Does Employment Protection Create Its Own Political Support?

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Abstract

This paper investigates the ability of employment protection to generate its own political support. A version of the Mortensen-Pissarides model is used for this purpose. Under the standard assumption of Nash bargaining, workers value employment protection because it strengthens their hand in bargaining. Workers in high productivity matches benefit most from higher wages as they expect to stay employed for longer. By reducing turnover employment protection shifts the distribution of match-specific productivity toward lower values. Thus stringent protection in the past actually reduces support for employment protection today. Introducing involuntary separations is a way of reversing this result. Now workers value employment protection because it delays involuntary dismissals. Workers in low productivity matches gain most since they face the highest risk of dismissal. The downward shift in the productivity distribution is now a shift towards ardent supporters of employment protection. In a calibrated example this mechanism sustains both low and high employment protection as stationary political outcomes. A survey of German employees provides support for employment protection being more strongly favored by workers likely to be dismissed.

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Most countries have adopted regulations that make it costly for employers to dismiss workers. It is often argued that stringent employment protection has substantial adverse consequences for labor market performance. Economists along with organizations such as the OECD and the IMF routinely urge countries to relax employment protection regulations. However, policy makers have been reluctant to follow this advice, or have faced stiff political opposition when trying to do so.

A commonly invoked explanation for this failure to deregulate is the following: what makes reform so difficult is precisely the fact that the current level of protection enjoyed by insiders is so high.[1]

According to this hypothesis, the fact that employment protection was stringent in the past induces employed workers to provide strong support for maintaining stringent protection into the future. Conversely, if protection was low in the past, then employed workers show little support in favor of introducing stronger protection, making it easy for countries such as the United States to maintain flexible labor markets. If this hypothesis is correct, it may play an important role in accounting for the large and persistent differences in employment protection regulations across countries.[2]

At this stage one could criticize this explanation as incomplete, since it is silent on why more stringent protection in the past generates stronger support for employment protection today. One could argue that if employment protection is beneficial to employed workers, then employed workers in the United States should support it as much as their counterparts in Europe.[3]

[1]See the leader "The reason why Europe finds reform so hard is that insiders are too protected" in *The Economist (2006)* for a recent statement of this argument in the context of the conflict about the *Contrat première embauche (CPE)* in France. Writing on European unemployment, Becker (1998) argues "If the explanation of high European unemployment rates is so clear, why are those governments reluctant to reform their labor markets toward the so-called Anglo-Saxon model? Although many excuses and explanations have been offered, politics is the most powerful reason. Strong unions, 'insiders' with well-paying jobs, and other groups fight to hold on to their perks and privileges. The fear of losing these votes discourages even parties on the right from making major labor- market reforms."

[2]Heckman and Pagés (2000) estimate the expected cost of future dismissal at time of hiring, expressed as a multiple of monthly wages. They show that this measure of dismissal costs varies greatly across countries. Blanchard and Wolfers (2000) make an attempt to construct time series of the stringency of employment protection for a group of OECD countries, which display substantial persistence.

[3]This critique of incompleteness provides the staring point for the analysis of policy persistence in Coate and Morris (1999).

This incompleteness provides the point of departure for the present paper, which focuses precisely on mechanisms through which high protection in the past can generate strong support of employed workers for employment protection today.

As a starting point, it is useful to consider the following heuristic argument. Suppose an economy had very stringent employment protection in the past. This regulation maintains some employed workers in jobs that would be destroyed in its absence. If this economy were to remove employment protection, these workers would become unemployed. Thus this group of workers resists deregulation and may succeed in keeping stringent protection in place. In an otherwise identical country with low employment protection in the past, a group of workers whose employment depends on stringent protection has never been generated, allowing this country to maintain flexible labor markets.

The key implicit assumption in this heuristic argument is that workers who would be left unemployed by deregulation resist the reform. The main question of this paper is then the following: under what circumstances is this implicit assumption justified?

I attack this question using a version of the Mortensen-Pissarides search and matching model (Mortensen and Pissarides (1994), Pissarides (2000)). I chose this framework for two reasons. First, the Mortensen-Pissarides model has become the standard theory of equilibrium unemployment and has been used extensively to study the effects of various policies, including employment protection, on labor market performance. Second, and more importantly, the first half of the heuristic argument is correct within this model under a wide variety of circumstances: employment protection maintains workers in relatively unproductive matches, and workers in these matches would be unemployed if employment protection were deregulated.

With the first half of the argument in place, the only remaining question is: are the workers made unemployed by the deregulation also opposed to the reform? In other words, are workers in good matches or workers in bad matches the primary beneficiaries of employment protection?

To provide an answer to this question, it is necessary to first take a step back and ask: why would employed workers support employment protection in the first place? I distinguish two channels through which workers can benefit from employment protection. First, it is frequently argued that by making it more difficult to dismiss the worker, employment protection strengthens workers' position in wage negotiations.[4] This I refer to as the *bargaining effect* of

[4] See for example Lindbeck and Snower (1988) and Blanchard and Portugal (2001).

employment protection. Second, and perhaps more in line with the etymology of the term, if separations are involuntary to workers, then employment protection benefits workers by delaying such involuntary separations. This I refer to as the *prolongation effect* of employment protection. Which of the two effects is present depends on how wages are determined and the interplay between wage setting and the separation decision.

I contrast two specific models of wage determination. The first, Nash bargaining, is the model of wage setting most commonly employed in the Mortensen-Pissarides environment. It is useful to consider this model of wage determination for two reasons. First, it has been in widespread use to examine the implications of employment protection for labor market performance. Thus an examination of how Nash bargaining shapes the political support for employment protection is interesting in its own right. Second, Nash bargaining is useful from an analytical perspective because it isolates one of the two channels through which workers gain from employment protection. Separations are bilaterally efficient. Workers and firms agree on the timing of separations, making separations voluntary to workers. Thus the prolongation effect is absent, leaving only the bargaining effect as a source of gains from employment protection.

With Nash bargaining, an increase in employment protection increases the wage of all workers. Workers in good matches benefit relatively more because they expect to remain employed for longer. Thus they are the primary beneficiaries of employment protection. But high employment protection in the past means fewer good matches today and thus lower support for employment protection. In particular, workers left unemployed by deregulation benefit more from the reform than other employed workers. They were stuck in bad matches, benefitting relatively little from the enhanced bargaining position, and move into unemployment voluntarily after deregulation. This occurs because the reform stimulates hiring, making it easier to find a new and better match. Thus the heuristic argument is not correct in this environment.[5]

[5] This argument extends beyond the realm of employment protection. Under Nash bargaining the worker receives a share of the surplus of the match. Many authors have assumed that labor market regulation enhances the bargaining position of workers by increasing the share of the surplus that workers are able to appropriate. Mortensen and Pissarides (1999a) consider a model in which collective bargaining enables monopoly unions to determine the share of workers in the surplus. Blanchard and Giavazzi (2003) study macroeconomic effects of deregulation in product and labor markets, taking labor market regulation to determine the share of workers in bargaining. In Brügemann (2004) I extend the analysis of the present paper to show that policies boosting the bargaining share of the worker are unable to create their own political support for the same reason as

The second model of wage determination I consider is orthogonal to Nash bargaining in the following sense: separations are involuntary to workers, activating the prolongation effect, while employment protection has no direct effect on wages, shutting down the bargaining effect. For the heuristic argument to be correct it must be the case that workers in poor matches, at least on average, gain relatively more from employment protection. I argue that this is a natural outcome in an environment with involuntary dismissals. Intuitively, for workers in good matches dismissal is only a remote concern, so they gain relatively little from an increase in employment protection. In contrast, workers in poor matches are closer to the separation margin and thus in a position to benefit more immediately from a delay in separation. In a calibrated example the positive feedback effect from past protection to current political support is sufficiently strong to generate multiple stationary political outcomes: low employment protection is maintained if protection was low in the past, high employment protection survives if past protection was high.

With involuntary dismissals an increase in employment protection is desired most by employed workers likely to be unemployed soon. The opposite is true for Nash bargaining. I utilize a recent survey of German workers to examine how these predictions measure up to the data. In this survey workers were asked about the likelihood of unemployment in the near future as well as about their stance towards employment protection reform. The survey evidence supports the view that an extension of employment protection is favored more strongly by workers who face a high probability of unemployment in the near future.

The remainder of the paper is organized as follows. In section 1 I introduce a version of the Mortensen-Pissarides model. Section 2 presents the two models of wage determination, analyzes their implications for the separation decision, and discusses how they shape the preferences of workers for employment protection. The general equilibrium of the model is studied in section 3. In section 4 I describe the political environment. The negative result for Nash bargaining is obtained in section 5. In section 6 I turn to the model with involuntary dismissal. The survey evidence is presented in section 7. Related literature is discussed in section 8 and section 9 concludes.

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employment protection: they are supported by workers in high productivity matches but shift the distribution of productivity toward lower values.

1 The Model

Time is discrete. There is a continuum of infinitely lived ex ante identical workers of mass one. At a point in time a worker is either employed or unemployed. The production structure of the economy consists of many firm-worker matches, each composed of one worker and one firm.

Timeline. The timing of events within a period is as follows. At the beginning of the period a fraction of workers in existing matches quits exogenously. Then surviving matches receive a new draw of match specific productivity. Next workers unemployed at the end of last period and vacancies posted during last period are matched and each new match receives an initial draw of match specific productivity. This is followed by separation decisions in all matches. Now production takes place in surviving matches. Finally firms decide whether to post vacancies.

Preferences. All agents have linear utility with discount factor $(1-\rho) \in (0,1)$: the utility of a consumption stream C_t is given by $\sum_{t=0}^{\infty}(1-\rho)^t C_t$.

Creation. Maintaining an open vacancy is associated with a cost c per period. If at the end of this period the number of unemployed workers is u and the number of open vacancies is v, then the number of new matches created next period is given by $m(u,v)$. The matching function m has constant returns to scale, is continuous, strictly increasing in both arguments, and satisfies $m(u,v) < \min\{u,v\}$. An open vacancy is matched with probability $q(\theta) \equiv m\left(\frac{1}{\theta},1\right)$. The matching probability of an unemployed worker is $f(\theta) \equiv m(1,\theta)$. The ratio $\theta = \frac{v}{u}$ is referred to as labor market tightness. To insure existence of equilibrium I assume that $\lim_{\theta\to\infty} q(\theta) = 0$.

Production. The initial productivity of a new match is drawn from a distribution given by the distribution function G_{new}. Subsequently a match experiences idiosyncratic productivity shocks. In particular, match specific productivity follows a Markov process with state space $\mathcal{Y} \subseteq \mathbb{R}_+$ and transition function Q. The process is stochastically monotone: if productivity is high today, it is likely to be high tomorrow; formally $y' \geq y$ implies that $Q(y',\cdot)$ first order stochastically dominates $Q(y, \cdot)$.[6] In addition, I make two standard technical assumptions. First, I assume that the state space $\mathcal{Y}$ is bounded. Second, I assume that the transition function satisfies the Feller property.[7] The payoff of non-market activity received by unemployed workers is denoted as $z \geq 0$.

Destruction. There is both exogenous and endogenous destruction. At the beginning of each period an employed worker quits with exogenous probability $\frac{\delta}{1-\rho} \in (0, 1)$.[8] Idiosyncratic shocks to match specific productivity are the source of endogenous destruction.

Employment Protection. When dismissing a worker, the firm is bound by statutory employment protection, which is modeled as wasteful firing costs $F \in \mathcal{F} \subseteq \mathbb{R}_+$.[9] I assume that firms in new are already subject to employment protection when they learn the initial productivity of a new match. Thus a firm cannot dismiss a worker at no cost if initial productivity is low. When discussing the robustness of results, I address the implications of allowing firms to do so. Quits are not subject to firing costs.

I assume that at time $t = 0$ the economy is in the steady state induced by some past level of firing costs F_0. Now the economy experiences an unanticipated change in the level of firing costs. Within period $t = 0$, I assume that the change occurs after separations have been made, but firms are given another opportunity to dismiss workers right after the change in policy takes effect. No further changes in firing costs are expected to occur in the future. In sections 2-3 the change in firing costs is treated as exogenous. Starting in section 4 the new level of firing costs F is endogenized as the outcome of a political decision.[10]

[6] Allowing for a general Markov process in discrete time — as opposed to working with specific processes in continuous time — allows me to highlight the *qualitative* features of the productivity process driving the theoretical results. For instance, the assumption of stochastic monotonicity is all that is needed to arrive at the negative conclusion in the case of Nash bargaining.

[7] The Markov process has the Feller property if $\int f(z')Q(z, dz')$ is a bounded and continuous function of z for any bounded and continuous function f. See Stokey and Lucas (1989, p. 220) for a discussion.

[8] I divide by the discount factor to simplify subsequent expressions.

[9] The analysis goes through if a fraction of firing costs goes to the worker as a severance payment, see Brügemann (2004) for details.

[10] This specification of political dynamics in form of an unanticipated once and for all change has been used in previous work on the political economy of employment protection, to be discussed in section 8. In particular, it is implicitly assumed that firms are surprised by the change in policy and do not have an opportunity to adjust employment before the new level of firing costs becomes effective. In Brügemann (2006b) I relax this assumption by giving firms an opportunity to dismiss workers before the effective date of the new level of firing

2 Wage Determination and the Separation Decision

In this section I introduce the two models of wage determination contrasted in this paper. I examine how they interact with the separation decision and thereby shape the preferences of workers for employment protection. First I discuss Nash bargaining and then I introduce a model of wage determination that gives rise to involuntary dismissals.

The analysis of wage determination is greatly simplified by the simple transitional dynamics of the Mortensen-Pissarides model in response to changes in parameters such as firing costs.[11] Both labor market tightness and the utility of unemployed workers immediately jump to their new steady state values. Only the level of employment and the production structure adjust slowly to the new steady state. Therefore I only need to consider the determination of wages in a match that operates in a stationary environment in which firing costs are constant at F and the utility of unemployed workers is constant at U.

Now consider a match in this stationary environment with fluctuating idiosyncratic productivity. Stochastic monotonicity of the productivity process implies that the optimal separation policy is a threshold rule. In general a threshold rule is a tuple $\underline{s} = (\underline{y}, \underline{\lambda})$. The first part $\underline{y}$ is a productivity threshold. The second part $\underline{\lambda}$ is the probability of separation if productivity is exactly equal to the threshold $\underline{y}$.[12]

With knowledge of U, F, current productivity y and the separation rule $\underline{s}$ it is straightforward to compute the joint present discounted value of a match $V(y, \underline{s}, F, U)$. Wage determination is about splitting this value between the worker and the firm, while the separation decision is about the determination of $\underline{s}$, and the two interact in important ways.

2.1 Nash bargaining

With Nash bargaining as it is typically applied to the Mortensen-Pissarides model, the joint value is shared according to the rule

$$\begin{aligned} W_{NB}(y, \underline{s}, F, U) &= U + \beta \left[V(y, \underline{s}, F, U) - (U - F) \right], \\ J_{NB}(y, \underline{s}, F, U) &= -F + (1 - \beta) \left[V(y, \underline{s}, F, U) - (U - F) \right]. \end{aligned} \tag{1}$$

costs, and I show that this creates an additional mechanism that can generate multiple stationary political outcomes.

[11]See Pissarides (2000), pp. 59–63.

[12]I need to allow for randomization in the separation rule to establish existence of equilibrium in the model with involuntary dismissals.

Here $W_{NB}(y, \underline{s}, F, U)$ is the utility of the worker and $J_{NB}(y, \underline{s}, F, U)$ is the value of the firm. The worker receives the utility from being unemployed U plus a share $\beta \in (0, 1)$ of the surplus, while the firm receives the remaining share of the surplus on top of the firing costs liability.[13]

The first thing to notice about the sharing rule (1) is that the worker and the firm agree about the choice of the separation rule $\underline{s}$: both want it to maximize the joint value $V(y, \underline{s}, F, U)$. In other words, the separation decision is privately efficient.

The following lemma establishes the comparative statics properties of the threshold productivity. All proofs are collected in the appendix.

Lemma 1. *The threshold productivity $y_{NB}(F, U)$ is strictly decreasing in F and strictly increasing in U.*

Higher firing costs make splitting up less attractive, while less painful unemployment hastens separation. Both the worker and the firm are indifferent with respect to separation when productivity equals $\underline{y}_{NB}(F, U)$, so any separation rule $\underline{s} = (\underline{y}_{NB}(F, U), \underline{\lambda})$ with $\underline{\lambda} \in [0, 1]$ is optimal. Let $\underline{s}_{NB}(F, U)$ be the set of optimal separation rules.

Let $W^*_{NB}(y, F, U) \equiv W_{NB}(y, \underline{s}_{NB}(F, U), F, U)$ be worker utility if the separation decision is optimal. The comparative statics properties of W^*_{NB} are key for the political economy analysis.

Lemma 2. *(a) Consider $U^H > U^L$. The difference $W^*_{NB}(y, F, U^H) - W^*_{NB}(y, F, U^L)$ is positive, bounded above by $U^H - U^L$, and weakly decreasing in y.*

(b) Consider $F^H > F^L$. The difference $W^*_{NB}(y, F^H, U) - W^*_{NB}(y, F^L, U)$ is non-negative, bounded above by $F^H - F^L$, and weakly increasing in y.

To discuss the mechanics of this lemma, it is instructive to examine the wage implied by Nash bargaining:

$$w_{NB}(y, F, U) = \rho U + \beta \left[y - \rho U + (\rho + \delta) F \right]. \tag{2}$$

[13] In Mortensen and Pissarides (1999b) firing costs do not enter the outside opportunity of the firm until the match experiences its first change in productivity. Firing costs improve the bargaining position of the worker and increase wages after the first productivity change. But they do not improve the bargaining position of the worker when the match forms. As a consequence, firing costs reduce the wage before the first productivity change to compensate the firm for the anticipated change in relative bargaining positions. In this environment the analysis of this section still provides the correct preferences of employed workers over firing costs at the time of the political decision, since these workers have already experienced productivity shocks. The equilibrium conditions of section 3.1 need to be adjusted to reflect that firing costs do not improve the bargaining position of workers in new matches, but this does not affect any results.

Higher utility from unemployment benefits employed workers. First, it puts them in a better position upon becoming unemployed. Second, it enables them to obtain a higher wage in bargaining. Higher firing costs enable workers to bargain towards higher wages and increase their utility for constant utility from unemployment. This is the *bargaining effect* of employment protection.

Key for the ability of employment protection to generate its own political support is how these two effects vary with productivity. An increase in the utility of unemployment increases wages only by $\beta\rho(U^H - U^L)$ while the flow value of unemployment increases by $\rho(U^H - U^L)$. Therefore workers in poor matches gain more, simply because they are more likely to become unemployed soon. In contrast, higher firing costs benefit workers in good matches more, holding utility from unemployment constant. This is because they can expect to remain employed for longer and are thus in a better position to benefit from higher wages.

In equilibrium an increase in firing costs also affects the utility of unemployed workers. To evaluate who gains most one has to take this effect into account. The equilibrium is analyzed starting in section 3. To anticipate the results, it is useful to work with the conjecture that utility from unemployment falls. If this is the case, then the equilibrium effect works in the same direction as the direct effect: workers in good matches suffer least from the drop in utility from unemployment since they are more sheltered from unemployment.

In the introduction I distinguished the bargaining effect and the prolongation effect as two channels through which workers can benefit from employment protection. I claimed that the prolongation effect is absent in the case of Nash bargaining. Notice however that here employment protection does extend job duration by reducing the separation threshold. If that is the case, why do workers not benefit from this increase in job length? To make this claim precise, notice that firing costs have two effects on worker utility $W_{NB}(y, \underline{s}_{NB}(F,U), F, U)$. The first effect works through wages, the second effect works the separation threshold. Now consider the following thought experiment. Consider an increase in firing costs from F^L to F^H, but fix the wage schedule at $w_{NB}(y, F^L, U)$. One can interpret this as allowing the worker to delay separation through the policy instrument of firing costs while leaving wages unaffected. Would the worker like this instrument to be used? Here the answer is no. This is because given the wage schedule $w_{NB}(y, F^L, U)$, the separation rule $\underline{s}_{NB}(F^L, U)$ is optimal from the perspective of the worker. She does not receive any direct benefit from manipulating the separation threshold. She wants the separation rule to drop after an increase in firing costs, but this is only an afterthought to higher wages through the bargaining effect, as higher wages make staying on the job more attractive.

2.2 Involuntary Dismissal

Now I consider a class of wage determination rules that are orthogonal to Nash bargaining in the following sense. First, an increase in firing costs no longer directly enables workers to obtain a higher wage. Second, the separation rule adopted by the firm is no longer optimal from the perspective of the worker. This gives workers a reason to manipulate this rule through the policy instrument of firing costs. Specifically, I consider wage rules of the form

$$w(y, F, U) = w_{ID}(U) \tag{3}$$

satisfying the following assumption.

Assumption 1. *The wage function w_{ID} is continuous and satisfies the following properties.*

(a) $w_{ID}(U) > z$ for all $U \geq \frac{z}{\rho}$.

(b) Consider $U^H > U^L \geq \frac{z}{\rho}$. Then

$$0 \leq w_{ID}(U^H) - w_{ID}(U^L) \leq \rho(U^H - U^L).$$

Let $\mathcal{U}_{ID} \equiv \{U | w_{ID}(U) > \rho U\}$ be the set of utility levels from unemployment such that the wage exceeds the flow value of unemployment ρU. As will be shown later, part (a) of Assumption 1 insures that in equilibrium utility from unemployment must lie within this set. As a consequence any dismissal is involuntary.[14] In contrast to the Nash bargaining wage rule (2), here the wage is independent of both firing costs and match specific productivity. Some dependence on productivity can be accommodated, but is not considered here as it generates little added insight.[15] Importantly, the wage is not directly affected by firing costs, as I want to shut down the bargaining effect in order to focus on the implications of involuntary dismissal.

[14]Dismissals are also bilaterally inefficient here. Involuntariness of dismissals implies bilateral inefficiency as long as firms take optimal separation decisions for a given wage rule. Both need not coincide if the firm can commit to a separation rule. For example, suppose the firm commits to the bilaterally efficient separation rule $\underline{s}_{NB}(F, U)$, and also commits to paying a wage $w > \rho U$ as long as the worker is employed. Then the worker would want to change the separation rule ex post, although separation is bilaterally efficient.

[15]The proofs of Lemmas 3–5 in appendix B are given for the more general case with dependence on productivity.

This class of wage rules includes a simple fixed wage $\bar{w}$, but it also allows the wage level to be affected by labor market conditions through the utility of unemployed workers U. Part (b) of Assumption 1 states that higher utility from unemployment increases the wage, but less than one for one. This property is shared by the Nash bargaining wage rule (2).

Taking as giving this wage, the firm solves an optimal stopping problem giving rise to a separation threshold $\underline{y}_{ID}(F, U)$.

Lemma 3. *The threshold productivity $y_{ID}(F, U)$ is weakly increasing in U and strictly decreasing in F.*

The qualitative properties of the separation threshold are similar to that of $\underline{y}_{NB}(F, U)$ established in Lemma 1. The only difference is that $\underline{y}_{ID}(F, U)$ is only weakly increasing in U. Unemployed utility affects the separation threshold only through the wage, and if an increase in U does not change the wage, then it leaves the threshold unaffected as well. The firm is indifferent about separation at $\underline{y}_{ID}(F, U)$, so the set of optimal separation rules $\underline{s}_{ID}(F, U)$ is made up of all pairs $(\underline{y}_{ID}(F, U), \underline{\lambda})$ with $\underline{\lambda} \in [0, 1]$.

Now let $W_{ID}(y, \underline{s}, F, U)$ denote worker utility if current match productivity is y, the wage is $w_{ID}(U)$, and dismissal occurs according to the separation rule $\underline{s}$. The argument F is carried along only for notational consistency with the case of Nash bargaining: conditional on the separation rule, there is no effect of firing costs on worker utility, precisely because the bargaining effect is shut down and firing costs do not affect wages.

Lemma 4. *The function W_{ID} has the following properties.*

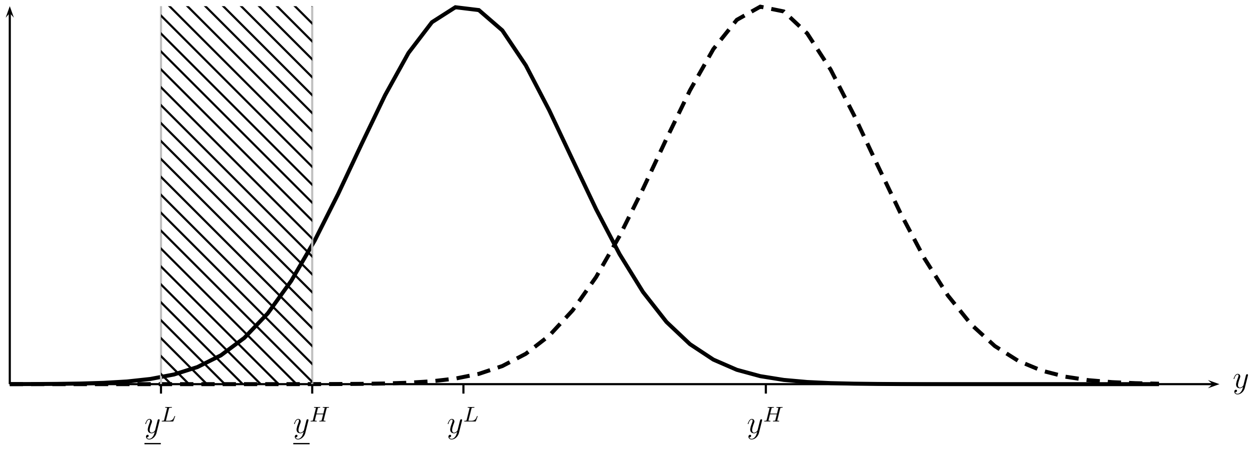
(a) Consider U^H, $U^L \in \mathcal{U}_{ID}$ with $U^H > U^L$. Then the difference $W_{ID}(y, \underline{s}, F, U^H) - W_{ID}(y, \underline{s}, F, U^L)$ is positive, bounded above by $U^H - U^L$, and weakly decreasing in y.

(b) Fix $U \in \mathcal{U}_{ID}$. Consider $\underline{s}^L < \underline{s}^H$. Then the difference $W_{ID}(y, \underline{s}^L, F, U) - W_{ID}(y, \underline{s}^H, F, U)$ is non-negative.

According to part (a), there is no difference vis-à-vis Nash bargaining in the comparative statics with respect to utility from unemployment. Part (b) considers a drop in the separation rule. First a drop in the separation rule needs to be defined. The natural way to order separation rules is lexicographic: if $\underline{s}^L = (\underline{y}^L, \underline{\lambda}^L)$ and $\underline{s}^H = (\underline{y}^H, \underline{\lambda}^H)$, then

$$\underline{s}^L \leq \underline{s}^H \quad \Leftrightarrow \quad \underline{y}^L < \underline{y}^H \text{ or } (\underline{y}^L = \underline{y}^H \text{ and } \underline{\lambda}^L \leq \underline{\lambda}^H).$$

Figure 1: Benefit of Delayed Separation



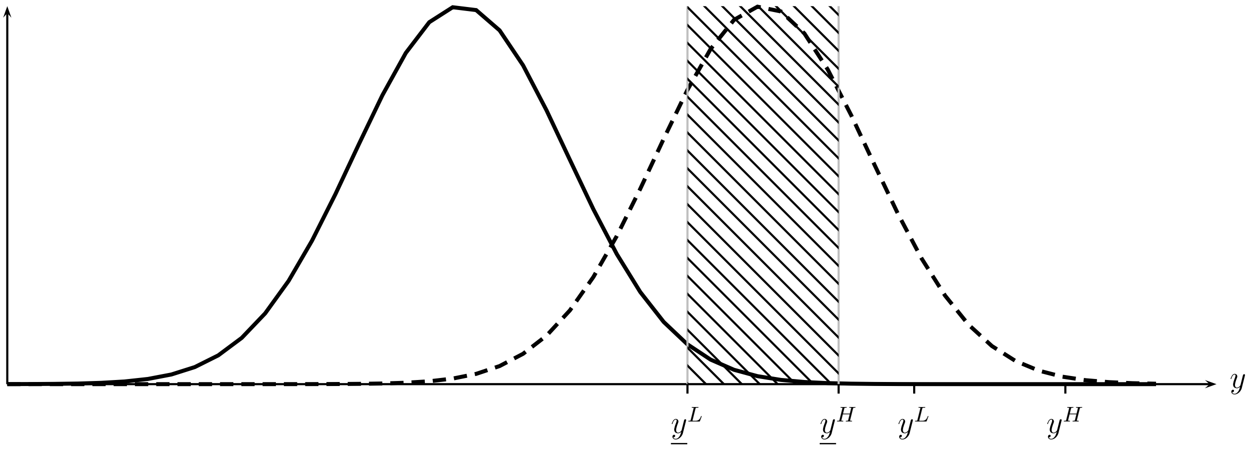
Part (b) states that workers benefit from a drop in the separation rule. This is because it prolongs jobs and any dismissal is involuntary, so that workers want to stay employed as long as possible.

The key question — on which Lemma 4 is silent — is how the benefit of a drop in the separation rule varies with productivity. If workers in poor matches gain most, then this may enable employment protection to generate its own support by creating many poor matches. Moreover, it is intuitive that workers in poor matches should gain most, since they are closest to being dismissed involuntarily. The calibrated example of section 6.2 shows that this mechanism can indeed be strong enough to sustain multiple stationary political equilibria. However, under the assumptions made so far, it is not true in general that workers in poor matches benefit most from a drop in the separation rule. The remainder of this section explains potential caveats and to what extent they can be resolved by imposing additional structure.

I begin by illustrating the basic idea in Figure 1. It shows how a drop in the separation threshold from $\underline{y}_H$ to $\underline{y}_L$ affects workers depending on their productivity level. Two productivity levels y^H and y^L are compared. The dashed curve is the density of next period's productivity given that productivity is y^H this period. In this example it is centered at y^H. The solid line provides the analogous density for the low productivity level y^L. The benefit of the drop in the separation threshold is that involuntary dismissal is avoided if productivity drops into the region $[\underline{y}_L, \underline{y}_H)$. In this example productivity is much more likely to drop into this region if productivity is y^L rather than y^H. Therefore the worker in a match with productivity y^L benefits more from the delay in dismissal when looking one period ahead.

I now turn to the first caveat. Stochastic monotonicity insures that lower productivity today means lower productivity tomorrow. But it does not insure that it is more likely to

Figure 2: Benefit of Delayed Separation, Caveat 1



reach the delayed dismissal region $[\underline{y}_L, \underline{y}_H)$. Figure 2 provide a counterexample which features substantial downward drift in productivity, so the density of next period's productivity is no longer centered at today's productivity. Here the worker in the low productivity match has little to gain from the reduction in the separation threshold, since next period's productivity will already be so much lower that avoiding separation in the region $[\underline{y}_L, \underline{y}_H)$ has little benefit.

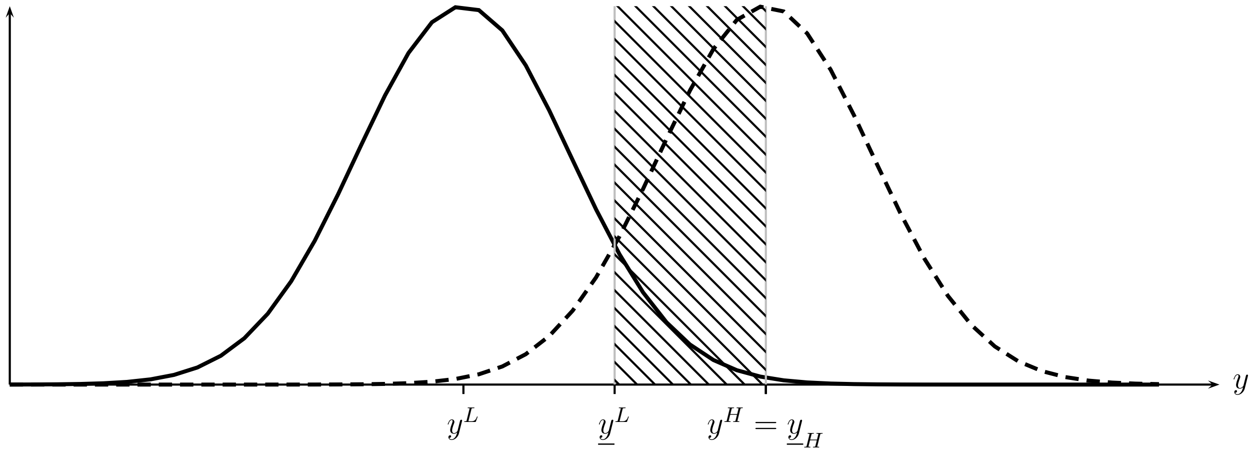
I now provide a sufficient condition that resolves this first caveat. Suppose that the productivity of a match starting with productivity y^H cannot drop below $y^L < y^H$ without first taking on the value y^L. Additionally, suppose that $y^L \geq \underline{y}_H$. This implies that the low productivity worker is not dismissed immediately under the higher separation rule. Given this constellation, a worker with high productivity y^H first needs to turn into a worker with low productivity y^L in order to pass into the delayed dismissal region $[\underline{y}_L, \underline{y}_H)$. Since delayed dismissal is the only benefit of firing costs, the high productivity worker obtains no flow benefits from higher firing costs until he turns into the low productivity worker. As a consequence, he benefits less that the worker with low productivity y_L.[16]

Condition 1. *If $y^H > y^L$, then $Q(y^H, [0, y^L)) = 0$ for all $y^H, y^L \in \mathcal{Y}$.*

Lemma 5. *Suppose that Condition 1 holds. Then for $\underline{s}^H, \underline{s}^L$ with $\underline{s}^L < \underline{s}^H$ and $\underline{s}^H = (\underline{y}^H, \underline{\lambda}^H)$ the difference $W_{ID}(y, \underline{s}^L, F, U) - W_{ID}(y, \underline{s}^H, F, U)$ is weakly decreasing in y for $y \geq \underline{y}_H$ and any $U \in \mathcal{U}_{ID}$.*

[16] If the state space is continuous, then Condition 1 implies that productivity can never drop. Condition 1 is only useful in conjunction with a state space of the form $\mathcal{Y} = \{\ldots, y_{n-1}, y_n, y_{n+1}, \ldots\}$ where $y_{n-1} < y_n$ for all $n \in \mathbb{N}$. With this state space Condition 1 is satisfied if $Q(y_n, \{y_m\}) = 0$ for $m < n-1$, so that productivity can only drop to the immediate predecessor.

Figure 3: Benefit of Delayed Separation, Caveat 2



The analogous condition to the sufficient condition of Lemma 5 in continuous time is that sample paths cannot exhibit downward discontinuities.[17] Substantively, it is more likely to be a good assumption if separation decisions are made frequently relative to the rate at which productivity can decline.

An important qualification in Lemma 5 is that the utility difference

$$W_{ID}(y, \underline{s}^L, F, U) - W_{ID}(y, \underline{s}^H, F, U)$$

is weakly decreasing for $y \geq \underline{y}_H$ and not necessarily on the entire productivity state space $\mathcal{Y}$. Figure 3 illustrates the importance of this second caveat. Consider the worker with low productivity y_L, which now lies below the threshold $\underline{y}^L$. This worker is in no position to benefit from the drop in the separation threshold. This is because $\underline{y}_L$ is not low enough to save his job, so he would be dismissed immediately after the implementation of the higher level of firing costs. And even if he were able to hold onto his job into the next period, his match would less likely have next period productivity in the delayed dismissal region $[\underline{y}_L, \underline{y}_H)$ than the worker with high productivity y_H. If $y^L \in [\underline{y}^L, \underline{y}^H)$ rather than $y^L < \underline{y}_L$, then this worker can still benefit somewhat from the delay in separation, but not to its full extent, as he has already passed through part of the delayed dismissal interval $[\underline{y}^L, \underline{y}^H)$.[18]

[17] See Aït-Sahalia (2002) for a discussion of the relationship between sample path continuity and discrete time Markov processes in which from one period to the next only movements between adjacent states are possible. Previous research on the political economy, to be discussed in section 8, assumed productivity processes with continuous sample paths. In Saint-Paul (2002) productivity is declining exponentially, while Vindigni (2002) and Brügemann (2004) consider a geometric Brownian motion.

[18] The example pictured in Figure 3 does not satisfy Condition 1, but the same logic applies if Condition 1 is satisfied.

The crux of this caveat is that workers in poor matches may not be able to fully benefit from a particular drop in the separation rule, simply because current productivity is already too low. There is one scenario were this caveat has less bite, namely if the separation rule drops to $\underline{s}^P \equiv (0,0)$, which amounts to prohibiting dismissals entirely. The following lemma establishes that workers in poor matches benefit more from prohibiting dismissals.

Lemma 6. *The difference $W_{ID}(y, \underline{s}^P, F, U) - W_{ID}(y, \underline{s}, F, U)$ is weakly decreasing in y on $\mathcal{Y}$ for any $\underline{s}$ and $U \in \mathcal{U}_{ID}$.*

While no additional structure needs to be imposed to obtain this result, it should be pointed out that this is the only result in this section that relies on the wage rule (3) being independent of match productivity. In other words, sufficient wage compression across match specific productivity levels is required to insure that prohibiting separations is relatively more attractive for workers in poor matches.

So far I have only examined under what circumstances a drop in the separation rule is more beneficial to workers in poor matches. However, in equilibrium an increase in firing costs also affects the utility of the unemployed, and again it is useful to work with the conjecture that utility from unemployment falls. If this is the case, then workers in poor matches gain most from the drop in the separation threshold (subject to the caveats above), but suffer more from the drop in utility from unemployment. Therefore, unlike with Nash bargaining, the two effects of firing costs do not work in the same direction. However, there is a special case of the wage rule (3) for which a drop in the utility of the unemployed affects workers at all levels of match specific productivity in the same way.

Condition 2. *The wage rule satisfies $w_{ID}(U) = \rho U + q$ for some $q > 0$.*

With this wage rule a drop in the utility of the unemployed reduces the wage by exactly the drop in the opportunity cost of working, so the utility of all workers falls one for one with the decrease in U.

Lemma 7. *Suppose Condition 2 holds. Then for all U^H, $U^L \in \mathcal{U}_{ID}$*

$$W_{ID}(y, \underline{s}, F, U^H) - W_{ID}(y, \underline{s}, F, U^L) = U^H - U^L.$$

In this special case, subject to the two caveats discussed above, an increase in firing costs benefits workers in poor matches relatively more even when the equilibrium effect is taken into account.

3 Economic Equilibrium and Steady State

3.1 Equilibrium Path

As discussed in section 2, the transitional dynamics of the model are such that the utility of the unemployed U (and thereby the separation threshold $\underline{s}$) as well as labor market tightness θ are constant along the equilibrium path after the change in firing costs at time $t = 0$. I now state the conditions that determine these values in equilibrium. Statements made about the equilibrium path in this section apply to both models of wage determination $M \in \{NB, ID\}$.

An equilibrium is a triple $(U, \theta, \underline{s})$ satisfying the following conditions

$$\underline{s} \in \underline{s}_M(F, U) \tag{4}$$

$$c \geq (1-\rho)q(\theta) \int J_M(y, \underline{s}, F, U) dG_{new}(y) \quad \text{with equality if } \theta > 0, \tag{5}$$

$$\rho U = z + (1-\rho) f(\theta) \int \left[W_M(y, \underline{s}, F, U) - U\right] dG_{new}(y). \tag{6}$$

Condition (4) requires that the separation rule $\underline{s}$ is optimal. Condition (5) is the free entry condition for posting vacancies. The right hand side is the return from posting a vacancy, that is the present discounted value of being matched with a worker next period. In equilibrium it cannot exceed the vacancy cost c and must equal this cost if a positive mass of vacancies is posted. Condition (6) states that the flow value of unemployment ρU is the sum of the value of non-market activity z and the capital gain from being matched with a firm next period.

Lemma 8. *(a) (Existence) For each level of firing costs $F \in \mathcal{F}$ the conditions* (4)–(6) *have a solution.*

(b) (Uniqueness) The equilibrium values of U, θ, and $\underline{y}$, denoted as $U_M^{eq}(F)$, $\theta_M^{eq}(F)$ and $\underline{y}_M^{eq}(F)$, are uniquely determined. Equilibrium utilities $W_M(y, \underline{s}_M^{eq}(F), F, U_M^{eq}(F))$ are uniquely determined.[19]

According to part (b) utility levels are well determined, which allows me to express the utility of a worker at time $t = 0$ as a function of the productivity of his match and the future level of firing costs :

$$\mathcal{W}_M(y, F) \equiv W_M(y, \underline{s}_M^{eq}(F), U_M^{eq}(F), F). \tag{7}$$

[19]Thus everything but the separation probability is unique. Under Nash bargaining all separation probabilities $\underline{\lambda}$ are consistent with equilibrium, so $s_{NB}^{eq}(F) = \{\underline{y}_{NB}^{eq}(F)\} \times [0,1]$ is the set of equilibrium separation rules. With involuntary dismissal the separation probability may be unique, this occurs if the productivity level $\underline{y}_M^{eq}(F)$ occurs with positive probability during the life of a match. See the proof for details.

Unemployed workers are included in this formulation by assigning them the productivity level $u < 0$ and setting $\mathcal{W}_M(u, F) \equiv U_M^{eq}(F)$. Let $\mathcal{Y}_{all} \equiv \{u\} \cup \mathcal{Y}$ be the enlarged productivity space including unemployment.

3.2 Steady State

First I establish that there is a unique steady state distribution of workers over the enlarged state space $\mathcal{Y}_{all}$.[20] Knowledge of the separation rule $\underline{s}$ and labor market tightness θ is sufficient to pin down the steady state distribution.

Lemma 9. *For each pair $(\underline{s}, \theta)$ a steady state distribution exists and is unique.*

Let $G_{all}^{ss}(\cdot|\underline{s}, \theta)$ denote the distribution function associated with the steady state distribution as a function of the separation rule $\underline{s}$ and labor market tightness θ. Next I turn to the productivity distribution conditional on employment, denoted as $G_{emp}^{ss}(\cdot|\underline{s})$. It does not depend on labor market tightness θ: the magnitude of flows into and out of unemployment matters for the level of employment but not for the distribution of productivity across employed workers. Now let $\geq_{FSD}$ denote first order stochastic dominance. The following lemma establishes that the productivity distribution shifts down with a fall in the separation rule.[21]

Lemma 10. *Suppose $\underline{s}^H \geq \underline{s}^L$. Then $G_{emp}^{ss}(\cdot|\underline{s}^H) \geq_{FSD} G_{emp}^{ss}(\cdot|\underline{s}^L)$.*

Next consider steady state employment, which is given by

$$L^{ss}(\underline{s}, \theta) = 1 - G_{emp}^{ss}(u|\underline{s}, \theta).$$

An increase in employment protection may simultaneously reduce both the separation rate as well as labor market tightness. Thus the effect on employment is generally ambiguous. This ambiguity is a common feature of equilibrium models of employment protection.[22]

[20] I compute the steady state distribution at the time of production. This is the productivity distribution and employment level right after the separation decision of the current period. Since in section 4 the political decision takes place right after the separation decision, this provides the correct distribution and employment level to aggregate preferences at the time of the vote.

[21] If the separation rule is so high that no new matches survive their first separation decision, then steady state employment is of course zero and their is no meaningful distribution of productivity across employed workers. In this case it is notationally convenient to set $G_{emp}^{ss}(\cdot|\underline{s})$ equal to the degenerate distribution with all mass at $+\infty$.

[22] Ljungqvist (2002) examines the effect of employment protection on the level of employment in a variety of general equilibrium models.

4 The Political Decision

In the previous section the model economy experienced an unanticipated exogenous change in firing costs at time $t = 0$. In the remainder of the paper I assume that the new level of firing costs F is the outcome of a political decision. Now it is the opportunity to change firing costs that arises unanticipatedly.[23] The key question is how the political support for future firing costs F varies with the extent of past employment protection F_0.

Since employed workers are the principal beneficiaries of employment protection, I focus on the question how their support varies with the extent of past protection. I do so by asking: suppose the new level of firing costs is the outcome of a political decision among employed workers, how does the outcome vary with the past level of firing costs? While the focus is on employed workers, I discuss how the results change if the unemployed and firm owners participate in the political decision.

I assume that the political equilibrium is the outcome of probabilistic voting (Lindbeck and Weibull (1997)). A detailed exposition of this model is provided in Persson and Tabellini (2000) and is not repeated here. Voters care not only about the policy at hand — here employment protection — but also about some second dimension which Persson and Tabellini (2000) refer to as "ideology". A key result is that outcomes of the political choice must maximize a weighted sum of individual utilities. In general the model allows for heterogeneity among voters in the strength of the concern for ideology, and a stronger concern for ideology translates into a lower weight. Intuitively, it is easier for candidates to attract the support of "swing-voters" with little ideological attachment, giving these voters a stronger influence on equilibrium policy. Here I assume that the concern for ideology is uniform across workers. Thus the political equilibrium must maximize average utility of employed workers.

Aggregating preferences through average utility is an illustrative example. The results I obtain below hold for many alternative ways of aggregating worker's preferences. Below I discuss what qualitative features of the aggregation rule are required for the results to carry over.

Let $\mathcal{F}$ be the set of available political choices. Then the set of political equilibria is[24]

$$\mathcal{P}_{M,emp}(F_0) \equiv \arg\max_{F \in \mathcal{F}} \int \mathcal{W}_M(y, F) dG^{ss}_{emp}(y|\underline{s}^{eq}_M(F_0)). \tag{8}$$

[23]If the opportunity to change regulation is anticipated it would be be inconsistent to assume that the economy is in steady state at time $t = 0$.

[24]If F_0 induces zero steady state employment, then it is notationally convenient to set $\mathcal{P}_{M,emp}(F_0) = \emptyset$.

The past level of firing costs F_0 induces a productivity distribution $G^{ss}_{emp}(\cdot|\underline{s}^{eq}_M(F_0))$. The political choice at time $t = 0$ must maximize average utility with respect to this distribution. Thus the past level of firing costs affects the political outcome at time $t = 0$ through its effect on the steady state productivity distribution prevailing at that time.[25] When the unemployed participated the set of political equilibria is denoted as $\mathcal{P}_{M,all}(F_0)$ and is obtained by replacing the productivity distribution across employed workers with the overall productivity distribution $G^{ss}_{all}(\cdot|\underline{s}^{eq}_M(F_0), \theta^{eq}_M(F_0))$.

To evaluate whether an increase in past firing costs shifts up the set of political choices $\mathcal{P}_{M,emp}(F_0)$ a way of ordering sets is required. I use the *strong set order* $\leq_S$, which is an extension of the usual order from points to sets.[26]

If a positive feedback between the past level of firing costs and the current support political support for firing costs is indeed present, then the question arises whether this mechanism is sufficiently strong to generate multiple stationary political outcomes.

Definition 1. *The model M exhibits multiple stationary political equilibria if there exist F^H_0, F^L_0 such that both $F^H_0 \in \mathcal{P}_{M,emp}(F^H_0)$ and $F^L_0 \in \mathcal{P}_{M,emp}(F^L_0)$, and $F^H_0 \notin \mathcal{P}_{M,emp}(F^L_0)$ or $F^L_0 \notin \mathcal{P}_{M,emp}(F^H_0)$.*[27]

Notice that if $\mathcal{P}_{M,emp}(F_0)$ is decreasing in the strong set order, then this rules out multiple stationary political equilibria. In the next section I show that this is the case for Nash bargaining.

[25]As a technical aside, recall that the past level of firing costs F_0 may induce a variety of stationary distributions which all share the same separation threshold $\underline{y}^{eq}_M(F_0)$ but differ slightly due to the probability at which workers are dismissed when productivity hits the threshold exactly. The notation used in equation (8) should thus be read as follows: F maximizes average utility subject to some distribution $G^{ss}_{emp}(\cdot|\underline{s})$ with $\underline{s} \in \underline{s}^{eq}_M(F_0)$.

[26] The set $\mathcal{P}^H$ is *as high as* the set $\mathcal{P}^L$, written $\mathcal{P}^H \geq_S \mathcal{P}^L$, if for every $F^L \in \mathcal{P}^L$ and $F^H \in \mathcal{P}^H$, $F^L > F^H$ implies that both F^L and F^H are elements of the intersection $\mathcal{P}^H \cap \mathcal{P}^L$. See Milgrom and Shannon (1994) for a detailed discussion of the strong set order.

[27]Since $\mathcal{P}_{M,emp}(F_0)$ is a set, even if an increase in F_0 shifts down the set $\mathcal{P}_{M,emp}(F_0)$ in the strong set order, there can still be multiple intersections with the 45-degree line. However, if F^H_0 and F^L_0 are two such intersections, then F^H_0 must also be a political equilibrium if F^L_0 prevailed in the past and vice versa. Here I am interested in a more restrictive type of multiplicity, where both low and high firing costs are stationary political equilibria, but it is not the case that low firing costs would also be a political equilibrium in the high firing costs economy or vice versa.

5 Nash Bargaining

In this section I show that under Nash bargaining higher firing costs in the past imply lower political support for firing costs today. The argument has two part. The first part is that an increase in past firing costs shifts down the productivity distribution. The second part is that this is a shift towards workers that have little to gain from firing costs.

However, I first need to address a preliminary issue concerning the set of available political choices $\mathcal{F}$. Suppose I allow employed workers to choose any non-negative level of firing costs. Over some range employed workers face a trade-off: an increase in firing costs increases wages but makes unemployment more painful. But at some point future hiring ceases and utility from unemployment remains constant at $\underline{U} = \frac{z}{\rho}$. Beyond this point there is no longer a trade-off: further increases in firing costs only increase wages, and there is no upper bound on the wage level that can be attained. Thus employed workers would vote for infinite firing costs, no matter what level of firing costs prevailed in the past. While it is true that the support for employment protection is non-increasing in past firing costs, this result is vacuous. To make the analysis interesting, I need to impose an upper bound on the level of firing costs. This can be justified by assuming that the amount of resources that can be extracted from firms is limited, which is reasonable. Therefore I assume that the set of available political choices is $\mathcal{F} \in [0, \bar{F}]$. Importantly, it does not automatically follow that now all workers prefer the upper bound $\bar{F}$. The level of firing costs at which hiring ceases could be very unattractive, and if $\bar{F}$ is not much larger it is also undesirable.

Now I turn to the first element of the two-part argument. Suppose an increase in past firing costs reduces the utility of the unemployed. Lemma 1 implies that the separation threshold $\underline{y}^{eq}_{NB}(F_0)$ drops. Lemma 10 then implies that the productivity distribution falls as well. Thus let

$$\mathcal{F}_{NB} = \left\{ F \in \mathcal{F} | \nexists F^H \in \mathcal{F} \text{ s.t. } F^H > F \text{ and } U^{eq}_{NB}(F^H) > U^{eq}_{NB}(F) \right\}$$

be the range over which an increase in firing costs reduces utility from unemployment.

Lemma 11. *Consider $F^H_0, F^L_0 \in \mathcal{F}_{NB}$ with $F^H_0 > F^L_0$. Let $\underline{s}^H_0 \in \underline{s}^{eq}_{NB}(F^H_0)$ and $\underline{s}^L_0 \in \underline{s}^{eq}_{NB}(F^L_0)$. Then $G^{ss}_{emp}(\cdot|\underline{s}^L_0) \geq_{FSD} G^{ss}_{emp}(\cdot|\underline{s}^H_0)$.*

If one could show that under Nash bargaining an increase in firing costs unambiguously reduces utility from unemployment, then the argument would be complete. However, this is not true in general.[28] Instead I take a different approach. I show that if a level of firing costs F is not in the range $\mathcal{F}_{NB}$, then it is dominated in the following sense: there exists a higher level of firing costs which is strictly preferred to F by all workers. Thus F could never have arisen as the outcome of a past political decision. In particular, it cannot be a stationary political equilibrium. Thus levels of firing costs outside of $\mathcal{F}_{NB}$ are of limited interest.[29]

Lemma 12. *If $F \in P_{NB,emp}(F_0)$ or $F \in P_{NB,all}(F_0)$ for some $F_0 \in \mathcal{F}$, then $F \in \mathcal{F}_{NB}$.*

Now I turn to the second part of the argument. Consider an increase in firing costs in the relevant range $\mathcal{F}_{NB}$. This change reduces utility from unemployment in equilibrium. As discussed in section 2.1, workers in good matches benefit more from the direct effect of higher wages and suffer less from the equilibrium effect of more painful unemployment.

Lemma 13. *Consider $F^H, F^L \in \mathcal{F}_{NB}$ with $F^H > F^L$. Then the difference $\mathcal{W}(y, F^H) - \mathcal{W}(y, F^L)$ is weakly increasing in y on $\mathcal{Y}_{all}$.*

With both elements in place, I can now obtain the main theoretical result of the paper: higher firing costs in the past shift down the set of political outcomes today.

Proposition 1. *Consider $F_0^H, F_0^L \in \mathcal{F}_{NB}$ with $F_0^H > F_0^L$. Then $\mathcal{P}_{NB,emp}(F_0^H) \leq_S \mathcal{P}_{NB,emp}(F_0^L)$.*

I conclude this section by discussing the robustness of this result with respect to various departures from the baseline specification.

Participation of the Unemployed. Unemployed workers suffer most from an increase in employment protection. Thus if more stringent regulation in the past is associated with higher unemployment today, this provides an additional force reducing support for firing costs today, strengthening the result of Proposition 1.

Corollary 1. *Consider $F_0^H, F_0^L \in \mathcal{F}_{NB}$ with $F_0^H > F_0^L$. Suppose that $\underline{s}_0^H \in \underline{s}_{NB}^{eq}(F_0^H)$ and $\underline{s}_0^L \in \underline{s}_{NB}^{eq}(F_0^L)$ implies $L^{ss}(\underline{s}_0^H, \theta_{NB}^{eq}(F_0^H)) \leq L^{ss}(\underline{s}_0^L, \theta_{NB}^{eq}(F_0^L))$. Then $\mathcal{P}_{NB,all}(F_0^H) \leq_S \mathcal{P}_{NB,all}(F_0^L)$.*

[28] If the bargaining share of workers β is low relative to what would be required in order to satisfy the Hosios (1990) rule for efficiency, then over some range an increase in firing costs substitutes for the low bargaining share of workers and increases the utility of the unemployed. This only applies up to a certain point when the implied bargaining power of workers becomes excessive, giving rise to a hump-shaped function $U_{NB}^{eq}(F)$.

[29] A level of firing costs outside of $\mathcal{F}_{NB}$ may of course be the outcome of a past political decision if model parameters other than firing costs were different in the past.

Participation of Firms. Firms in bad matches suffer relatively more from employment protection. They are more likely to pay the firing costs in the near future, so they are more affected by the direct effect of firing costs. The equilibrium effect of lower utility from unemployment moderates wages, which benefits firms in good matches more since they expect to keep the worker for longer. Thus — as for workers — the two effects work in the same direction.

For the economy as a whole it is not surprising that high firing costs are less desirable if employment protection was stringent in the past. With low past firing costs the labor market functioned well in the past, workers and firms are well matched on average, the need to move on to better matches is less urgent, so a policy that slows down turnover is less costly. In contrast, if firing costs were high in the past, then firms and workers are poorly matched, and removing policies interfering with the creation of new matches is more desirable. Under Nash bargaining this statement applies not only to the economy as a whole but to *both* firms and workers separately.

Preference Aggregation. The argument of this section is not specific to probabilistic voting. What qualitative properties must the preference aggregation rule satisfy for the argument to apply? As established in Lemma 13 worker preferences satisfy weakly increasing differences. What is needed is that the aggregation rule is monotone in the following sense: if preferences satisfy weakly increasing differences, then a downward shift in the distribution of productivity (in the sense of first order stochastic dominance) must reduce the political outcome. Majority voting is another example with this property.[30]

Hiring Threshold. Now consider departing from the basic model by allowing firms to dismiss workers at no cost after learning initial productivity. Now there is a hiring threshold in addition to the separation threshold. Importantly, this threshold typically increases with the level of firing costs, as match formation becomes more selective given that separation is more costly. How does this affect the results of this section? While an increase in firing costs still tends to shift the productivity distribution down through a lower separation threshold,

[30] The argument in the text implies that the set of Condorcet winners must be decreasing in the past level of firing costs, but it leaves open whether a Condorcet winner exists. A convenient feature of worker preferences in the context of majority voting is that by Lemma 13 they satisfy single crossing, thus a Condorcet winner always exists. See Brügemann (2004) for details.

tougher hiring standards now work in the opposite direction, and the overall effect on the productivity distribution is no longer clear. In Brügemann (2006a) I show that the distribution still shifts down if the increase in firing costs does not reduce the level of employment. Thus if employment effects of employment protection are small relative to their effects on turnover, then higher firing costs in the past still reduce support for employment protection today. But if there is a substantial negative effect on employment, then higher past firing costs may increase the support for firing costs today among *employed* workers. This is balanced by the higher level of unemployment, so whether overall support for firing costs increases depends on the political influence of the unemployed.

Non-uniform Bargaining Effect. Equation (2) shows that under Nash bargaining an increase in firing costs raises the wage uniformly across match specific productivity levels. As a consequence, longer expected job duration in good matches translates into larger gains from employment protection. To overturn this result, the wage of workers in poor matches would have to rise relatively more, sufficient to outweigh shorter job duration. In the limit, a worker just about to be dismissed would require a very large wage increase. Nevertheless, it would be an interesting route to explore the quantitative implications of bargaining models with non-uniform wage effects for the ability of employment protection to create its own support.[31]

6 Involuntary Dismissal

In this section I ask whether employment protection can generate its own political support in the model with involuntary dismissal. First I provide a theoretical analysis and then I turn a calibrated example.

6.1 Theory

I begin by addressing two preliminary issues. The first concerns the set of political choices $\mathcal{F}$. With Nash bargaining the analysis was only interesting if $\mathcal{F}$ was assumed to be bounded. Here this is not necessary, and I set $\mathcal{F} = \mathbb{R}_+$.

[31] An alternative way of introducing Nash bargaining into the Mortensen-Pissarides model based on Binmore, Rubinstein, and Wolinsky (1986) would give rise to non-uniform wage effects, see Hall and Milgrom (2005) for an application in a different context.

Second, recall that the properties of worker utility W_{ID} in Lemmas 3–6 were established only unemployed utility varying in the involuntary dismissal region $\mathcal{U}_{ID}$. Therefore I need to show that equilibrium utility from unemployment must lie in this region for all levels of firing costs.

Lemma 14. *For all $F \in \mathcal{F}$ equilibrium utility from unemployment satisfies $U^{eq}_{ID}(F) \in \mathcal{U}_{ID}$.*

Now I turn to the main analysis, which consists of the same two parts as with Nash bargaining. The first step – showing that an increase in firing costs shifts down the productivity distribution – turns out to be simpler here because an increase in firing costs always reduces the separation rule.

Lemma 15. *Consider $F^H, F^L \in \mathcal{F}$ with $F^H > F^L$. Let $\underline{s}^H \in \underline{s}^{eq}_{ID}(F^H)$ and $\underline{s}^L \in \underline{s}^{eq}_{ID}(F^L)$. Then $\underline{s}^H \leq \underline{s}^L$.*

In conjunction with Lemma 10 this yields a strengthened version of Lemma 11.

Lemma 16. *Consider $F^H_0, F^L_0 \in \mathcal{F}$ with $F^H_0 > F^L_0$. Let $\underline{s}^H_0 \in \underline{s}^{eq}_{ID}(F^H_0)$ and $\underline{s}^L_0 \in \underline{s}^{eq}_{ID}(F^L_0)$. Then $G^{ss}_{emp}(\cdot|\underline{s}^L_0) \geq_{FSD} G^{ss}_{emp}(\cdot|\underline{s}^H_0)$.*

Next I turn to the second part. Here one may hope to obtain a direct counterpart to Lemma 13, establishing that worker preferences $\mathcal{W}_{ID}(y, F)$ satisfy weakly decreasing differences. This is not possible for the reasons discussed in section 2.2. The first caveat can be sidestepped by assuming that the process of match specific productivity satisfies Condition 1. The equilibrium effect of lower utility from unemployment works in the opposite direction, but this can be sidestepped by imposing Condition 2. It is the second caveat that cannot be sidestepped by imposing additional structure. The only theoretical result available relies on Lemma 6, and establishes that higher firing costs in the past increase the political support for prohibitive firing costs today. Here the prohibitive level of firing costs F^P is defined at the infimum level that induces an equilibrium separation rule of $s^{eq}_{ID}(F) = \{\underline{s}^P\}$, where $\underline{s}^P = (0, 0)$ is the prohibitive separation rule.

Proposition 2. *Suppose Condition 2 holds. Consider $F^H_0, F^L_0 \in \mathcal{F}$ with $F^H_0 > F^L_0$. If $F^P \in \mathcal{P}_{ID,emp}(F^L_0)$, then $F^P \in \mathcal{P}_{ID,emp}(F^H_0)$.*

Thus the qualitative statements that can be made are substantially weaker than in the case of Nash bargaining. Moreover, it is a quantitative question whether the ability of employment protection to create its own support is strong enough to generate multiple stationary political equilibria. For these reasons, I move straight to a calibrated example of the model with involuntary dismissal.

6.2 Calibrated Example

For the most part this will be a standard calibration of the Mortensen-Pissarides model. A key question is to what extent the calibrated model is able to capture the effects of employment protection on unemployment and worker turnover. Unfortunately empirical work on employment protection has not generated a consensus. The effect on unemployment is theoretically ambiguous and so are the empirical results. More surprisingly it has also been difficult to ascertain negative effects of employment protection on flows, which are theoretically unambiguous. Here I rely on the work of Blanchard and Portugal (2001) both to guide the calibration and to evaluate the performance of the model. They carry out a detailed comparison of two labor markets: the US as a country with very low employment protection and Portugal as a country with one of the most stringent employment protection regimes.

Blanchard and Portugal summarize their results as a set of stylized numbers. For the United States monthly outflows from employment equal 3 percent while monthly outflows from unemployment are $\frac{1}{3}$. Together this implies an unemployment rate of 9 percent. For Portugal monthly outflows from employment are only a third of the corresponding value in the US. But the same is true for outflows from unemployment, so the implied unemployment rate is once again 9 percent.

The calibration strategy is as follows. I calibrate the model at zero firing costs to match both the level of unemployment as well as the size of flows in the US: I match an unemployment rate of 9 percent and a monthly job finding rate of $\frac{1}{3}$. I associate the model at prohibitive firing costs F^P with the Portuguese labor market. Again I match the unemployment rate of 9 percent. However, I do not target the Portuguese job finding rate. Below I evaluate to what extent the calibrated model can explain the difference between the job finding rates of the two countries. Notice that in the calibrated model the effect of introducing prohibitive firing costs on steady state unemployment is zero by construction. This accords with the stylized facts for the US and Portugal. But even beyond these two countries it provides a natural benchmark in light of ambiguous empirical results.

I now discuss the calibration in more detail, starting with functional forms. I assume a wage rule of the form $w_{ID}(U) = \bar{w}$. The theoretical analysis suggests that a wage rule satisfying Condition 2 is more conducive to the ability of employment protection to create its own political support. However, with this wage rule employment protection has a very strong negative effect on wages through the utility of the unemployed. Therefore the level of support for employment protection tends to be low, even while it may vary a lot with past firing costs. Indeed it turns out that if the model is calibrated with this wage rule, then there is no support for the introduction of employment protection irrespective of the past level of firing costs. This leads me to consider the wage rule above.

I assume a standard constant returns to scale Cobb-Douglas matching function $m(u, v) = \phi u^{\alpha} v^{1-\alpha}$.

The next step is to specify the process of match specific productivity. In the standard Mortensen-Pissarides model, whenever a match experiences a productivity shock, the new level is drawn from some fixed distribution. As a consequence all employed workers are equally likely to become unemployed irrespective of the current productivity of the match. This process is not suitable for present purposes because here heterogeneity in preferences for employment protection arises precisely because workers in better matches are less likely to become unemployed. To have a parsimonious process with this feature, I assume that log productivity follows a random walk

$$Q(y, \{e^{\sigma} y\}) = Q(y, \{e^{-\sigma} y\}) = \frac{1}{2}$$

where $\sigma > 0$ parametrizes the volatility of the process. I assume that the initial productivity distribution is degenerate with all mass at productivity y_{new}, which is normalized to one.

Finally I turn to the choice of parameters. The length of a model period is one month. I set $\rho = 0.0041$ for an annual discount rate of 5 percent.

There is no direct evidence on the magnitude of match specific productivity shocks. To have some discipline, I rely on estimates of the magnitude of idiosyncratic shocks at the firm level. Comin and Philippon (2005) report that the standard deviation of the annual growth rate of sales (of the median firm) has increased from 0.1 in 1955 to 0.21 in 2000 in the US. I set $\sigma = 0.058$ for a standard deviation of annual productivity growth of 0.2.

Surveying empirical work on the matching function, Petrongolo and Pissarides (2001) identify the interval $[0.5, 0.7]$ as a reasonable range for the parameter α. I choose the midpoint of this interval $\alpha = 0.6$.

The choice of the value of non-market activity z turns out to be inconsequential. Since the wage does not respond to the utility of the unemployed, it follows that z does not affect the equilibrium allocation. It does affect the utility of workers. But it turns out that any choice of z strictly below the wage level $\bar{w}$ (to be determined below) gives rise to the same political equilibria. The utility levels computed below are obtained using $z = 0.4$.[32]

The model offers one additional normalization. Increasing vacancy costs c and the scale parameter of the matching function ϕ in such a way as to keep the ratio $\frac{c^{1-\alpha}}{\phi}$ constant affects the equilibrium number of vacancies, but otherwise leaves the equilibrium allocation and utility levels unchanged. Here I set $c = 0.3$, a value commonly used in the literature.[33]

Three parameter values have yet to be determined: the scale parameter of the matching function ϕ, the wage level $\bar{w}$, and the quit rate $\frac{\delta}{1-\rho}$. They are chosen to match the stylized numbers discussed earlier: the unemployment rate and the job finding rate in the US, and the unemployment rate in Portugal. The implied values are $\phi = 0.166$, $\bar{w} = 0.982$, and $\delta = 0.023$.

Figure 4 shows how the equilibrium varies with the level of firing costs.[34] By construction, steady state unemployment equals 9 percent both at zero firing costs and at the prohibitive level, which equals $F^P = 36.25$. The separation threshold is monotone decreasing in the level of firing costs, as it must be according to Lemma 15. Introducing a small amount of firing costs benefits unemployed workers: the lower job finding rate is outweighed by longer job duration if one does find a job. Further increases in firing costs sharply reduces unemployed utility, which rebounds a little bit approaching prohibitive firing costs. Also by construction, the job finding rate equals $\frac{1}{3}$ at zero firing costs. For prohibitive firing costs the job finding rate is 0.233. Since the rate is $\frac{1}{9}$ in Portugal the calibrated model can only account for part of the difference between the two countries.

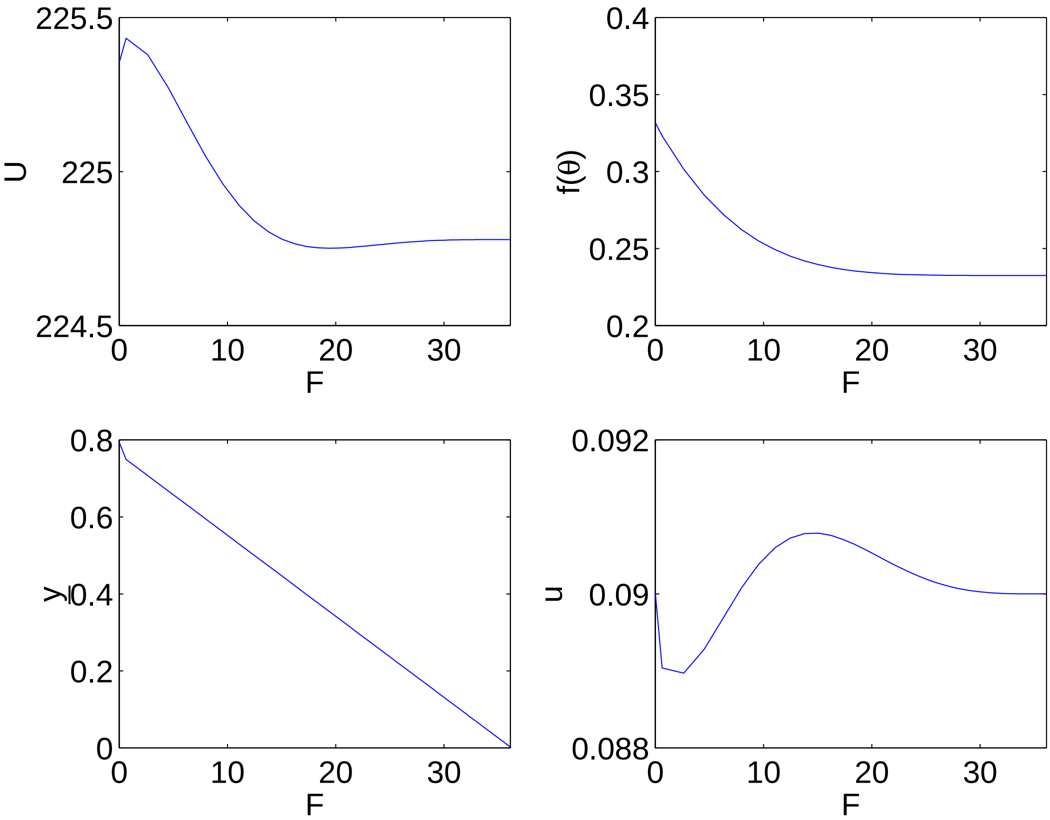
Next I turn to the question which levels of firing costs constitute stationary political equilibria. As a first step, panel (a) of Figure 5 illustrates how worker preferences for employment protection vary with match specific productivity. For comparison the dotted line shows the utility of an unemployed worker. The dashed line displays the utility of a worker in a very

[32]It is common in the literature to calibrate z by setting it at 40 percent of the wage. The calibrated wage to be determined below is close to one.

[33]Average steady state output is 1.21 at zero firing costs and 1.08 with prohibitive firing costs. So vacancy cost are between 25 and 28 percent of average output.

[34]Notice that the productivity state space is discrete. An increase in firing costs that does not reduce the separation threshold enough to reach the next lower value in the productivity state space does not extent job duration and reduces the utility of all workers. Thus it is sufficient to restrict attention to the set of levels of firing costs such that $\underline{y}^{eq}_{ID}(F) = y$ for some $y \in \mathcal{Y}$. The plots in Figure 4 are for this set of firing cost levels.

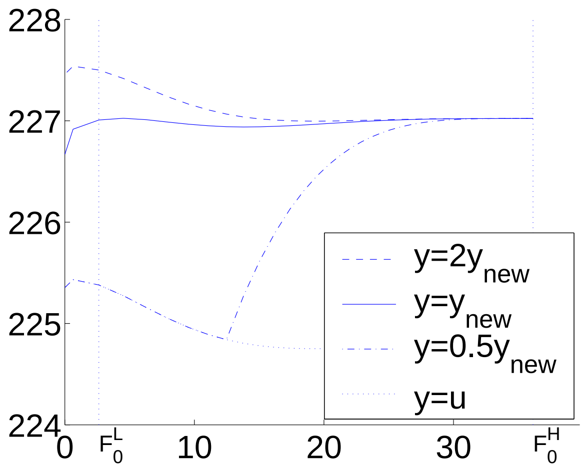
Figure 4: Equilibrium as a function of F



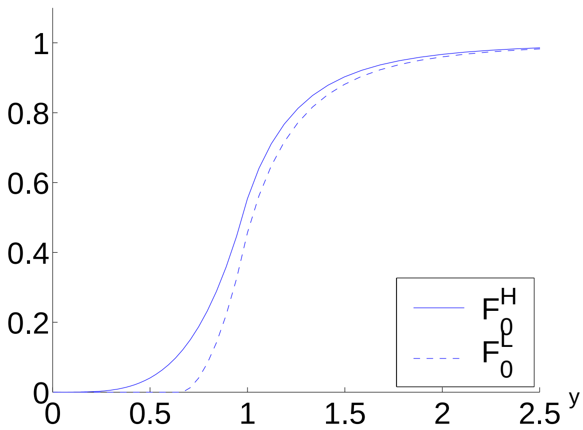
good match with twice initial productivity. This worker may face a spell of unemployment if she quits, so she benefits from the increase in utility from unemployment associated with introducing a little bit of employment protection. But she does not need to be concerned about being dismissed from her current job, so she benefits very little from the fact that employment protection also delays dismissal. This is different for a worker at the initial productivity level y_{new}, whose utility is represented by the solid line. This worker benefits from increasing firing costs beyond the point where employment protection is beneficial to unemployed workers, because he is relatively likely to face dismissal. Finally consider the utility of a worker with half initial productivity, represented by the dash-dotted line. For low levels of firing costs this worker would be dismissed. Over this range her utility coincides with that of an unemployed worker. As firing costs increase at some point her job is saved and she continues to benefit from increasing firing costs as the security of her job is improved.[35]

[35] At the prohibitive level F^P all employed workers have the same level of utility. This is because they all receive the same wage and are completely protected from dismissal. This implication disappears if some dependence of the wage on productivity is introduced.

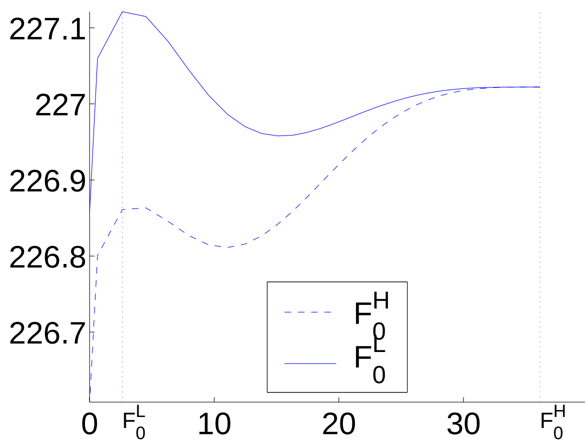
Figure 5: High vs. Low Past Firing Cost



(a) Preferences $\mathcal{W}_{ID}(y, F)$ as function of F



(b) Cumulative Distribution



(c) Average Employed Utility

If firing costs were high in the past, then many workers are in a similar situation to the worker with half initial productivity, generating strong support for prohibitive firing costs. If firing costs were low in the past, then the worker with initial productivity is more representative, and there is strong support for small but positive firing costs. It turns out that these forces give rise to two stationary political equilibria $F_0^H \equiv F^P$ and F_0^L.

According to Lemma 16 an increase in firing costs shifts down the distribution of match specific productivity. Panel (b) illustrates the magnitude of this shift for an increase in firing costs from F_0^L to F_0^H. With low past firing costs there are no matches with productivity below $\underline{y}(F_0^L) = 0.67$. With prohibitive firing costs 10 percent of employed workers are below this threshold, and overall the distribution is shifted towards lower quality matches.

Panel (c) shows how this shift in the productivity distribution translates into differences in average utility of employed workers. High firing costs in the past clearly reduces the level of average utility, so the dashed line is everywhere below the solid line.[36] The graph confirms that both F_0^H and F_0^L are stationary political equilibria. Since F_0^H is not a maximizer if F_0^L prevailed in the past and vice versa, it follows that the definition of multiplicity introduced in section 4 is satisfied.

Again I conclude the section with a discussion of robustness.

Participation of the Unemployed. Is multiplicity specific to the case in which only employed workers participate? One can check the following for the calibrated example: if unemployed workers participate in the vote, then this reduces the *level* of support for employment protection somewhat; but both F_0^H and F_0^L continue to be stationary political equilibria.

Participation of Firm Owners. For the same reasons as under Nash bargaining firms in poor matches suffer more from stringent employment protection. Thus giving political influence to firms weakens the ability of employment protection to generate its own political support. Under Nash bargaining high firing costs in the past create a shared desire by both firms and workers to deregulate. In contrast, with involuntary dismissal high past firing costs make workers and firms more divided about the level of firing costs to be set today.

[36] They only coincide if firing costs are prohibitive for the reason discussed in footnote 35: all workers are completely safe from dismissal and receive the same wage.

Preference Aggregation. To what extent does the ability of employment protection to create its own political support depend on the specific model of political choice? With Nash bargaining I gave a qualitative answer, relying on a monotonicity property of the aggregation rule. Now it becomes a quantitative question which needs to be answered case by case. Here I only consider majority voting, once again utilizing the calibrated example. If F_0^L prevailed in the past, then 68 percent of voters favor F_0^L over F_0^H. If F_0^H was in place in the past this shrinks to 55 percent. First notice that overall support for employment protection is lower, making low firing costs the political equilibrium irrespective of past firing costs. The reason is clear from panel (a) of Figure 5: workers in good matches are close to indifferent, while workers in very poor matches strongly prefer prohibitive firing costs; probabilistic voting maps these differences in intensity into differences in political influence, while majority voting gives all workers the same influence. For the same reason the ability of employment protection to create its own support likely to be weaker: the shift in the productivity distribution associated with higher past firing costs is a shift from workers who are close to indifferent towards workers who strongly prefer stringent employment protection. This translates into a larger increase in political support under probabilistic voting than under majority voting. The mechanism is still at work, however, and if the model is recalibrated with a higher level of idiosyncratic volatility $\sigma = 0.0866$ (to match an annual productivity growth standard deviation of 0.3), then the level of support for employment protection increases, and prohibitive firing costs emerge as a second stationary political equilibrium under majority voting.[37]

Hiring Margin. The negative conclusion under Nash bargaining is quite robust to allowing firms to dismiss new workers at no cost after learning initial match specific productivity. This is different here. Now the following scenario is possible: an increase in past firing costs mostly increases hiring standards, thereby generating both more good matches and more unemployment. Both groups dislike employment protection. Therefore the following empirical question is of some importance for understanding the political economy of employment protection: is the drop in hiring associated with higher firing costs mostly due to reduced recruiting effort (here captured by vacancy creation), or is it mostly driven by more selective hiring?

[37] The caveats discussed in section 2.2 imply that worker preferences do not exhibit the single crossing property. Thus – unlike in the case of Nash bargaining – the median voter theorem does not apply and a candidate for a Condorcet winner has to be compared to all alternatives numerically. This issue also arises in Saint-Paul (1999, 2002), who refers to it as the “lost generation” effect.

7 Evidence from a Survey of Employees

In the summer of 2004 researchers at the Universities of Jena and Hannover conducted a representative phone survey of 3039 persons between the ages of 20 and 60. In order to enable an East-West comparison, about 1500 persons in each Eastern and Western Germany were surveyed. The primary focus of the survey was the perceived fairness of layoffs and pay cuts.[38] In the process two question were asked that are of particular interest in the present context. First, employed respondents were asked "How likely is it in your opinion that you will become unemployed in the near future? Very likely, somewhat likely, somewhat unlikely, or very unlikely?" Second, all respondents were asked "Should statutory employment protection be extended, maintained without change, somewhat reduced, or entirely abolished?"

The prediction of the model with Nash bargaining is clear: workers in good matches are unlikely to be dismissed and are the most ardent supporters of employment protection.

Due to the caveats of section 2.2 it is not necessarily true that the reverse pattern holds in the model with involuntary dismissals. But two more specific predictions can be derived.

Let F_0 be the past level of firing costs. Then all workers at the time of the vote have at least productivity $\underline{y}^{eq}_{ID}(F_0)$. Now consider an increase in firing cost to $F > F_0$. Notice that the second caveat of section 2.2 has no bite in this situation. This caveat applies if a given increase in firing cost is not sufficiently large to save the job of a worker in a poor match. But an increase in firing costs beyond the status quo is always large enough to save the job of all workers currently employed. Lemmas 5 and 7 then imply that workers employed in poor matches benefit most from an increase in firing costs above the status quo.

Prediction 1. *Suppose Conditions 1 and 2 hold. Consider F, $F_0 \in \mathcal{F}$ with $F > F_0$. Then $\mathcal{W}_{ID}(F, y) - \mathcal{W}_{ID}(F_0, y)$ is weakly decreasing on the support of $G^{ss}_{emp}(\cdot|\underline{s}^{eq}_{ID}(F_0))$.*

The situation is quite different for a drop in firing costs from the status quo F_0 to a lower level $F < F_0$. Compare two workers with productivity levels $y_H > y_L$ who are both left unemployed by this deregulation. Then the worker in the better match suffers more because he loses a better job.

[38]The project received support from the Hans-Böckler Foundation, which maintains the following web page concerning the project: `http://www.boeckler.de/cps/rde/xchg/SID-3D0AB75D-304D8C79/hbs/hs.xsl/show_project_fofoe.html?projectfile=S-2003-546-3.xml`. See Gerlach et al. (2006) for an analysis of the perceived fairness of layoffs and pay cuts using this survey.

Table 1: Cross Tabulation

Unemployed in near future?	Employment Protection				
	extend	unchanged	reduce	abolish	total
very likely	41	60	17	19	137
	29.93	43.80	12.41	13.87	100.00
somewhat likely	90	174	51	16	331
	27.19	52.57	15.41	4.83	100.00
somewhat unlikely	153	367	173	36	729
	20.99	50.34	23.73	4.94	100.00
very unlikely	49	174	65	24	312
	15.71	55.77	20.83	7.69	100.00
unemployed	138	178	53	39	408
	33.82	43.63	12.99	9.56	100.00
total	471	953	359	134	1917
	24.57	49.71	18.73	6.99	100.00

Prediction 2. *Consider F, $F_0 \in \mathcal{F}$ with $F < F_0$. Then $\mathcal{W}_{ID}(F, y) - \mathcal{W}_{ID}(F_0, y)$ is weakly decreasing for $y < \underline{y}^{eq}_{ID}(F)$.*

According to these predictions workers in matches close to $\underline{y}^{eq}_{ID}(F_0)$ are in the following situation: under the status quo they are very likely to become unemployed, so they benefit most from extending employment protection; on the other hand, they have relatively little to loose if employment protection is abolished.

Now I examine how these predictions fare when confronted with the survey data. I drop the self-employed, persons out of the labor force as well as non-respondents to the questions of interest. This leaves 1917 respondents that are either employees or unemployed. Table 1 provides a simple cross tabulation of the answers to the two questions of interest.

The pattern in the first column is inconsistent with Nash bargaining and consistent with prediction 1: the percentage of workers in favor of extending employment protection is monotone increasing in the perceived likelihood of future unemployment. The pattern in the fourth column is consistent with prediction 2: 13.87 percent of workers considering it very likely to be unemployed in the near future want to see employment protection abolished, while the corresponding percentage varies between only 4.83 percent and 7.69 for employees who

Table 2: Probit Regression

dependent	extend		abolish	
very likely	0.136	(2.75)	0.041	(1.59)
somewhat likely	0.114	(2.99)	-0.029	(-1.67)
somewhat unlikely	0.054	(1.69)	-0.028	(-1.76)
very unlikely	excluded			
unemployed	0.123	(2.87)	-0.002	(-0.07)
male	-0.077	(-3.62)	0.026	(2.11)
west	-0.052	(-2.46)	-0.019	(-1.61)
white collar	-0.048	(-1.66)	-0.11	(-0.67)
age	-0.003	(-3.07)	0.0004	(0.75)
vocational school	-0.58	(-1.45)	-0.018	(-0.73)
foreman certificate	-0.098	(-1.96)	0.042	(1.41)
professional school	-0.045	(-1.40)	-0.001	(-0.06)
college or university	-0.104	(-3.95)	-0.01	(-0.63)
other degree	0.032	(0.36)	-0.018	(-0.36)
no degree	0.043	(0.94)	0.033	(1.21)
apprenticeship	excluded			
observations	1917		1917	

NOTE.– z-statistics of underlying coefficients in parentheses.

consider their job safer. Notice that the responses of unemployed workers are somewhat puzzling from the perspective of both models, and models of the political economy of employment protection more generally. Still in line with theory, unemployed workers dislike the status quo and are more often in favor of abolishing employment protection than the average employed worker. But they most often respond in favor of extending employment protection.

The survey provides a limited number of controls, including age, sex, part of Germany (East or West), whether the worker is blue or white collar, and information on the highest degree obtained. I run probit regressions, again focussing on the responses “extend” and “abolish”. Table 2 reports the discrete change in probability associated with each independent dummy variable and the marginal effect of age. The results show that the pattern in the tabulation is robust with respect to these controls.

8 Related Literature

The present paper is the first to analyze the structure of political support for employment protection in the standard Mortensen-Pissarides model with Nash bargaining. More generally, it is the first to examine the ability of employment protection to create its own political support in an environment where workers benefit from employment protection through the bargaining effect rather than the prolongation effect.

On the other hand, I am not the first to argue that employment protection may generate its own political support when workers benefit through the prolongation effect. Here my contribution is more subtle. Saint-Paul (2002) recently obtained this result in a model of job creation and destruction with vintage capital.[39] He emphasizes that it is the presence of labor market rents (defined as the utility difference between employed and unemployed workers) that makes job duration valuable and enables employment protection to generate its own political support. Yet my analysis of Nash bargaining shows that rents *per se* cannot be the driving force: here workers earn rents but they do not value job prolongation. Instead I trace the value of job prolongation more narrowly to involuntary dismissals.

Saint-Paul does not discuss the role of involuntary dismissals. In fact, he assumes that wages are determined through Nash bargaining, specifically the special case in which the worker has all the bargaining power. Thus separations should be bilaterally efficient and voluntary from the perspective of workers. However, Saint-Paul makes an error in deriving the wage implied by his assumptions. Given this incorrect wage, the separation decision of the firm is bilaterally inefficient and separations are involuntary from the perspective of workers. Thus his results are based on a wage rule that implies involuntary dismissals.[40] The distinction

[39]He refers to this as the *constituency effect* of employment protection.

[40]An explanation of where the error arises requires a brief discussion of Saint-Paul's model. It is quite different from the model used in the present paper, in particular with respect to the modeling of firing costs. He assumes that firing costs are incurred if a job is destroyed. But an incumbent worker in a given job can be replaced without the firm being obligated to pay the firing costs, as long as the job continues. However, replacement workers are assumed to be less productive than incumbents due to the specific human capital acquired by the latter upon job creation. This productivity difference gives rise to a rent. All of this rent goes to the worker as the worker is assumed to have all the bargaining power. The process of job creation and destruction is driven by embodied technological progress: existing jobs are destroyed when they have fallen to far behind the frontier. In particular, due to the productivity difference discussed above, a given job occupied by a replacement worker is destroyed earlier than the same job if it were occupied by the original incumbent. As a consequence, for some time after creation the relevant outside option of the firm determining the size of

between rents and involuntary dismissals is substantively important. While rents clearly are a pervasive feature of labor markets with frictions and specific investments, it is much less well understood whether turnover is privately efficient and to what extent involuntary dismissals are a frequent occurrence.

Concerning the ability of employment protection to generate its own support, the present paper has both a negative and a positive message vis-à-vis Saint-Paul (2002). On one hand — as just discussed — the circumstances conducive to this ability are narrower than previously argued: not labor market rents as such but involuntary dismissals allow firing costs to create their own political support. On the other hand, Saint-Paul concludes that the positive effect of past firing costs on current support for employment protection is unlikely to be sufficiently strong to generate multiplicity of stationary equilibria. In contrast, here multiplicity arises in a calibrated version of a standard Mortensen-Pissarides model.

Saint-Paul's work discussed above is closest to the present paper, as it directly addresses the question whether employment protection creates its own political support. Other related work can be grouped into two categories. Research in the first group addresses other aspects of the political economy of employment protection. Papers in the second group examine the ability of policies other than employment protection to create their own political support.

Vindigni (2002) builds on Saint-Paul's work and examines how the extent of idiosyncratic uncertainty affects the political support for employment protection.[41] He finds that an increase in idiosyncratic risk increases the support for firing costs if rents going to workers are large

the rent going to the incumbent is replacement. But eventually, even though it is still efficient to maintain the job if occupied by an incumbent, the relevant outside option of the firm is no longer replacement but destruction of the job. However, Saint-Paul computes the wage as if the relevant outside option were always replacement, i.e. as if the firm did not have access to the eventually superior outside option of destruction. Thus the implied wage is too high and gives rise to premature bilaterally inefficient dismissal. Actually an earlier version of the paper, Saint-Paul (1999), does not contain this error. It directly specifies a wage rule that gives rise to involuntary dismissals. Rather than trying to provide a micro-foundation for this wage rule as the outcome of bilaterally efficient bargaining, it provides a micro-foundation in form of a version of Shapiro and Stiglitz (1984).

[41] Vindigni builds on Saint-Paul (1999), that is the precursor of Saint-Paul (2002) discussed in footnote 40. Vindigni points out that Saint-Paul's reduced form wage rule differs from Nash Bargaining in that it gives rise to involuntary dismissals. He also briefly addresses the ability of employment protection to create its own political support, which he refers to as status quo bias. However, the argument for status quo bias he presents does not appeal to the downward shift in the match specific productivity distribution associated with high past firing costs, which is key to the mechanism considered here.

while the opposite effect occurs if the bargaining power of workers is low.[42]

Several papers trace differences in employment protection across countries to differences in fundamentals such as civic attitudes (Algan and Cahuc (2006)), religion (Algan and Cahuc (2004)), credit market imperfections (Fogli (2004)) and costs of interregional mobility (Belot (2004)). Their examination of the role of fundamentals complements the focus of the present paper on amplification and persistence.

Boeri and Burda (2003) take the extent of employment protection as given and argue that higher firing costs increase the political support for wage rigidity. Thus their work is complementary to the present paper, which takes features of wage determination as given and examines how they shape the political support for employment protection.

Several papers on the political economy of employment protection examine interactions with other policies. Boeri, Conde-Ruiz, and Galasso (2003) provide a political economy analysis of the trade-off between employment protection and unemployment benefits. Koeniger and Vindigni (2003) develop a model in which more regulated product markets are associated with stronger support for employment protection.

Hassler et al. (2005) is part of the second group. They develop a model in which unemployment insurance reduces mobility. Over time this increases the attachment of workers to their present location, which in turn sustains the political support for generous unemployment insurance. Benabou (2000) develops a theory in which low inequality is conducive to the adoption of redistributive policies, which in turn perpetuate low inequality. In Hassler et al. (2003) redistributive policies affect private investments in such a way as to maintain the constituency for redistribution. Finally, Coate and Morris (1999) analyze the phenomenon of policy persistence more generally, and argue that it arises if agents respond to the introduction of a policy by undertaking investments to benefit from this policy.

9 Concluding Remarks

In this paper I examined under which circumstances employment protection has the ability to create its own political support. I have shown that the answer depends crucially on the interplay between wage determination and the separation decision.

[42] In his framework the level of worker rents and the extent to which dismissals are involuntary are controlled by the same parameter. It may thus be interesting to uncouple these two aspects of the employment relationship and to examine how each interacts with the extent of idiosyncratic risk.

Under the standard assumption of Nash bargaining workers gain from employment protection through an improved bargaining position. In this environment more stringent protection in the past actually reduces support for employment protection today.

I found that employment protection can create its own support if workers benefit instead through the delay of involuntary dismissals. In a calibrated example this mechanism turned out to be sufficiently strong to sustain multiple stationary political equilibria.

To conclude, I outline two directions for future research. First, it would be desirable to better understand features of separation decisions and employment protection, particularly those that have emerged as important in the analysis of the present paper, but have received little attention in previous work. First, only a small empirical literature has attempted to attack the question to what extent separations are involuntary.[43] Second, the relative importance of channels through which workers benefit from employment protection are not well understood. Do they support employment protection because it enhances their bargaining position, because it delays involuntary dismissals, or because they benefit through some other channel such as insurance?[44] Finally, while it is well understood that employment protection reduces the job finding rate, it is not clear whether this comes about mostly through less recruiting effort or more selective hiring by firms.

A second direction for future work would be to jointly analyze the political determination of employment protection and the framework for wage determination. In the present paper I took the features of wage determination as given and analyzed their implications for the political economy of employment protection. However, features of wage determination are themselves influenced by labor market policy. Minimum wages and the wage compression associated with collective bargaining and strong unions limit the ability of firm-worker pairs to set match specific wages and thus may be important sources of involuntary dismissals. Since both wage determination and employment protection are influenced by labor market policy and interact in important ways, it would be desirable to extend the model to study their joint determination.[45] An interesting question is then whether particular bundles of wage policies and employment protection have the ability to create their own political support.

[43] In an early paper McLaughlin (1991) found separations observed in the Panel Study of Income Dynamics to be consistent with bilaterally efficient turnover. In a recent paper using Dutch matched worker-firm data, Gielen and van Ours (2006) find that inefficient quits are rare while inefficient layoffs occur frequently.

[44] The insurance role of employment protection is analyzed by Pissarides (2001) and Bertola (2004) in an environment with risk averse workers and imperfect insurance markets.

[45] Bertola and Rogerson (1997) discuss complementarities of wage determination and employment protection.

A Proofs of Lemmas 1 and 2

In equilibrium utility from unemployment cannot be lower than the utility from perpetual unemployment $\underline{\mathrm{U}} \equiv \frac{z}{\rho}$. Boundedness of the state space $\mathcal{Y}$ implies that utility from unemployment cannot exceed some upper bound $\bar{U}$ for any value of firing costs F or any of the two models of wage determination. Thus it is sufficient to analyze wage determination and the separation decision for utility from unemployment varying in the set $\mathcal{U} \equiv [\underline{\mathrm{U}}, \bar{U}]$. Firing costs are allowed to vary in $\mathcal{F} = \mathbb{R}_+$. The optimal stopping problem for the maximization of the value of the match is

$$V^*(y, F, U) = \max\left\{y + \delta U + (1 - \rho - \delta)\int V^*(y', F, U)Q(y, dy'), U - F\right\}.$$

The second argument of the maximum operator is the joint payoff if the match dissolves today, given by the utility of unemployment obtained by the worker minus the firing costs liability of the firm. The first argument of the maximum operator is the value of continuing the match. This yields output y this period. With probability $\frac{\delta}{1-\rho}$ the worker quits at the beginning of next period. In this case the firm obtains zero (it does not have to pay the firing costs) while the worker obtains utility $(1 - \rho)U$, as he is unemployed at the beginning of next period. Taken together this yields the present discounted joint payoff δU. If the worker does not quit, then the match survives into the next period, receives a new productivity draw y', and once again faces the same decision.

Lemma A. *The joint value function V^* is bounded, continuous, and has the following properties.*

(a) For each $(F, U) \in \mathcal{F} \times \mathcal{U}$ there exists a unique threshold $\underline{y}_{NB}(F, U) \in \mathbb{R}$ such that $V^*(y, F, U)$ equals $U - F$ for $y \leq \underline{y}_{NB}(F, U)$ and is strictly increasing in y for $y \geq \underline{y}_{NB}(F, U)$.

(b) Fix $U \in \mathcal{U}$. Consider $F^H, F^L \in \mathcal{F}$ with $F^H > F^L$. Then $\underline{y}_{NB}(F^H, U) < \underline{y}_{NB}(F^L, U)$. The difference $V^*(y, F^H, U) - V^*(y, F^L, U)$ is non-positive, bounded below by $F^L - F^H$, and weakly increasing in y.

(c) Fix $F \in \mathcal{F}$. Consider $U^H, U^L \in \mathcal{U}$ with $U^H > U^L$. Then $\underline{y}_{NB}(F, U^H) > \underline{y}_{NB}(F, U^L)$. The difference $V^*(y, F, U^H) - V^*(y, F, U^L)$ is non-negative, bounded above by $U^H - U^L$, and weakly decreasing in y.

Proof. Let $\mathcal{V}'$ be the set of functions $V : \mathcal{Y} \times \mathcal{F} \times \mathcal{U} \to \mathbb{R}$ satisfying all the properties stated in the lemma. Let $\mathcal{V}$ be the set of functions obtained when the strictly increasing requirement in property (a) is replaced by weakly increasing, and the strict inequalities in properties (b) and (c) are replaced by weak inequalities. Define the operator

$$(TV)(y, F, U) \equiv \max \left\{ y + \delta U + (1 - \rho - \delta) \int V(y', F, U) Q(y, dy'), U - F \right\}.$$

I will show that $T(\mathcal{V}) \subseteq \mathcal{V}'$. The desired result then follows from Corollary 1 to the Contraction Mapping Theorem in Stokey and Lucas (1989) in conjunction with the fact that $\mathcal{V}$ is a complete metric space. To verify the claim that $T(\mathcal{V}) \subseteq \mathcal{V}'$, suppose $V \in \mathcal{V}$. Then TV is bounded and continuous by Lemma 9.5 in Stokey and Lucas. It remains to verify properties (a)–(c).

(a) Define

$$(CV)(y, F, U) \equiv y + \delta U + (1 - \rho - \delta) \int V(y', F, U) Q(y, dy').$$

As V is weakly increasing in y and Q is stochastically monotone, it follows that the integral is weakly increasing in y. Thus CV is strictly increasing in y. Set $\underline{y}(F, U)$ equal to the unique solution of the equation $(CV)(y, F, U) = U - F$. Then $(TV)(y, F, U) = U - F$ for $y \leq \underline{y}(F, U)$ and $(TV)(y, F, U)$ is strictly increasing in y for $y \geq \underline{y}(F, U)$.

(b) Consider $F^H, F^L \in \mathcal{F}$ with $F^H > F^L$. Since $0 \geq V(y', F^H, U) - V(y', F^L, U) \geq F^L - F^H$ for all $y' \in \mathcal{Y}$ it follows that $0 \geq (CV)(y, F^H, U) - (CV)(y, F^L, U) \geq (1 - \rho - \delta)(F^L - F^H)$. Since the value of separation drops by $F^H - F^L$ it follows that $0 \geq (TV)(y, F^H, U) - (TV)(y, F^L, U) \geq F^L - F^H$. Next consider the comparative statics of the separation threshold. As $(CV)(\underline{y}(F^L, U), F^L, U) = U - F^L$ it follows that $(CV)(\underline{y}(F^L, U), F^H, U) > U - F^H$, so it must be that $\underline{y}(F^H, U) < \underline{y}(F^L, U)$. It remains to show that the difference $(TV)(y, F^H, U) - (TV)(y, F^L, U)$ is weakly increasing in y. It is weakly increasing on $[0, \underline{y}(F^L, U)]$ because on this interval $(TV)(y, F^L, U) = U - F^L$ while $(TV)(y, F^H, U)$ is weakly increasing. For $y \geq \underline{y}(F^L, U)$ the difference is given by

$$\begin{aligned}
&(TV)(y, F^H, U) - (TV)(y, F^L, U) \\
&= (TC)(y, F^H, U) - (TC)(y, F^L, U) \\
&= (1 - \rho - \delta) \int \left[V(y', F^H, U) - V(y', F^L, U) \right] Q(y, dy')
\end{aligned}$$

and weakly increasing in y because $V(y', F^H, U) - V(y', F^L, U)$ is weakly increasing in y' and Q is stochastically monotone.

(c) The proof of property (c) proceeds in exactly the same way as the proof of property (b).

■

Proof of Lemma 1: Follows immediately from Lemma A. ■

Proof of Lemma 2:

(a) Using equation (1)

$$W^*_{NB}(y, F, U^H) - W^*_{NB}(y, F, U^L) = (1-\beta)(U^H - U^L) + \beta \left[V^*(y, F, U^H) - V^*(y, F, U^L) \right].$$

The second term is non-negative, bounded above by $\beta(U^H - U^L)$, and weakly decreasing in y by property (c) of Lemma A. Thus the sum is positive, bounded above by $U^H - U^L$, and weakly decreasing in y.

(b) Using equation (1)

$$W^*_{NB}(y, F^H, U) - W^*_{NB}(y, F^L, U) = \beta \left[V^*(y, F^H, U) - V^*(y, F^L, U) + (F^H - F^L) \right].$$

By property (b) of Lemma A the value of the match decreases but by less then $F^H - F^L$. Thus the change in worker utility is non-negative and bounded above $F^H - F^L$. From the change in the match value it inherits the property of being weakly increasing in y.

■

B Proofs of Lemmas 3– 7

I prove Lemmas 3–5 for a more general setting in which the wage is allowed to depend on match specific productivity

$$w(y, F, U) = w_{ID}(y, U).$$

Assumption 1 is adapted as follows.

Assumption B. *The wage function w_{ID} is continuous and satisfies the following properties.*

(a) $w_{ID}(y, U) > z$ for all $U \geq \frac{z}{\rho}$ and $y \in \mathcal{Y}$.

(b) Consider $U^H > U^L \geq \frac{z}{\rho}$. Then for all $y \in \mathcal{Y}$

$$0 \leq w_{ID}(y, U^H) - w_{ID}(y, U^L) \leq \rho(U^H - U^L).$$

(c) *Consider y^H, $y^L \in \mathcal{Y}$ with $y^H > y^L$. Then for all $U \geq \frac{z}{\rho}$*

$$0 \leq w_{ID}(y^H, U) - w_{ID}(y^L, U) < y^H - y^L.$$

The definition of the set $\mathcal{U}_{ID}$ is generalized to $\mathcal{U}_{ID} \equiv \{U | w_{ID}(0, U) > \rho U\}$, so with $U \in \mathcal{U}_{ID}$ any dismissal is involuntary.

Recall from appendix A that equilibrium utility from unemployment must lie in the bounded set $\mathcal{U}$. Thus I restrict the analysis of the separation decision and worker utility to the intersection $\mathcal{U}_{\cap ID} \equiv \mathcal{U} \cap \mathcal{U}_{ID}$.

The optimal stopping problem of the firm is

$$J^*_{ID}(y, F, U) = \max \left\{ y - w_{ID}(y, U) + (1 - \rho - \delta) \int J^*_{ID}(y', F, U) Q(y, dy'), -F \right\}.$$

and one obtains the following lemma.

Lemma B.1. *The joint value function J^*_{ID} is bounded, continuous, and has the following properties.*

(a) *For each $(F, U) \in \mathcal{F} \times \mathcal{U}_{\cap ID}$ there exists a unique threshold $\underline{y}_{ID}(F, U) \in \mathbb{R}$ such that $J^*_{ID}(y, F, U)$ equals $-F$ for $y \leq \underline{y}_{ID}(F, U)$ and is strictly increasing in y for $y \geq \underline{y}_{ID}(F, U)$.*

(b) *Fix $U \in \mathcal{U}_{\cap ID}$. Consider $F^H, F^L \in \mathcal{F}$ with $F^H > F^L$. Then $\underline{y}_{ID}(F^H, U) < \underline{y}_{ID}(F^L, U)$. The difference $J^*_{ID}(y, F^H, U) - J^*_{ID}(y, F^L, U)$ is non-positive, bounded below by $F^L - F^H$, and weakly increasing in y.*

(c) *Fix $F \in \mathcal{F}$. Consider $U^H, U^L \in \mathcal{U}_{\cap ID}$ with $U^H > U^L$. Then $\underline{y}_{ID}(F, U^H) \geq \underline{y}_{ID}(F, U^L)$. The difference $J^*_{ID}(y, F, U^H) - J^*_{ID}(y, F, U^L)$ is non-positive, bounded below by $U^L - U^H$, and weakly decreasing in y.*

Proof. Analogous to the proof of Lemma A. ■

Proof of Lemma 3: Follows immediately from Lemma B.1. ■

The next lemma establishes the key properties of the worker utility function W_{ID}. Recall that worker utility does not directly depend on firing costs, and the argument F is only carried along for notational consistency with Nash bargaining. Thus here I can treat W_{ID} as a function with domain $\mathcal{Y} \times \underline{\mathcal{S}} \times \mathcal{U}_{\cap ID}$, where $\underline{\mathcal{S}} \equiv \mathbb{R} \times [0, 1]$ is the set of possible separation rules.

Lemma B.2. *The worker utility function W_{ID} is bounded and has the following properties.*

(a) For $(\underline{s}, U) \in \underline{\mathcal{S}} \times \mathcal{U}_{\cap ID}$ with $\underline{s} = (\underline{y}, \underline{\lambda})$ worker utility $W_{ID}(y, \underline{s}, F, U)$ equals U for $y < \underline{y}$ and is weakly increasing in y.

(b) Fix $\underline{s} \in \underline{\mathcal{S}}$. Consider U^H, $U^L \in \mathcal{U}_{\cap ID}$ with $U^H > U^L$. Then $W_{ID}(y, \underline{s}, F, U^H) - W_{ID}(y, \underline{s}, F, U^L)$ is non-negative, bounded above by $U^H - U^L$, and weakly decreasing in y.

(c) Fix $U \in \mathcal{U}_{\cap ID}$. Consider $\underline{s}^L$, $\underline{s}^H \in \underline{\mathcal{S}}$ with $\underline{s}_L < \underline{s}_H$. Then $W_{ID}(y, \underline{s}^L, F, U) - W_{ID}(y, \underline{s}^H, F, U)$ is non-negative.

Proof. Let $\mathcal{W}_{ID}$ be the set of functions $W : \mathcal{Y} \times \underline{\mathcal{S}} \times \mathcal{U}_{\cap ID} \to \mathbb{R}$ satisfying all the properties stated in the lemma. Define the operator

$$
\begin{aligned}
&(TW)(y, \underline{s}, F, U) \\
&\equiv (1 - \lambda(y, \underline{s})) \left[w_{ID}(y, U) + \delta U + (1 - \rho - \delta) \int W(y', \underline{s}, F, U) Q(y, dy') \right] + \lambda(y, \underline{s}) U.
\end{aligned}
$$

where

$$
\lambda(y, (\underline{y}, \underline{\lambda})) = \begin{cases} 0 & \text{if } y > \underline{y}, \\ \underline{\lambda} & \text{if } y = \underline{y}, \\ 1 & \text{if } y < \underline{y}. \end{cases}
$$

I will show that $T(\mathcal{W}_{ID}) \subseteq \mathcal{W}_{ID}$. The desired result then follows from the Contraction Mapping Theorem in conjunction with the fact that $\mathcal{W}_{ID}$ is a complete metric space. To verify the claim that $T(\mathcal{W}_{ID}) \subseteq \mathcal{W}_{ID}$, suppose $W \in \mathcal{W}_{ID}$. Then TW is clearly bounded. It remains to verify properties (a)-(c).

(a) Since $\lambda(y, \underline{s}) = 1$ for $y < \underline{y}$ it follows that $(TW)(y, \underline{s}, F, U) = U$. Next consider $y^H, y^L \in \mathcal{Y}$ with $y^H > y^L$. We have

$$
\begin{aligned}
&(TW)(y^H, \underline{s}, F, U) - (TW)(y^L, \underline{s}, F, U) \\
&= (1 - \lambda(y^H, \underline{s})) \Bigg[w_{ID}(y^H, U) - w_{ID}(y^L, U) \\
&\quad + (1 - \rho - \delta) \left(\int W(y', \underline{s}, F, U) Q(y^H, dy') - \int W(y', \underline{s}, F, U) Q(y^L, dy') \right) \Bigg] \\
&\quad + \left(\lambda(y^L, \underline{s}) - \lambda(y^H, \underline{s}) \right) \Bigg[w_{ID}(y^L, U) - \rho U \\
&\quad + (1 - \rho - \delta) \int \left(W(y', \underline{s}, F, U) - U \right) Q(y^L, dy') \Bigg]
\end{aligned}
$$

The first term is non-negative since w_{ID} is weakly increasing in y, W is weakly increasing in y', and Q is stochastically monotone. The second term is non-negative as $w_{ID}(y,U) > \rho U$ for $U \in \mathcal{U}_{\cap ID}$, $W(y,\underline{s},F,U) \geq U$ for all $(y,\underline{s},U) \in \mathcal{Y}\times\underline{\mathcal{S}}\times\mathcal{U}_{\cap ID}$, and $\lambda(y,\underline{s})$ is weakly decreasing in y.

(b) We have

$$\begin{aligned}
&(TW)(y,\underline{s},F,U^H) - (TW)(y,\underline{s},F,U^L) \\
&= (1-\lambda(y,\underline{s}))\left[w_{ID}(y,U^H) - w_{ID}(y,U^L) + \delta(U^H - U^L)\right] \\
&\quad + (1-\lambda(y,\underline{s}))(1-\rho-\delta)\int\left[W(y',\underline{s},F,U^H) - W(y',\underline{s},F,U^L)\right]Q(y,dy') \\
&\quad + \lambda(y,\underline{s})(U^H - U^L).
\end{aligned} \tag{B.1}$$

All three terms are non-negative. Moreover, since $w_{ID}(y,U^H) - w_{ID}(y,U^L) \leq \rho(U^H - U^L)$ and $W(y',\underline{s},F,U^H) - W(y',\underline{s},F,U^L) \leq U^H - U^L$, it follows that $(TW)(y,\underline{s},F,U^H) - (TW)(y,\underline{s},F,U^L) \leq U^H - U^L$.

(c) We have

$$\begin{aligned}
&(TW)(y,\underline{s}^L,F,U) - (TW)(y,\underline{s}^H,F,U) \\
&= (1-\lambda(y,\underline{s}^L))\int\left[W(y',\underline{s}^L,F,U) - W(y',\underline{s}^H,F,U)\right]Q(y,dy') \\
&\quad + \left(\lambda(y,\underline{s}^H) - \lambda(y,\underline{s}^L)\right)\Big[\left(w_{ID}(y,U) - \rho U\right) \\
&\quad + (1-\rho-\delta)\int\left(W(y',\underline{s}^H,F,U) - U\right)Q(y,dy')\Big].
\end{aligned}$$

The first term is non-negative since W satisfies property (c). The second term is non-negative since $w_{ID}(y,U) > \rho U$ for $U \in \mathcal{U}_{\cap ID}$ and $W(y,\underline{s},F,U) \geq U$ for all $(y,\underline{s},U)$ in $\mathcal{Y}\times\underline{\mathcal{S}}\times\mathcal{U}_{\cap ID}$.

■

Proof of Lemma 4. Follows immediately from Lemma B.2. ■

Proof of Lemma 5. Consider $y^H, y^L \in \mathcal{Y}$ with $y^H > y^L \geq \underline{y}_H$. Let $\pi(\tau, y^H, y^L)$ be the probability that a sample path originating at y^H attains y^L for the first time after τ periods. These probabilities are the same whether the separation rule is $\underline{s}^H$ or $\underline{s}^L$, because a sample path first has to attain y^L before it can be subject to endogenous destruction. Then

$$\begin{aligned}
&W_{ID}(y^H, \underline{s}^L, F, U) - W_{ID}(y^H, \underline{s}^H, F, U) \\
&= \sum_{\tau=0}^{\infty} (1-\rho)^\tau \pi(\tau, y^H, y^L) \left[W_{ID}(y^L, \underline{s}^L, F, U) - W_{ID}(y^L, \underline{s}^H, F, U) \right] \\
&\leq W_{ID}(y^L, \underline{s}^L, F, U) - W_{ID}(y^L, \underline{s}^H, F, U).
\end{aligned}$$

where the last inequality follows from $W_{ID}(y^L, \underline{s}^L, F, U) - W_{ID}(y^L, \underline{s}^H, F, U) \geq 0$ together with $\sum_{\tau=0}^{\infty} (1-\rho)^\tau \pi(\tau, y^H, y^L) \leq 1$. ■

Proof of Lemma 6. With the separation rule $\underline{s}^P$ all employed workers receive the same wage $w_{ID}(U)$ until they quit. Thus

$$W_{ID}(y, \underline{s}^P, F, U) = \frac{w_{ID}(U) + \delta U}{\rho + \delta}$$

for all $y \in \mathcal{Y}$. Thus $W_{ID}(y, \underline{s}^P, F, U) - W_{ID}(y, \underline{s}, F, U)$ is weakly decreasing in y because $W_{ID}(y, \underline{s}, F, U)$ is weakly increasing in y by property (a) of Lemma B.2. ■

Proof of Lemma 7. This is shown by modifying the proof of Lemma B, adding the property of Lemma 7 to the set of properties satisfied by functions in the set $\mathcal{W}_{ID}$. Given that $W \in \mathcal{W}_{ID}$, one then only needs to verify that TW has the property of Lemma 7. Condition 2 implies $w_{ID}(U^H) - w_{ID}(U^H) = \rho(U^H - U^L)$. As $W \in \mathcal{W}_{ID}$ one also has $W(y, \underline{s}, F, U^H) - W(y, \underline{s}, F, U^L) = U^H - U^L$. Therefore equation (B.1) simplifies to

$$\begin{aligned}
&(TW)(y, \underline{s}, F, U^H) - (TW)(y, \underline{s}, F, U^L) \\
&= (1 - \lambda(y, \underline{s})) \left[\rho(U^H - U^L) + \delta(U^H - U^L) \right] \\
&+ (1 - \lambda(y, \underline{s}))(1 - \rho - \delta)(U^H - U^L) + \lambda(y, \underline{s})(U^H - U^L).
\end{aligned}$$

and the desired result follows. ■

C Proof of Lemma 8

Proof of Lemma 8. Combining condition (4) with equation (6) yields the condition

$$\rho U = z + (1-\rho)\theta q(\theta) \int \left[W_M(y, (\underline{y}_M(F, U), \underline{\lambda}), F, U) - U \right] dG_{new}(y). \tag{C.1}$$

As a first step I look for values of $U \in \mathcal{U}$ and $\underline{\lambda} \in [0, 1]$ such that equation (C.1) is satisfied for a given value of θ. First fix $\underline{\lambda} = 0$ and consider the right hand side of equation

(C.1). It is weakly decreasing as a function of U for both models of wage determination. For $M = NB$ this follows from property (a) of Lemma 2. For $M = ID$ the capital gain $\int \left[W_{ID}(y, (\underline{y}_{ID}(F,U), 0), F, U) - U\right] dG_{new}(y)$ is weakly decreasing in U by property (a) of Lemma 4, holding constant the separation threshold $\underline{y}_{ID}(F,U)$. Moreover, the threshold $\underline{y}_{ID}(F,U)$ is weakly increasing in U by Lemma 3, which further reduces the capital gain. The left hand side of equation (C.1) is strictly increasing in U, so it remains to show that the two must intersect. For $U = \underline{U}$ the left hand side equals z and is thereby lower than the right hand side. Since the left hand side increases without bound, it eventually exceeds the right hand side. If $M = NB$ the right hand side is independent of $\underline{\lambda}$ and continuous in U. It follows that there is a unique $\hat{U}(\theta) \geq \underline{U}$ such that equation (C.1) is satisfied if and only if $U = \hat{U}(\theta)$ and $\underline{\lambda} \in [0,1]$. For $M = ID$ the right hand side need not be continuous as a function of U when the separation probability is held constant at $\underline{\lambda} = 0$. A discontinuity at U can occur if the productivity level $\underline{y}_{ID}(F,U)$ is attained with positive probability at some point during the life of a match. If a small increase in utility from unemployment increases the separation threshold, then the right hand side jumps downward at U because staying employed is strictly better than unemployment. Nevertheless, the right hand side is left continuous. It follows that there is a unique $\hat{U}(\theta)$ such that the right hand side is weakly larger than the left hand side for $U \leq \hat{U}(\theta)$ and strictly smaller for $U > \hat{U}(\theta)$. Then there are two possibilities. If $\int W_{ID}(y, (\underline{y}_{ID}(F,U), \underline{\lambda}), F, U) dG_{new}(y)$ is independent of $\underline{\lambda}$, then the right hand side must in fact be continuous in U at $\hat{U}(\theta)$. In this case equation (C.1) is satisfied if and only if $U = \hat{U}(\theta)$ and $\underline{\lambda} \in [0,1]$. Otherwise $\int W_{ID}(y, (\underline{y}_{ID}(F,U), \underline{\lambda}), F, U) dG_{new}(y)$ is continuous and strictly decreasing in $\underline{\lambda}$ and there is a unique $\hat{\underline{\lambda}}(\theta) \in [0,1]$ to equalize the right and left hand sides, so $U = \hat{U}(\theta)$ and $\underline{\lambda} = \hat{\underline{\lambda}}(\theta)$ is the unique solution.

The function $\hat{U}(\theta)$ constructed above is continuous (the discontinuities discussed above result in flat parts of this function) and weakly increasing. Substituting this function into the right hand side of equation (5) yields the term $(1-\rho)q(\theta) \int J_M(y, \underline{s}_M(F, \hat{U}(\theta)), F, \hat{U}(\theta)) dG_{new}(y)$, which is continuous and strictly decreasing in θ. If it is strictly less than c for $\theta = 0$, then the equilibrium has $\theta_M^{eq}(F) = 0$ and $U_M^{eq}(F) = \frac{z}{\rho}$. Otherwise the assumption that $\lim_{\theta \to \infty} q(\theta) = 0$ insures that there is a unique value $\theta_M^{eq}(F)$ for which this term equals c. Equilibrium utility from unemployment is then given by $U_M^{eq}(F) = \hat{U}(\theta_M^{eq}(F))$. The equilibrium separation threshold is $\underline{y}_M^{eq}(F) = \underline{y}_M(F, U_M^{eq}(F))$. ∎

D Proof of Lemmas 9 and 10

First some additional notation is introduced. Let $\mathcal{B}$ be the σ-algebra associated with the Markov process of match specific productivity, so the transition function is a mapping $Q : \mathcal{Y} \times \mathcal{B} \to [0,1]$. Let $\mathcal{B}_{all}$ be the σ-algebra $\mathcal{B}$ extended in the natural way to the enlarged state space $\mathcal{Y}_{all}$ defined in section 3.1. Next I derive the transition function that includes transitions between productivity states while employed as well as between employment and unemployment, denoted as $Q_{all}(\cdot|\underline{s},\theta) : \mathcal{Y}_{all} \times \mathcal{B}_{all} \to [0,1]$. First consider transitions within employment. For $y \in \mathcal{Y}$ and a set $Y \in \mathcal{B}$ we have

$$Q_{all}(y, Y|(\underline{y},\underline{\lambda}),\theta) = \left(1-\tilde{\delta}\right)\left[Q(y, Y \cap (\underline{y},+\infty)) + (1-\underline{\lambda})Q(y, Y \cap \{\underline{y}\})\right].$$

A match with productivity y after separation today survives quits at the beginning of next period with probability $1-\tilde{\delta}$ where $\tilde{\delta} \equiv \frac{\delta}{1-\rho}$. Then it receives a new productivity draw, which may lead to endogenous destruction if the draw falls short of the threshold $\underline{y}$. Next consider transitions from unemployment. Here

$$Q_{all}(u, Y|(\underline{y},\underline{\lambda}),\theta) = f(\theta)\left[\mu_{new}(Y \cap (\underline{y},+\infty)) + (1-\underline{\lambda})\mu_{new}(Y \cap \{\underline{y}\})\right]$$

where μ_{new} is the probability measure associated with the distribution function G_{new}. A worker unemployed after separation decisions in the current period must wait until next period to be matched again, and productivity in the new match must exceed $\underline{y}$ for the worker to remain employed after next period's separation decision.

For a probability measure μ_{all} on $(\mathcal{Y}_{all}, \mathcal{B}_{all})$ define

$$(T^*_{all}(\mu_{all}|\underline{s},\theta))(Y) \equiv \int Q_{all}(y, Y|\underline{s},\theta)\mu_{all}(dy),$$

that is $T^*_{all}(\cdot|\underline{s},\theta)$ is the adjoint operator associated with Q_{all}. Let $T^{*n}_{all}(\cdot|\underline{s},\theta)$ be the operator obtained if $T^*_{all}(\cdot|\underline{s},\theta)$ is iterated n times.

Lemma D. *The operator T^*_{all} has a unique invariant probability measure, denoted as $\mu^{ss}_{all}(\cdot|\underline{s},\theta)$, and $T^{*n}_{all}(\mu_{all})$ converges strongly to this invariant probability measure as $n \to \infty$ for any probability measure μ_{all} on $(\mathcal{Y}_{all}, \mathcal{B}_{all})$.*

Proof. Transitions from employment satisfy $Q_{all}(y,\{u\}|\underline{s},\theta) \geq \tilde{\delta}$ for all $y \in \mathcal{Y}$ while transitions from unemployment satisfy $Q_{all}(u,\{u\}|\underline{s},\theta) \geq 1-f(\theta)$. Thus $Q_{all}(y,\{u\}|\underline{s},\theta) \geq \min\left[\tilde{\delta}, 1-\theta q(\theta)\right] > 0$ for all $y \in \mathcal{Y}_{all}$ where the strict inequality follows from the assumptions that $\delta > 0$ and $m(u,v) < \min[u,v]$. The lemma then follows immediately from Theorem 11.12 in conjunction with Exercises 11.5(a) and 11.4(c) in Stokey and Lucas (1989). ■

Proof of Lemma 9: Follows immediately from Lemma D. Here $G^{ss}_{all}(\cdot|\underline{s},\theta)$ is the distribution function associated with $\mu^{ss}_{all}(\cdot|\underline{s},\theta)$. ■

Now I turn to the distribution of match specific productivity across employed workers and the proof of Lemma 10. While this is of course just the distribution derived above conditional on employment, it is useful to derive it from a separate transition function. In steady state the mass of workers separating equals the mass of workers entering employment. Thus the distribution of productivity across employed workers can be computed from the transition function induced by Q when separated matches are replaced by matches with productivity drawn from μ_{new}. Of course this transition function does not exist if the separation rule is so high that all new matches separate immediately, that is if

$$h((\underline{y},\underline{\lambda})) \equiv \mu_{new}((\underline{y},+\infty)) + (1-\underline{\lambda})\mu_{new}(\{\underline{y}\}) = 0.$$

If $h(\underline{s}) > 0$ then this transition function is given by

$$\begin{aligned}
&Q_{emp}(y, Y|(\underline{y},\underline{\lambda}))\\
&= \left(1-\tilde{\delta}\right)\left[Q(y, Y\cap(\underline{y},+\infty)) + (1-\underline{\lambda})Q(y, Y\cap\{\underline{y}\})\right]\\
&+ \left(\tilde{\delta} + \left(1-\tilde{\delta}\right)\left[Q(y,[0,\underline{y})) + \underline{\lambda}Q(y,\{\underline{y}\})\right]\right)\frac{\mu_{new}(Y\cap(\underline{y},+\infty)) + (1-\underline{\lambda})\mu_{new}(Y\cap\{\underline{y}\})}{\mu_{new}((\underline{y},+\infty)) + (1-\underline{\lambda})\mu_{new}(\{\underline{y}\})}.
\end{aligned}$$

The first term of the sum is the probability of transiting to a productivity level in the set Y by surviving both quits and the separation decision at the beginning of next period. The second term of the sum is the probability of transiting to the set Y via replacement through new matches with a productivity level within that set. Thus this term is the product of the destruction rate and the probability of new matches having productivity in Y. Notice that the latter probability is conditional on a new match being formed.

Let $T^*_{emp}(\cdot|\underline{s})$ be the adjoint operator associated with $Q_{emp}(\cdot|\underline{s})$. Lemma D insures that $T^*_{emp}(\cdot|\underline{s})$ has a unique invariant distribution $\mu^{ss}_{emp}(\cdot|\underline{s})$ as long as $h(\underline{s}) > 0$.

Proof of Lemma 10. First consider the uninteresting case in which steady state employment is necessarily zero under the high separation rule, that is if $h(\underline{s}_H) = 0$. In this case by definition $\mu^{ss}_{emp}(\cdot|\underline{s}_H)$ is degenerate with all mass at $+\infty$ (see footnote 21), so the statement of the lemma is correct.

Now turn to the case $h(\underline{s}_H) > 0$ which implies that $h(\underline{s}_L) > 0$. As a first step I show that $T^*_{emp}(\cdot|\underline{s}^H)$ dominates $T^*_{emp}(\cdot|\underline{s}^L)$ according to the definition of dominance in Müller and

Stoyan (MS, 2002, p. 180). Using Theorem 5.2.5 in MS dominance can be verified by showing that $Q_{emp}(y,[0,y']|\underline{s}^H) \leq Q_{emp}(y,[0,y']|\underline{s}^L)$ for all $y, y' \in \mathcal{Y}$. As usual write $\underline{s}^H = (\underline{y}^H, \underline{\lambda}^H)$ and $\underline{s}^L = (\underline{y}^L, \underline{\lambda}^L)$. For $y' < \underline{y}_H$ the desired result follows immediately as $Q_{emp}(y,[0,y']|\underline{s}^H) = 0$. So consider the case $y' \geq \underline{y}_H$. First it is helpful to note that

$$\frac{\mu_{new}((\underline{y}_H, y']) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})}{\mu_{new}((\underline{y}_H, +\infty)) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})} \leq \frac{\mu_{new}((\underline{y}_L, y']) + (1-\underline{\lambda}_L)\mu_{new}(\{\underline{y}_L\})}{\mu_{new}((\underline{y}_L, +\infty)) + (1-\underline{\lambda}_L)\mu_{new}(\{\underline{y}_L\})}.$$

Thus it is enough to show that

$$\begin{aligned}
&\left(1-\tilde{\delta}\right)\left[Q(y,(\underline{y}_H, y']) + (1-\underline{\lambda}_H)Q(y,\{\underline{y}_H\})\right] \\
&\quad + \left(\tilde{\delta} + \left(1-\tilde{\delta}\right)\left[Q(y,[0,\underline{y}_H)) + \underline{\lambda}_H Q(y,\{\underline{y}_H\})\right]\right)\frac{\mu_{new}((\underline{y}_H, y]) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})}{\mu_{new}((\underline{y}_H, +\infty)) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})} \\
\leq&(1-\tilde{\delta})\left[Q(y,(\underline{y}_L, y']) + (1-\underline{\lambda}_L)Q(y,\{\underline{y}_L\})\right] \\
&\quad + \left(\tilde{\delta} + \left(1-\tilde{\delta}\right)\left[Q(y,[0,\underline{y}_L)) + \underline{\lambda}_L Q(y,\{\underline{y}_L\})\right]\right)\frac{\mu_{new}((\underline{y}_H, y]) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})}{\mu_{new}((\underline{y}_H, +\infty)) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})}.
\end{aligned}$$

Collecting terms, this condition reduces to

$$\begin{aligned}
&\left[Q(y,[\underline{y}_L, \underline{y}_H)) + \underline{\lambda}_H Q(y,\{\underline{y}_H\}) - \underline{\lambda}_L Q(y,\{\underline{y}_L\})\right]\frac{\mu_{new}((\underline{y}_H, y]) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})}{\mu_{new}((\underline{y}_H, +\infty)) + (1-\underline{\lambda}_H)\mu_{new}(\{\underline{y}_H\})} \\
\leq&\left[Q(y,[\underline{y}_L, y_H)) + \underline{\lambda}_H Q(y,\{\underline{y}_H\}) - \underline{\lambda}_L Q(y,\{\underline{y}_L\})\right]
\end{aligned}$$

which is satisfied. Now let μ be a probability measure on $(\mathcal{Y}, \mathcal{B})$. By Theorem 5.2.2. in MS

$$T^{*n}_{emp}(\mu|\underline{s}^H) \geq_{FSD} T^{*n}_{emp}(\mu|\underline{s}^L)$$

for all $n \geq 0$. Since first order stochastic dominance is closed with respect to strong convergence, it follows that

$$\mu^{ss}_{emp}(\cdot|\underline{s}_H) \geq_{FSD} \mu^{ss}_{emp}(\cdot|\underline{s}_L).$$

■

E Proof of Lemmas 11–13 and Proposition 1

Proof of Lemma 11. First note that F_0^L, $F_0^H \in \mathcal{F}^{NB}$ implies $U^{eq}_{NB}(F_0^H) \leq U^{eq}_{NB}(F_0^L)$. Then parts (b) and (c) of Lemma A imply that $\underline{y}^{eq}_{NB}(F_0^H) = \underline{y}_{NB}(F_0^H, U^{eq}_{NB}(F_0^H)) < \underline{y}_{NB}(F_0^L, U^{eq}_{NB}(F_0^L))$. This in turn implies implies $\underline{s}_0^H \leq \underline{s}_0^L$. The result now follows from Lemma 10. ■

Proof of Lemma 12. Suppose $F^L \notin \mathcal{F}_{NB}$. Then there exists $F^H \in \mathcal{F}$ such that $F^H > F^L$ and $U^{eq}_{NB}(F^H) > U^{eq}_{NB}(F^L)$. Thus

$$\begin{aligned}
&\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L) \\
&= \left[W_{NB}(y, F^H, U^{eq}_{NB}(F^H)) - W_{NB}(y, F^H, U^{eq}_{NB}(F^L))\right] \\
&\quad + \left[W_{NB}(y, F^H, U^{eq}_{NB}(F^L)) - W_{NB}(y, F^L, U^{eq}_{NB}(F^L))\right].
\end{aligned} \tag{E.1}$$

Property (a) of Lemma 2 implies that the first term is positive, while property (b) insures that the second term of the sum is non-negative. Thus all employed workers as well as unemployed workers strictly benefit from an increase of firing costs from F^L to F^H. This immediately implies $F^L \notin \mathcal{P}_{NB,emp}(F_0)$ and $F^L \notin \mathcal{P}_{NB,all}(F_0)$. ■

Proof of Lemma 13. Since $F^L, F^H \in \mathcal{F}_{NB}$ it follows that $U^{eq}_{NB}(F^H) \le U^{eq}_{NB}(F^L)$. Property (a) of Lemma 2 implies that the first term of equation (E.1) is weakly increasing in y, while property (b) insures that the second term is weakly increasing in y. ■

Proof of Proposition 1. Suppose $F^L \in \mathcal{P}_{NB,emp}(F^L_0)$ and $F^H \in \mathcal{P}_{NB,emp}(F^H_0)$ with $F^H > F^L$. Since $F^L \in \mathcal{P}_{NB,emp}(F^L_0)$ it follows that there exists $\underline{s}^L_0 \in \underline{s}^{eq}_{NB}(F^L_0)$ such that

$$\int \left[\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)\right] dG^{ss}_{emp}(y|\underline{s}^L_0) \le 0.$$

Similarly $F^H \in \mathcal{P}_{NB,emp}(F^H_0)$ implies that there exists $\underline{s}^H_0 \in \underline{s}^{eq}_{NB}(F^H_0)$ such that

$$\int \left[\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)\right] dG^{ss}_{emp}(y|\underline{s}^H_0) \ge 0.$$

By Lemma 11 it follows that $G^{ss}_{emp}(\cdot|\underline{s}^H_0) \le_{FSD} G^{ss}_{emp}(\cdot|\underline{s}^L_0)$. As $F^H > F^L$ the difference $\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)$ is weakly increasing in y by Lemma 13. This yields the inequality

$$\int \left[\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)\right] dG^{ss}_{emp}(y|\underline{s}^L_0) \ge \int \left[\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)\right] dG^{ss}_{emp}(y|\underline{s}^H_0).$$

Together these three inequalities imply

$$\begin{aligned}
&\int \left[\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)\right] dG^{ss}_{emp}(y|\underline{s}^L_0) \\
&= \int \left[\mathcal{W}_{NB}(y, F^H) - \mathcal{W}_{NB}(y, F^L)\right] dG^{ss}_{emp}(y|\underline{s}^H_0) = 0.
\end{aligned}$$

Hence $F^H \in \mathcal{P}_{NB,emp}(F^L_0)$ and $F^L \in \mathcal{P}_{NB,emp}(F^H_0)$.

F Proof of Lemmas 14–15 and Proposition 2

Proof of Lemma 14. Consider $F \in \mathcal{F}$ and suppose $w_{ID}(U_{ID}^{eq}(F)) \leq \rho U_{ID}^{eq}(F)$. Then the capital gain from finding a job is zero and equation (6) implies $U_{ID}^{eq}(F) = \frac{z}{\rho}$. But this contradicts part (a) of Assumption 1 according to which $w_{ID}(U_{ID}^{eq}(F)) > z$. ■

Proof of Lemma 15. Let $U^H = U_{ID}^{eq}(F^H)$ and $U^L = U_{ID}^{eq}(F^L)$. Suppose that the separation threshold does not decrease, so $\underline{s}^H > \underline{s}^L$. As a first step I show that this implies $U^H > U^L$. This is because $U^L \leq U^H$ would imply $\underline{y}_{ID}(F^H, U^H) < \underline{y}_{ID}(F^L, U^L)$ by Lemma 3, contradicting $\underline{s}^H > \underline{s}^L$. As a second step I show that $\underline{s}^H > \underline{s}^L$ together with $U^H > U^L$ yields a contradiction using the equilibrium conditions. Since $\int J_{ID}(y, \underline{s}_{ID}(F, U), F, U) dG_{new}(y)$ is weakly decreasing in U and F by Lemma B.1, condition (5) implies that $\theta_{ID}^{eq}(F^H) \leq \theta_{ID}^{eq}(F^L)$. However, given that $\underline{s}^H > \underline{s}^L$ and $\theta_{ID}^{eq}(F^H) \leq \theta_{ID}^{eq} F^L)$ condition (6) implies that $U^H \leq U^L$. ■

Proof of Proposition 2. The utility difference can be written as

$$\begin{aligned}\mathcal{W}_{ID}(y, F^P) - \mathcal{W}_{ID}(y, F^L) = &\left[W_{ID}(y, \underline{s}^P, U_{ID}^{eq}(F^P), F^P) - W_{ID}(y, \underline{s}^P, U_{ID}^{eq}(F^L), F^L)\right] \\ &+ \left[W_{ID}(y, \underline{s}^P, U_{ID}^{eq}(F^L), F^L) - W_{ID}(y, s_{ID}^{eq}(F^L), U_{ID}^{eq}(F^L), F^L)\right]\end{aligned}$$

The first term equals $U_{ID}^{eq}(F^P) - U_{ID}^{eq}(F^L)$ by Lemma 7 (recall that F has no direct effect on worker utility here, so only utility from unemployment changes in the first term). The second term is weakly decreasing in y by Lemma 6 for $y \geq 0$. Thus overall the utility difference $\mathcal{W}(y, F^P) - \mathcal{W}(y, F^L)$ is weakly decreasing for $y \geq 0$.

Now suppose $F^P \in \mathcal{P}_{ID,emp}(F_0^L)$. Then there exists $\underline{s}_0^L \in \underline{s}_{ID}^{eq}(F_0^L)$ such that

$$\int \left[\mathcal{W}_{ID}(y, F^P) - \mathcal{W}_{ID}(y, F)\right] dG_{emp}^{ss}(y|\underline{s}_0^L) \geq 0.$$

for all $F \in \mathcal{F}$. Now pick any $\underline{s}_0^H \in \underline{s}_{ID}^{eq}(F_0^H)$. By Lemma 15 one has $G_{emp}^{ss}(\cdot|\underline{s}_0^L) \geq_{FSD} G_{emp}^{ss}(\cdot|\underline{s}_0^H)$. Thus

$$\int \left[\mathcal{W}_{ID}(y, F^P) - \mathcal{W}_{ID}(y, F)\right] dG_{emp}^{ss}(y|\underline{s}_0^H) \geq 0.$$

for all $F \in \mathcal{F}$. Thus $F^P \in \mathcal{P}_{ID,emp}(F_0^H)$. ■

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