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Unemployment Compensation Finance and Labor Market Rigidity

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ABSTRACT

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The systematic use of experience rating is an original feature of the U.S. unemployment benefit system. In most states, unemployment benefits are financed by taxing firms in proportion to their separations. Experience rating is a way to require employers to contribute to the payment of unemployment benefits they create through their firing decisions. It is striking that experience rating is absent from the unemployment compensation systems of other OECD countries, where benefits are usually financed by taxes on payrolls, paid by employers or employees, and by government contributions (Holmlund, 1998). Is experience rating only adapted to the U.S. labor market? Would it be suitable in other countries? At first glance, it is likely that experience rating is not desirable in many European labor markets characterized by high firing costs. We provide a simple matching model of a rigid labor market including firing costs, temporary jobs and a minimum wage in order to analyze the issue. Our analysis leads us to argue that experience rating is likely to reduce unemployment and to improve the welfare of low skilled workers in France, and more generally for low skilled workers in a typical rigid Continental European labor market.

JEL Classification: J41, J64, J65

Keywords: unemployment benefits, job protection, matching models

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1 Introduction

The systematic use of experience rating is an original feature of the U.S. unemployment benefit system. In most states, unemployment benefits are financed by taxing firms in proportion to their separations. Experience rating is a way to require employers to contribute to the payment of unemployment benefits they create through their firing decisions. It is striking that experience rating is absent from the unemployment compensation systems of other OECD countries, where benefits are usually financed by taxes on payrolls, paid by employers or employees, and by government contributions (Holmlund, 1998). Is experience rating only adapted to the U.S. labor market? Would it be suitable in other countries? Indeed, the U.S. labor market is specific, to the extent that it is always considered as being dramatically flexible: There is no job protection (OECD, 1999) and the minimum wage is low with respect to many other OECD countries (OECD, 1998). Is experience rating suitable only on a very flexible labor market, and not desirable if the labor market faces strong job protection and high minimum wage?

Many contributions have been devoted to the consequence of experience rating on unemployment and welfare (see Holmlund, 1998, for a survey).

Feldstein (1976) has been among the first to offer a theoretical analysis of experience rating. Feldstein presents a model of temporary layoffs, which are frequent in the U.S. economy. He considers the behavior of a firm, with an exogenous number of employees, facing demand shocks. He argues that the unemployment insurance subsidy causes layoffs when they would not otherwise happen, and magnifies the size of the layoffs that do occur. Feldstein concludes his analysis by stressing that "if there were full experience rating in the unemployment insurance tax and if benefits were taxed like other income, the subsidy to temporary layoffs would be eliminated. Unemployment insurance could then continue to provide protection for those who are temporarily laid off without any distortion in their behavior" (Feldstein, 1976, p 956). However, Feldstein's conclusion has been challenged by Burdett and Wright (1989), who argue that experience rating increases unemployment under reasonable conditions if the number of employees is not an exogenous number, as Feldstein assumed, but is chosen optimally by the employer. Marceau (1993) reaches close conclusions in a framework in which there is Cournot competition on the market for the good produced by firms. Marceau shows that if there is free entry and exit, average industrial employment may be a decreasing function of the experience rating because the number of firms in the industry decreases with this parameter.

All these papers consider the consequence of experience rating on *temporary* layoffs. It is assumed that a pool of workers is attached to the firm, and do not find a job elsewhere when unemployed. As Feldstein (1976) stressed, this analysis is likely to be relevant in the

manufacturing sector in the U.S., but temporary layoffs are scarce in most European labor markets. Accordingly, some contributions have looked at the consequence of experience rating in an equilibrium model of unemployment allowing for workers mobility across firms. In this framework, experience rating has the same type of consequence as a combination of an increase in firing cost and a decrease in the payroll tax. As shown by Mortensen (1994), Millard and Mortensen (1997) and Mortensen and Pissarides (1999a,b), an increase in firing costs has an ambiguous impact on unemployment: It reduces both job creation and job destruction. The decrease in the payroll tax is usually beneficial to employment. Millard and Mortensen (1997) find that increasing experience rating decreases unemployment for reasonable parameters values in a search and matching model, with endogenous job destruction and wages bargained at the firm level. As Millard and Mortensen do not explicitly introduce a balanced budget for the unemployment benefit system, the increase in experience rating has exactly the same effect on unemployment as a rise in firing costs. Actually, it can be argued that introducing a balanced budget constraint would magnify the decrease in unemployment due to experience rating, since the payroll tax should be reduced by the increase in experience rating. From this point of view, Albrecht and Vroman (1999) contribution is of particular interest because they explicitly introduce a balanced budget constraint for the unemployment benefit system. They examine the consequence of experience rating in an efficiency wage model where workers heterogeneity gives rise to imperfect monitoring and endogenous layoffs. They compare two self-financing unemployment compensation systems: One in which benefits are financed by a proportional payroll tax and another in which firms are taxed in proportion to their separations. They find that experience rating is favorable to employment, wage and production for any level of unemployment benefit. The reason being that experience rating, which increases separation costs, induces firms to pay higher wages in order to avoid layoffs due to shirking. Thus, Albrecht and Vroman are able to show that one gets higher wages, lower unemployment and higher production with experience rating for relevant parameters values.

Generally, empirical analysis of experience rating yields support to Feldstein's analysis. Topel (1983) estimates that unemployment insurance subsidy due to payroll taxes accounts for more than a quarter of layoffs in his data set. The series of papers of Anderson and Meyer (1993, 1994, 2000) sheds light on the effects of experience rating in a broad variety of cases in the United States. Anderson and Meyer (2000) is of particular interest since the authors provide a detailed analysis of the 1984 Washington state legislation switch from a payroll tax system to an experience-rated system. This natural experiment provides good evidence on the effects of experience rating compared to a payroll tax system and thus may help elaborating a potential reform of the unemployment benefits scheme in Continental Europe.

Overall, the contributions which analyze the consequence of experience rating in equilibrium unemployment models conclude that it is a good system. Nevertheless, it should be noticed that these contributions do not analyze how experience rating interacts with other labor market institutions. The aim of our paper is to tackle this issue. In this perspective, we use a simple equilibrium search and matching model, based on Mortensen and Pissarides (1994, 1999a) framework, which takes into account important rigidities of European labor markets. More precisely, following Blanchard and Landier (2000) and Cahuc and Postel-Vinay (2002), we take into account job protection by introducing both firing costs and temporary jobs, which play a very important role in European countries (see OECD, 1999). We also introduce a minimum wage. Section 2 presents the model that will allow us to mimic both flexible and rigid labor markets. Section 3 is devoted to the analysis of the consequence of experience rating in a flexible labor market – U.S. like – that is used as a benchmark to understand the influences of labor market rigidities on the efficiency of experience rating. Section 4 sheds some light on the influence of labor market rigidities and tries to assess the desirability of experience rating on a particular labor market often considered as very rigid: The French labor market. Section 5 provides some concluding comments.

2 The model

2.1 The labor market

We consider an economy with two goods: Labor and a numeraire good produced thanks to labor. There is an endogenous measure of firms. Each firm has only one job, that can be either filled or vacant. The labor force is composed of a continuum of infinite lived individuals, which measure is normalized to unity. Each individual offers one unit of labor per unit of time. Individuals have identical preferences, represented by a concave utility function with standard properties, denoted by $U(R)$, where R stands for the instantaneous income. It is also assumed that workers do not save and do not have access to financial markets. Time is continuous and the future is discounted by all individuals at a fixed rate $r > 0$.

Vacant jobs and unemployed workers are matched together in pairs through an imperfect matching process. The measure of matches per unit of time is given by the matching function $M(v, u)$, where v and u represent the vacancy and unemployment rates respectively. The matching function satisfies the standard properties: It is increasing, continuously differentiable, homogenous of degree one and yields no hiring if the mass of unemployed workers or vacant jobs is nil. Linear homogeneity of the matching function allows us to write the rate at which a vacant job meets an unemployed worker as $m(u, v)/v = m(\theta)$, where $\theta = v/u$ stands for the labor mar-

ket tightness ratio. Similarly, the exit rate from unemployment reads as $m(u,v)/u = \theta m(\theta)$. The properties of the matching function imply that $m(\theta)$ and $\theta m(\theta)$ are decreasing and increasing functions of the labor market tightness ratio respectively.

Following Blanchard and Landier (2000), it is assumed that all new matches start with productivity x_0. Changes in productivity are governed by a Poisson process with arrival rate α for jobs that have not yet been hit by a productivity shock. In the event of a shock, a new value of productivity is drawn from a general distribution function $F(x)$ with support in the range $]-\infty, +\infty[$, such that the expected value of productivity (conditional on job continuation) is larger than x_0. After the first productivity shock, new productivity shocks, drawn from the same distribution $F(x)$, occur according to a Poisson process with arrival rate $\lambda < \alpha$. This set of assumptions allows us to take into account that productivity is generally larger on jobs with long tenure than on new jobs and that job stability increases with tenure (see for instance: Farber, 1999). Actually, there are many reasons that can explain this phenomenon: For instance, learning by doing implies that productivity and then wages rise with seniority, on-the-job search can give rise to wage increases, incentives issues may induce employers to offer wages increasing with seniority.

The model is meant to mimic both flexible — U.S. like — and prototypical rigid European labor markets. In this perspective, it is important to make a sharp distinction between temporary jobs on one hand, and long-term, or 'stable' jobs, on the other hand. In our economy, it is assumed that two types of jobs can coexist. Temporary jobs, with low separation costs, will be distinguished from long-term jobs, with high firing costs. This specification allows us to embed a wide range of typically precarious labor contracts, such as short term contracts or temporary employment whose use has considerably spread in most continental European labor markets over the last decade.

It is assumed that stable jobs are regular type of contracts with no predetermined length. Once a shock has occurred, a stable job is either terminated or continued according to the new productivity value. The destruction cost of any stable job amounts to $f_s + \tau_s$, where f_s is the firing tax redistributed through lump sum transfers to all the workers, and τ_s is a tax used to finance unemployment benefits. In this simple framework, τ_s represents the experience rating schedule for stable jobs. It is worth noticing that, in general, experience rating schedules which have been implemented are more complex than a simple firing cost schedule. In actual experience rating schedules, the tax paid by a firm depends on the number of past layoffs, on the total wage bill paid to the workers still employed by the firm, but also on the duration of the unemployment spells experienced by laid off workers. There exists different schedules (for instance, the benefit ratio system and the reserve ratio system), which are based upon different

combinations of these ingredients. As it will appear below, taxes used to finance unemployment benefits do hinge on the duration of the unemployment spells experienced by laid off workers in our framework. However, for the sake of simplicity, we consider a memoryless experience rating schedule[2]. As our focus is on steady states, this assumption does not seem to be very restrictive. It would be worth introducing experience rating systems with memory in order to analyze the cyclical properties of the labor market.

Temporary jobs start with the same productivity level, x_0, as stable jobs. Once the first productivity shock has occurred, a temporary job is either destroyed or transformed into a stable job. Destruction costs of temporary jobs amount to $f_t + \tau_t \leq f_s + \tau_s$, where $f_t \leq f_s$ is the firing tax redistributed through lump sum transfers to all the workers, and $\tau_t \leq \tau_s$ is the tax used to finance unemployment benefits. These assumptions allow us to be able to represent a situation in which temporary jobs have a limited duration and can be transformed into stable jobs with high separation costs. Indeed, in Continental Europe, temporary jobs have to be either transformed or destroyed after a certain duration that hinges on criteria that differ across countries.

The hiring process is supposed to be the same for both stable and temporary jobs. Obviously, temporary jobs are always preferred by firms, because they bear less administrative firing costs than stable jobs. Therefore, we deem realistic to assume that the type of contract to be offered by the firm is subject to government's approval. Hiring on temporary jobs is granted to an exogenous fraction $p \in [0,1]$ of new matches, the remaining part being stable jobs.

The decisions of opening a new vacant job slot or terminating a job of either type are based on the asset values of the various options. The instantaneous cost of a vacant job is denoted by h. Its is filled at rate $m(\theta)$. With probability p the job will be temporary, and will yield an expected present discounted value denoted by Π_t. With a complementary probability, $(1-p)$, the job will be stable, and will yield an expected present discounted value denoted by Π_{ns} (ns stands for new stable). Thus, the value of a vacant job, denoted by Π_v, solves:

$$r\Pi_v = -h + m(\theta)\left\{p\text{Max}\left[\Pi_t, \Pi_v\right] + (1-p)\text{Max}\left[\Pi_{ns}, \Pi_v\right] - \Pi_v\right\}. \tag{1}$$

Let us denote by w the wage, that will be shown to be the same on every job given our assumptions on wage formation. Then, denoting by $\Pi_s(x)$ the value of a stable job, with current productivity x, that has already been hit by a shock, Π_t solves:

$$r\Pi_t = x_0 - w - \tau + \alpha\left[\int_{-\infty}^{+\infty} \text{Max}\left[\Pi_s(x), \Pi_v - \tau_t - f_t\right] dF(x) - \Pi_t\right]. \tag{2}$$

[2] As far as we are aware all the papers devoted to experience rating adopt this assumption. The analysis of the dynamic consequences of experience rating system with memory is certainly a very interesting extension to consider in future work.

Similarly, Π_{ns} solves:

$$r\Pi_{ns} = x_0 - w - \tau + \alpha \left[\int_{-\infty}^{+\infty} \text{Max} \left[\Pi_s(x), \Pi_v - \tau_s - f_s \right] dF(x) - \Pi_{ns} \right], \tag{3}$$

where $\Pi_s(x)$ satisfies:

$$r\Pi_s(x) = x - w - \tau + \lambda \left[\int_{-\infty}^{+\infty} \text{Max} \left[\Pi_s(x), \Pi_v - \tau_s - f_s \right] dF(x) - \Pi_s(x) \right]. \tag{4}$$

Job creation is governed by the assumption of free entry onto the search market. Free entry drives the value of a vacant job slot, Π_v, to zero in each point of time. The free entry condition implies, together with equation (1):

$$\frac{h}{m(\theta)} = p\Pi_t + (1-p)\Pi_{ns}. \tag{5}$$

This condition shows that the expected cost of a vacancy, $h/m(\theta)$, is necessarily equal to the expected value of a new match, that yields Π_t with probability p and Π_{ns} with probability $(1-p)$.

Jobs are destroyed if their asset value is lower than their destruction cost. Equation (4) shows that $\Pi_s(x)$ increases with the productivity parameter x. Therefore, stable jobs are destroyed when they are hit by a bad productivity shock, which level is below an endogenous threshold value, denoted by x_s, defined by $\Pi_s(x_s) = -f_s - \tau_s$. Using equation (4), this condition is equivalent to:

$$x_s = w + \tau - r(\tau_s + f_s) - \frac{\lambda}{r+\lambda} \int_{x_s}^{+\infty} (x - x_s) dF(x). \tag{6}$$

The same reasoning applies to temporary jobs: They are destroyed if their productivity x is below the endogenous threshold, denoted by x_t, defined by $\Pi_s(x_t) = -f_t - \tau_t$. Using equations (2) and (6), this condition is equivalent to

$$x_t = x_s + (r+\lambda)\left[(\tau_s + f_s) - (\tau_t + f_t) \right]. \tag{7}$$

It can be seen, from equation (7), that the reservation productivity for the transformation of temporary jobs into stable jobs, x_t, is larger than x_s, the reservation productivity for stable jobs, if and only if firing costs are larger for stable jobs than for temporary jobs.

Substituting the definitions (2), (3) and (4) of the values of temporary and stable jobs into the free entry condition (5), and using the definitions of the threshold values x_s and x_t, yields a relation between the labor market tightness θ, the wage w, and threshold values x_s and x_t, that reads as:

$$\begin{aligned} \frac{h}{m(\theta)} \quad = \quad & \frac{1}{r+\alpha} \left\{ x_0 - w - \tau + \alpha p \left[\int_{x_t}^{+\infty} \left(\frac{x - x_s}{r+\lambda} - f_s - \tau_s \right) dF(x) - F(x_t)(f_t + \tau_t) \right] \right. \\ & \left. + \alpha(1-p) \left[\int_{\varepsilon_s}^{+\infty} \left(\frac{x - x_s}{r+\lambda} \right) dF(x) - (f_s + \tau_s) \right] \right\} \end{aligned} \tag{8}$$

The left-hand side of this equation is the expected cost of a vacant job and the right-hand side corresponds to the expected value of a filled job. In equilibrium, the labor market tightness, θ, the reservation productivities of new jobs and stable jobs, denoted respectively by x_t and x_s, are defined by equations (6), (7) and (8), for a given value of the wage. Labor market tightness and reservation productivities determine the composition of jobs and the unemployment rate through their influence on labor market flows.

Flows

Labor market flows play a key role in the determination of the unemployment rate, which depends on the rates of job destruction and job transformation as well as the mass of vacant jobs. Let us notice that the exit rate from unemployment reads as: $M(v,u)/u = \theta m(\theta)$. Let us denote by t the mass of temporary jobs and by s the mass of stable jobs that have been hit by a productivity shocks. The steady state flows equilibrium implies that the mass of entries into unemployment amounts to the mass of exits from unemployment:

$$\theta m(\theta) u = \alpha \left[F(x_t) t + F(x_s) \left(1 - u - t - s \right) \right] + \lambda F(x_s) s. \tag{9}$$

Moreover, in steady state, the outflows and inflows into temporary jobs are equal, which reads as:

$$\theta m(\theta) u p = \alpha t. \tag{10}$$

Similarly, the equality of outflows and inflows into new stable jobs (that have not yet been hit by a shock) reads:

$$\theta m(\theta) u (1-p) = \alpha \left(1 - u - t - s \right). \tag{11}$$

The three last equations imply:

$$u = \frac{\lambda F(x_s)}{\lambda F(x_s) \left[1 + \frac{p \theta m(\theta)}{\alpha} \right] + \theta m(\theta) \left[1 - p F(x_t) - (1-p) F(x_s) \right]]} \tag{12}$$

Equation (12) indicates that the unemployment rate increases with the job destruction rates $\alpha F(x_t)$, $\alpha F(x_s)$ and $\lambda F(x_s)$, but decreases with respect to $\theta m(\theta)$, the exit rate from unemployment. Let us now analyze how the equilibrium values of these variables are influenced by such features of the labor market as wage setting, job protection and the unemployment benefit system.

2.2 Unemployment benefits and wage setting

Unemployed workers get an instantaneous income made of three elements. First, an exogenous income, denoted by z, coming from their own activity (home production, leisure...). Second, lump sum transfers resulting from firing costs f_t and f_s which are not devoted to finance unemployment benefits. Third, unemployment benefits, denoted by b. Unemployment benefits are financed thanks to two instruments: A tax, denoted by τ, paid by each employer on each filled job, and a tax paid when a job is destroyed, denoted by τ_t and τ_s for a temporary job and a stable job respectively. As it has already been stressed, this second type of tax is introduced in order to evaluate the consequence of experience rating. Accordingly, the expenditure of the unemployment benefit system is ub, whereas its resources per unit of time are:

$$B = \tau(1-u) + \tau_s F(x_s)\left[\lambda s + \alpha(1-u-s-t)\right] + \tau_t \alpha F(x_t)t \tag{13}$$

Matching models with a balanced budget constraint and a given replacement ratio generally exhibit multiple equilibria (Rocheteau, 1999). In order to avoid this problem, we shall henceforth look at the consequence of experience rating on unemployment and welfare for a given level of expenditure B, assuming a balanced budget. This allows us to look for the optimal degree of experience rating, for any level of expenditure, according to a well defined criterion, which can be either welfare or unemployment. It is worth noticing that assuming that the budget B is given and balanced implies that unemployment benefit b is endogenous: It is worth B/u. Moreover, if τ_t and τ_s are exogenous parameters, τ is necessarily an endogenous variable, which balances the required level of expenditure. If τ_t and τ_s are all equal to zero, there is no experience rating. If they are such that τ is worth zero, there is full experience rating.

Employed workers get a wage denoted by w. In our benchmark case, which represents a flexible labor market with neither firing cost nor minimum wage, it is assumed that the wage is set by employers. This simple assumption allows us to obtain a situation in which all workers receive the same wage, equal to $b+z$. This assumption may have some important drawbacks at first glance. First, it is admittedly less general than assuming wage bargaining, as it is done in most matching models of the labor market. However, it should be noticed that we want to look at the consequences of experience rating in the presence of a minimum wage. Introducing a minimum wage in a model with wage dispersion, as it is the case if wages are bargained over, gives rise to complexities (Cahuc and Zylberberg, 1999) that we want to avoid to be able to focus on comprehensible mechanisms. Second, assuming that workers do not get any share of the quasi-rent yielded by filled jobs gives rise to a very inefficient allocation, with too many jobs in equilibrium (see Hosios, 1990 and Pissarides, 2000). From this point of view, it would have

been more relevant to assume that wages were determined through a wage posting process which yields an efficient outcome, that maximizes the expected utility of unemployed workers, as in Moen (1997), or Acemoglu and Shimer (1999). However, computing a wage posting equilibrium in a matching model with risk aversion and endogenous job destruction is a complex issue[3] that is beyond the scope of this paper, devoted to the analysis of the consequences of labor market rigidities on the efficiency of different unemployment compensation finance schemes. Third, given our assumption, workers do not bear any risk in the flexible economy, since they are just paid their reservation wage whatever they do. Accordingly, one may wonder whether it is worth analyzing unemployment benefits in such a framework. On this particular issue, we argue that this not a problem as far as we are interested in the financing of the unemployment benefit system and not in the design of the optimal benefits that workers should get. Moreover, we shall see that unemployment benefits can be welfare improving because they influence wages, and that our assumption allows us to illustrate in a simple way the response of wages to unemployment benefits.

Actually, our simple assumption turns out to be relevant for our purpose, which is merely to understand the impact of experience rating in the presence of flexible wages in order to see what changes are introduced by the minimum wage and firing costs.

3 Experience rating on a flexible labor market

Our benchmark case is a flexible labor market with a competitive wage and no job protection. Many contributions have shown that experience rating has a positive effect on employment and welfare in such a context. Our analysis can be split in two parts. First, we begin to study the theoretical properties of the model when an increase in the experience rating tax rate occurs. Second, we aim at fine tuning the theoretical analysis with some computational exercises.

3.1 Theoretical analysis

Let us begin to assume that there is no firing cost ($f_t = f_s = 0$) and that experience rating applies to all jobs, ($\tau_t = \tau_s$) in a context in which the wage is flexible. In this simple case, temporary and stable jobs are identical. Then, the value of p, the share of new matches that yield temporary jobs, is worthless, and the reservation productivity is the same for all jobs: $x_s = x_t$. Equations (6), (8), (9) and (13) imply that the equilibrium values of the labor market

[3] In particular, employers cannot any more offer contracts with a constant wage only, because such contracts entail inefficient separations. Employers would have to post contracts that specify wages and severance payments.

tightness and the reservation productivity are defined by the two following equations:

$$\frac{h}{m(\theta)} = \frac{x_0 - x_s}{r+\lambda} - \tau_s \tag{14}$$

$$x_s = B\left[\lambda F(x_s) + \theta m(\theta)\right]\left[\frac{1}{\theta m(\theta)} + \frac{1}{\lambda F(x_s)}\right] - \left[r + \lambda F(x_s)\right]\tau_s - \lambda \int_{x_s}^{+\infty} \frac{(x - x_s)}{r+\lambda} dx \tag{15}$$

The equilibrium is represented on Figure 1 in the (θ, x_s) plane. The equilibrium values of the labor market tightness θ and the reservation productivity x_s are determined by the intersection of a downwards sloping job creation curve (equation (14)) and an upward sloping job destruction curve[4] (equation (15)). Intuitively, the job creation curve has a negative slope because a higher reservation productivity tends to increase the rate of job destruction. Accordingly, a higher reservation productivity for continuation of stable jobs entails a shorter expected duration of jobs. Thus, if the reservation productivity, x_s, is increased, expected profits for new jobs are falling off, which induces entrepreneurs to create fewer jobs, that, in turn, leads to a decrease in the labor market tightness. The job destruction curve has a positive slope, because an increase in the labor market tightness tends to improve workers' outside opportunities, and, therefore, to raise the exit rate from unemployment, the expected utility of unemployed workers, and wages. Thus, if the labor market tightness is raised, the expected profits are falling off and the reservation productivity is increased, so that more jobs are terminated.

Now, let us look at the consequences of a rise in experience rating. These consequences are depicted on Figure 1. It induces a move from steady state equilibrium A to steady state equilibrium B. An increase in experience rating decreases the job reservation productivity x_s for any given value of the labor market tightness, which corresponds to an upward move of the job destruction curve. From this point of view, experience rating acts like a firing cost that creates labor hoarding. It can also be checked that experience rating decreases job creation, because it increases the cost of job destruction. Accordingly, the job creation curve is shifting down, as shown by Figure 1. One must keep in mind that this mechanism takes account of the budget equilibrium of the unemployment compensation system, which differs from the analysis provided by Millard and Mortensen (1997).

Overall, experience rating diminishes both the job destruction of stable jobs and the labor market tightness. Therefore, its effect on unemployment is ambiguous and it is necessary to fine tune our results using computational exercises.

[4]It can be easily checked that the job destruction curve is upward sloping if the unemployment rate is lower than 50%. We assume that this condition is fulfilled.

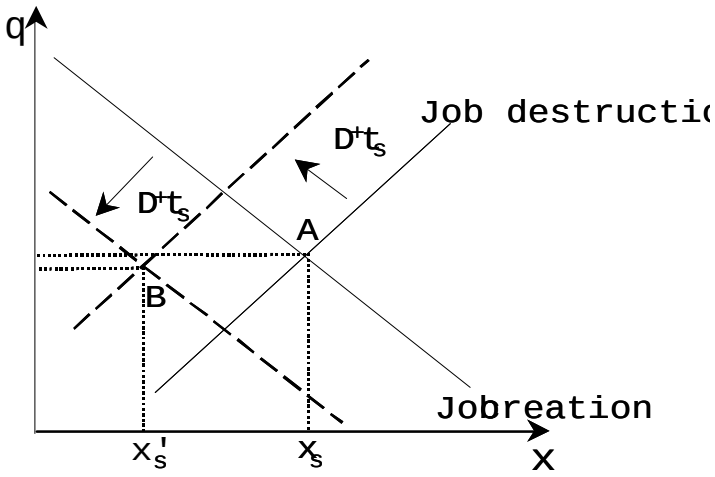

Figure 1: Effects of an increase in experience rating in the flexible labor market.

It is also worth giving some hints on the consequences of experience rating on welfare in the flexible economy. It can easily be understood that workers, who all get the same instantaneous utility $U(b+z) = U\left[\left(\frac{B}{u}\right)+z\right]$, benefit from positive unemployment benefits. Indeed, equations (9), (14) and (15) imply that an increase in B, which moves the job destruction curve towards the bottom in Figure 1, entails an increase in the unemployment rate. More formally, one gets: $0 < du/dB << \infty$. As $d(B/u)/dB = (1/u)\left[1-(du/dB)(B/u)\right]$, the fact that $0 < du/dB << \infty$ and u takes a positive finite value as $B \to 0$, implies that $\underset{B\to 0}{\text{Lim}}\, d(B/u)/dB = 1/u > 0$. Accordingly, in our framework, it is worth introducing *positive* values of unemployment benefits. But, for positive values of unemployment benefits, the job destruction rate is too high in the absence of experience rating, because unemployment benefits induce a discrepancy between the *social value of jobs surplus*, which obtains by comparison of the productivity of the job, x, to the productivity outside the market, z, and the *private value of jobs surplus,* which is derived from the comparison of the job productivity free of taxes, $x-\tau$, to the workers reservation wage, $b+z$. In order to make this point clear, let us consider, for the sake of simplicity, a static environment. In that case, efficiency requires that all jobs with $x \geq z$ continue, but the private decisions of employers imply that they destroy jobs such that $x-\tau < z+b$. Accordingly, it appears that unemployment benefits induce a discrepancy between the private and the efficient job destruction decisions for two reasons. First, the fiscal externality, stressed by Feldstein (1976), arises, since employers who fire workers do not take account of the increase in the tax induced by their action in the absence of experience rating. Accordingly, employers fire too many workers, which implies a too

high value of the tax τ, and too many job destructions. Second, the reservation wage, $w = b + z$, is increased by unemployment benefits. This also leads to too many job destructions. For these two reasons[5], the job destruction rate is too high if there are positive unemployment benefits and no experience rating in the flexible economy. That is why it is worth using experience rating. In sum, in our benchmark economy, it appears that the welfare of workers can be maximized thanks to a combination of positive unemployment benefits and experience rating.

3.2 Computational exercises

Our computational exercises illustrate the effects of experience rating in a more stringent manner. They suggest that some positive experience rating is favorable to both employment and welfare for a large range of plausible parameters values.

Since the U.S. market does have experience rating, we start with a calibration of the flexible market model for the U.S., in the line of Mortensen and Pissarides (1999a,b). A matching function of the Cobb-Douglas form is assumed, such that $m(v,u) = v^{0.5}u^{0.5}$. The distribution of idiosyncratic shocks is assumed to be uniform on the support $[0,1]$. The productivity on new jobs x_0 is worth 0.7 and the average productivity for jobs already hit by shocks amounts to 0.81. This is in accordance with the assumption stating that productivity increases with job tenure. We assume a CRRA utility function: $U(R) = R^{1-\sigma}/(1-\sigma)$, with $\sigma = 1.5$. The time unit is the quarter. Parameters α, λ, h, and B are chosen so that the steady state implications of the model match reasonable values for the unemployment rate, the unemployment spell, the job destruction rate and the replacement ratio. Namely, the baseline parameters value used in our computational exercise, reported in Table 1, aims at matching the U.S. labor market for low skilled workers whose education attainment is no more than a high school diploma. For those workers, the unemployment rate averages about 8.5% in 2001 (Bureau of Labor Statistics, 2002). The unemployment spell amounts to a bit less than one quarter and the replacement ratio, b/w, worth 55% (which is compatible with the average net replacement ratio for the U.S. according to the OECD data: Martin, 1996), which implies that $B = 0.032$. It should be noticed that λ, z and h reach likely values that are in the range of those usually chosen by other calibrations of matching models (Millard and Mortensen, 1997, Mortensen and Pissarides, 1999a,b).

Henceforth the degree of experience rating, denoted by ε, is the share of the expected discounted cost of an unemployed worker. Namely, given that the exit rate from unemployment is $\theta m(\theta)$, the expected discounted cost of an unemployed worker is $b/\left[r + \theta m(\theta)\right]$, and ε is defined as the share of this cost paid by an employer when a worker is fired. The value of ε amounts to

[5]Notice that these two effects would also arise in a model with wage bargaining or with wage posting.

Parameters	z	α	λ	h	r	f_t	f_s
	.3	.375	.094	.4	.0125	0	0
Endogenous variables	Unempl. Rate			Unempl. Spell			
	8.5%			0.85 quarter			

Table 1: Parameters value and features of the flexible labor market

0.62 in our benchmark calibration. This number corresponds to the average experience rating in the U.S. economy over the years 1988 – 1997 (UIPL, 1999).

Figure 2 plots the unemployment rate as a function of the degree of experience rating ε applying to all jobs in the flexible economy, for the benchmark value of the budget[6], $B = 0.032$. It should be noticed that welfare merely amounts to $U\left[\left(\frac{B}{u}\right) + z\right]/r$, since all workers get the same income in the flexible labor market. Accordingly, changes in welfare can be immediately deduced from changes in the unemployment rate. Figure 2 shows that unemployment is minimized for a degree of experience rating greater than one and larger than the actual degree of experience rating in the US economy. This result is in accordance with Feldstein (1976) who argue that the optimal experience rating index is greater than one. It can also be seen that experience rating induces a relatively small impact on the unemployment rate that decreases from 8.57%, for $\varepsilon = 0$, to 8.48%, for $\varepsilon = 1.1$. This result is in line with Anderson (1993) and Anderson and Meyer (2000) findings, according to which experience rating has a very weak impact on average unemployment in the U.S. Moreover, Anderson and Meyer (2000, p. 99) estimate that "a move to full experience rating would lower the claim rate by 0.31-0.56 percentage points". In our model, the job destruction rate, which corresponds to the claim rate as every fired workers is eligible to the unemployment benefits, is lowered by 0.48 percentage points when one moves from $\varepsilon = 0$ to $\varepsilon = 1$, which is in the range provided by Anderson and Meyer.

It is often argued that experience rating is the same thing as firing costs. Our framework, allows us to show that this assertion is far from being right. In our framework, experience rating has a different impact on unemployment than firing costs. Indeed, an increase in the experience rating index, ε, reduces, for a given budget, the payroll tax τ (the same result would arise for a given replacement ratio b). This drop in the payroll tax increases profits and is therefore likely to foster job creation. The effect of an increase in the firing costs is likely to be different. As a matter of fact, in our framework, an increase in firing costs raises the unemployment rate, because the increase in the separation costs f_t and f_s is not compensated by a payroll tax decrease. The consequence of a firing tax hike in our benchmark calibration ($\varepsilon = 0.62$) is illustrated by Figure 3.

[6]Equivalently, we could have considered a constant replacement ratio and look for the degree of experience rating that minimizes the budget B.

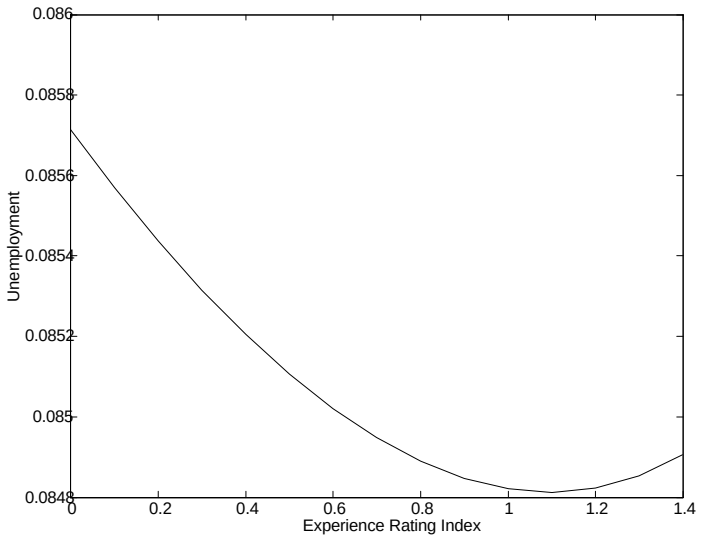

Figure 2: Experience rating and unemployment in the flexible economy.

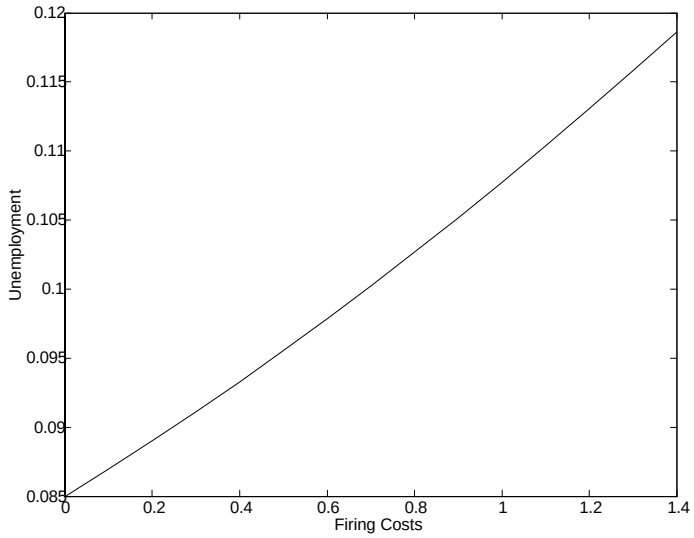

Figure 3: Firing costs and unemployment in the flexible economy.

4 Experience rating on a rigid labor market

We are going to focus on two aspects of labor market rigidity: Job protection and the minimum wage, which play a very important role in Continental Europe. We start our analysis by some computational exercises meant to underline the properties of our model when firing costs or a minimum wage are introduced in our benchmark economy. Then, we evaluate the consequence of experience rating on a specific labor market, namely the French labor market, which has many features often met in Continental European economies.

4.1 Firing costs and minimum wage

Job protection is likely to counteract the benefits of experience rating. The potential virtue of experience rating being to lower job destruction, it is doubtful that it is worthwhile using experience rating when there are high firing costs. This point is illustrated by Figure 4, which represents the consequences of experience rating[7], when firing costs that amount to the level met on the French labor market (see below) are introduced in the benchmark flexible economy. Namely, at this stage, the existence of temporary jobs is neglected ($p = 0$), and it is assumed that all jobs face firing costs that worth 50% of the average yearly wage. One can see that experience rating is not any more useful to decrease unemployment (an therefore improve welfare) when there are protection levels similar to those met in Continental Europe. More generally, it appears that the optimal degree of experience rating decreases with the level of job protection, and can even become negative, when job protection is beyond a threshold value.

The influence of the minimum wage on the efficiency of experience rating can easily be understood in our simple framework. Let us assume that a minimum wage is introduced in the flexible labor market, without any firing cost. It can be understood that experience rating can improve efficiency for two reasons. First, the minimum wage increases the mass of inefficient job destructions, with positive job surplus. Experience rating is a way to counteract this type of inefficiency, independently of the unemployment benefit financing problem, because, in the presence of a minimum wage, it is worth introducing firing costs that are redistributed to employers as a subsidy lowering labor cost. Second, the fiscal externality stressed by Feldstein (1976) still exists when there is a minimum wage, since the labor cost amounts to $w + \tau$ in the absence of experience rating, τ being taken as given by each employer.

In order to illustrate the consequence of experience rating in the presence of a minimum wage, let us introduce a binding minimum wage in the benchmark flexible economy. As shown

[7]The average experience rating index in the benchmark economy is set to $\varepsilon = 0.62$. This value is calculated using UI data for the US economy from 1988 to 1997.

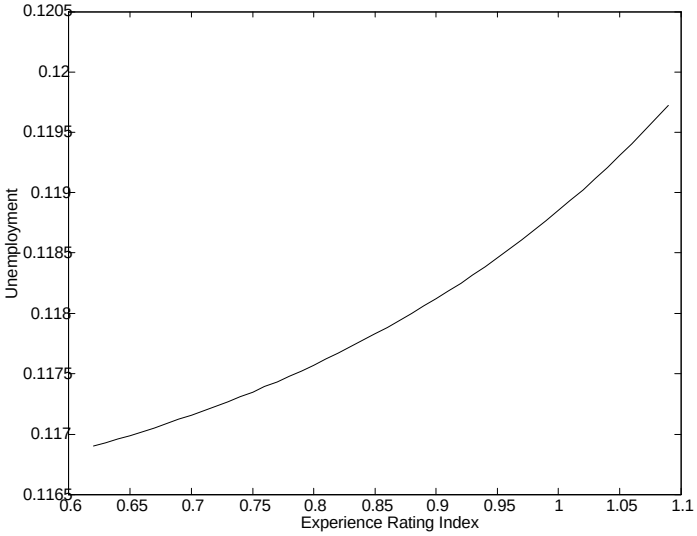

Figure 4: Experience rating with a flexible wage and stringent job protection.

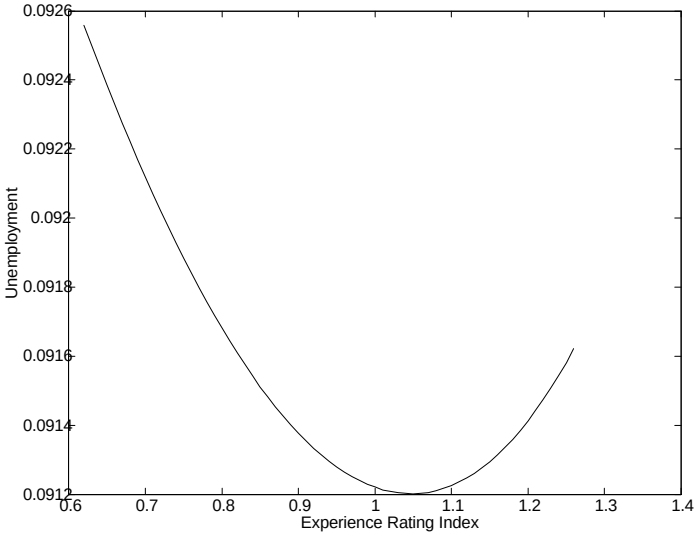

Figure 5: Experience rating in the labor market with a minimum wage and no firing cost.

by Figure 5, assuming that the minimum wage entails an unemployment rate of about 9.25% for the average experience rating index (instead of an approximated 8.50% when the wage is flexible), experience rating can give rise to a decrease in the unemployment rate. One can note that the decrease in the unemployment rate is larger when there is a binding minimum wage. Indeed, a variation in the experience rating index in the range $[0.62, 1]$ induces an approximately ten times greater drop in the unemployment rate when there is a binding minimum wage. Simulations non reported here show that the impact of experience rating on unemployment increases with the level of the minimum wage.

4.2 A typical European labor market

Now, let us turn to the issue of the efficiency of experience rating on a specific labor market. Namely, let us consider the French case, which is instructive insofar as many features of the French labor market are also present in European labor markets. Actually, job protection arises in a very specific form in such markets, because there are both stable jobs, that benefit from an important job protection, and unstable jobs, with a very short duration — see Goux and Maurin (2000), Cohen (1999). The spread of temporary jobs in Continental Europe, during the eighties and the beginning of the nineties (OECD, 1999), is a striking feature of European labor markets with high firing costs. In this context, some new questions arise: What is the real degree of job protection when temporary and permanent jobs coexist? Should both temporary and permanent jobs be concerned by experience rating?

Our model allows us to answer, to a certain extent, to these questions. The focus is on the unskilled workers who are paid a minimum wage. Accordingly, the minimum wage has been set to get an unemployment rate of 20% in the absence of experience rating. This unemployment rate for unskilled workers is in line with recent figures provided by the French forecasting department (Doisy, Duchêne and Gianella (2002)). According to the empirical evidence provided by the French Ministry of labor (DARES, 2001), unstable jobs for unskilled workers are assumed to be less than one quarter long on average ($\alpha = 1.12$) and entry into employment through a temporary contract is granted to 70% of new hirings ($p = 0.7$). It is assumed that both temporary and new stable jobs start at the same productivity $x_0 = 0.7$. Accordingly, the average productivity on jobs already hit by a shock is worth 0.75. The amount of the firing costs set by law on such jobs is modest. Following Goux and Maurin (2000), it has been assumed that firing costs on temporary jobs amount to 5% of the yearly wage. On the contrary, job protection is much more stringent on stable jobs which face firing costs that amount to 50% of the yearly wage. Remaining parameters are set so as to reproduce the share and destruction rate for both temporary and stable jobs

Parameters	z	α	λ	h	r	f_t	f_s
	.2	1.12	0.12	.4	.0125	$.2w$	$2w$
Endogenous variables	Unempl. Rate			Unempl. Spell			
	20%			1.82 quarter			

Table 2: Parameters value and features of the rigid labor market

on the French labor market[8]. Table 2 presents the main features of the labor market that arise with the selected parameters value when there is no experience rating.

The impact of experience rating on unemployment and welfare is illustrated by Figure 6. We distinguish two cases: First, experience rating may apply to all jobs, second, to stable jobs only. Moreover, we look at the consequence of experience rating on unemployment, on the utilitarian criterion — which corresponds to the weighted sum of the workers' expected utilities that are defined in appendix — on the welfare of the unemployed workers and on the welfare of the employees on new jobs. Globally, Figure 6 shows that the unemployment rate reaches a minimum, and the different measures of welfare a maximum, for a positive value of experience rating in all cases. Thus, experience rating is worthwhile: It decreases unemployment and improves welfare even in the case where it also applies to temporary jobs. Even if firing costs are relatively high in France, the presence of temporary jobs and of a minimum wage makes experience rating desirable for the low skilled workers. It is also worth noting that experience rating has a much stronger impact on the unemployment rate in France (a 1.49 percentage point drop) than in the U.S. (about a 0.1 percentage point drop, as shown in Figure 2). The high level of the minimum wage in France is likely to explain this result, that appears to be very robust in our framework: It holds in a large range of plausible parameters values.

Our model also sheds light on the way experience rating should be applied on European labor markets. Given that only a low share of new matches are transformed into stable jobs, our model suggests that experience rating should not apply to new jobs — namely fixed-term jobs that represent 70% of hirings in France. The intuition for this result is that applying experience rating on unstable jobs strongly discourages job creation. In other words, introducing experience rating on stable jobs only is a way to delay the expected separation costs when firms post vacancies, which limits the negative impact of separation costs on job creation. Obviously, introducing experience rating on stable jobs only induces an increase in the share of new jobs, since the new jobs destruction rate is raised and the stable jobs destruction rate is decreased by experience rating. A priori, this is detrimental to workers who are not employed on a stable job. However,

[8]The model yields results in accordance with empirical evidence for the French labor market. The share of temporary jobs is less than $8,5\%$ and the destruction rate close to 72%. Finally, the destruction rate for stable jobs is about 6.25%.

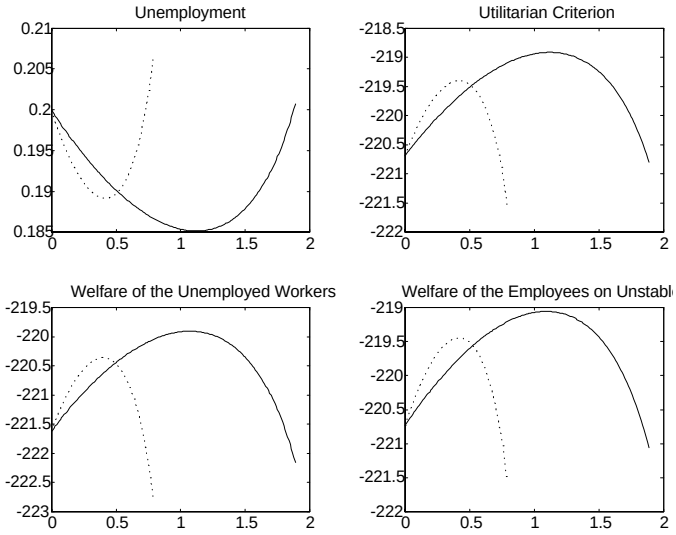

Figure 6: Experience rating, unemployment, and welfare, on the French labor market. Experience rating applies either to all jobs (dashed lines) or to stable jobs only (continuous lines).

it appears that this phenomenon is not really a problem here, since both unemployed workers and employees on new jobs, who are those who suffer from the spread of job instability, benefit from experience rating introduced in such a way.

5 Conclusion

In this paper, we have utilized a model of a rigid labor market including firing costs, temporary jobs and a minimum wage. This model leads us to argue that experience rating is likely to reduce unemployment and to improve labor market efficiency for low skilled workers in France, and more generally for low skilled workers in a typical rigid Continental European labor market. These results suggest that the combination of minimum wage, temporary jobs and firing cost met in Continental Europe gives rise to a form of labor market regulation where experience rating is worthwhile.

Obviously, our model has some limitations that future work should go beyond. First, workers heterogeneity is not taken into account. Actually, experience rating is likely to induce firms to substitute workers with short expected unemployment durations to workers with long expected unemployment duration, because the cost of the former is lower in case of separation. From this point of view, experience rating may be detrimental to very low skilled workers, whose unemployment spell is long. It is important to take this feature into account to evaluate the robustness of our results. Second, ex ante firms heterogeneity has been neglected. The intro-

duction of experience rating induces an increase in the tax burden in sectors with high labor turn-over and a decrease in the others. It is important to evaluate the consequences of such redistributive effects on the employment level of each sector to obtain a complete picture of the effect of experience rating (Deere, 1991). Third, we have limited the analysis to the segment of the labor market with a binding minimum wage when we focused on the European situation. It would be worth taking into account the interactions between this segment and the others in which wages are bargained by social partners. Fourth, our model does not account for the macroeconomic environment. Analyzing the incidence of experience rating on welfare and unemployment when the economy is subject to both idiosyncratic and macroeconomic shocks is on our research agenda.

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6 Appendix: Expected utilities

All workers benefit from a lump sum transfer $f \geq 0$, that stems from the firing costs paid by firms. An unemployed worker is assumed to enjoy the flow earnings z from leisure, and to get unemployment benefits, denoted by b. His rate of job finding is $\theta m(\theta)$. Hence, the value of unemployment, denoted by V_u, solves:

$$rV_u = U(z+b+f) + \theta m(\theta)\left[pV_t + (1-p)V_{ns} - V_u\right], \tag{16}$$

where V_{ns} and V_t denotes the value function of an employee on a new stable job and on a temporary job respectively.

Denoting by V_s the value function on a stable job already hit by a shock, V_{ns}, V_s and V_t solve:

$$\begin{aligned}
rV_{ns} &= U(w+f) + \alpha\left\{F(x_s)V_u + \left[1-F(x_s)\right]V_s - V_{ns}\right\}, & (17)\\
rV_t &= U(w+f) + \alpha\left\{F(x_t)V_u + \left[1-F(x_t)\right]V_s - V_t\right\} & (18)\\
rV_s &= U(w+f) + \lambda F(x_s)\left(V_u - V_s\right). & (19)
\end{aligned}$$

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