No. 2114

WELFARE DIFFERENTIALS ACROSS FRENCH AND US LABOUR MARKETS: A GENERAL EQUILIBRIUM INTERPRETATION

Daniel Cohen

INTERNATIONAL MACROECONOMICS AND LABOUR ECONOMICS

ISSN 0265-8003

WELFARE DIFFERENTIALS ACROSS FRENCH AND US LABOUR MARKETS: A GENERAL EQUILIBRIUM INTERPRETATION

Daniel Cohen

Discussion Paper No. 2114
March 1999

Centre for Economic Policy Research
90–98 Goswell Rd
London EC1V 7RR
Tel: (44 171) 878 2900
Fax: (44 171) 878 2999
Email: cepr@cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **International Macroeconomics** and **Labour Economics**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as a private educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions. Institutional (core) finance for the Centre has been provided through major grants from the Economic and Social Research Council, under which an ESRC Resource Centre operates within CEPR; the Esmée Fairbairn Charitable Trust; and the Bank of England. These organizations do not give prior review to the Centre's publications, nor do they necessarily endorse the views expressed therein.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Daniel Cohen

CEPR Discussion Paper No. 2114

March 1999

ABSTRACT

Welfare Differentials Across French and US Labour Markets: A General Equilibrium Interpretation*

The paper computes lifetime welfare functions for French and US workers. For the vast majority of workers, we find that the lifetime discrepancy between the welfare of an employed and that of an unemployed worker appears to be quite similar in the two countries, corresponding to 9 monthly wages in the United States and 13 monthly wages in France. From these and other values, we then calibrate standard parameters of equilibrium theories of unemployment such as hiring and firing costs and the quantitative incidence of unemployment benefit onto the equilibrium hiring rates. We find that the latter factor dominates the other. Because of the heterogeneity that we document on the labour market, we show, however, why reducing the level of French unemployment benefits to the level of US benefits would dramatically reduce the welfare of the most vulnerable workers on the labour market.

JEL Classification: D31, J6, P52
Keywords: ranking, unemployment duration, wage earnings inequality, labour market dynamics

Daniel Cohen
ENS-CEPREMAP
48 boulevard Jourdan
F–75014 Paris
FRANCE
Tel: (33 1) 40 77 84 59
Fax: (33 1) 44 24 38 57
Email: dcohen@elias.ens.fr

*This paper is produced as part of a CEPR research network on *Trade, Inequality and European Unemployment*, funded by the European Commission under the Targeted Socio-Economic Research Programme (Contract No. SOE2–CT97–3050). This work is part of a research programme on an international comparison of labour markets, financed by the Direction de la Prévision (French Ministry of Economy) and directed by the author. It includes a study of the labour market of England (S Burgess), Germany (Christoph Schmidt), and Spain (Gilles Saint-Paul). The author is most grateful to Pascaline Dupas and Augustin Landier for brilliant research assistance, to David Thesmar for his precious advice and to Arnaud Lefranc and Alexandre Vincent for their generous help on a previous version of this work.

Submitted 22 February 1999

NON-TECHNICAL SUMMARY

It is conventionally assumed that the French worker, when he becomes unemployed, falls into some kind of 'non-employment' trap that the US worker can escape through a dynamic labour demand. In other words, it is often assumed that the discrepancy between the life-cycle welfare of an employed and that of an unemployed worker is much wider in France than in the United States. Most often, however, these intuitions are barely substantiated empirically and the only statistic that is used to that purpose is the exit rate out of unemployment. The primary purpose of this work is to provide such an evaluation of the utility level of an employed and that of an unemployed worker and to compare their discrepancy across the Atlantic.

The results that we obtain can be simply summarized as follows. The discrepancy between the welfare of an employed and that of an unemployed worker is much closer across the Atlantic than is perhaps usually assumed: we find that it amounts to 9 months of wages in the United States and to 13 months in France. The critical reason for this (low) discrepancy is the fact that the higher French replacement ratio appears to compensate well (in terms of welfare) the welfare loss due to a lower exit rate. Such a result is in fact what equilibrium theory of unemployment would predict and we attempt to calibrate, through our results, the quantitative implication of such theories.

In order to do so, we first interpret the welfare differentials that we obtain in terms of hiring and firing costs. More specifically, we analyse separately the welfare differentials of a newly hired worker (who can be thought of as a worker not yet protected by a tenured contract) from that of the other workers. Hiring costs (or more specifically hiring frictions as the text will make clear) appear to be remarkably similar in the two countries: 2.6 monthly wages in France and 2.7 monthly wages in the United States, while firing frictions are larger in France: they stand at 8 months against 5 in the United States. As it turns out, however, these numbers only play a relatively minor role in explaining the discrepancy between the hiring rates in the two countries. Unemployment benefits differentials are quantitatively much more important.

We also find strong evidence of heterogeneity in the labour market of each country. We find that about 20% of workers exit unemployment very slowly when they lose their job. We interpret these discrepancies as evidence of discrimination that is more pronounced in the United States than in France, although it applies to fewer workers. We conclude on the dilemmas of French policy-making, that go against the idea that reducing unemployment benefits would be Pareto improving. Given the heterogeneity that prevails on the labour market, we show that this would dramatically affect the welfare of the most vulnerable segment of the labour market.

INTRODUCTION

How can one compare the destiny of a French and of an American worker? It is conventionally assumed that the French worker, when he becomes unemployed, falls in some kind of "non-employment" trap that the American worker can escape through a dynamic labor demand. In other words, it is often assumed that the discrepancy between the life-cycle welfare of an employed and that of an unemployed worker is much wider in France than in the US. Most often, however, these intuitions are barely substantiated empirically, and the only statistic that is used to that purpose is the exit rate out of unemployment. The primary purpose of this work is to provide such an evaluation of the utility level of an employed and of that of an unemployed worker and to compare their discrepancy across the Atlantic.

The pragmatic solution that I shall o®er in this paper to address this question is to draw upon the fact that wage equations are (e±ciently) estimated in logarithms to estimate an intertemporal utility function based upon a log speci¯cation, a function that is sympathetic to many macro-economists. This will allow us to estimate a value function for each worker (as a function of age, education, labor market status and current wage if employed) that will explicitly incorporate the risk and dangers of being unemployed in the future. The closest parent to this paper is the work by Flinn (1997) who compared the US to Italy.

The results that we obtain can be simply summarized as follows. The discrepancy between the welfare of an employed and that of an unemployed worker is much closer across the Atlantic than is perhaps usually assumed: we ¯nd that it amounts to a permanent discount representing about 9.5% of current income in France and 6.5% in the US. The critical reason for this (low) discrepancy between the two countries is due to the fact that the higher French replacement ratio appears to compensate well (in terms of welfare) the welfare loss due to lower exit rate. Such result is in fact exactly what equilibrium theory of unemployment would predict, and we attempt to calibrate, through our results, the quantitative implication of such theories.

In order to do so, we ¯rst interpret the welfare di®erentials that we obtain in terms of hiring and ¯ring costs. More speci¯cally, we analyze separately the welfare di®erentials of a newly hired worker (who can be thought as a worker not yet protected by a tenured contract) from that of the other workers. Hiring costs (or more specifically hiring frictions as the text will make clear) appear to be remarkably similar in the two countries: they amount to 2.6 monthly wages in France and to 2.7 monthly wages in the US, while firing frictions are larger in France: they stand at 8 months against 5 in the US. As we shall see, however, these numbers only play a relatively minor role in explaining the discrepancy between the hiring rates in the two countries. Unemployment benefits differentials are quantitatively much more important.

We also find strong evidence of heterogeneity in the labor market of each country. We find that about 20% of workers exit unemployment very slowly when they lose their job. We interpret these discrepancies in terms of a ranking model à la Blanchard-Diamond, and find more discrimination in the US than in France, although it applies to less workers. We also shed light on the patterns of wages of displaced workers and compare our results to a recent paper by Ljungqvist and Sargent (1998). Finally, we conclude with a few remarks on the dilemmas of French policy making, that go against the idea that reducing unemployment benefits would be Pareto improving.

1 A summary comparison of French and US labor markets

In this study we shall only consider male workers aged 30-50. By imposing this restriction, we allow ourselves to aggregate unemployed and out of the labor force workers and to get rid of the difficult task of taking account of hidden unemployment. In the case of France we will rely upon the Enquête Emploi (1991-94) while in the case of the US we shall rely upon the PSID data set (1987-1992). The French sample counts 66723 individuals, and the US sample 25805 persons. If we focus here on 1991 (a year that was, in both country, the end of an expansion), one gets the following results:

US	7.0
France	7.0

Table 1: Non-Employment Rates: males 30-50 years old
(1991, in %); source: US: PSID; France: Enquete Emploi;

As one sees, the number of American workers aged 30-50 who held a job in 1991 is exactly the same as its French counterpart (1991 is the crossing point: the French numbers were lower before and larger afterwards).

As is well known, the critical di®erence between the two countries, however, lies in the °ows in and out of non-employment[1].

Consider for instance the unemployment spell of a cohort of newly unemployed workers. The exit rates in the two countries come as follows.

	US	France
1 month	83.3%	87.1%
3 months	46.2%	67.4%
6 months	25.2%	51.5%
1 year	12.5%	26.9
2 years	5.6%	14.7%

Table 2: Survival rate of newly unemployed workers
% of formerly employed workers who have not found at least one job,
x months after they lost their last job;
Source: US: PSID; France: Enquete Emploi; Males 30-50 years old;

We then see that after 6 months, only one fourth of US workers were still non-employed while more than half the French numbers are.

Another statistic will shed light on the di®erence between the two countries: the survival rate of the stock of non-employed workers (rather than the survival rate of a cohort of newly unemployed workers).

[1]See Dupas (1998) and Cohen et al. (1997) for further details.

	US	France
1 month	92.3%	97.2%
3 months	70.8%	91.5%
6 months	57.6%	85.0%
1 year	43.1%	64.9%
2 years	37.1%	56%

Table 3: survival rates of the stock of non-employed workers:
% of the stock of non-employed workers who will not have found at least one job x months later;
Source: US: PSID; France: Enquete Emploi; Males 30-50 years old;

One sees a striking di®erence between the cohort of newly unemployed workers and the stock of non-employed workers. The di®erences between France and the US are even more striking. After six months only 15% of the stock of French worker without a job have found one, while almost 45% of their US counterparts did. This is a well known characteristics which is usually explained by the heterogeneity of the labor market. The best workers leave ¯rst, so that the stock of non-employed workers is loaded with workers who have a lower hiring rate. An alternative explanation is one where history dependence plays a critical role: the longer a worker stays unemployed, the harder it is to ¯nd a job, say because of the depreciation of his human capital. Most studies of the French labor market rule out this explanation and favor heterogeneity as the main reason why the hazard rate decreases over time (see eg. Lollivier (1993) and Fougµere and Kamionka, 1992). We return to this issue below.

Let us now brie°y analyze the other side of the unemployment equation: the rate at which a worker switches from employment to non-employment. Let us ¯rst analyze the stock of workers who are employed. The likelihood that they will not experience a non-employment spell comes as follows.

	US	France
6 months	95.0%	98.1%
1 year	88.3%	94.5%
2 years	81.2%	92.5%

Table 4: Survival rates: employed workers

% of employed workers who will not have experienced at least one non-employment spell;
Source: US: PSID; France: Enquete Emploi; Males 30-50 years old;

We see that over a two-year period, only 7.5% of French workers will have experienced a non-employment spell while the corresponding US number is 19.8% (more than twice the French numbers). Combined with the data on hiring rates, one sees that the amount of turnover (from the worker's perspective) is much larger in the US than in France. One statistics, however, goes against such line of reasoning: it is the rate at which new matches are destroyed in the two countries. In order to see this, let us consider here the survival rate of a new job.

	US	France
1 month	98.8%	91.2%
6 months	89.1%	59.9%
12 months	77.1%	47.1%
2 years	58.2%	36.4%

Table 5: survival rate of new matches:
% of employed workers who have held a job for less than one year and will not have experienced at least one non-employment spell x months later;
Source: US: PSID; France: Enquete Emploi; Males 30-50 years old;

We see that more than half the French workers who found a new job will have lost it after a year, while less than a quarter of their American counterpart will have experience a separation. This shows that French jobs are more often initially destroyed than later on. This is a feature which clearly comes from the fact that workers are never initially protected by a tenured contract (they are always o®ered a review period which usually last between 6 and 18 months) . Let us call "insiders" the employed workers who have avoided a non-employment spell for at least one year, and "outsiders" those who did not. In the theoretical section 4, we shall interpret the insiders as

[1] See Landier (1998) for such an interpretation.

those workers who are protected by a tenured contract involving ¯ring costs, and the outsiders as the workers who can be ¯red at no cost.

Despite quite distinct separation rates in the two countries, the distribution is remarkably similar.

	France	US
Insiders	95.0%	95.4%
Outsiders	5.0 %	4.6%

Table 6: Decomposition of employed workers
Insiders: Employed workers who have not experienced a non-employment spell in the previous year;
Outsiders: other employed workers; Source: US: PSID; France: Enquete Emploi; Males 30-50 years old;

To summarize brie°y these data, we then see that, in average, US turnover is larger than French turnover, that indirect evidence of heterogenous labor market are very strong and ¯nally that institutional di®erences are presumably behind the highly destructive nature of new matches in France.

2 a model of transition

2.1 a decomposition

Let us now estimate a model of transitions across the di®erent states of nature that characterize the work-cycle of a French and US worker. We use the same monthly data from the Enquête Emploi in France and of the PSID in the US that we used in the previous section. French data allow to follow the trajectory of a French worker during three consecutive years (months t=1 to 36). For the sake of symmetry we shall do the same with a US worker. Wages are detrended . We use the ¯rst twelve months as a window of observation to characterize a worker's status. We distinguish 4 states of nature:

- Insiders (I) as workers who did not experience an unemployment spell during the ¯rst twelve months.

- Outsiders (O) as workers who started t=0 without a job and found one before t=12.

- Newly unemployed (NU) as workers who started with a job and lost it during the first twelve months.

- Long term unemployed (LU) as workers who did not experience an employment spell for the first twelve months.

We distinguish four types of characteristics: young (31-40 years old), old (41-50 years old); unskilled (in the US less than eleven years of study; in France, no diploma above BEP which is approximately the same definition as in the US), and skilled (who are then the huge majority) otherwise. Furthermore we assume that workers are composed of two statistically unobservable types: the workers who are "quick" to find a new job once unemployed and those who are "slow" to get hired. Each group is distinguished by an index $\epsilon = 1; 2$: Group 1 refers to the workers who find a job "quickly", with a probability h_1, and group 2 to the workers who are "slow" and find one with a probability h_2. We estimate the various parameters of the transitions by the maximum likelihood method.

2.2 Estimation Procedure

We assume that the switches across states are driven by Poisson processes. Let $t^{\epsilon} = (s_k^{\epsilon}; s_j^{\epsilon}; s_O^{\epsilon}; h_{\epsilon})$ be the parameters of these processes: s_k^{ϵ} is the parameter of the transition from I to NU; s_j^{ϵ} measures job-to-job transitions (see appendix 3 on the way we handle these), s_O^{ϵ} is the parameter of the transition from O to NU; h_{ϵ} is the parameter of the transition from NU to O:

We call $f^{\epsilon} = (f_I^{\epsilon}; f_O^{\epsilon})$ the wage distributions associated to each of the states I or O. We then call $f_k^{\epsilon}(w); f_j^{\epsilon}(w); f_{IO}^{\epsilon}(w); f_{OO}^{\epsilon}(w)$ the conditional distributions associated (respectively) to staying in the same job(f_k^{ϵ}), shifting from one job to another without an unemployment spell (f_j^{ϵ}), of shifting to another job after one unemployment spell from being an insider (f_{IO}^{ϵ}) and from being an outsider (f_{OO}^{ϵ}), when starting from an initial wage w (see appendix 3 on how we model this dependence). We postulate independence between t and f; that is, we assume that the probability of switching from one state to another does not depend on the wage that you are paid.

Each worker of a given type has a given probability to be in one of the four categories that we considered. Call µ 2 £ = f I; O; NU; LU g any one of these categories and call $x^{"}_{µ}$;(for " = 1; 2) the probability that a worker should be of type " and in state µ. Call P" the overall probability that a worker should be of type "; one then has: $\sum_{µ} x^{"}_{µ} = P_{"}$; " = 1; 2.

One can write the likelihood function of the N individuals in the sample in the following form:

$$L(x; t; f) = \prod_{i 2 N} \prod_{µ 2 £} Â^{µ}_{i}[x^{1}_{µ}L^{1}_{µ}(t^{1}; f^{1}) + x^{2}_{µ}L^{2}_{µ}(t^{2}; f^{2})]$$

$Â^{µ}_{i}$ is the characteristic function that is worth 1 if the worker i is in state µ and 0 otherwise; $L^{"}_{µ}(t^{"}; f^{"})$ is the likelihood that a worker of type " in the state µ should be observed to follow a path $(t^{"}; f^{"})$. We spell in detail how to compute these functions in appendix 4.

2.3 Results

Let us summarize here our key results. (The detailed results are in appendix 5).

Hiring rates:

	France			US		
	h_1	h_2	p^1_{NU}	h_1	h_2	p^1_{NU}
L	15.5	0.6	70.6	27.0	0.9	85.4
Q	15.4	0.7	76.9	27.0	1.7	86.1

Table 7: Hiring rates
L: unskilled, Q: skilled workers
group 1: "quick "workers; group 2: "slow" workers, and probability of group 1 (p^1_{NU}) (in %)

We find that both countries are characterized by a dual structure of quick and slow workers which is relatively similar (approximately 80% of good, and 20% of bad workers, less so in the US, more so in France). This is very close to the "mover-stayer" model (see Fougère and Kamionka, 1992 and Joutard and Werquin, 1992). The French numbers are always smaller than the US ones.

Separation rates:

Regarding the separation rates, the results come as follows.

	France				US			
	s_k	s_j	s_0^1	s_0^2	s_k	s_j	s_0^1	s_0^2
L	0.30	0.28	6.2	18.0	0.57	0.55	3.7	10.3
Q	0.20	0.27	4.8	18.0	0.32	0.55	1.9	10.3

Table 8: Separation rates (in %)

s_k : Transition towards non-employment of "insiders"

s_j : Transition towards another job of "insiders"

s_0^ϵ : Transition towards non-employment of "outsiders" of type $\epsilon = 1; 2$:

We could estimate different separation rate for the groups 1 and 2 of outsiders, but only an identical one for the insiders of each group. We find that the separation rates of French insiders are about half their American counterparts, while the separation rates of French outsiders are about twice their American counterparts! This result correspond to the model spelled out in appendix 1: in order to avoid paying firing costs later on, French firms are initially much more destructive of new matches than their American counterparts.

Wage losses

We present here the table regarding the wage distribution of workers of types 1 and 2 and the wage losses associated to an unemployment spell. We distinguish the wage loss of former insiders (who stayed more than one year without experiencing an unemployment spell) and that of outsiders. The results come as follow.

France

	Average wage	Displacement loss of insiders	Displacement loss of outsiders
Group 1 L	8.9	-11.9	0
Group 1 Q	9.2	-12.2	0
Group 2 L	8.9	-6.7	0
Group 2 Q	9.2	-15.7	0

US

	Average wage of insiders	Displacement loss of insiders	Displacement loss of outsiders
Group 1 L	6.8	-6.0	0
Group 1 Q	7.3	-6.3	0
Group 2 L	6.8	-1.8	0
Group 2 Q	7.3	-7.5	0

Table 9: Patterns of wages (in %)

We then see that the average wage of groups 1 and 2 workers are identical both in France and in the US. This may be taken as an indication that ¯rms do not observe the di®erence between workers of type 1 or type 2, or that they cannot exploit these di®erences (because, say, of equal pay policies). We also ¯nd that the displacement loss of French insiders who become outsiders are more than twice larger than the corresponding numbers in the US. This might be taken either as an indication that the bargaining power of an insider is more substantial in France than in the US, or (/and) that the loss of productivity (and human capital) is larger (see Jacobson et al.,1993, Lefranc 1998, or Rhum,1991) . We shall return on this critical issue later on.

Finally, we ¯nd that an outsider who lost his job does not experience a wage loss when he ¯nds a new one, as opposed to what happens to an insider. This can be taken as an indication that the human capital loss potentially experienced by an insider is not (primarily) due to the lenght of his unemployment spell (as Ljungquist and Sargent have assumed): otherwise, insiders and outsiders should follow the same fate. Again, we return to this critical point below.

3 Value functions

3.1 Method

In order to compute the life-time value function of a worker, we shall make two strong assumptions. One is that there is no consumption smoothing, ie we shall assume that consumption equates wages. We analyze in appendix 2 how to relax this assumption and show that the potential e®ects of consumption smoothing with limited liability are likely to be small. The second assumption that we make is that utility is logarithmic. As we indicated in the introduction, this assumption allows to simplify dramatically the exercice, to the extent that the log normality of the wage yields a straightforward linear model to solve. At this stage, more work is needed to see how sensitive our results are to this assumption.

We shall compute here the value function of a 40 years old worker who is just in between "young" and "old". We assume that he faces a probability of dying driven by a Poisson process of parameter $\lambda = 0.25\%$ (per month) which corresponds to an expected lifetime of 35 years (variations around that theme leads to very few changes). We assume a discount factor i=0.5% per month (which corresponds to a yearly discount factor of 6%) so that altogether we plug a discount factor $r = i + \lambda = 0.75\%$ per month. (see Ljungquist and Sargent, 1998, for a similar approach). Regarding replacement ratios, we borrow the numbers from Nickell (1997) and take a replacement ratio of 60% in France and, in the US, of 50% for the ¯rst six months and of 30% afterwards.

Let us call $J_I^{\varepsilon}(w)$ the value function of an insider of type $\varepsilon = 1; 2$ who has a job which pays w now and w' in the next period, $J_O^{\varepsilon}(w)$ the correspondig value function of an outsider and $J_U^{\varepsilon}(w)$ the value function of a non-employed worker whose previous wage was w: One may write:

$$J_I^{\varepsilon}(w) = \int_0^{\infty} e^{-(r+s)t}\left[\mathrm{Log}\, w_t + s_k J_U^{\varepsilon}(w'_t) + s_j J_I^{\varepsilon}(w'_t)\right] dt$$

with $s = s_k + s_j$

Similarly, by writing J_O the value function of an outsider:

$$J_0^{\varepsilon}(w) = \int_0^{12} e^{-(r+s_0)t}\left[\mathrm{Log} w_t + s^{\varepsilon} J_U^{\varepsilon}(w_t')\right] dt$$
$$+ e^{-(r+s_0)12} J_I^{\varepsilon}(w')$$

Furthermore, we can write J_U^{ε} as the solution to :

$$r J_U^{\varepsilon}(w) = \mathrm{Log} z + h_{\varepsilon}\left[E(J_o^{\varepsilon}(w')) - J_U^{\varepsilon}(w)\right]$$

i.e.:

$$J_U^{\varepsilon}(w) = \frac{1}{r+h_{\varepsilon}}\left[\mathrm{Log} z + h_{\varepsilon} J_o(w')\right]$$

Neglecting intra-annual wage differentals, we can discretize those value functions and write:

$$J_I^{\varepsilon}(w) = \frac{1}{r+s}\left[1 - e^{-(r+s)12}\right] \mathrm{Log} w$$
$$+ \frac{1}{r+s}\left[1 - e^{-(r+s)12}\right] s_k J_U^{\varepsilon}(w')$$
$$+ \frac{1}{r+s}\left[1 - e^{-(r+s)12}\right] s_j J_I^{\varepsilon}(w')$$
$$+ e^{-(r+s)12} J_I^{\varepsilon}(w'):$$

:

$$J_O^{\varepsilon}(w) = \frac{1}{r+s_0}\left[1 - e^{-(r+s_0)12}\right] \mathrm{Log} w$$
$$+ \frac{1}{r+s_0}\left[1 - e^{-(r+s_0)12}\right] s_0 J_U^{\varepsilon}(w')$$
$$+ e^{-(r+s_0)12} J_I^{\varepsilon}(w'):$$

Thanks to the log-linearity of the model, one can then solve for each cell x a value function of the form:

$$
\begin{aligned}
J_E^x &= A_E^x \, Logw + B_E^x \\
J_U^x &= C_E^x \, Logw + D_E^x
\end{aligned}
$$

3.2 Results

We call J_I , $-J_U$ and $-J_O$ the value functions of an insider, of one who just lost his job, and of one who just found one. In order to interpret the units associated to these value functions, write:

$$LogW_x \equiv rJ_x;$$

in which r is the discount factor (=0.75%) so that W_x can be interpreted as the "permanent" value of income associated to being in a state x. We can then write:

$$Log\frac{W_y}{W_x} = r(J_y - J_x)$$

and interpret as a "permanent" loss (in percentage term) the effect of shifting from a state x to a state y. Let us start with the worker of group 1 (the "quick" workers). We get the following results:

FRANCE

	$W_I - W_U$	${}_IW_0 - W_U$	${}_OW_O - W_U$
Skilled	9.6	1.95	3.0
Unskilled	9.8	1.90	2.9

US

	$W_I - W_U$	${}_IW_0 - W_U$	${}_OW_O - W_U$
Skilled	6.7	2.0	2.3
Unskilled	7.2	1.95	2.8

Table 10
Permanent loss of income (in %) due to change of status, group 1 ("quick" workers)
$W_I - W_U$: shift from insider to unemployed
${}_IW_0 - W_U$: shift from (previously insiders) outsiders to unemployed
${}_OW_0 - W_U$: shift from (previously outsiders) outsiders to unemployed

We see that workers of group 1 follow a relatively similar route in both countries. The discrepancy between outsiders and unemployed workers are almost identical, ranging from 2.3 to 3% in both countries. The discrepancy between insiders and unemployed workers are slightly larger. Yet the numbers are not very far apart: 9.6% in France and 6.7% in the US (for the qualified workers), and roughly similar numbers for the unskilled. Let us compare these results to the group 2. We get the following results.

FRANCE

	$W_I - W_U$	${}_IW_0 - W_U$	${}_OW_O - W_U$
Skilled	20.6	-1.2	8.85
Unskilled	20.2	21.7	7.2

US

	$W_I - W_U$	${}_IW_0 - W_U$	${}_OW_O - W_U$
Skilled	65.1	21.75	14.7
Unskilled	57.9	23.4	18.5

Table 11: Permanent discount, group 2 (slow workers)

$W_I - W_U$: shift from insider to unemployed
$_IW_0 - W_U$: shift from (previously insiders) outsiders to unemployed
$_OW_0 - W_U$: shift from (previously outsiders) outsiders to unemployed

In all cases, we now find that US workers of type 2 suffer considerably more than their French counterpart when experiencing an unemployment spell. To take one example, an insider of type 2 who loses his job loses the equivalent of about 65% of his permanent income in the US, while his French counterpart loses about 20%. This is a feature which is directly associated to the more generous structure of French unemployment benefits. One apparent pathology is the status of French skilled workers of type 2. They appear to gain nothing from finding a job (indeed losing a bit). The intuition is simply the following: they benefit from generous unemployment benefits which are indexed on their previous wages and, by taking a new job, they run the risk of getting back to unemployment at lower levels of benefits (once they took their wage loss).

3.3 inequalities

We can then compare French and US inequalities, when account is now taken of both employed and non-employed worker. We shall take here the coefficient of variation (CV)of the Log of wages and of the log of the value functions, as a measure of inequalities. We get:

	US	France
CV (w)	7.9%	5.4%
CV (W_J)	5.6%	3.6%

Table12: Coefficient of variation
w: current wages
W_J: permanent wages

We first see that the level of inequalities that is generated by our index is about 30% lower than the traditional index. This is a number that is in line with the results presented Gottshalk and Moffitt (1994), when they compare permanent income inequalities to current ones. Perhaps surprisingly at first glance, the level of inequality that is delivered in France is scaled down by almost exactly the same amount as the American ratio. The reason is obviously related to the fact that we did not find much of a difference between the countries so far as employment/unemployment value functions were concerned, at least for the vast majority of workers (type 1). Low French hiring rates were indeed compensated ("caused" perhaps) by large replacement ratios whose effect were neutral on $J_E - J_U$. Regarding workers of type 2, the French system is better, but also, workers of type 2 are more numerous there; altogether this appears to be neutral so far as inequalities are concerned.

4 a theoretical background

4.1 the economy

In order to offer a suggested interpretation of the results presented above, let us briefly summarize an equilibrium model of unemployment, out of which we shall interpret the numbers that we reached in the previous section. We consider an economy in which each worker has a productivity $\tilde{y}$ which is a random variable with a $c.d.f.F(.)$. We assume here that the draw is performed at the beginning of each new job, stays constant all along the lifetime of the job and is independently drawn for two different jobs. (We analyze in appendix 2 how to handle serial correlation across jobs). We call $\tilde{w}$ the wage that is negotiated by the worker. We assume that each worker has a probability s to lose his job and a probability h (per unit of time) to find a new one, once he became unemployed. In this section, we shall take s to be an exogenous parameter and solve for the determination of the equilibrium value of h. We show in appendix 1 how the model could be handled to account for endogenous separation.

Let us call τ the tax rate on output, and let $(1-\tau)\tilde{y}$ be net output. Assume that each separation entails a deadweight loss to the firm (which is not captured by the worker) that is worth $\tilde{F} = f.(1-\tau).\tilde{y}$. (As is well known since the work of Lazear, the part of the firing costs which are captured by the worker would be internalized in the bargaining process and have no incidence in the equilibrium). Call $g = (1 - s.f)(1 - \tau)$. The value to the firm of a new hire is then worth:

$$J_F = \frac{g\tilde{y} - \tilde{w}}{r + s}.$$

So far as the employed workers are concerned, the value of a job is:

$$J_E(\tilde{w}) = \int_0^\infty e^{-(r+s)t}\,[u(\tilde{w}) + sJ_U]\,dt = \frac{1}{r+s}[\mathrm{Log}\tilde{w} + sJ_U] \tag{1}$$

in which J_U is the value function associated to being unemployed and $u(.) = \mathrm{Log}(.)$, as in the previous section. In this formulation, we assume that there is no consumption smoothing from the workers so that wage and consumption can be equated. One can write:

$$J_U = \frac{1}{r+h}[\mathrm{Log}(z) + h.E_0(J_E(\tilde{w}))] \tag{2}$$

in which E_0 is the expectation operator and z represents unemployment benefits.

Let us call :

$$E_0(\mathrm{Log}\tilde{w}) = \mathrm{Log}w_m, \tag{3}$$

We can write, after substitution:

$$rJ_U = \frac{1}{r+s+h}[(r+s)\mathrm{Log}z + h\mathrm{Log}w_m] \tag{4}$$

and

$$J_E(w_m) - J_U = \frac{\mathrm{Log}w_m/z}{r+s+h}. \tag{5}$$

4.2 wages and general equilibrium

Let us assume that wages are bargained out of a Nash equilibrium (as in Binmore et al., 1986). , characterized by:

$$\mathrm{Max}[J_E(\tilde{w}) - J_U]^{\gamma}[J_F + \tilde{F}]^{1-\gamma} \tag{6}$$

This formulation corresponds to the case where a disagreement over a proposed wage contract obliges the firm to surrender the deadweight loss $\tilde{F}$. The bargaining can then be written

$$Max\ [\frac{Log(\widetilde{w}) + sJ_U}{r+s} - J_U]^{\varphi}[\frac{g.\widetilde{y} - \widetilde{w}}{r+s} + \tilde{F}]^{1-\varphi} \tag{7}$$

and the outcome is

$$J_E(\widetilde{w}) - J_U = \frac{Log(\widetilde{w}) - rJ_U}{r+s} = \frac{\varphi}{1-\varphi}(1/\widetilde{w})[\frac{g.\widetilde{y} - \widetilde{w}}{r+s} + \tilde{F}] \tag{8}$$

which determines $\tilde{w}$ as a function of $\tilde{y}$. More specifically, let us approximate $\frac{gy-w}{w}$ by $Log\frac{gy}{w}$. One then finds:

$$Log\widetilde{w} - rJ_U = \frac{\varphi}{1-\varphi}[(1+k)Log\frac{g.\tilde{y}}{\widetilde{w}} + k]. \tag{9}$$

in which $k = f(r+s)/(1-sf)$. This leads to the general formulation:

$$Log\widetilde{w} = Logw_m + \psi Log\widetilde{y}/y_m. \tag{10}$$

in which

$$\psi = \frac{\varphi(1+k)}{1+\varphi k}. \tag{11}$$

One clearly sees that an increase of firing costs will act as an increase in the bargaining power φ of workers.

In order to solve the general equilibrium value of the hiring rate h, let us adopt here a simplified version of Pissarides' model. Call C the cost per unit of time to fill a vacant position and assume that there is a (fixed) probability q per unit of time to fill it. Assuming free-entry, the expected cost to fill the vacancy should equate the benefits that it generates, i.e.:

$$\frac{C}{q} = E(\frac{g.\widetilde{y} - \widetilde{w}}{r+s}) = \frac{g.\tilde{y}^{1} - \tilde{w}^{1}}{r+s}. \tag{12}$$

Approximating again $\frac{g\hat{y}}{\hat{w}} - 1$ by $\text{Log}\frac{g\hat{y}}{\hat{w}}$; we can rewrite (12) as

$$\frac{\hat{w}}{r+s}\text{Log}\frac{g\hat{y}}{\hat{w}} = \frac{C}{q}. \tag{13}$$

Let us assume that $C = C_0.\hat{w}$ which amounts to stating that hiring is a labor intensive activity, and let us further assume that $\hat{y}$ (and hence $\hat{w}$) are Log normal, and let σ^2 be the variance of $\hat{y}$. From (13) and (8), one has:

$$J_E(w_m) - J_U = \frac{\gamma}{1-\gamma}[K+F] \tag{14}$$

with $K = C_0/q - \frac{1}{2}\frac{\sigma^2(1-\rho^2)}{r+s}$, which is simply stated as follows: the bargaining power of workers is set by firing and hiring frictions. [2]

By writing $z = \frac{1}{d}w$ which corresponds to the hypothesis that there is a fixed replacement ratio, and by use of (5), we can write:

$$\frac{\text{Log}d}{r+s+h} = \frac{\gamma}{1-\gamma}[K+F] \tag{15}$$

which allows to solve for the general equilibrium. Simple comparative static exercises become possible.

1) An increase of z, which is aimed at raising the welfare of an unemployed worker, is immediately neutralized, in this model, by a corresponding decrease of h. When holding taxes constant, this is neutral at equilibrium for J_E and J_U.

2) An increase of γ, or an increase of F, is again translated into a reduction of the hiring rate which tends to reduce J_E and J_U; but increase $J_E - J_U$.

3) An increase of s, which corresponds to a shorter horizon for the match reduces the hiring rate and lower J_E and J_U. At the equilibrium, the difference J_E - J_U remains unchanged.

4) Any increase in the tax rate τ lowers by a corresponding amount the income of the workers (see eq.12) but is neutral for the hiring rate.

---

[2]Since $\text{Log}\hat{y} = \text{Log}y_m + \sigma.n$; $\text{Log}\hat{w} = \text{Log}w_m + \rho\sigma.n$, n being the normal, one has $\hat{y} = y_m e^{\frac{1}{2}\sigma^2}$ and $\hat{w} = w_m e^{\frac{1}{2}\rho^2\sigma^2}$ which yields : $\text{Log}\frac{\hat{y}}{\hat{w}} = \text{Log}\frac{y_m}{w_m} + \frac{1}{2}\sigma^2(1-\rho^2)$.

These comparative statics exercises can be summarized in the following table:

Shocks	h	J_E	J_U	$J_E - J_U$
$\uparrow z$	$\searrow$	$=$	$=$	$=$
$\uparrow s$	$\searrow$	$\searrow$	$\searrow$	$=$
$\uparrow \varphi$ or $\uparrow F$	$\searrow$	$\searrow$	$\searrow$	$\nearrow$
$\uparrow \tau$	$=$	$\searrow$	$\searrow$	$=$

Clearly, any increase of z which has to be financed by taxes will merge the first and the last row of the table.

This model is fairly standard and yields predictible results. It ignores however a number of specific features of the labor market that are critical to interpreting the data and deliver policy implications. We now address them in turn.

4.3 Heterogenous labor markets

First analyze the case in which the labor market consists of two distinct categories of workers. Furthermore, assume here that the two kind of workers only differ from the stand point of their hiring rate but are otherwise observationally identical to the firm which hires then. Take for instance the case in which workers of type 2 always get last on the waiting queue to a new job (see e.g. the Blanchard-Diamond (1994) ranking model). Assume, e.g., that

$$h_2 = \mu . h_1; \text{ with } \mu < 1$$

In that case one can always write:

$$(r + s + h_1)[J_E^1(w_m^1) - J_U^1] = \mathrm{Log}\frac{w_m^1}{z_1}$$

and

$$(r + s + h_2)[J_E^2(w_m^2) - J_U^2] = \mathrm{Log}\frac{w_m^2}{z_2}$$

Let us assume that workers of type 1 and 2 are paid the same wage. This may occur if firms cannot differentiate them. Say, e.g., that workers 2 awake late and workers 1 early but firms do not observe this. This may also occur if firms must pay equal wage for equal job, irrespectively of what they know of the difference in the bargaining power of the two types of workers (say that the law or the unions forbid discrimination).

Assume that workers of type 2 are a small minority and that the bargaining model only applies to workers 1, under the veil of which workers of type 2 are paid. In that case, one gets:

$$J_E^1(w_m^1) - J_U^1 = \frac{\gamma}{1-\gamma}[K + F]$$

and

$$J_E^2(w_m^2) - J_U^2 = \frac{\gamma}{1-\gamma}\mu[K + F]$$

in which:

$$\mu = 1 + \frac{(1-\beta)h_1}{r + s + \beta h_1}$$

One sees that the parameter μ represents the bargaining multiplier of workers with low hiring rates.

We are now able to analyze the welfare implications of these models. The welfare of workers of type 1 is readily computed (taking the average worker):

$$\begin{aligned} rJ_U^1 &= \mathrm{Log} w_m^1 - \frac{\gamma}{1-\gamma}(r+s)(K+F) \\ rJ_E^1(w_m^1) &= \mathrm{Log} w_m^1 - \frac{s\gamma}{1-\gamma}(K+F) \end{aligned}$$

We then see that the equilibrium welfare implications of a change of unemployment benefits are nil, within this model, if we hold taxes constant. Clearly, to the extent that taxes need to be raised, this will lower the welfare of workers by a corresponding amount. Except for this tax effect, any increase of unemployment benefit raise the expected time spent on welfare by a number which exactly neutralizes its initial impact.

One can also readily compute the welfare of workers of type 2:

$$rJ_U^2 = \mathrm{Log} z_2 + h_2(J_E^2 - J_U^2)$$

In that case, one sees that the outcome of unemployment benefit upon the welfare of workers of type 2 is a priori ambiguous. One the one hand, reducing z is good for h, hence good for J_U^2; on the other hand, the benefit of raising h, if it comes at the cost of lower unemployment benefits might be bad. In fact, within our model, there is no ambiguity and, holding taxes constant, reducing unemployment benefits is always bad for workers of type 2. Indeed, one can readily write:

$$rJ_U^2 = rJ_U^1 - \frac{(r+s)(1-\mu)h_1}{r+s+\mu h_1}$$

so that any increase of h_1 which is brought by a reduction of unemployment benefits is neutral for rJ_U^1 (up to the tax effect) and simply lowers rJ_U^2: This simply goes in line with the common sense argument that a reduction of unemployment benefits can hurt unemployed workers, although as one sees, this is strictly speaking true for workers with low hiring rates only.

We can summarize our results as follows.

Proposition 1 : Holding taxes constant, raising unemployment benefits is neutral for "quick workers" and welfare improving for "slow" workers.

One can readily compare this result to those which are obtained in other models where risk aversion and unemployment benefits are present. First consider the case where all workers are of group 1. In that case, despite risk aversion and the lack of consumption smoothing, unemployment benefits are totally neutral in our model (when holding taxes constant). The straightforward reason is that bargaining with the firms set an equilibrium difference between intertemporal welfare functions that cannot be lifted upward. Since output itself is exogenous here, the levels of welfare themselves (except for taxes) are unchanged. The reason why, in the case when there are two groups, workers of type 2 do benefit from unemployment benefit, arises from the fact that their wages are not set according to their own welfare, but according to other workers's welfare. In models where productivity of the worker is an endogenous variable that depends on the workers and the firms's strategy, one would still get a given equilibrium difference between the welfare of employed and unemployed workers, but both values functions can be lifted up, as it is the case in the paper by Acemoglu and Shimer (1999).

4.4 Two staged hiring process

We have documented in sections 1 and 2 the very high pattern of destruction of new matches. This is clearly due to the fact that the "quality" of the match is only revealed after some time (simply think here of the ability of the worker to fit the task that he is offered). This screening process is also likely to be more intense in France than in the US to the extent that higher firing cost will make it harder, later on, to fire a worker that does not fit the bill. We present one such model, in the spirit of Mortensen and Pissarides (1994) in appendix 1. In order to simplify the analysis, let us here simply assume that there exists a review period that last T periods (see Landier (1998) for a theoretical underpinning) and which is characterized by a separation rate s_0 which is distinct from the separation rate s and presumably larger. Furthermore, we assume that during the review period, the firm does not have to pay the firing cost when the separation occurs.

The value to a worker to be hired as an "outsider" (i.e. as a non tenured worker) can be written as:

$$J_0(\bar{y}) = \int_0^T e^{-(r+s_0)t}[\text{Log}\,\bar{w}_0 + s_0 J_U]dt + e^{-(r+s_0)T} J_E(\bar{y})$$

in which $J_E(\bar{y})$ is the value of a tenured contract of the kind that has been studied before. (For simplicity we assume that the wage of the "outsider" is set once and for all at the beginning of the review period).

Simply call

$$J_0 = J_0(y_m)$$

the expected value of the match that an insider has access to.

One must now write:

$$rJ_U = \text{Log}z + h[J_0 - J_U]. \tag{16}$$

The free entry condition must now be written:

$$J_0 - J_U = \frac{\gamma}{1-\gamma}K; \tag{17}$$

since new comers, the"outsiders" as we have called them, can be fired without firing costs, while the same condition (8) holds for insiders.

It one neglects the profits (or the losses) made by the firms during the review period, one can write:

$$J_F^0 = e^{-(r+s_0)T} J_F(y_m) \tag{18}$$

in which s_0 denotes the separation rate of outsiders, J_F^0 is the value to hire an outsider, and $J_F(y_m)$ is the value to have a tenured worker. We can then write:

$$J_E(w_m) - J_U = \frac{\gamma}{1-\gamma}\left[e^{(r+s_0)T}K + F\right] \tag{19}$$

The general equilibrium of the system then becomes:

$$h\frac{\gamma}{1-\gamma}K + [(r+s)\frac{\gamma}{1-\gamma}(mK + F)] = \mathrm{Log}d \tag{20}$$

in which one has written:

$$m = e^{(r+s_0)T} \tag{21}$$

One can readily extend the validity of equation (20) to the case in which unemployment benefits vary over time. Assume for instance that unemployment benefits are such that:

$$\begin{aligned} z &= \frac{1}{d_a}w \text{ for } T_0 \text{ periods and} \\ z &= \frac{1}{d_b}w \text{ afterwards.} \end{aligned}$$

In that case, one can readily see that we only need to substitute for Logd in (20) a new term Logd_m defined as:

$$\mathrm{Logd}_m = \left[1 - e^{-(r+h)T_0}\right]\mathrm{Logd}_a + e^{-(r+h)T_0}\mathrm{Logd}_b \tag{22}$$

Clearly, in the case that we explored in the previous sub-section in which there are two groups of workers, this model will only be valid for the first group of workers (for whom the bargaining model applies), while the group 2 would be indexed upon the outcome of the first group.

5 Welfare differentials: a suggested interpretation

We are now able to interpret our results regarding the value functions of French and US workers along the line of the general equilibrium theory that we outlined in the previous section.

5.1 Hiring and firing costs

>From the value function of an outsider, we are able to compute the hiring cost that are paid by a firm, up to the coefficient $\frac{\gamma}{1-\gamma}$ that measures the bargaining power of the worker. Indeed we know that

$$J_0 - J_U = \frac{\gamma}{1-\gamma} K; \tag{23}$$

in which K measures the hiring cost. Let us call hiring "frictions" the right hand side term. We get the following numbers:

	France	U.S.
L	2.5	2.6
Q	2.6	2.2

Table13: Hiring frictions ($= \frac{\gamma}{1-\gamma} K$)
(units: monthly wages)
L: unskilled workers
Q: skilled workers

Those numbers are outstandingly similar in the two countries and across skilled and unskilled workers. In all cases, it takes a cost corresponding to 2.5 months of wage to hire a worker.

We can then similarly reconstruct, up to the coefficient $\frac{\gamma}{1-\gamma}$, the firing costs in the two countries through the two equations:

$$J_E - J_U = \frac{\gamma}{1-\gamma}[mK + F]$$

and:

$$J_0 - J_U = \frac{\gamma}{1-\gamma}K$$

We find:

	France	Etats-Unis
L	7.4	5.2
Q	7.7	5.2

Table 13: Firing frictions ($\frac{\gamma}{1-\gamma}F$) group 1 (numbers of foregone monthly wages)

We then see that the friction $\frac{\gamma}{1-\gamma}F$ which is generated by firing costs is 50% larger in France than in the US. Altogether, though, it takes 7.4 months to hire and fire a worker in the US and 10.3 months in France. The difference does not look as "big" as many commentators would presume. Furthermore we see that skilled and unskilled workers appear to obey about the same model, which contradicts, at least for the males aged 30-50 of the group 1, the idea that other regulations such as the minimum wage, tilt the bargaining power of French unskilled worker in their favor (once employed).

5.2 Hiring rates

One may now venture to ask the extent to which such differences may account for the large difference in the hiring rates that are achieved in the two countries. In order to do so, one now quantify the impact of the various parameters at work. The equilibrium determination of hirings was written theoretically in equation (20), as:

$$h\frac{\varphi}{1-\varphi}K + (r+s)\frac{\varphi}{1-\varphi}[mK+F] = \mathrm{Log}\, d$$

Empirically this yields the following results. Calling d the ratio w/z (and focussing here on skilled workers, the results being fairly similar for the unskilled ones).

France

$$2.6h + [12.2 \cdot 10^{-2}] = \mathrm{Log}\, d_F = 0.5$$

which yields $h = 14.6\%$: (against an actual value of 15.5%)

United States

$$2.7h + [9.7 \cdot 10^{-2}] = \mathrm{Log}\, d_{US} = 0.81$$

which yields h=26.5% (against an actual value of 27%).

Those equations allow us to have some insight on the quantitative forces at work in the determination of the hiring rates. To start with, we find that the term $(r+s)(mK+F)\frac{\varphi}{1-\varphi}$ which is in bracket in the empirical equation is larger in France than in the US, which shows that destruction are larger in the former country, explaining in part why hiring rates are lower. One sees however that this term has a second order effect in the determination of the hiring rate. If one were to plug the US number into the French equation, one would raise the French hiring rate by 20% only. Instead, by plugging the US replacement ratio into the French equation, this would double the French hiring rate!

5.3 Wage losses

These number also help us re-interpret the origin of the wage loss of former insiders. Three forces are potentially at work. One is that workers lose at once the specific human capital that goes with the the job that they. Another is that they gradually lose general human capital as they seek for another job while being idle; a third one is that they enter a new job without the protections that were attached to their previous job. Let us start with this last interpretation. Relying upon equation (9) we can calibrate the extent to which firing costs can explain the wage loss of insiders. Substracting the wage of an insider for which $k > 0$ (call it w_I) from the wage of an outsider for which k is nil (call it w_O) (and neglecting $Log(g\bar{y}/\bar{w})$), we can indeed rewrite the term that originates from firing costs as:

$$Log(w_I/w_O) = \varphi f(r+s) = [\frac{\varphi}{1-\varphi} f(r+s)/(1-sf)](1-\varphi):$$

The term in bracket can be reconstructed from our estimates. We find a value of 6% in France and 4% in the US. This number yields the upper limit of what can be explained by the loss of firing protection. Compared to the result of table 9, we then see that, at least in France, certainly more than half of the wage loss of displaced insiders originates from a human capital loss. This brings us to the question of whether this loss originates from a specific human capital that is immediately lost as soon as the worker gets fired, or whether they originate from the time spent looking for a job as Lijungqvist and Sargent (1998) have argued. From table 9, we see that outsiders who lose their jobs do not experience furthers cuts, once they found a new job. This can be taken as evidence that the wage loss does not appear to originate from the unemployment spell itself. We are then left with a specific human capital loss. Taking a middle of the ground number $\varphi = 1/2$, one can reconstruct a human capital loss of 20% in France and of 10% in the US. The difference between the two countries might be the outcome of the longer tenure that is spent on any given specific job in France. Indeed, the French separation rate (towards another job or towards unemployment) being twice lower than the US numbers, this fits the results that we have.

5.4 Ranking

In order to estimate the ranking parameter μ, we shall proceed as follows. Assuming that the same hiring costs and the same firing costs apply to workers 1 and 2, we compute the equilibrium hiring rates h_2^* that would apply to workers 2 if those rates were determined endogenously, through the equilibrium equation (22). We then compute the ratio $\mu = \frac{h_2}{h_2^*}$ as the discrepancy between the actual and the theoretical numbers. We get the following numbers:

	France	US
L	13.2	2.7
Q	10.8	6.3

Table 14: Ranking parameter μ (in %)

We then see that ranking is more important in the US than in France, both for unskilled and skilled workers. This is why, workers of type 2 suffer more in the US than they do in France (see table 11): they face low unemployment benefits that do not trigger large hiring rates. .

6 Conclusion

These exercises allows us to shed some light on the dilemmas of French policymaking.

On the one hand, regarding the majority of workers, a case can be made that reducing replacement ratios would be Pareto improving in the medium run. The short run risk of obtaining an outcome with low hiring rates and low unemployment benefits is obviously very large, and in itself may explain the reluctance to follow that route. But another, potentially more devastating, problem stands out. It might very well be that workers of type 2 are prohibited to reach a job because of other features of the labor markets, sheer discrimination, minimum wages, collective bargaining or firing costs themselves. In that case, reducing the French replacement ratio would have dramatic consequences for these workers, and would raise dangerously the amount of French inequality. This may explain why, given all the uncertainties, the statu quo is so palatable to French policy makers.

References

Acemoglu, D. and R. Shimer: "Equilibrium Unemployment Bene¯ts" Journal of Political Economy, 107, 893-928.

Binmore, K., A. Rubinstein and A. Wolinski (1986), "The Nash Bargaining solution in economic modeling" Rand Journal of Economics, 17, 176-88.

Blanchard, O. and P. Diamond (1994) "Ranking, Unemployment Duration, and Wages" Review of Economic Studies, 1994, 61, 417-435.

Cohen, D., A. Lefranc and G. Saint-Paul (1997), "French unemployment : a transatlantic perspective" Economic Policy 25, 267-290.

Dupas, P. (1998): "Une comparaison des marchés du travail français et américains", Cepremap et Direction de la Prevision, mimeo.

Flinn, C.(1997): "Labor Market Structure and Welfare: A Comarison of Itamly and the US." New-York University, Mimeo.

Fougère, Denis and Thierry Kamionka (1992), "Un modèle Markovien du marché du travail", Annales d'Economie et de Statistique, 27.

Gottshalk, P. et R. Mo±t (1994) "The Growth of earnings instablity in the US Labor Market", Brookings Papers on Economic Activity, 2, 217-272.

Gruber, Jonathan (1997) "The Consumption Smoothing Bene¯ts of Unemployment Insurance", American Economic Review, vol. 87, NO. 1.

Jacobson, Louis S., Lalonde, Robert J. and D. Sullivan , 1993, "Earnings losses of displaced workers", American Economic Review,

Joutard, Xavier and Patrick Werquin (1992), "Les déterminants individuels de la durée du chômage: de l'intérêt de distinguer les emplois stables des emplois précaires", Economie et Prévision, 1-2/1992 143-156

Lefranc, A. "What do you lose when you lose your job?", mimeo, Paris X University.

Landier, A. (1998) "Coûts de licenciement, chômage et inégalités", mémoire de DEA, EHESS.

Ljungqvist L. and T. Sargent (1998) "The European Unemployment Dilemma" Journal of Political Economy, vol.106, no3.

Mortensen, D. and C. Pissarides (1994) "Job creation and Job destruction in the theory of unemployment", Review of Economic Studies, 1994.

Nickell, S.(1997) "Unemployment and Labor Markets Rigidities: Europe vs North America" Journal of Economic Perspective, vol 11, no 3, 55-74.99

Pissarides, C. (1990) Equilibrium Unemployment Dynamics, Oxford: Basil Blackwell.

Ruhm C., (1991): "Are Workers Permanently Scarred by Job Displacement", American Economic Review, 81.

Appendix 1
A model of endogenous separation

Let us present here a simple framework in which separations are endogenous and analyze how the two-tier tenured contract operates. We follow here Mortensen and Pissarides (1994) and Landier (1998). Assume that a match is characterized by a productivity $\tilde{y}$ and an "adaptability" coefficient $\tilde{C} = \tilde{c}.\tilde{y}$, in which $\tilde{c}$ is a match specific random variable: The latter measures how much the enterprise has to pay in order to re-train a worker whose job has been hit by a re-training shock (that comes on top of other sources of separations measured by s). We assume that such shocks occur with a probability λ per unit of time. By writing $\tilde{F}$ the firing costs, the value of the firm is written:

$$rJ(\tilde{y};\tilde{C}) = g\tilde{y} - \tilde{w} - s(J + \tilde{F}) + \lambda Max[-\tilde{C}; -J(\tilde{y};\tilde{C}) - \tilde{F}]$$

The firm will fire iff:

$$\tilde{C} > \tilde{C}^*$$

in which $\tilde{C}^*$ is a solution to:

$$(r + s + \lambda)\tilde{C}^* = (r + s)\tilde{F} + (g\tilde{y} - \tilde{w})$$

in which $\tilde{w}$ is as a solution of the bargaining problem. Neglect for simplicity the term $(g\tilde{y} - \tilde{w})$: (Technically, one can take the case when the distribution of $\tilde{c}$ is discrete, say that it can take 3 values: low; medium and high). All matches such that $c^* > (r + s)f(1 - \tau)/(r + s + \lambda)$ will then be destroyed, defining an equilibrium separation rate:

$$s^* = s + \lambda[1 - G(c^*)]$$

in which G is the cdf of $\tilde{c}$. This rate will clearly be a decreasing function of F: The country with high separation cost will retrain its workers more often.

Let us assume that the firm will not immediately offer a tenured contract to the worker. In order to simplify the analysis, let us assume that the tenured contract is offered only after the first retraining shock has occurred. In that case, one can write the value to be hired as an outsider:

$$rJ_0(\tilde{y}) = \tilde{y} - \tilde{w} - sJ_0 + \lambda Max[0; J_i(\tilde{y};\tilde{C}) - \tilde{C}]$$

in which J_- is the value to be hired as an insider:

$$J_-(\bar{y}; \bar{c}; \bar{F}) = \text{Max}\left(\frac{\bar{y} - \bar{w} - \lambda \bar{F}}{r + s + \lambda}; \frac{\bar{y} - \bar{w} - \lambda \bar{c}}{r + s} \right)$$

One now finds a new critical value c_0^* beyond which the untenured worker will be fired. Since J_- is a decreasing function of $\bar{F}$; one immediately sees that the separation rate of outsiders has to be higher in the country with large firing costs.

Appendix 2:
Consumption smoothing

Let us assume that the unemployed worker hold a stock Ω of financial wealth that he can draw upon in order to smooth consumption. Assume, furthermore, that borrowing is forbidden (following Deaton), so that $\Omega_t \geq 0$:

Under these assumption, we can then write the problem faced by the unemployed worker as:

$$J^*_U(\Omega) = \underset{(C_t)_{t \geq 0}}{Max} \int_0^\infty e^{-(r+h)t} \left[Log C_t + h J^*_E(\Omega_t) \right] dt$$

subject to $\dot{\Omega}_t = r\Omega_t + y_b - C_t$; $\Omega_t \geq 0$; $\Omega_0 = \Omega$ in which Ω is the interest rate paid on the financial asset, and which, we assume, coincide with the discount factor and y_b correspond to unemployment benefit. $J^*_E(\Omega)$ measures the value function of the worker, once he has found a new job, and after being left with a stock of unspent financial wealth Ω_t: The first order condition can be readily written as:

$$\begin{aligned} \frac{1}{C_t} &= x_t \\ \dot{x}_t - h x_t &= h J'_E(\Omega_t) \end{aligned}$$

in which x_t is the constate variable asociated to wealth. The complexity of this equation arises from the term $J'_E(\Omega)$ which measures the marginal benefit of financial wealth to a newly employed worker. In order to avoid this difficulty, let us try to bound the discrepancy $J^*_E - J^*_U$. In order to obtain a lower bound to the value $J^*_E - J^*_U$; note that the worker depletes his asset while unemployed.We can then write:

$$J^*_U(\Omega) \quad \hat{J}_U(\Omega) \equiv \underset{(C_t)_{t \geq 0}}{Max} \int_0^\infty e^{-(r+h)} \left[Log C_t + h J^*_E(\Omega) \right] dt; \; \Omega_t \geq 0$$

since the right-hand side now amount to assuming that the worker's asset are brought back to the level that they reached at the beginning of the spell. The solution to the new problem that is set at the right-hand side now becomes a straightforward exercice. One can readily see that the consumption pattern is two staged:

$$
\begin{aligned}
C_t &= C_0 e^{-ht}; \text{ as long as } \Omega_t \geq 0 \\
C_t &= y_b, \text{ once } \Omega_t = 0
\end{aligned}
$$

The time T when $\Omega_T = 0$ for the first time is a solution to:

$$\Omega_0 = y_b \int_0^T \left[e^{h(T-t)} - 1 \right] e^{-rt} dt.$$

and consumption is imply $C_t = e^{h(T-t)} . y_b$ as long as $t \leq T$.

Taking T to be small enough to allow (first and second order) approximation, one finds:

$$T = \sqrt{\frac{r\Omega_0}{hy_b}}$$

which then measures how long it takes for the worker to draw entirely his stock of financial assets.

Let us now assess how much welfare this consumption smoothing yields to the worker. One can write:

$$
\begin{aligned}
\hat{J}_U(\Omega) &= \int_0^\infty e^{-(r+h)t}[\mathrm{Log}\hat{C}_t + hJ_E^*(\Omega)]dt \\
&= \int_0^T e^{-(r+h)t}[\mathrm{Log}\hat{C}_t + hJ_E^*(\Omega)]dt + \int_T^\infty e^{-(r+h)t}[\mathrm{Log}\hat{C}_t + hJ_E^*(\Omega)]dt
\end{aligned}
$$

One can then compare this new value function to the one that we computed in the text (in which no consumption smoothing is allowed) as:

$$\hat{J}_U(\Omega) - J_U = \int_0^T e^{-(r+h)} \mathrm{Log}(\hat{C}_t / C_t) dt + \frac{h}{r+h} [J_E^*(\Omega) - J_E] dt$$

in which $C_t = y_b$ and $\hat{C}_t = e^{h(T-t)} y_b.$

Making a second order approximation to these computations, one gets that the first term $\int_0^T e^{-rt} \mathrm{Log}\frac{\hat{C}_t}{C_t} dt$ is simply $\Delta = \frac{\beta}{y_b}$: One then write:

$$\hat{J}_U(\beta) - J_U = \frac{\beta}{y_b} + \frac{h}{r+h}(J_E^*(\beta) - J_E)$$

>From this equality we can now write:

$$J_U^*(\beta) - J_U \le \hat{J}_U(\beta) - J_U \le \frac{\beta}{y_b} + J_E^*(\beta) - J_E$$

which now allows us to bound from below the optimal discrepancy $J_E^* - J_U^*$ as:

$$J_E - J_U - \frac{\beta}{y_b} \le J_E^* - J_U^* \le J_E - J_U$$

Empirical estimates

If we take Gruber (1997)'s estimates that β is worth in average three weeks of income and take y_b to be equal (in average) to 40% of income in the US we find that $\Delta = \frac{\beta}{y_b}$ amounts to 1.9 months. In France, the corresponding number (with a replacement ratio of 0.6) would be 1.25 months. This would reduce the sum of our hiring and firing frictions by 25% in the US and by 12% in France; it would not change the overall picture that we have presented.

Appendix 3
Serial correlation of job performance

Let us review here how the theoretical model that we present in section 4 should be rewritten when the value of the match is serially correlated within and across jobs. This will set the framework of our empirical work. Let us assume that each match i yields a surplus y_{it} at time t which can be written:

$$\mathrm{Log}\, y_{it} = \mathrm{Log}\, y_m + \epsilon_{it}$$

in which:

$$\sum_i \epsilon_{it} = 0;\ \forall t;$$

and

$$\epsilon_{it} = \rho\, \epsilon_{it-1} + \nu^k_{it}\ ,\forall t;$$

in which ν_{it} is a white noise which satisfies: $\sum_i \nu^k_{it} = 0\ \forall t$:

One can then write (for the workers who keep their jobs):

$$\mathrm{Log}\, y_{it} = \rho_k y_{it-1} + (1 - \rho_k)\mathrm{Log}\, y_m + \nu^k_{it}$$

in which case the wage bargaining delivers:

$$\mathrm{Log}\, w_{it} = \rho_k \mathrm{Log}\, w_{it-1} + (1 - \rho_k)\mathrm{Log}\, w_m + \xi^k_{it}:$$
$$\text{with } \xi^k_{it} = \varphi\, \nu^k_{it}:$$

This is the formulation upon which we shall base our estimation.

Similarly, with no change for the specification of the equilibrium, we shall assume that the productivity of the job which is offered to an unemployed worker depends upon his previous productivity through the following relationship:

$$\mathrm{Log}\, y_{i;t} = \rho_u \mathrm{Log}\, y_{i;t-1} + (1 - \rho_u)\mathrm{Log}\, y^u_m + \nu^u_{i;t}:$$

in which we write $y_m^u = y_m - \Delta_u^y$. This formulation captures the idea that workers who lose their job suffer a one off downward shift on the ladder of job promotion.

This implies, similarly, that the equilibrium wage can be written:

$$Logw_{i,t}^u = \rho_u Logw_{i,t-1} + (1 - \rho_u)(Logw_m - \Delta_u) + \xi_{it}^u$$

In this formulation, displaced workers experience initially a negative shock, which they regain progressively. More specifically, in the empirical implementation that follows, we shall distinguish the productivity of a formerly insider worker from that of a formerly outsider one. We shall then estimate two parameters $\rho_u = \rho_{io}$ for the former and $\rho_u = \rho_{oo}$ for the latter.

In the empirical implementation, we also take account of transitions that relate to job-to-job shift. In theory, one would want to estimate a transition that is conditional upon finding a job which pays more (at least up to a non observable noise). While the model works well for the US, it seems much harder to implement on French data (in average, French job to job movers actually appears to lower their wage as they switch job); in order to avoid adding extra complexities to a model that is already difficult to estimate, we chose to treat on the job changes as exogenous events.

Appendix 4: Likelihood estimators

One can rewrite the likelihood spelled out in section 4.2 as:

$$L(x;t;f) = \prod_{\theta \in \Theta} (x_\theta^1 + x_\theta^2)^{N_\theta} \cdot L_0$$

in which N_θ is the number of workers in state θ, and $L_0 = \prod_i \chi_i^\theta (p_\theta^1 L_\theta^1 + p_\theta^2 L_2^\theta)$, and $p_\theta^1 = \frac{x_\theta^1}{x_\theta^1 + x_\theta^2}$ and $p_\theta^2 = 1 - p_\theta^1$ are the probabilities that a worker in state θ should be of type 1 or 2.

Clearly, within our framework by which the transitions and wages are independent, this is solved in two steps. One immediately finds $(x_1^\theta + x_2^\theta) = \frac{N_\theta}{N}$ and only needs to characterize L_0 to which we now turn. It is the product of the following terms.

1. <u>Insiders</u>

We have called s_k the separation rate of insiders (from employment to non-employment) and s_j the job-to-job separation rate. We take these two separation rates to be identical for the two groups (empirically, we lacked information to distinguish them). The likelihood is written as follows.

i) First consider a worker who keeps the same job for 24 consecutive months. This will occur (for each group) with a probability $e^{-s \cdot 24}$ in which : $s = s_k + s_j$. For those who keep their job during 24 consecutive months:

$$L_a = \prod_i [\sum_{\epsilon=1}^{2} p_i^\epsilon f_i^\varepsilon(w_i) \cdot e^{-s \cdot 24} \cdot f_k^\varepsilon(w_i')]$$

in which $f_\epsilon^i(w)$ is the density to observe an insider with a wage $w = a_\epsilon x + \varepsilon_\epsilon$, and of type $\epsilon = 1, 2$; similarly $f_\epsilon^k(w')$ denotes the density to observe an insider who keeps his job and obtains, 12 months after, a wage $w' = \rho_k w + (1 - \rho_k)(a_\epsilon x + \Delta_{\epsilon k}) + \xi_\epsilon^k$. $\Delta_{\epsilon k}$ measures the benefit of on the job training. Finally p_i^ϵ is a logistic function of the characteristics.

ii) For those to whom a new job is offered and accepted:

$$L_b = \prod_i \Big[\sum_{\epsilon=1}^{2} p_I^{\epsilon} f_I^{\epsilon}(w_i) . s_j . e^{-st_i} . f_j^{\epsilon}(w_i^0)\Big].$$

in which: $w^0 = \rho_j . w + (1 - \rho_j)(a_\epsilon x + \Delta_{\epsilon k}) + \xi^j$ and $f_\epsilon^j(w^0)$ is the corresponding density.(We then allow here for a discrepancy between the initial distribution $a_\epsilon x$ and the next period one $a_\epsilon x + \Delta_k$).

iii) for those who lose their jobs and find one:

$$L_c = \prod_i \Big[\sum_{\epsilon=1}^{2} p_I^{\epsilon} f_I^{\epsilon}(w_i) . s_k e^{-st_i} h_\epsilon . e^{-h_\epsilon (t_i^0 - t_i)} . f_{IO}^{\epsilon}(w_i^0)\Big]$$

by writing $w^0 = \rho_{io} w + (1 - \rho_{io})(b_\epsilon x + \Delta_{io}) + \xi^{io}$; in which $b_\epsilon x$, ($\epsilon = 1, 2$) is the average wage of outsiders.

iv) For those who lose and do not find a job during the period under study:

$$L_d = \prod_i \Big[\sum_{\epsilon=1}^{2} p_I^{\epsilon} f_I^{\epsilon}(w) . s_k e^{-st_i} . e^{-h_i (T - t_i)}\Big]$$

2. <u>Outsiders</u>

We call s_o^ϵ the separation rate of outsiders towards non-employment (and ignore here job-to job moves). With notations which parallels the previous ones, we can write the contribution of outsiders to the grand likelihood as:

$$L_e = \prod_i \Big[\sum_{\epsilon=1}^{2} p_O^{\epsilon} f_O^{\epsilon}(w_i) s_o^{\epsilon} e^{-s_O^{\epsilon}(t_i^0 - t_i)} . h_\epsilon e^{-h_\epsilon (t_i^{0''} - t_i^0)} f_{OO}^{\epsilon}(w_i^0)\Big]$$

for those who lose their job and find a new one, and , if they do not:

$$L_f = \prod_i \Big[\sum_{\epsilon=1}^{2} p_O^{\epsilon} f_O^{\epsilon}(w_i) . e^{-s_O^{\epsilon} 12} f_\epsilon^{oi}(w_i^0)\Big];$$

for those who become insiders (after a year without an unemployment spell).

3. Unemployed workers

We call p^{τ}_{NU} the probability that a worker who experience a new unemployment spell should be of type 1 or 2 and p^{τ}_{LU} the corresponding probability for a worker who stayed more than 12 months without a job. We write p^{τ}_{NU} as a linear combination of p^{τ}_{I} and p^{τ}_{O}. We simply write the contribution of an unemployed worker to the grand likelihood as:

$$L_g = \prod_i \left[\sum_{\tau=1}^{2} p^{\tau}_{XU} \cdot h_{\tau} \cdot e^{-h_{\tau} t_i} \cdot s^{\tau}_{0} e^{-s^{\tau}_{0}(t^{0}_{i} - t_i)} \right].$$

in which XU is NU or LU; according to the case, and t_i is the time when they get a job if they do, while :

$$L_g = \prod_i \left[\sum_{\tau=1}^{2} p^{\tau}_{XU} \cdot e^{-h_{\tau} T} \right]$$

is the likelihood of those who have not found a job at the end of the time T of observation.

Appendix 5: empirical estimates

Hiring rates, separations rates and probabilities: : logit models;
Notations:
type 1: "quick workers"; type 2: "slow workers";
unskilled: US: high school drop outs: France: less than BEP;
old: 41-50 years old; young: 30-40 years old.

p_{i2} : probabilility that insiders are of type 2 (slow workers).
p_{o2} : probabilility that outsiders are of type 2 (slow workers).

s_i: separation rate of insiders towards non-employment,
s_{ji} : job to job transition of insiders;

$s_{o"}$:separation rate of outsiders of type " towards non-employment,

wages:
model: $Logw_{it} = ½_{xy} Logw_{i;t ¡ 1} + (1 ¡ ½_{xy})(Logw^{y}_{"} ¡ ¢_{xy}) + \tilde{»}^{xy}_{it}$
in which xy represents a transition from state x to state y; $w^{y}_{"}$ the average wage of workers of type " in state y (=insider or outsider);:

Notations:

a.Transitions:
k=worker keeps the same job;
j= worker switches from one job to another without a non-employment spell;
u= worker switches from one job to another with a non-employment spell;

b. Wages:
wage ": unconditional distribution of wage of workers of type " (=1,2);
rho-k-" : auto-correlation of wages of workers that keep the same job;
rho-j-" : correlation of wages of workers that switch directly to another job;
rho-u-" : auto-correlation of wages of workers that switch to another job through non-employment;
delta -k- " : discount of workers that keep the same job;

delta -j- " : discount of workers that switch directly to another job;
delta -u- " : discount of workers that switch to another job through non-employment;