead to a steady increase in this employment type implying a substitution of regular employment. Instead, there exists a hump-shaped relationship between temporary agency employment and its degree of legal deregulation. Whereas deregulation out of a high degree of regulation leads to an increase in temporary agency employment, its rate decreases the more extensive legal deregulation is. Thus, deregulation efforts of the temporary agency employment sector that occurred in most European countries in recent decades, do not inevitable lead to a strengthening of this sector, but may even lead to a declining rate of temporary agency employment in the economy. At the same time, the rate of regular employment increases monotonically and overall employment benefits from the deregulation.

The reason for the hump-shaped pattern of temporary agency employment and the steady increase in regular employment is the cost structure of temporary agency employment. There are often voluntary, non-institutional firm-level agreements restricting the degree of temporary agency employment used in the production. Thus, the costs of temporary agency employment to increase convexly. The higher the rate of temporary agency employment induced by legal deregulation, the higher the impact of the non-institutional firm-level agreements on marginal costs. Because agencies are rather small compared to the large firms they bargain with, they do not consider the consequences of the convex cost structure in their negotiations. Combined with the fact that more attractive temporary agency employment forces the labor unions to reduce their wage claims for regular employed workers to prevent employment losses and maintain the competitiveness with temporary agency employment, temporary agency employment may even decrease in the degree of legal deregulation, while regular employment increases monotonically.

These findings reject the main argument of opponents of temporary agency employ-

ment that its legal deregulation leads to a substitution of regular employment and to a higher share of precarious employment. Hence, the policy makers' idea, that legal deregulation of temporary agency employment increases the flexibility of the European labor markets and brings people to work who may not find regular employment, seems to be verified. Thus, legal deregulation of temporary agency employment aiming at an increasing employment level may be continued.

Nevertheless, even if legal deregulation does not lead to a decline in the coverage of collectively bargained wages in the economy, it leads to a reduction in workers' wage rates and a reduction in labor union's utility.

A Appendix

A.1 Steady-State Employment Flows

Using the steady-state conditions for each labor market state, the respective job-searchers and the condition that $U + L_T + L_A + L_R = 1$, the steady-state flows from the perspective of the firm can be rewritten to obtain the respective flow equations from for the different employment rates

$$L_T = \frac{\theta_T m(\theta_T) \cdot (1 - L_R) + [\chi - \theta_T m(\theta_T)] \cdot L_A}{\delta + \theta_T m(\theta_T) + \theta_A m(\theta_A) + \gamma_T \theta_R m(\theta_R)} \tag{54}$$

$$L_A = \frac{\theta_A m(\theta_A) L_T}{\chi + \gamma_A \theta_R m(\theta_R)} \tag{55}$$

$$L_R = \frac{[1 - L_T(1 - \gamma_T) - L_A(1 - \gamma_A)] \cdot \theta_R m(\theta_R)}{\delta + \theta_R m(\theta_R)}. \tag{56}$$

The numerators denote the flows into and out of the respective labor market states. Division by the respective denominator weights the flows by the average retention period of a job in the respective state.

A.2 Concavity of the Firm's Instantaneous Profit Function

Using eqs. (12) and (13), the instantaneous profit of the firm, eq. (14), can be written as

$$\pi_j = \tau^\kappa (L_{j,R} + L_{j,A})^{\rho\kappa} I^{1-\kappa} - w_{j,R} L_{j,R} - \varepsilon x L_{j,A}^\sigma - h (V_{j,A} + V_{j,R}), \tag{57}$$

with $\kappa = (\eta - 1)/\eta$. The lower κ, the higher the firm's monopoly power in the goods market. The second order conditions are

$$\frac{\partial^2 \pi}{\partial L_{j,R}^2} = \rho\kappa(\rho\kappa - 1)\tau^\kappa (L_{j,R} + L_{j,A})^{\rho\kappa - 2} I^{1-\kappa} < 0 \tag{58}$$

$$\frac{\partial^2 \pi}{\partial L_{j,A}^2} = \rho\kappa(\rho\kappa - 1)\tau^\kappa (L_{j,R} + L_{j,A})^{\rho\kappa - 2} I^{1-\kappa} - \sigma(\sigma - 1)\varepsilon x L_{j,A}^{\sigma - 2} < 0 \tag{59}$$

$$\frac{\partial^2 \pi}{\partial L_{j,R} \partial L_{j,A}} = \rho\kappa(\rho\kappa - 1)\tau^\kappa (L_{j,R} + L_{j,A})^{\rho\kappa - 2} I^{1-\kappa} < 0. \tag{60}$$

While the necessary condition for a profit maximum is that the first-order conditions are equal to zero, the sufficient condition for a profit maximum is

$$\frac{\partial^2 \pi}{\partial L_{j,R}^2} \frac{\partial^2 \pi}{\partial L_{j,A}^2} - \left(\frac{\partial^2 \pi}{\partial L_{j,R} \partial L_{j,A}} \right)^2 > 0. \tag{61}$$

This can be seen to hold for $\kappa \in (0,1)$ and $\sigma > 1$:

$$\rho\kappa(\rho\kappa - 1)\tau^{\kappa}(L_{j,R} + L_{j,A})^{\rho\kappa-2} I^{1-\kappa} \cdot [-\sigma(\sigma-1)\varepsilon x L_{j,A}^{\sigma-2}] > 0. \tag{62}$$

A.3 Corner Solutions in Firm's Production

The decision of the firm, which type of labor input to use in the production, directly depends on the marginal costs of each labor input. If the costs of an additional temporary worker undercut (exceed) the marginal costs of a regular worker, the firm will only produce with temporary workers (regular workers). Evaluating eqs. (37) and (38) at $L_A > 0$ and $L_R = 0$, it turns out that that the firm will produce by solely using temporary workers in the entire production, if

$$\tau^{\kappa} L_{j,R}^{\rho\kappa} I^{1-\kappa} = \sigma x \varepsilon L_A^{\sigma-1} + [r + \chi + \gamma_A \theta_R m(\theta_R)] \frac{h}{m(\theta_A)} < w_R + (r+\delta)\frac{h}{m(\theta_R)}.$$

On the contrary, evaluating eqs. (37) and (38) at $L_R > 0$ and $L_A = 0$, it follows that the final good will be produced by solely using regular employment, if

$$\tau^{\kappa} L_{j,R}^{\rho\kappa} I^{1-\kappa} = w_R + (r+\delta)\frac{h}{m(\theta_R)} < [r + \chi + \gamma_A \theta_R m(\theta_R)] \frac{h}{m(\theta_A)}.$$

Choosing the cost function of temporary employment to be convex (but not too convex) ensures to rule out the first case, since temporary employment becomes too expensive at a certain level of production. On the other hand, a convex cost function implies that temporary workers are relatively cheap at a low level of production, making the second case less likely. Thus, the probability to obtain an interior solution crucially depends on the convexity of the cost function of temporary employment.

A.4 Derivatives of Firm's Labor Demand

Using eqs. (37) and (38), respectively, it turns out that the labor demand decreases with respect to its own costs, i.e. formally

$$\frac{dL_{j,R}}{dw_R} = \frac{1}{\rho\kappa(\rho\kappa-1)\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-2}I^{1-\kappa}} < 0 \tag{63}$$

and

$$\frac{dL_{j,A}}{dx} = \frac{\sigma L_{j,A}^{\sigma-1}}{\rho\kappa(\rho\kappa-1)\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-2}I^{1-\kappa} - \sigma(\sigma-1)\varepsilon x L_{j,A}^{\sigma-2}} < 0. \tag{64}$$

Taking eqs. (63) and (64) into account, it can be shown that the labor demand of regular (temporary) workers increases in the fee x (wage of regular workers)

$$\frac{dL_{j,R}}{dx} = -\frac{dL_{j,A}}{dx} > 0 \tag{65}$$

$$\frac{dL_{j,A}}{dw_R} = \frac{\rho\kappa(\rho\kappa-1)\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-2}I^{1-\kappa}\cdot\frac{dL_{j,R}}{dw_R}}{\sigma(\sigma-1)\varepsilon x L_{j,A}^{\sigma-2} - \rho\kappa(\rho\kappa-1)\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-2}I^{1-\kappa}} > 0. \tag{66}$$

A.5 Utility Maximization of the Labor Union

The representative labor union chooses its optimal wage w_R by maximizing its objective function, eq. (24), subject to the firm's labor demand, determined by eqs. (37) and (38). In the utility maximum, the second-order condition of the objective function U_j has to be negative, i.e.

$$\frac{\partial^2 U_j}{\partial w_R^2} = 2\cdot\frac{\partial[\Psi_R-\Psi_U]}{\partial w_R}\cdot\frac{\partial L_{j,R}(w_R)}{\partial w_R} + (\Psi_R-\Psi_U)\cdot\frac{\partial^2 L_{j,R}(w_R)}{\partial w_R^2} < 0. \tag{67}$$

Since

$$\frac{\partial[\Psi_R-\Psi_U]}{\partial w_R} = \frac{1}{r+\delta+\theta_R m(\theta_R)} > 0 \tag{68}$$

$$\frac{\partial L_{j,R}}{\partial w_R} = \frac{1}{\rho\kappa(\rho\kappa-1)\tau^{\kappa}(L_{j,R}+L_{j,A})^{\rho\kappa-2}I^{1-\kappa}} < 0 \tag{69}$$

$$\frac{\partial^2 L_{j,R}}{\partial w_R^2} = -\frac{\partial L_{j,R}}{\partial w_R}\cdot(L_{j,R}+L_{j,A})^{-1}(\rho\kappa-2)\cdot\frac{\partial[L_{j,R}+L_{j,A}]}{\partial w_R} > 0 \tag{70}$$

$$\frac{\partial[L_{j,R}+L_{j,A}]}{\partial w_R} = \frac{1}{\rho\kappa-1}(L_{j,R}+L_{j,A})\left(w_R+\frac{r+\delta}{m(\theta_R)}h\right)^{-1} < 0, \tag{71}$$

the second-order condition is[9]

$$\frac{\partial^2 U_j}{\partial w_R^2} = \frac{1}{r+\delta+\theta_R m(\theta_R)} \cdot \frac{\partial L_{j,R}}{\partial w_R} \cdot \left[2 - (w_R - z)\frac{\rho\kappa - 2}{\rho\kappa - 1}\left(w_R + \frac{r+\delta}{m(\theta_R)}h\right)^{-1}\right]. \tag{74}$$

Rearrangement of the terms in corner brackets leads to

$$w_R\left(2 - \frac{\rho\kappa - 2}{\rho\kappa - 1}\right) > -\left(z\frac{\rho\kappa - 2}{\rho\kappa - 1} + \frac{r+\delta}{m(\theta_R)}2h\right).$$

The right-hand-side is negative and the term in brackets at the left-hand-side is positive. Hence, the second-order condition for the union's utility maximization problem is indeed negative.

[9]To calculate eq. (71), use

$$L_{j,A} = \left[\left(w_R + \frac{r+\delta}{m(\theta_R)}h - \frac{r+\chi+\gamma_A\theta_R m(\theta_R)}{m(\theta_A)}h\right)\frac{1}{\sigma\varepsilon x}\right]^{\frac{1}{\sigma-1}} \tag{72}$$

$$L_{j,R} = \left[\left(w_R + \frac{r+\delta}{m(\theta_R)}h\right)\frac{1}{\tau^\kappa I^{1-\kappa}\rho\kappa}\right]^{\frac{1}{\rho\kappa-1}} - \left[\left(w_R + \frac{r+\delta}{m(\theta_R)}h - \frac{r+\chi+\gamma_A\theta_R m(\theta_R)}{m(\theta_A)}h\right)\frac{1}{\sigma\varepsilon x}\right]^{\frac{1}{\sigma-1}}, \tag{73}$$

which can be derived by using the steady-state condition and eqs. (34) and (36) or rather (33), (35), (72), respectively.

References

Addison, J. T., & Schnabel, C. (2003). *International Handbook of Trade Unions*. Edward Elgar.

Amuedo-Dorantes, C., Malo, M. A., & Muñoz-Bullón, F. (2008). The Role of Temporary Help Agency Employment on Temp-to-Perm Transitions. *Journal of Labor Research*, *29*(2), 138-161.

Arrowsmith, J. (2006). *Temporary Agency Work in an Enlarged European Union*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

Autor, D. H. (2001). Why Do Temporary Help Firms Provide Free General Skills Training? *The Quarterly Journal of Economics*, *116*, 1409-1448.

Autor, D. H. (2003). Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing. *Journal of Labor Economics*, *21*, 1-42.

Autor, D. H., & Houseman, S. N. (2005). *Temporary Agency Employment as a Way Out of Poverty?* (Upjohn Working Papers and Journal Articles No. 05-123). W.E. Upjohn Institute for Employment Research.

Autor, D. H., & Houseman, S. N. (2010). Do Temporary-Help Jobs Improve Labor Market Outcomes for Low-Skilled Workers? Evidence from "Work First". *American Economic Journal: Applied Economics*, *2*(3), 96-128.

Bauer, C., & Lingens, J. (2013). Does Collective Wage Barganing Restore Efficiency in a Search Model with Large Firms? *The Economic Journal*, *124*, 1066-1085.

Baumann, F., Mechtel, M., & Stähler, N. (2011). Employment Protection and Temporary Work Agencies. *LABOUR*, *25*, 308-329.

Beissinger, T., & Baudy, P. (2015). *The Impact of Temporary Agency Work on Trade Union Wage Setting: A Theoretical Analysis* (IZA Discussion Papers No. 8802). Institute for the Study of Labor (IZA).

Boeri, T., Brugiavini, A., & Calmfors, L. (Eds.). (2001). *The Role of Unions in the Twenty-first Century: A Report for the Fondazione Rodolfo Debenedetti*. Oxford University Press.

Booth, A. L. (1995). *The Economics of the Trade Union*. Cambridge: Cambridge University Press.

Bundesagentur für Arbeit. (2016a). Der Arbeitsmarkt in Deutschland - Zeitarbeit - Aktuelle Entwicklungen - Januar 2016.

Bundesagentur für Arbeit. (2016b). Der Arbeits- und Ausbildungsmarkt in Deutschland - Monatsbericht März 2016.

Christoffel, K., Kuester, K., & Linzert, T. (2009). The Role of Labor Markets for Euro Area Monetary Policy. *European Economic Review*, *53*, 908-936.

Ciett. (2013). *The Agency Industry around the World*. Economic Report. International Confederation of Private Employment Agencies. Downloadable at http://www.ciett .org/fileadmin/templates/ciett/docs/Stats/Ciett_EC_Report_2013_Final_web.pdf

Crimmann, A., Ziegler, K., Ellguth, P., Kohaut, S., & Lehmer, F. (2009). *Forschungsbericht zum Thema Arbeitsmarktüberlassung, Endbericht*. Institut für Arbeitsmarkt- und Berufsforschung, Nürnberg.

Delacroix, A. (2006). A Multisectorial Matching Model of Unions. *Journal of Monetary Economics*, *53*(3), 573-596.

Dixit, A., & Stiglitz, J. (1977). Monopolistic Competition and Optimum Product Diversity. *American Economic Review*, *67*, 297-308.

Ebell, M., & Haefke, C. (2006). *Product Market Regulation and Endogenous Union Formation* (IZA Discussion Papers No. 2222). Institute for the Study of Labor (IZA).

Garz, M. (2013). Employment and Wages in Germany Since the 2004 Deregulation of the Temporary Agency Industry. *International Labour Review*, *152*(2), 307-326.

Haller, P., & Jahn, E. J. (2014). *Zeitarbeit in Deutschland: Hohe Dynamik und kurze Beschäftigungsdauern* (IAB-Kurzbericht No. 13). IAB-Kurzbericht.

Holst, H., Nachtwey, O., & Dörre, K. (2010). The Strategic Use of Temporary Agency Work - Functional Change of a Non-standard Form of Employment. *International Journal of Action Research*, *6*(1), 108-138.

Houseman, S. N. (2001). Why Employers Use Flexible Staffing Arrangements: Evidence

From an Establishement Survey. *Industrial and Labor Relations Review*, *55*(1), 149-170.

Jahn, E. J., & Bentzen, J. (2012). What Drives the Demand for Temporary Agency Workers? *LABOUR*, *26*(3), 341-355.

Jahn, E. J., & Rosholm, M. (2013). Is Temporary Agency Employment a Stepping Stone for Immigrants? *Economics Letters*, *118*(1), 225-228.

Jahn, E. J., & Rosholm, M. (2014). Looking Beyond the Bridge: The Effect of Temporary Agency Employment on Labor Market Outcomes. *European Economic Review*, *65*, 108-125.

Jahn, E. J., & Weber, E. (2015). Identifying the Substitution Effect of Temporary Agency Employment. *Macroeconomic Dynamics*.

Krause, M. U., & Uhlig, H. (2012). Transitions in the German Labor Market: Structure and Crisis. *Journal of Monetary Economics*, *59*, 64-79.

Krause, R. (2012). Tarifverträge zur Begrenzung der Leiharbeit und zur Durchsetzung des Equal-Pay-Grundsatzes, Rechtsgutachten im Auftrag des Hugo Sinzheimer Instituts für Arbeitsrecht, Frankfurt am Main.

Krusell, P., & Rudanko, L. (2012). *Unions in a Frictional Labor Market* (NBER Working Papers No. 18218). National Bureau of Economic Research, Inc.

Kvasnicka, M. (2009). Does Temporary Help Work Provide a Stepping Stone to Regular Employment? In *Studies of Labor Market Intermediation* (p. 335-372). National Bureau of Economic Research, Inc.

Mortensen, D. T., & Pissarides, C. A. (1994). Job Creation and Job Destruction in the Theory of Unemployment. *Review of Economic Studies*, *61*(3), 397-415.

Neugart, M., & Storrie, D. (2006). The Emergence of Temporary Work Agencies. *Oxford Economic Papers*, *58*(1), 137-156.

Ono, Y., & Sullivan, D. (2013). Manufacturing Plants' Use of Temporary Workers: An Analysis Using Census Microdata. *Industrial Relations*, *52*(2), 419-443.

Petrongolo, B., & Pissarides, C. A. (2001). Looking into the Black Box: A Survey of the Matching Function. *Journal of Economic Literature*, *39*(2), 390-431.

Pissarides, C. A. (2000). *Equilibrium Unemployment Theory, 2nd Edition.* The MIT Press.

Ranjan, P. (2013). Offshoring, Unemployment, and Wages: The Role of Labor Market Institutions. *Journal of International Economics*, *89*, 172-186.

Vidal, M., & Tigges, L. M. (2009). Temporary Employment and Strategic Staffing in the Manufacturing Sector. *Industrial Relations*, *48*(1), 55-72.

Hohenheim Discussion Papers in Business, Economics and Social Sciences

The Faculty of Business, Economics and Social Sciences continues since 2015 the established “FZID Discussion Paper Series” of the “Centre for Research on Innovation and Services (FZID)” under the name “Hohenheim Discussion Papers in Business, Economics and Social Sciences”.

Institutes

510 Institute of Financial Management
520 Institute of Economics
530 Institute of Health Care & Public Management
540 Institute of Communication Science
550 Institute of Law and Social Sciences
560 Institute of Economic and Business Education
570 Institute of Marketing & Management
580 Institute of Interorganisational Management & Performance

Download Hohenheim Discussion Papers in Business, Economics and Social Sciences
from our homepage: https://wiso.uni-hohenheim.de/papers

Nr.	Autor	Titel	Inst.
01-2015	Thomas Beissinger, Philipp Baudy	THE IMPACT OF TEMPORARY AGENCY WORK ON TRADE UNION WAGE SETTING: A Theoretical Analysis	520
02-2015	Fabian Wahl	PARTICIPATIVE POLITICAL INSTITUTIONS AND CITY DEVELOPMENT 800-1800	520
03-2015	Tommaso Proietti, Martyna Marczak, Gianluigi Mazzi	$EURO MI_{IND}$-D: A DENSITY ESTIMATE OF MONTHLY GROSS DOMESTIC PRODUCT FOR THE EURO AREA	520
04-2015	Thomas Beissinger, Nathalie Chusseau, Joël Hellier	OFFSHORING AND LABOUR MARKET REFORMS: MODELLING THE GERMAN EXPERIENCE	520
05-2015	Matthias Mueller, Kristina Bogner, Tobias Buchmann, Muhamed Kudic	SIMULATING KNOWLEDGE DIFFUSION IN FOUR STRUCTURALLY DISTINCT NETWORKS – AN AGENT-BASED SIMULATION MODEL	520
06-2015	Martyna Marczak, Thomas Beissinger	BIDIRECTIONAL RELATIONSHIP BETWEEN INVESTOR SENTIMENT AND EXCESS RETURNS: NEW EVIDENCE FROM THE WAVELET PERSPECTIVE	520
07-2015	Peng Nie, Galit Nimrod, Alfonso Sousa-Poza	INTERNET USE AND SUBJECTIVE WELL-BEING IN CHINA	530
08-2015	Fabian Wahl	THE LONG SHADOW OF HISTORY ROMAN LEGACY AND ECONOMIC DEVELOPMENT – EVIDENCE FROM THE GERMAN LIMES	520
09-2015	Peng Nie, Alfonso Sousa-Poza	COMMUTE TIME AND SUBJECTIVE WELL-BEING IN URBAN CHINA	530

Nr.	Autor	Titel	Inst.
10-2015	Kristina Bogner	THE EFFECT OF PROJECT FUNDING ON INNOVATIVE PERFORMANCE AN AGENT-BASED SIMULATION MODEL	520
11-2015	Bogang Jun, Tai-Yoo Kim	A NEO-SCHUMPETERIAN PERSPECTIVE ON THE ANALYTICAL MACROECONOMIC FRAMEWORK: THE EXPANDED REPRODUCTION SYSTEM	520
12-2015	Volker Grossmann Aderonke Osikominu Marius Osterfeld	ARE SOCIOCULTURAL FACTORS IMPORTANT FOR STUDYING A SCIENCE UNIVERSITY MAJOR?	520
13-2015	Martyna Marczak Tommaso Proietti Stefano Grassi	A DATA–CLEANING AUGMENTED KALMAN FILTER FOR ROBUST ESTIMATION OF STATE SPACE MODELS	520
14-2015	Carolina Castagnetti Luisa Rosti Marina Töpfer	THE REVERSAL OF THE GENDER PAY GAP AMONG PUBLIC-CONTEST SELECTED YOUNG EMPLOYEES	520
15-2015	Alexander Opitz	DEMOCRATIC PROSPECTS IN IMPERIAL RUSSIA: THE REVOLUTION OF 1905 AND THE POLITICAL STOCK MARKET	520
01-2016	Michael Ahlheim, Jan Neidhardt	NON-TRADING BEHAVIOUR IN CHOICE EXPERIMENTS	520
02-2016	Bogang Jun, Alexander Gerybadze, Tai-Yoo Kim	THE LEGACY OF FRIEDRICH LIST: THE EXPANSIVE REPRODUCTION SYSTEM AND THE KOREAN HISTORY OF INDUSTRIALIZATION	520
03-2016	Peng Nie, Alfonso Sousa-Poza	FOOD INSECURITY AMONG OLDER EUROPEANS: EVIDENCE FROM THE SURVEY OF HEALTH, AGEING, AND RETIREMENT IN EUROPE	530
04-2016	Peter Spahn	POPULATION GROWTH, SAVING, INTEREST RATES AND STAGNATION. DISCUSSING THE EGGERTSSON-MEHROTRA-MODEL	520
05-2016	Vincent Dekker, Kristina Strohmaier, Nicole Bosch	A DATA-DRIVEN PROCEDURE TO DETERMINE THE BUNCHING WINDOW – AN APPLICATION TO THE NETHERLANDS	520
06-2016	Philipp Baudy, Dario Cords	DEREGULATION OF TEMPORARY AGENCY EMPLOYMENT IN A UNIONIZED ECONOMY: DOES THIS REALLY LEAD TO A SUBSTITUTION OF REGULAR EMPLOYMENT?	520

FZID Discussion Papers

(published 2009-2014)

Competence Centers

IK	Innovation and Knowledge
ICT	Information Systems and Communication Systems
CRFM	Corporate Finance and Risk Management
HCM	Health Care Management
CM	Communication Management
MM	Marketing Management
ECO	Economics

Download FZID Discussion Papers from our homepage: https://wiso.uni-hohenheim.de/archiv_fzid_papers

Nr.	Autor	Titel	CC
01-2009	Julian P. Christ	NEW ECONOMIC GEOGRAPHY RELOADED: Localized Knowledge Spillovers and the Geography of Innovation	IK
02-2009	André P. Slowak	MARKET FIELD STRUCTURE & DYNAMICS IN INDUSTRIAL AUTOMATION	IK
03-2009	Pier Paolo Saviotti, Andreas Pyka	GENERALIZED BARRIERS TO ENTRY AND ECONOMIC DEVELOPMENT	IK
04-2009	Uwe Focht, Andreas Richter and Jörg Schiller	INTERMEDIATION AND MATCHING IN INSURANCE MARKETS	HCM
05-2009	Julian P. Christ, André P. Slowak	WHY BLU-RAY VS. HD-DVD IS NOT VHS VS. BETAMAX: THE CO-EVOLUTION OF STANDARD-SETTING CONSORTIA	IK
06-2009	Gabriel Felbermayr, Mario Larch and Wolfgang Lechthaler	UNEMPLOYMENT IN AN INTERDEPENDENT WORLD	ECO
07-2009	Steffen Otterbach	MISMATCHES BETWEEN ACTUAL AND PREFERRED WORK TIME: Empirical Evidence of Hours Constraints in 21 Countries	HCM
08-2009	Sven Wydra	PRODUCTION AND EMPLOYMENT IMPACTS OF NEW TECHNOLOGIES – ANALYSIS FOR BIOTECHNOLOGY	IK
09-2009	Ralf Richter, Jochen Streb	CATCHING-UP AND FALLING BEHIND KNOWLEDGE SPILLOVER FROM AMERICAN TO GERMAN MACHINE TOOL MAKERS	IK

Nr.	Autor	Titel	CC
10-2010	Rahel Aichele, Gabriel Felbermayr	KYOTO AND THE CARBON CONTENT OF TRADE	ECO
11-2010	David E. Bloom, Alfonso Sousa-Poza	ECONOMIC CONSEQUENCES OF LOW FERTILITY IN EUROPE	HCM
12-2010	Michael Ahlheim, Oliver Frör	DRINKING AND PROTECTING – A MARKET APPROACH TO THE PRESERVATION OF CORK OAK LANDSCAPES	ECO
13-2010	Michael Ahlheim, Oliver Frör, Antonia Heinke, Nguyen Minh Duc, and Pham Van Dinh	LABOUR AS A UTILITY MEASURE IN CONTINGENT VALUATION STUDIES – HOW GOOD IS IT REALLY?	ECO
14-2010	Julian P. Christ	THE GEOGRAPHY AND CO-LOCATION OF EUROPEAN TECHNOLOGY-SPECIFIC CO-INVENTORSHIP NETWORKS	IK
15-2010	Harald Degner	WINDOWS OF TECHNOLOGICAL OPPORTUNITY DO TECHNOLOGICAL BOOMS INFLUENCE THE RELATIONSHIP BETWEEN FIRM SIZE AND INNOVATIVENESS?	IK
16-2010	Tobias A. Jopp	THE WELFARE STATE EVOLVES: GERMAN KNAPPSCHAFTEN, 1854-1923	HCM
17-2010	Stefan Kirn (Ed.)	PROCESS OF CHANGE IN ORGANISATIONS THROUGH eHEALTH	ICT
18-2010	Jörg Schiller	ÖKONOMISCHE ASPEKTE DER ENTLOHNUNG UND REGULIERUNG UNABHÄNGIGER VERSICHERUNGSVERMITTLER	HCM
19-2010	Frauke Lammers, Jörg Schiller	CONTRACT DESIGN AND INSURANCE FRAUD: AN EXPERIMENTAL INVESTIGATION	HCM
20-2010	Martyna Marczak, Thomas Beissinger	REAL WAGES AND THE BUSINESS CYCLE IN GERMANY	ECO
21-2010	Harald Degner, Jochen Streb	FOREIGN PATENTING IN GERMANY, 1877-1932	IK
22-2010	Heiko Stüber, Thomas Beissinger	DOES DOWNWARD NOMINAL WAGE RIGIDITY DAMPEN WAGE INCREASES?	ECO
23-2010	Mark Spoerer, Jochen Streb	GUNS AND BUTTER – BUT NO MARGARINE: THE IMPACT OF NAZI ECONOMIC POLICIES ON GERMAN FOOD CONSUMPTION, 1933-38	ECO

Nr.	Autor	Titel	CC
24-2011	Dhammika Dharmapala, Nadine Riedel	EARNINGS SHOCKS AND TAX-MOTIVATED INCOME-SHIFTING: EVIDENCE FROM EUROPEAN MULTINATIONALS	ECO
25-2011	Michael Schuele, Stefan Kirn	QUALITATIVES, RÄUMLICHES SCHLIEßEN ZUR KOLLISIONSERKENNUNG UND KOLLISIONSVERMEIDUNG AUTONOMER BDI-AGENTEN	ICT
26-2011	Marcus Müller, Guillaume Stern, Ansger Jacob and Stefan Kirn	VERHALTENSMODELLE FÜR SOFTWAREAGENTEN IM PUBLIC GOODS GAME	ICT
27-2011	Monnet Benoit, Patrick Gbakoua and Alfonso Sousa-Poza	ENGEL CURVES, SPATIAL VARIATION IN PRICES AND DEMAND FOR COMMODITIES IN CÔTE D'IVOIRE	ECO
28-2011	Nadine Riedel, Hannah Schildberg-Hörisch	ASYMMETRIC OBLIGATIONS	ECO
29-2011	Nicole Waidlein	CAUSES OF PERSISTENT PRODUCTIVITY DIFFERENCES IN THE WEST GERMAN STATES IN THE PERIOD FROM 1950 TO 1990	IK
30-2011	Dominik Hartmann, Atilio Arata	MEASURING SOCIAL CAPITAL AND INNOVATION IN POOR AGRICULTURAL COMMUNITIES. THE CASE OF CHÁPARRA - PERU	IK
31-2011	Peter Spahn	DIE WÄHRUNGSKRISENUNION DIE EURO-VERSCHULDUNG DER NATIONALSTAATEN ALS SCHWACHSTELLE DER EWU	ECO
32-2011	Fabian Wahl	DIE ENTWICKLUNG DES LEBENSSTANDARDS IM DRITTEN REICH – EINE GLÜCKSÖKONOMISCHE PERSPEKTIVE	ECO
33-2011	Giorgio Triulzi, Ramon Scholz and Andreas Pyka	R&D AND KNOWLEDGE DYNAMICS IN UNIVERSITY-INDUSTRY RELATIONSHIPS IN BIOTECH AND PHARMACEUTICALS: AN AGENT-BASED MODEL	IK
34-2011	Claus D. Müller-Hengstenberg, Stefan Kirn	ANWENDUNG DES ÖFFENTLICHEN VERGABERECHTS AUF MODERNE IT SOFTWAREENTWICKLUNGSVERFAHREN	ICT
35-2011	Andreas Pyka	AVOIDING EVOLUTIONARY INEFFICIENCIES IN INNOVATION NETWORKS	IK
36-2011	David Bell, Steffen Otterbach and Alfonso Sousa-Poza	WORK HOURS CONSTRAINTS AND HEALTH	HCM
37-2011	Lukas Scheffknecht, Felix Geiger	A BEHAVIORAL MACROECONOMIC MODEL WITH ENDOGENOUS BOOM-BUST CYCLES AND LEVERAGE DYNAMICS	ECO
38-2011	Yin Krogmann, Ulrich Schwalbe	INTER-FIRM R&D NETWORKS IN THE GLOBAL PHARMACEUTICAL BIOTECHNOLOGY INDUSTRY DURING 1985–1998: A CONCEPTUAL AND EMPIRICAL ANALYSIS	IK

Nr.	Autor	Titel	CC
39-2011	Michael Ahlheim, Tobias Börger and Oliver Frör	RESPONDENT INCENTIVES IN CONTINGENT VALUATION: THE ROLE OF RECIPROCITY	ECO
40-2011	Tobias Börger	A DIRECT TEST OF SOCIALLY DESIRABLE RESPONDING IN CONTINGENT VALUATION INTERVIEWS	ECO
41-2011	Ralf Rukwid, Julian P. Christ	QUANTITATIVE CLUSTERIDENTIFIKATION AUF EBENE DER DEUTSCHEN STADT- UND LANDKREISE (1999-2008)	IK

Nr.	Autor	Titel	CC
42-2012	Benjamin Schön, Andreas Pyka	A TAXONOMY OF INNOVATION NETWORKS	IK
43-2012	Dirk Foremny, Nadine Riedel	BUSINESS TAXES AND THE ELECTORAL CYCLE	ECO
44-2012	Gisela Di Meglio, Andreas Pyka and Luis Rubalcaba	VARIETIES OF SERVICE ECONOMIES IN EUROPE	IK
45-2012	Ralf Rukwid, Julian P. Christ	INNOVATIONSPOTENTIALE IN BADEN-WÜRTTEMBERG: PRODUKTIONSCLUSTER IM BEREICH „METALL, ELEKTRO, IKT“ UND REGIONALE VERFÜGBARKEIT AKADEMISCHER FACHKRÄFTE IN DEN MINT-FÄCHERN	IK
46-2012	Julian P. Christ, Ralf Rukwid	INNOVATIONSPOTENTIALE IN BADEN-WÜRTTEMBERG: BRANCHENSPEZIFISCHE FORSCHUNGS- UND ENTWICKLUNGSAKTIVITÄT, REGIONALES PATENTAUFKOMMEN UND BESCHÄFTIGUNGSSTRUKTUR	IK
47-2012	Oliver Sauter	ASSESSING UNCERTAINTY IN EUROPE AND THE US - IS THERE A COMMON FACTOR?	ECO
48-2012	Dominik Hartmann	SEN MEETS SCHUMPETER. INTRODUCING STRUCTURAL AND DYNAMIC ELEMENTS INTO THE HUMAN CAPABILITY APPROACH	IK
49-2012	Harold Paredes-Frigolett, Andreas Pyka	DISTAL EMBEDDING AS A TECHNOLOGY INNOVATION NETWORK FORMATION STRATEGY	IK
50-2012	Martyna Marczak, Víctor Gómez	CYCLICALITY OF REAL WAGES IN THE USA AND GERMANY: NEW INSIGHTS FROM WAVELET ANALYSIS	ECO
51-2012	André P. Slowak	DIE DURCHSETZUNG VON SCHNITTSTELLEN IN DER STANDARDSETZUNG: FALLBEISPIEL LADESYSTEM ELEKTROMOBILITÄT	IK
52-2012	Fabian Wahl	WHY IT MATTERS WHAT PEOPLE THINK - BELIEFS, LEGAL ORIGINS AND THE DEEP ROOTS OF TRUST	ECO
53-2012	Dominik Hartmann, Micha Kaiser	STATISTISCHER ÜBERBLICK DER TÜRKISCHEN MIGRATION IN BADEN-WÜRTTEMBERG UND DEUTSCHLAND	IK
54-2012	Dominik Hartmann, Andreas Pyka, Seda Aydin, Lena Klauß, Fabian Stahl, Ali Santircioglu, Silvia Oberegelsbacher, Sheida Rashidi, Gaye Onan and Suna Erginkoç	IDENTIFIZIERUNG UND ANALYSE DEUTSCH-TÜRKISCHER INNOVATIONSNETZWERKE. ERSTE ERGEBNISSE DES TGIN-PROJEKTES	IK
55-2012	Michael Ahlheim, Tobias Börger and Oliver Frör	THE ECOLOGICAL PRICE OF GETTING RICH IN A GREEN DESERT: A CONTINGENT VALUATION STUDY IN RURAL SOUTHWEST CHINA	ECO

Nr.	Autor	Titel	CC
56-2012	Matthias Strifler Thomas Beissinger	FAIRNESS CONSIDERATIONS IN LABOR UNION WAGE SETTING – A THEORETICAL ANALYSIS	ECO
57-2012	Peter Spahn	INTEGRATION DURCH WÄHRUNGSUNION? DER FALL DER EURO-ZONE	ECO
58-2012	Sibylle H. Lehmann	TAKING FIRMS TO THE STOCK MARKET: IPOS AND THE IMPORTANCE OF LARGE BANKS IN IMPERIAL GERMANY 1896-1913	ECO
59-2012	Sibylle H. Lehmann, Philipp Hauber and Alexander Opitz	POLITICAL RIGHTS, TAXATION, AND FIRM VALUATION – EVIDENCE FROM SAXONY AROUND 1900	ECO
60-2012	Martyna Marczak, Víctor Gómez	SPECTRAN, A SET OF MATLAB PROGRAMS FOR SPECTRAL ANALYSIS	ECO
61-2012	Theresa Lohse, Nadine Riedel	THE IMPACT OF TRANSFER PRICING REGULATIONS ON PROFIT SHIFTING WITHIN EUROPEAN MULTINATIONALS	ECO

Nr.	Autor	Titel	CC
62-2013	Heiko Stüber	REAL WAGE CYCLICALITY OF NEWLY HIRED WORKERS	ECO
63-2013	David E. Bloom, Alfonso Sousa-Poza	AGEING AND PRODUCTIVITY	HCM
64-2013	Martyna Marczak, Víctor Gómez	MONTHLY US BUSINESS CYCLE INDICATORS: A NEW MULTIVARIATE APPROACH BASED ON A BAND-PASS FILTER	ECO
65-2013	Dominik Hartmann, Andreas Pyka	INNOVATION, ECONOMIC DIVERSIFICATION AND HUMAN DEVELOPMENT	IK
66-2013	Christof Ernst, Katharina Richter and Nadine Riedel	CORPORATE TAXATION AND THE QUALITY OF RESEARCH AND DEVELOPMENT	ECO
67-2013	Michael Ahlheim, Oliver Frör, Jiang Tong, Luo Jing and Sonna Pelz	NONUSE VALUES OF CLIMATE POLICY - AN EMPIRICAL STUDY IN XINJIANG AND BEIJING	ECO
68-2013	Michael Ahlheim, Friedrich Schneider	CONSIDERING HOUSEHOLD SIZE IN CONTINGENT VALUATION STUDIES	ECO
69-2013	Fabio Bertoni, Tereza Tykvová	WHICH FORM OF VENTURE CAPITAL IS MOST SUPPORTIVE OF INNOVATION? EVIDENCE FROM EUROPEAN BIOTECHNOLOGY COMPANIES	CFRM
70-2013	Tobias Buchmann, Andreas Pyka	THE EVOLUTION OF INNOVATION NETWORKS: THE CASE OF A GERMAN AUTOMOTIVE NETWORK	IK
71-2013	B. Vermeulen, A. Pyka, J. A. La Poutré and A. G. de Kok	CAPABILITY-BASED GOVERNANCE PATTERNS OVER THE PRODUCT LIFE-CYCLE	IK
72-2013	Beatriz Fabiola López Ulloa, Valerie Møller and Alfonso Sousa-Poza	HOW DOES SUBJECTIVE WELL-BEING EVOLVE WITH AGE? A LITERATURE REVIEW	HCM
73-2013	Wencke Gwozdz, Alfonso Sousa-Poza, Lucia A. Reisch, Wolfgang Ahrens, Stefaan De Henauw, Gabriele Eiben, Juan M. Fernández-Alvira, Charalampos Hadjigeorgiou, Eva Kovács, Fabio Lauria, Toomas Veidebaum, Garrath Williams, Karin Bammann	MATERNAL EMPLOYMENT AND CHILDHOOD OBESITY – A EUROPEAN PERSPECTIVE	HCM

Nr.	Autor	Titel	CC
74-2013	Andreas Haas, Annette Hofmann	RISIKEN AUS CLOUD-COMPUTING-SERVICES: FRAGEN DES RISIKOMANAGEMENTS UND ASPEKTE DER VERSICHERBARKEIT	HCM
75-2013	Yin Krogmann, Nadine Riedel and Ulrich Schwalbe	INTER-FIRM R&D NETWORKS IN PHARMACEUTICAL BIOTECHNOLOGY: WHAT DETERMINES FIRM'S CENTRALITY-BASED PARTNERING CAPABILITY?	ECO, IK
76-2013	Peter Spahn	MACROECONOMIC STABILISATION AND BANK LENDING: A SIMPLE WORKHORSE MODEL	ECO
77-2013	Sheida Rashidi, Andreas Pyka	MIGRATION AND INNOVATION – A SURVEY	IK
78-2013	Benjamin Schön, Andreas Pyka	THE SUCCESS FACTORS OF TECHNOLOGY-SOURCING THROUGH MERGERS & ACQUISITIONS – AN INTUITIVE META-ANALYSIS	IK
79-2013	Irene Prostolupow, Andreas Pyka and Barbara Heller-Schuh	TURKISH-GERMAN INNOVATION NETWORKS IN THE EUROPEAN RESEARCH LANDSCAPE	IK
80-2013	Eva Schlenker, Kai D. Schmid	CAPITAL INCOME SHARES AND INCOME INEQUALITY IN THE EUROPEAN UNION	ECO
81-2013	Michael Ahlheim, Tobias Börger and Oliver Frör	THE INFLUENCE OF ETHNICITY AND CULTURE ON THE VALUATION OF ENVIRONMENTAL IMPROVEMENTS – RESULTS FROM A CVM STUDY IN SOUTHWEST CHINA –	ECO
82-2013	Fabian Wahl	DOES MEDIEVAL TRADE STILL MATTER? HISTORICAL TRADE CENTERS, AGGLOMERATION AND CONTEMPORARY ECONOMIC DEVELOPMENT	ECO
83-2013	Peter Spahn	SUBPRIME AND EURO CRISIS: SHOULD WE BLAME THE ECONOMISTS?	ECO
84-2013	Daniel Guffarth, Michael J. Barber	THE EUROPEAN AEROSPACE R&D COLLABORATION NETWORK	IK
85-2013	Athanasios Saitis	KARTELLBEKÄMPFUNG UND INTERNE KARTELLSTRUKTUREN: EIN NETZWERKTHEORETISCHER ANSATZ	IK

Nr.	Autor	Titel	CC
86-2014	Stefan Kirn, Claus D. Müller-Hengstenberg	INTELLIGENTE (SOFTWARE-)AGENTEN: EINE NEUE HERAUSFORDERUNG FÜR DIE GESELLSCHAFT UND UNSER RECHTSSYSTEM?	ICT
87-2014	Peng Nie, Alfonso Sousa-Poza	MATERNAL EMPLOYMENT AND CHILDHOOD OBESITY IN CHINA: EVIDENCE FROM THE CHINA HEALTH AND NUTRITION SURVEY	HCM
88-2014	Steffen Otterbach, Alfonso Sousa-Poza	JOB INSECURITY, EMPLOYABILITY, AND HEALTH: AN ANALYSIS FOR GERMANY ACROSS GENERATIONS	HCM
89-2014	Carsten Burhop, Sibylle H. Lehmann-Hasemeyer	THE GEOGRAPHY OF STOCK EXCHANGES IN IMPERIAL GERMANY	ECO
90-2014	Martyna Marczak, Tommaso Proietti	OUTLIER DETECTION IN STRUCTURAL TIME SERIES MODELS: THE INDICATOR SATURATION APPROACH	ECO
91-2014	Sophie Urmetzer, Andreas Pyka	VARIETIES OF KNOWLEDGE-BASED BIOECONOMIES	IK
92-2014	Bogang Jun, Joongho Lee	THE TRADEOFF BETWEEN FERTILITY AND EDUCATION: EVIDENCE FROM THE KOREAN DEVELOPMENT PATH	IK
93-2014	Bogang Jun, Tai-Yoo Kim	NON-FINANCIAL HURDLES FOR HUMAN CAPITAL ACCUMULATION: LANDOWNERSHIP IN KOREA UNDER JAPANESE RULE	IK
94-2014	Michael Ahlheim, Oliver Frör, Gerhard Langenberger and Sonna Pelz	CHINESE URBANITES AND THE PRESERVATION OF RARE SPECIES IN REMOTE PARTS OF THE COUNTRY – THE EXAMPLE OF EAGLEWOOD	ECO
95-2014	Harold Paredes-Frigolett, Andreas Pyka, Javier Pereira and Luiz Flávio Autran Monteiro Gomes	RANKING THE PERFORMANCE OF NATIONAL INNOVATION SYSTEMS IN THE IBERIAN PENINSULA AND LATIN AMERICA FROM A NEO-SCHUMPETERIAN ECONOMICS PERSPECTIVE	IK
96-2014	Daniel Guffarth, Michael J. Barber	NETWORK EVOLUTION, SUCCESS, AND REGIONAL DEVELOPMENT IN THE EUROPEAN AEROSPACE INDUSTRY	IK

IMPRINT

University of Hohenheim
Dean’s Office of the Faculty of Business, Economics and Social Sciences
Palace Hohenheim 1 B
70593 Stuttgart | Germany
Fon +49 (0)711 459 22488
Fax +49 (0)711 459 22785
E-mail wiso@uni-hohenheim.de
Web www.wiso.uni-hohenheim.de