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by Dennis Wesselbaum

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JEL classification: D61, E24, E32.

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Firing Tax vs. Severance Payments - An Unequal Comparison*

Dennis Wesselbaum[†]

Kiel Institute for the World Economy and EABCN

May 19, 2011

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1 Introduction

It is a stylized fact that many countries - especially continental European ones - provide workers with job-security measures. The study by Garibaldi and Violante (2005) shows that one has to distinguish between two immanent elements of lay-off costs, namely (i) transfers from firm to worker and (ii) a tax that is paid outside the firm-worker pair. We will refer to the former as a severance payment and to the latter as a firing cost. A firing cost is a wasteful tax, i.e. a real cost, on separation which is non-Coasean. In contrast, severance payments are paid directly to the worker, increasing consumption opportunities. More precisely, from the firm's perspective there is no difference between paying a wasteful firing tax or transferring this money to the worker. However, from the worker's perspective, there is a major difference. In case of separation, the worker will receive an additional payment. Furthermore, the authors show that within a search model with insider and outsider workers, they obtain different results from imposing a firing tax or a severance payment.

Along this line, Cozzi et al. (2010) present evidence for the importance and the dispersion of severance payment for a set of OECD countries. They show that severance payments for instance in Italy equal 20 monthly wages, while they equal 1.2 monthly wages in the United Kingdom.

The contribution of our paper is twofold. First, we focus on the differences in the business cycle implications of firing cost, severance payments respectively. As business cycle stabilization is a key objective of governments the appropriate design of employment protection can help to achieve this goal. Second, we investigate the different steady state effects from using these two types of lay-off costs. The latter exercise is motivated by the observation of several European countries using large reforms in labor regulation to deal with high and persistent unemployment rates (OECD (2006)).

To the best of our knowledge, there is no study that discusses the different implications of those two types of lay-off costs. The business cycle implications of firing costs has been discussed by Veracierto (2008), while e.g. Poiny and Wesselbaum (2011) analyze the welfare effects of using firing costs. On the other hand, the paper by Alvarez and Veracierto (1998) discusses the long-run implications of severance payments. They show that severance payments decrease unemployment as they reduce lay-off rates and increase welfare.

We use a Real Business Cycle (RBC, for short) search and matching model augmented by firing costs, severance payments respectively. In order to introduce those costs properly, we model separations endogenously, creating an additional decision margin for the firm.

Our analysis shows that under both specifications, the response and the convergence path of our model economy is quite similar. However, we find that the model economy with firing

costs is much more volatile than the severance payment economy. Furthermore, the model with severance payments replicates the second moments observed for the U.S. economy fairly well. The model is able to generate a strong Beveridge curve and matches second moments reasonably well. Furthermore, we investigate the steady state implications of changing the cost parameters. We find that all reforms reduce the welfare in our model economy, but increase employment. The main mechanisms at work are the effects on wages and the additional demand stimulus steaming from transfers to the worker. We show that the government (or social planner) faces a trade-off in the design of employment protection. Increasing e.g. severance payments would reduce welfare but reduce unemployment. Furthermore, the design of lay-off costs creates strong spill-over effects for other elements of employment protection.

The paper is structured as follows. The next section develops the model and section 3 discusses our simulation results. Section 4 concludes.

2 Model Derivation

The description of our model economy proceeds in three steps. First, we define the economy's preferences and technology and we then present the model's assumed market structure. Finally, we conclude with the definition of an equilibrium.

2.1 Preferences and Technology

We now present a general equilibrium model with flexible prices, labor market imperfections and two types of lay-off costs. Our economy inhabits two different agents; households and firms. The labor market is imperfect due to the assumption of search and matching frictions following Mortensen and Pissarides (1994). While choosing the optimal path of labor, firms face hiring and firing costs, severance payments respectively. Finally, wages are set in individualistic Nash bargaining.

2.1.1 Households

We assume that our economy is populated by a continuum of infinitively-lived identical households. Households equally share income and risk among all family members as in Merz (1995). The households preferences are given by the following utility function

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{\sigma}{\sigma-1} C_t^{\frac{\sigma-1}{\sigma}} \right], \quad (1)$$

where $\beta \in (0, 1)$ is the subjective time discount factor. Furthermore, C_t is period t 's consumption and $\sigma > 0$ gives the intertemporal elasticity of substitution.

2.1.2 Technology

The firm uses labor services to produce differentiated goods according to the production function

$$Y_{it} = Z_t N_{it} \int_{\bar{z}_{it}} z \frac{f(z)}{1 - F(\bar{z}_{it})} dz \equiv Z_t N_{it} P(\bar{z}_{it}), \quad (2)$$

where Z_t is a Hicks-neutral aggregate technology shock following a first-order autoregressive process

$$\ln Z_t = \rho_Z \ln Z_{t-1} + e_{Z,t}, \quad (3)$$

where $0 < \rho_Z < 1$ is the autocorrelation term and its innovation is i.i.d. over time and normally distributed

$$e_{Z,t} \sim N(0, \sigma_Z). \quad (4)$$

Subscript i denotes the individual employment relationship between firm and worker. In each period t , labor services at firm i are driven by the number of employees, N_{it} and the worker's idiosyncratic productivity, z_{it} . The idiosyncratic productivity is drawn in advance of the production process in every period from a time-invariant distribution with c.d.f. $F(z)$ and positive support $f(z)$. Its mean is given by μ_{LN} and the variance is determined by σ_{LN} . Furthermore, \bar{z}_{it} is an endogenously determined cut-off point below which separation takes place.

2.2 Market Structure

While the good market is perfectly competitive, the labor market is imperfect due to the assumption of search and matching frictions. Trade in the labor market is uncoordinated, costly and time-consuming. Search takes place on a discrete and closed market. Workers can be either employed or unemployed, such that there is no out of labor force option. Similarly, each firm has one job that is either filled, or vacant. If the job is filled, it is subject to the probability of being endogenously destructed, $F(\bar{z}_t)$, or being exogenously destroyed, $\rho^x > 0$, i.e.

$$\rho_t = \rho^x + (1 - \rho^x) F(\bar{z}_t). \quad (5)$$

In addition, firms create jobs at the rate $M(U_t, V_t)$ at the non-state-contingent cost of $c > 0$ units of output per vacancy, where M is the homogeneous-of-degree-one-matching-function,

$$M(U_t, V_t) = m U_t^\mu V_t^{1-\mu}, \quad (6)$$

where $m > 0$ gives the match efficiency, $\mu > 0$ is the elasticity of the matching function with respect to unemployment and v_t is the vacancy rate. The vacancy-to-unemployment ratio, $\theta_t = V_t/U_t$,

reflects labor market tightness. Then, the vacancy filling probability is $q(\theta_t) = M(U_t, V_t)/V_t$. Combining entry and exit definitions yields the evolution of employment

$$N_{t+1} = (1 - \rho_{t+1})(N_t + M_t). \quad (7)$$

Similarly, the evolution of aggregate unemployment can be written as

$$U_t = 1 - N_t. \quad (8)$$

Finally, households own all shares in the firm and receive any of their profits as dividends each quarter.

2.3 Optimization and Equilibrium

Optimization of all agents defines the equilibrium. We start with the households utility maximization problem and continue with the firms profit maximization problem. Then, we solve the bargaining problem between firm and worker and determine the optimal combination of wage and hours. We conclude with a definition of the equilibrium.

2.3.1 Households

We assume that the economy begins with all households having identical financial wealth and consumption histories. This assumption assures that together with the optimal use of the available contingent claims markets, this homogeneity will continue. Moreover, this allows us to only consider the consumption and savings decisions of a representative household. The representative household faces the following budget constraint

$$C_t + T_t = W_{it}N_{it} + bU_t + \Pi_t, \quad (9)$$

where benefits b are financed by the government through lump-sum taxes, T_t . Dividends are denoted by Π_t and W_{it} is the real wage. Then, the household maximizes 1 subject to 9, which gives the standard first order condition

$$C_t^{-\sigma} = \lambda_t, \quad (10)$$

where λ_t is the multiplier on the budget constraint.

2.3.2 Firms

The representative firm in our economy solves its profit maximization problem by choosing the optimal path for $\{N_t, V_t, p_t\}_{t=0}^{\infty}$ by maximizing

$$E_t \sum_{t=0}^{\infty} \beta^t \lambda_t \left[p_t \left(\frac{p_t}{P_t} \right)^{-(1+\epsilon)} Y_t - W_t N_t - cV_t - G(\bar{z}_t) \right], \quad (11)$$

subject to the evolution of employment (7) and the production function (2). p_t is the price chosen by the firm and P_t is the aggregate price index,

$$P_t = \left[\int_0^1 P_{it}^{1-\epsilon} di \right]^{\frac{1}{1-\epsilon}}, \quad (12)$$

where the demand elasticity is given by $\epsilon > 0$.

The first term in parenthesis gives real revenue depleted by total wage costs, vacancy posting costs and total firing costs. $G(\bar{z}_t)$ gives the total amount of firing costs, which is the integral over those workers idiosyncratic productivities falling below the threshold. For a worker with the idiosyncratic productivity z_{it} , the firm has to pay

$$g(z_{it}) = (k + \tilde{k}) z_{it}, \quad (13)$$

as purely wasted firing costs and severance payments. Here, $k > 0$ denotes the share of idiosyncratic productivity paid as a firing tax and $\tilde{k} > 0$ gives the share of idiosyncratic productivity paid as a severance payments. We choose this specification for the lay-off function because we want to reproduce the findings from Dolado et al. (2005), namely that employment protection varies within a country. Reasons for those differences within a country amongst others are educational level, firm size, skill and tenure. Those factors are idiosyncratic and hence we need a variable that captures those idiosyncratic characteristics. For this reason, we relate lay-off costs directly to the workers productivity, as the wage will also depend on macroeconomic variables.¹

Finally, the first-order conditions are²

$$\partial N_t : \tau_t = \frac{Y_t}{N_t} - W_t + (1 - \rho_t) E_t \beta_{t+1} \tau_{t+1}, \quad (14)$$

$$\partial V_t : c = (1 - \rho_t) q(\theta_t) E_t \beta_{t+1} \tau_{t+1}, \quad (15)$$

$\beta_{t+1} = E_t \beta \frac{\lambda_{t+1}}{\lambda_t}$ is the stochastic discount factor, τ_t is the Lagrange multiplier on the evolution of employment. Using these two equations yields the job creation condition

$$\frac{c}{q(\theta_t)} = (1 - \rho_t) E_t \beta_{t+1} \left[\frac{Y_{t+1}}{N_{t+1}} - W_{t+1} + \frac{c}{q(\theta_{t+1})} \right].$$

The left-hand side of this equation gives the hiring costs which equal the benefits of creating a new job. The latter depends on the marginal product of labor depleted by the wage and increased by saved hiring costs in the next period in case of non-separation.

¹Here, we assume that lay-off costs are linear in idiosyncratic productivity. This assumption is supported by the finding from Abowd and Kramarz (2003) showing that in France separation costs are mildly concave in the number of exits.

²Note that we dropped subscript indices due to symmetry in the competitive equilibrium.

2.3.3 Wage Bargaining

If a firm and a worker have matched, the job shares an economic rent which is splitted in individual Nash bargaining by maximizing the Nash product

$$W_t(z_t) = \arg \max_{\{W_t(z_t)\}} \left[\left(\mathcal{W}_t - \mathcal{U}_t + \tilde{k}z_t \right)^\eta \left(\mathcal{J}_t - \mathcal{V}_t + (k + \tilde{k})z_t \right)^{1-\eta} \right], \quad (16)$$

where former parenthesis gives the worker's surplus and the latter parenthesis denotes the firm surplus. Furthermore, $\eta \in (0, 1)$ is the worker's relative bargaining power. To obtain an explicit expression for the individual real wage we have to determine the asset value functions and substitute them into the Nash bargaining solution. Let \mathcal{W}_t denote the - Bellman type - asset value function of being employed for the worker

$$\mathcal{W}_t = W_t(z_t) + E_t \beta_{t+1} (1 - \rho_{t+1}) \int_{\bar{z}_{t+1}} \mathcal{W}_{t+1}(z) \frac{f(z)}{1 - F(\bar{z}_t)} dz + E_t \beta_{t+1} \rho_{t+1} (\mathcal{U}_{t+1} + \tilde{k}z_t), \quad (17)$$

depending on the worker's real wage, the discounted, expected value of staying employed and, in case of separation, the value of being unemployed plus the severance payment. Furthermore, the value of being unemployed can be written as

$$\mathcal{U}_t = b + E_t \beta_{t+1} \theta_t q(\theta_t) (1 - \rho_{t+1}) \int_{\bar{z}_{t+1}} \mathcal{W}_{t+1}(z) \frac{f(z)}{1 - F(\bar{z}_t)} dz + E_t \beta_{t+1} (1 - \theta_t q(\theta_t)) (1 - \rho_{t+1}) \mathcal{U}_{t+1}, \quad (18)$$

where unemployment benefits, b , are added to the expected value of being in an employment relationship in the next period or staying unemployed for another period.

On the firm side, we find that \mathcal{V}_t , the value of posting vacancies, has to be zero in equilibrium due to a free entry condition. Furthermore, we define the value of a worker to the firm as

$$\mathcal{J}_t = Z_t z_t - W_t(z_t) + E_t \beta_{t+1} \left[(1 - \rho_{t+1}) \int_{\bar{z}_{t+1}} \mathcal{J}_{t+1} \frac{f(z)}{1 - F(\bar{z}_t)} dz - \rho_{t+1} (k + \tilde{k}) z_t \right], \quad (19)$$

where the worker's output is depleted by the wage and the expectation of continuation of the employment relationship or the lay-off costs in case of separation.

It can then be shown that the individual real wage satisfies the optimality condition

$$\mathcal{W}_t - \mathcal{U}_t + \tilde{k}z_t = \frac{\eta}{1 - \eta} \left(\mathcal{J}_t + (k + \tilde{k})z_t \right). \quad (20)$$

Inserting the value functions into the Nash bargaining solution yields the real wage

$$W_t(z_t) = \eta (Z_t z_t + c\theta_t) + (1 - \eta) b + \left[(\eta - \eta \beta_{t+1} \rho_{t+1}) k + (2\eta - 1 - \beta_{t+1} \rho_{t+1}) \tilde{k} \right] z_t. \quad (21)$$

As usual in search models, the wage depends on the linear combination of the firm's and the worker's fall back position. In addition, we find that the wage depends on the lay-off cost related

to the idiosyncratic productivity. If we assume symmetric bargaining as predominantly used in the related literature and impose that $\beta, \rho < 1$, we obtain

$$\left[\underbrace{\left(\frac{1}{2} - \frac{1}{2}\beta\rho \right) k}_{>0} - \underbrace{\beta\rho \tilde{k}}_{>0} \right] z_t, \quad (22)$$

such that firing costs increase the wage, while severance payments decrease the wage. Firing costs increase the rent that is splitted in the bargaining while only affecting the firm's value functions. Therefore, as they reflect more resources to be splitted, they increase the wage. On the other hand, severance payments strongly influence the worker's asset value functions - and therefore her optimal decisions - while they reflect claims on future consumption flows.

Finally, the cut-off point can be found by using

$$\mathcal{J}_t < - \left(k + \tilde{k} \right) \bar{z}_t, \quad (23)$$

such that separation takes place whenever the value of a worker to the firm is below the associated lay-off costs. Some algebra gives

$$\bar{z}_t = \frac{(1 - \eta)b + \eta c \theta_t - \frac{c}{q(\theta_t)}}{(1 - \eta)Z_t + [1 - \eta + (\eta - 1)\beta_{t+1}\rho_{t+1}] k + 2(1 - \eta)\tilde{k}}. \quad (24)$$

Lay-off costs, since $[1 - \eta + (\eta - 1)\beta_{t+1}\rho_{t+1}] k + 2(1 - \eta)\tilde{k} > 0$ holds for the symmetric bargaining case, decrease the threshold. The intuition is quite straightforward, workers are protected by lay-off costs and hence the firm is more reluctant to terminate an ongoing employment relationship and pay lay-off costs. Therefore, the firm shifts the cut-off point to the left of the distribution and less workers are separated. Along this line, severance payments have a larger effect on the threshold in the symmetric bargaining baseline scenario, as $[\frac{1}{2} + \frac{1}{2}\beta\rho] k < \tilde{k} \forall k = \tilde{k}$. Again, the intuition is straightforward, as the lower wage in the severance payment case creates less incentives to separate from a worker.

2.3.4 Equilibrium

The resource constraint of our economy is given by

$$Y_t = C_t + cV_t + G(\bar{z}_t). \quad (25)$$

Then, for the given stochastic process $\{Z_t\}_{t=0}^{\infty}$, a determined equilibrium is a state-contingent sequence of $\{C_t, Y_t, N_t, M_t, \theta_t, V_t, U_t, \bar{z}_t, \rho_t, \lambda_t, W_t\}_{t=0}^{\infty}$. Finally, the set of equations forming the equilibrium is linearized around the non-stochastic steady-state.

The calibration of the model is on a quarterly basis for the United States and parameter values are set according to stylized facts and the relevant literature. Risk aversion, σ , is set to the value 2 and the discount factor, β , is 0.99. The steady state separation rate, ρ , is 0.12 according to den Haan et al. (2000). Then, the critical threshold can be computed by using the inverse function, i.e. $z = F(\rho)^{-1}$. Parameters characterizing the c.d.f $F(z)$ are taken from Krause and Lubik (2007) and are set to $\mu_{LN} = 0$, and $\sigma_{LN} = 0.12$. Furthermore, the elasticity of the matching function with respect to unemployment, μ , is set to 0.7, while the steady state firm matching rate is $q = 0.7$. Then, matches in steady state are given by $M = \frac{\rho}{1-\rho}N$, where steady state employment is set to 0.9. The steady state vacancy rate can then be found and equals $V = \frac{M}{q}$, which gives the steady state labor market tightness $\theta = \frac{V}{1-N}$. In addition, the match efficiency is given by $m = q\theta^\mu$. Vacancy posting costs are 0.05 and the unemployment benefits are 0.5. Following the discussion in Brown et al. (2009), we set $k = \tilde{k} = 0.1$, i.e. 10 % of the worker's productivity is paid as a firing tax, severance payment respectively. We assume symmetric bargaining and set $\eta = 0.5$. Finally, the shock is autocorrelated with $\rho_Z = 0.9$ as usual in the literature.

3 Discussion

We will start our analysis of different lay-off costs by a discussion of the implications for business cycle fluctuations, viz. for the volatility of key variables. Then, we will proceed to analyze the effects on welfare.

3.1 Business Cycle Fluctuations

Figure 1 presents the response of our model economy to a favorable one percent productivity shock. We distinguish between two cases. First, and plotted in black, we consider the model with firing costs, such that the firing cost parameter k is set to 0.1, while the severance payment parameter is 0. Then, plotted in red, we repeat the exercise for the severance payment case, without firing costs, i.e. $k = 0$ and $\tilde{k} = 0.1$. A first graphical inspection of the impulse response functions yields the insight that there is only a very small difference between the severance payment case and the firing cost case. We find that qualitatively the effects are very similar. A positive productivity shock increases the incentives for firms to post vacancies, in order to extract surpluses over the cycle. Therefore, vacancies increase and job creation raises on impact. As output increases, unemployment falls, increasing labor market tightness. In order to keep more workers, firms decrease the cut-off point, which reduces the separation rate. Real wages increase as workers demand a part of the larger surplus created by the shock. However, as we have discussed in the bargaining section before, the

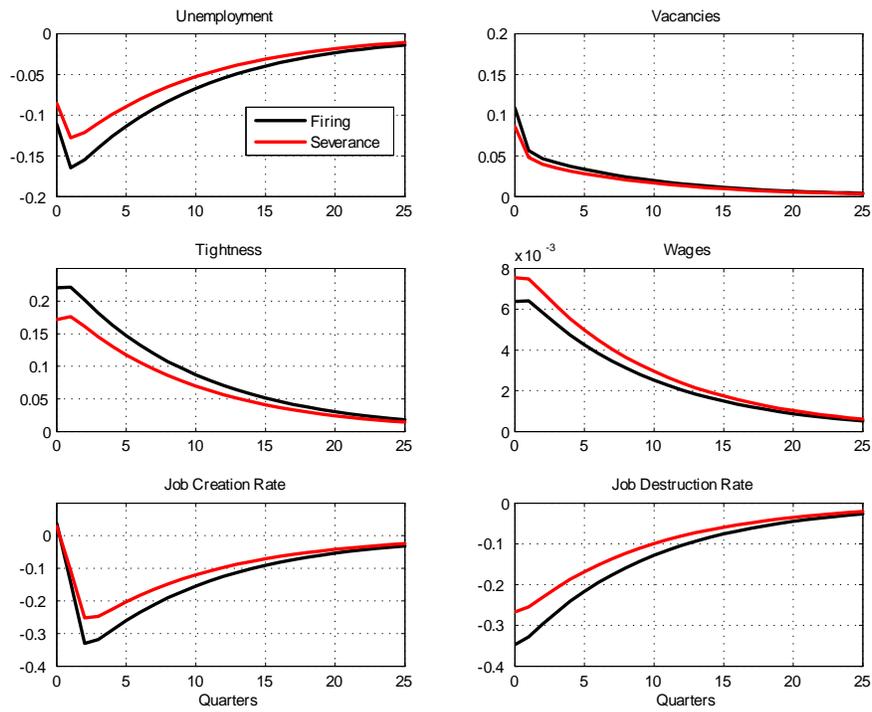


Figure 1: Notes: Firing Tax vs. Severance Payments. Horizontal axes measure quarters, vertical axes deviations from steady state.

severance payment case implies a larger reaction of wages, as the change in the fall back positions carries over to the extraction of surpluses over the cycle. This channel causes the visible differences in the convergence process. The severance payment economy is less persistent, as the higher wage decreases incentives for firms to create new jobs. Consistently, we observe a smaller impact on job flows.

Let us consider the second moments of our simulations shown in Table 2.

Table 1:

	U.S. data	$k = \tilde{k} = 0$	Firing	Severance
$std(U)$	0.18	0.32	0.41	0.32
$std(V)$	0.20	0.13	0.16	0.13
$std(\theta)$	0.37	0.44	0.56	0.44
$std(\rho)$	0.01	0.21	0.27	0.21
$corr(U, V)$	-0.89	-0.91	-0.90	-0.91
$corr(jcr, jdr)$	-0.36	0.85	0.85	0.85

Table 2: Notes: Data values taken from Shimer (2005).

The volatilities for key variables are presented for the three cases considered above. We find that the firing cost model is much more volatile than the severance payment model. In detail, unemployment is significantly more volatile if we include firing costs in the model, which has of course strong implications for the design of unemployment benefits, i.e. automatic stabilizers in general. The response of vacancies is quite similar, implying that labor market tightness is closer to its empirical value, if we assume severance payments. As discussed, the firing cost model implies larger adjustment, i.e. job flows, and hence a stronger adjustment and larger volatility of the separation rate as observed in the data. Furthermore, all specifications create a strong Beveridge curve, but fail to create the negative correlation between job creation and destruction.

3.2 Welfare Implications

It is a well known stylized fact that European labor markets are less flexible, due to stricter employment protection legislation, compared with Anglo-Saxon countries, see e.g. Ljungqvist (2002). Following the OECD (2006) Report, several European countries are pursuing large reforms in labor regulation in order to work against the high and persistent unemployment rates.³ In this section,

³One example for this wave of reforms is the so-called ‘‘Agenda 2010’’ in Germany. The reform mostly aims at relaxing some rules protecting workers, notably by cutting drastically unemployment benefits.

we focus on the different effects of using firing costs or severance payments to protect workers, hence follow the approach by Alvarez and Veracierto (1998) to start with the laissez-faire economy. First, we will define our welfare measure and consecutively, discuss the welfare implications of using the two instruments.

3.2.1 Measuring Welfare Gains

Here, I adopt the strategy used in Poilly and Sahuc (2008) and Poilly and Wesselbaum (2010). We denote the welfare in the initial steady state by

$$\mathbb{W}_0^{init} = E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{\sigma}{\sigma-1} (C_t^{init})^{\frac{\sigma-1}{\sigma}} \right], \quad (26)$$

where C_t^{init} is the path of consumption chosen in the initial steady state. Then, welfare in the new steady state is given by

$$\mathbb{W}_0^{final} = E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{\sigma}{\sigma-1} (C_t^{final})^{\frac{\sigma-1}{\sigma}} \right]. \quad (27)$$

Following Lucas (1987), we interpret the welfare gain as follows: The gain is given by the fraction of the consumption stream an agent should give in order to compensate for the fact that she has to switch from an initial steady-state to a new one.

Then, Ξ , the welfare gain in percentage points, can be found by solving

$$\mathbb{W}_0^{final} = E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{\sigma}{\sigma-1} (C_t^{final})^{\frac{\sigma-1}{\sigma}} (1 + \Xi)^{\frac{\sigma-1}{\sigma}} \right], \quad (28)$$

which gives

$$\Xi = \left[\frac{\mathbb{W}_0^{final}}{\mathbb{W}_0^{init}} \right]^{\frac{\sigma}{\sigma-1}} - 1. \quad (29)$$

3.2.2 The Welfare Implications of Using Lay-off Costs

In order to understand the different welfare implications of using the two lay-off costs, we proceed as follows. We assume that our economy is in its steady state with both lay-off costs being 0. Then, we simulate the transition path to the new steady state, upon an increase in severance payments or firing costs. First, we increase the severance payment parameter (to a value of 0.01), while firing costs remain unchanged. Second, we repeat this exercise vice versa. Finally, we increase both parameters simultaneously, viz. by setting both parameters to 0.005.⁴ The results for those three reforms are described in Table 4. Furthermore, the transmission paths are shown in Figure 2 and 3. We find that in all considered cases, welfare is decreased.⁵ An increase in lay-off costs leads the

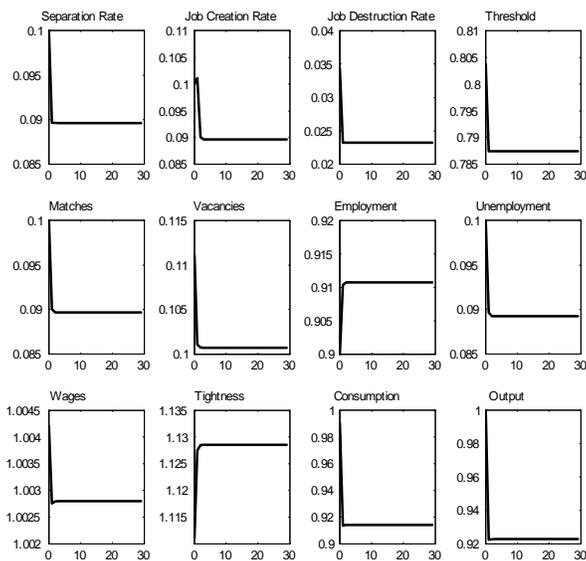


Figure 2: Notes: Increase of severance payments ($\tilde{k} = 0 \rightarrow 0.01$). Horizontal axes measure quarters, vertical axes levels.

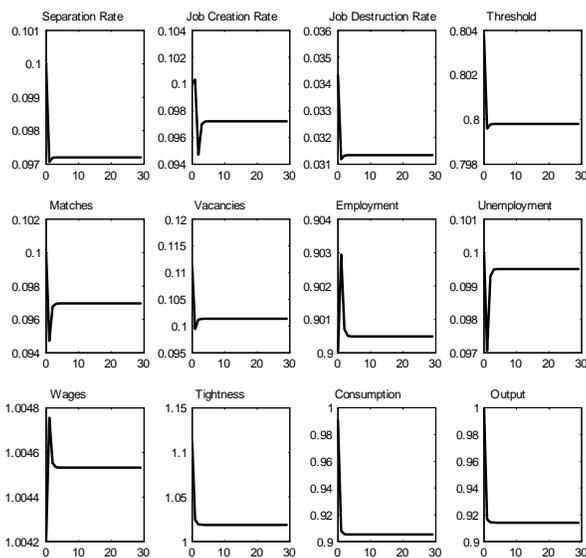


Figure 3: Notes: Increase of severance payments ($k = 0 \rightarrow 0.01$). Horizontal axes measure quarters, vertical axes levels.

Table 3: Welfare Implications.

	Severance	Firing	Severance & Firing
Ξ	-7.72	-8.61	-8.13
ΔU	-0.11	-0.005	-0.06
ΔV	-0.09	-0.09	-0.09
Δjcr	-0.10	-0.03	-0.07
Δjdr	-0.32	-0.09	-0.21
ΔW	-0.001	0	0

Table 4: Notes: Steady state changes are expressed in deviation from the initial steady state (where $k = \tilde{k} = 0$). The parameter governing the share of firing costs, severance payments respectively is increased from 0 to 0.01. For the joint shock, we set both parameters to 0.005, such that they jointly equal 0.01.

firm to be more reluctant in firing workers. The firm reduces the cut-off point and keeps even less productive workers, even though the value of this job for the firm is negative but still above the lay-off costs. This implies a drop in the separation rate and the job destruction rate. Simultaneously, the firm has less incentives to create new jobs and reduces vacancy posting activities. However, as visible from the transmission path, the effect working along the destruction margin dominates and hence, employment increases. As we have discussed in the wage setting section, higher firing costs increase real wages and higher severance payments decrease real wages. Finally, output and consumption decrease, which is driven by higher wages and imposed lay-off costs.

We find that these three reforms increase employment, as they reduce the destruction flow by a larger amount than they reduce job creation. Along this line, we find that higher employment protection via increased severance payments comes with lower labor market flows and lower wages. In contrast, higher firing costs tend to increase wages. Therefore, the wage channel plays an important part for the transition process and the determination of the final steady state. Furthermore, severance payments have an additional - although small - stabilizing effect on output (compare the drop in the firing cost case vs. the drop in the severance payment case), as the payment to the worker generates an intrinsic demand stimulus.

Finally, we find that within a combination of severance payment and firing costs, both wage effects work in opposite directions and therefore offset any additional wage effects. As a consequence,

⁴Jointly, they equal 0.01 and hence we can compare this reform with the first two cases.

⁵In our model, welfare is entirely driven by consumption. However, including the disutility of work is likely to leave our qualitative results unaffected, as employment increases and hence would further reduce welfare.

the firing cost effect dominates.

At this point, we can draw the following conclusions. Higher lay-off costs reduce the welfare in our model economy, as higher turnover costs and an increased wage bill reduce output. In contrast, increased employment protection increases employment and reduces labor market flows. To two lay-offs costs differ in their effects on key variables as the wage reacts differently to those costs.

4 Conclusion

This paper compares two elements of lay-off costs, namely firing costs and severance payments. Firing costs are a wasteful tax paid by the firm, while severance payments are a transfer from the firm to the worker in case of separation. To analyze the different effect of these costs, we develop a general equilibrium RBC model that allows to explicitly distinguish between severance payments and firing costs.

First, we show that the introduction of those two different lay-off costs has different effects on wages and the critical cut-off point. We find that severance payments, as they are a claim on future consumption, tend to lower wages, while firing costs increase them, since they solely increase the surplus to be splitted and reduce the value of a worker to the firm.

Second, we show that the model with firing costs shows a much higher volatility of key labor market variables as the model with severance payments. In addition, the model is able to generate the Beveridge curve, i.e. the negative correlation between unemployment and vacancies.

A second important dimension of two lay-off costs are the different welfare effects of labor market reforms. We find that welfare is reduced in any considered case driven mainly by turnover costs, being paid in terms of the consumption good. This finding contradicts the results from Alvarez and Veracierto (1998) and implies that the transition process is a main driver of the welfare effects and should always be taken into consideration. Furthermore, we find that higher employment protection increases employment and reduces labor market flows. These insights yield a significant trade-off in the design of employment protection. Increasing e.g. severance payments would reduce welfare but reduce unemployment by almost 11 %. Moreover, the design of lay-off costs in the system of employment protection creates strong spill-over effects for other ingredients of employment protection, e.g unemployment benefits, or other automatic stabilizers. For instance, let the government have a business cycle stabilization goal, then the severance payment is preferable in terms of generating less fluctuations in response to an exogenous shock - as it also entails a transfer from firm to worker and acts therefore as an automatic stabilizer, while firing costs are just wasteful. In addition, as unemployment fluctuates less, this implies that less workers have to

use e.g. unemployment benefits, which is beneficial, as workers stay employed, firms do not have to pay adjustment costs and the government does not have to pay unemployment benefits. Based upon our findings, if the government chooses a mix of firing costs and severance payments, it should ensure that severance payments are dominant.

In summary, severance payments generate less fluctuations, reduce welfare by the smallest amount, and reduce unemployment by the largest amount. In contrast, firing cost generate more fluctuations, have stronger negative effects on welfare, and are less successful in reducing unemployment. The main mechanisms at work are the effect on wages and the additional demand stimulus stemming from transfers to the worker.

References

- [1] Abowd, John M. and Kramarz, Francis (2003): "The Costs of Hiring and Separations." *Labor Economics*, 10(5): 499-530.
- [2] Alvarez, Fernando and Veracierto, Marcelo L. (1998): "Search, self-insurance and job-security provisions." Working Paper Series WP-98-2, Federal Reserve Bank of Chicago.
- [3] Brown, Alessio J. G., Merkl, Christian, and Snower, Dennis J. (2009): "An Incentive Theory of Matching." Kiel Working Paper No. 1512, April 2009.
- [4] Burda, Michael C. (1992): "A Note on Firing Costs and Severance Benefits in Equilibrium Unemployment." *The Scandinavian Journal of Economics*, 94(3): 479-489.
- [5] Cozzi, Marco, Fella, Giulio, and Violante, Gianluca (2010): "The Non-neutrality of Severance Payments with Incomplete Markets." mimeo.
- [6] Dolado, Juan J., Jansen, Marcel and Jimeno, Juan F. (2005): "Dual Employment Protection Legislation: A Framework for Analysis." IZA Discussion Paper, No. 1564, April 2005.
- [7] Fella, Giulio (2009): "Optimal Severance Pay in a Matching Model." mimeo.
- [8] Fujita, Shigeru, Nekada, Christopher J., and Ramey, Garey (2007): "The Cyclicity of Worker Flows: New Evidence from the SIPP." Federal Reserve Bank of Philadelphia Working Paper, No. 07-5.
- [9] Fujita, Shigeru, and Ramey, Garey (2007): "Reassessing the Shimer Facts." Federal Reserve Bank of Philadelphia Working Paper, No. 07-2.
- [10] Fujita, Shigeru, and Ramey, Garey (2008): "The Cyclicity of Separation and Job Finding Rates." Federal Reserve Bank of Philadelphia Working Paper, No. 07-19.
- [11] Garibaldi, Pietro, and Violante, Giovanni L. (2005): "The Employment Effects of Severance Payments with Wage Rigidities." *Economic Journal*, 105(506): 799-832.
- [12] Den Haan, Wouter J., Ramey, Garey, and Watson, Joel (2000): "Job Destruction and the Propagation of Shocks." *American Economic Review*, 90(3): 482-498.
- [13] Hopenhayn, Hugo A., and Rogerson, Richard (1993): "Job Turnover and Policy Evaluation: A General Equilibrium Approach." *Journal of Political Economy*, 101(5): 915-938.

- [14] Krause, Michael U., and Lubik, Thomas A. (2007): "The (Ir)relevance of Real Wage Rigidity in the New Keynesian Model with Search Frictions." *Journal of Monetary Economics*, 54(3): 706-727.
- [15] Ljungqvist, Lars (2001): "How Do Layoff Costs Affect Employment?" CEPR Discussion Paper, No. 3051, November 2001.
- [16] Lucas Robert E. (1987): "Models in Business Cycle." Basil Blackwell, New York.
- [17] Merz, Monika (1995): "Search in the Labor Market and the Real Business Cycle." *Journal of Monetary Economics*, 36(2): 269-300.
- [18] Messina, Julián, and Giovanna Vallanti (2006): "Job Flow Dynamics and Firing Restrictions - Evidence from Europe." European Central Bank Working Paper, No. 602, April 2006.
- [19] OECD, 2006. OECD Employment Outlook.
- [20] Poilly, Céline, and Sahuc, Jean-Guillaume (2008): "Welfare Implications of Heterogeneous Labor Markets in a Currency Area," Documents de Travail 199, Banque de France.
- [21] Poilly, Céline, and Wesselbaum, Dennis (2010): "Evaluating Labor Market Reforms: A Normative Analysis." mimeo.
- [22] Ramey, Garey (2008): "Exogenous vs. Endogenous Separation." Mimeo, October 2008.
- [23] Shimer, Robert. 2005. "The Cyclical Behavior of Equilibrium Unemployment and Vacancies." *American Economic Review*, 95(1): 25-49.
- [24] Veracierto, Marcelo L. (2008): "Firing Costs and Business Cycle Fluctuations." *International Economic Review*, 49(1): 1-39.