Negative Income Tax, employment and welfare

Pedro LAGES DOS SANTOS

CERENE, University of Le Havre
Faculty of International Affairs
25 rue Philippe Lebon, BP 420
76057 Le Havre Cedex
France

e-mail : pedro.lages@univ-lehavre.fr

Abstract

Today, a lot of questions remain asked as to the situation of the poorest. In France like in most of western countries, the authorities are particularly paying attention to the social benefit system and the tax one. This article deals with a measure thought to improve the situation of the poorest while taking people back to employment i.e. the Negative Income Tax. We use a matching model like Gavrel and Lebon (2000) (similarly to Marimon and Zilibotti (1999)), which is based on an explicit differentiation of skills. The introduction of such an instrument presents interesting results. First, the « incentive to work» effect is real and allows reducing the number of unemployed people. Secondly, the redistributive effect of this measure definitely appears, improving the situation of the poorest and reducing inequalities among workers. Nevertheless, total production, individual and collective surplus fall because of the decrease of the average productivity of jobs due to a smaller selectivity of agents.

Key words : Matching, Differentiation of skills, Negative Income Tax, unemployment and productivity.

JEL Classification numbers : D63, H21, J41, J64.

1. INTRODUCTION

For many years, in spite of the decrease of unemployment level (thanks to 1.6 million of posts created between 1997 and the end of 2000) linked with a relatively steady growth (2.8% on the same period), a lot of questions are left unanswered as to the situation of the poorest in France.

Indeed, even if jobs are created, it is necessary to have an appropriate offer to require of. Why is it not always the case? This may be explained, at least partly, by the existence of inactivity traps as Laroque and Salanié (2000) had shown and therefore by the limits and even the gaps that the social benefits system has been revealing years after years. On the one hand, the minimum cost of employment (Minimum wage + National Insurance Contribution) that has been imposed to the employers does not favour the hiring since it makes employment's demand less flexible. On the other hand, for the offer, two social minima interfere nowadays in France with the free working of labour market. Indeed, if it is close to zero or even if it is negative, the gap between social benefits and net minimum wage can create a "poverty trap" making the acceptance of a job not interesting. Moreover, similarly, an "unemployment trap" may exist, inherent in the comparison, for an unemployed worker, of his benefits with his perspective of wage if he accepts a certain job. In both cases, these effects are reinforced by the whole of the other social allowances. By another way, we cannot forget that a lot of families, because they have a weak wage, are not concerned in the possible reductions of taxes consented by the government.

That is the reason why, lastly, a possible remake of the national insurance benefits system was envisaged. Many studies were dedicated to this purpose and several measures were brought on. We can point out for instance the program and the law against exclusion of July 29th of 1998 or more recently, the creation of the "prime à l'emploi" which is similar to the Earned Income Tax Credit (EITC) implemented in the USA. In this occasion, many ideas (often criticized) reappeared like Negative Income Tax, Basic Income or less radical, the "Allocation Compensatrice de Revenu" (ACR) of Godino (1999).

Concerning the Negative Income Tax (NIT, thereafter), it was developed by Friedman in 1962 then by neokeynesians such as Tobin in order to avoid the traps of assistance onto encourage employment. Then the Negative Income Tax, implemented like a reverse taxation, allows to link the access to a job and thus to a wage, with the benefit of a proportional subsidy. In theory, such a reform offers the advantage of improving the situation of the poorest employees while inciting unemployed people to search actively a job. This also could allow refining the progressiveness of the French fiscal system. Countries like the USA with the EITC or Great Britain with the Working Family Tax Credit present encouraging results with that kind of reform.

In spite of numerous questions aroused by this measure, the NIT is today pointed out. Empirical works are not numerous because of the lake of data and that is the reason why many analyses take the way of modelling. As for the present paper, this way was retained in order to study the effects of such a reform in a matching model (since Pissarides (1990) many analysis of the labour market rest on the matching model). We use the tool of analyses exposed by Gavrel and Lebon (2000). This matching model is based on an explicit differentiation of workers and jobs, which are distributed on a circle where the distance between two points on this circle measures the mismatch between the requirements of a firm and the skill of a worker. This mismatch determines the productivity of the job concerned and, after bargaining, the wage and the profits.

We establish that, in this framework, the introduction of a Negative Income Tax presents unexpected results. In spite of a positive effect on employment, a fall of productivity (in average) makes the individual and collective surplus decreasing.

The paper is organized as follows. Section 2 presents the model, which is solved in section 3. In section 4, we study the comparative static of the model. Then, in section 5, we precise the results with simulations. The last section collects some final comments.

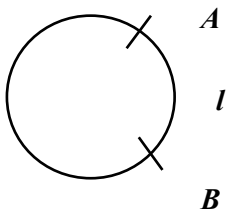
2. THE MODEL

The economy presents two sectors of numerous risk-neutral agents: the workers and the firms. The N workers are heterogeneous. The jobs that the firms offer them are heterogeneous too. All the workers are infinitely lived. On the contrary, the firms, which produce the same good, can "die". We assume that, at each period, the firms face a constant and exogenous risk of destruction; the probability of this event is denoted by s. At each period, a share s of the firms disappears but the free entry of new firms on the market stabilises their number. All the agents have the same discount rate r. Let R denote the sum $(1+r)$. In order to describe the differentiation of workers and jobs, we use Salop (1979) approach.

2.1 The skill circle.

We assume that workers and jobs are uniformly distributed on a circle which circumference is equal to 2. This distribution is exogenous. The position of a worker on the circle represents its "type" of skill whereas those of a firm define the "type" of skill that perfectly suits its needs. On the circle of skills (held or required), the distance l ($0 \leq l \leq 1$) between a worker (in A) and a firm (in B), measures the match (or mismatch). Thus matching is perfect when the distance l equals 0. On the opposite, the mismatch is maximized when l reaches unity.

Figure 1. The skill circle



Then, the productivity of a worker for the given representative firm, denoted *y(l),* is a decreasing function of this distance *l* with $y'(l)<0$ and $y''(l) \leq 0$. Note that we suppose that each firm only employs one worker and, then, its production is determined by the productivity of this one.

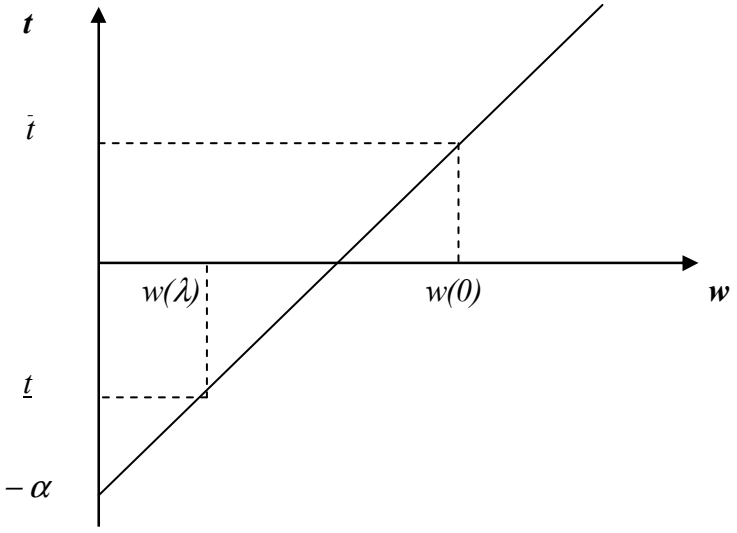
2.2. Intertemporal utilities

When a worker is hired, his productivity and, then, his gross wage *w(l)* depends on the distance *l* between his "type" and that of the firm which employs him. We denote $W_E(l)$ the intertemporal utility of the hired worker. We assume, for the sake of simplicity, that unemployed people do not receive unemployment benefits. Their intertemporal utility $W_U(\lambda)$ depends on the mismatch limit λ that is, the distance above which a firm rejects a worker. At this stage of the analysis, limit λ is exogenous. λ influences the hiring probability *p* and the expected intertemporal utility of a worker who is hired. Since the distribution of vacancies is uniform, $\overline{W_E}$ is defined by:

$$\overline{W_E}=\frac{1}{\lambda}\int_0^{\lambda} W_E(l)dl \qquad (1)$$

We introduce in this model a particular tax scheme. Note that this only applies to workers, as we suppose the unemployed people have no income. The amount of the tax *t[w(l)]* imposed on each worker depends on the level of the income he gets. The particularity of the tax system consists in the fact that we admit that high incomes pay a tax whereas low incomes gain from tax credit. Besides, workers collecting average income are tax exempted. Let's suppose $t[w(0)]=\bar{t}$ the highest amount of tax paid by a worker and $t[w(\lambda)]=\underline{t}$ the maximum tax credit amount collected. We will consider, for the simulation, a function of this form: $t[w(l)]= -\alpha + \gamma w(l)$.

Graph 1: The tax function



Moreover, we admit that this system is built so as the collected taxes on high income workers just allow to finance the negative tax from which profit low incomes. Thus, we obtain:

$$\int_{w(\lambda)}^{w(0)} t(w)dw=0$$

In stationary equilibrium, intertemporal utilities $W_E(l)$ and W_U satisfy:

$$W_E(l)=w(l)-t[w(l)]+R^{-1}\left[sW_U+(1-s)W_E(l)\right] \quad (2)$$

$$W_U=R^{-1}\left[p\overline{W}_E+(1-p)W_U\right] \quad (3)$$

The utility of an employee depends at the same time on its net wage and on its expectation of future utility, which rely on the fact of keeping or not its job in the future. The utility of an unemployed worker only depends on the perspective of a possible hiring.

2.3. Firms profits

Jobs offered by the firms are either vacant or filled. Note $J_F(l)$ the value of a filled job (which also depends on l) and J_V the value of a vacant job.

The value of a filled job is then given by :

$$J_F(l)=y(l)-w(l)+R^{-1}\left[sJ_V+(1-s)J_F(l)\right] \quad (4)$$

The value of a vacant job J_V is a function of limit λ. Indeed, this limit threshold affects the probability q of filling this job as well as the expectation of the value of the filled job.

Consequently, we have:

$$\bar{J}_F=\frac{1}{\lambda}\int_0^{\lambda} J_F(l)dl \quad (5)$$

$$J_V=-c+R^{-1}\left[q\bar{J}_F+(1-q)J_V\right] \quad (6)$$

As it is not filled, the job costs c to the firm (i.e. employer has to invest to create this post and look for an employee) and thus, the value of the job only depends on the probability q of being filled. Therefore, new jobs will be created as long as $J_V > 0$, so until:

$$J_V=0 \quad (7)$$

Note $\bar{y}$ and $\bar{w}$ the average production and the average wage. We have:

$$\bar{y}=\frac{1}{\lambda}\int_0^{\lambda} y(l)dl \quad (8)$$

$$\bar{w}=\frac{1}{\lambda}\int_0^{\lambda} w(l)dl \quad (9)$$

Given equations (4), (5), (6) and (7), we have:

$$\bar{J}_F=\frac{R(\bar{y}-\bar{w})}{r+s} \quad (10)$$

$$\bar{J}_F=\frac{Rc}{q} \quad (11)$$

The expectation of the value of a filled job depends at the same time on the expectation of future rents in terms of difference between productivity and salary cost but also on realisable profit thanks to the maintenance (or the creation) of vacant jobs.

2.4. Surplus sharing and the limit of "mismatch"

According to the Nash rule, the surplus created by a couple employer/employee is shared out between the two "agents" according to their respective negotiating power. Note β ($0<\beta<1$), the bargaining power of the workers. Then, the respective rents of workers and of firms with a filled post are represented by:

$$W_E(l)-W_U=\beta[W_E(l)+J_F(l)-W_U-J_V] \quad (12)$$

$$J_F(l)-J_V=(1-\beta)[W_E(l)+J_F(l)-W_U-J_V] \quad (13)$$

The association employer/employee is only realisable if it gives a positive total surplus. Then, we have:

$$W_E(l)+J_F(l)-W_U-J_V\geq 0 \quad (14)$$

Consequently, the limit λ satisfy:

$$W_E(\lambda)+J_F(\lambda)-W_U-J_V=0 \quad (15)$$

According to equations (15), (12) and (13), we obtain:

$$W_E(\lambda)=W_U \quad (16)$$

$$J_F(\lambda)=J_V \quad (17)$$

We can consider λ as the limit hiring distance and consequently, the worker "located" at this distance λ from his employer will be offered a wage allowing him to be just incited to participate. Let's remember that firms create new jobs as long as anticipated profits are strictly positive. As a consequence, seeing that the value of a filled job by a worker "located" at the distance λ from his employer is at equilibrium equal to the value of a vacant job, it remains no rent for this particular employee and that means simply that he will be remunerated according to his productivity. Then, we have:

$$y(\lambda) = w(\lambda) \quad (18)$$

The lowest wage is equal to the payment of the productivity of the job filled by a worker located the furthest possible of his employee.

2.5. Hiring function

We consider a reformulation of the "urn ball model" (Hall (1977), Pissarides (2000), Petrongolo and Pissarides (2001)). Following the job search theory (Mc Kenna (1985)), we assume that an unemployed worker only meets one firm able to hire him per period. However, this one has "no priori" information about job offers. We admit that the hiring firm an unemployed worker meets is drawn at random among all the firms with "the type" located from a distance inferior to x of its own "type". The variable x is exogenous and represents "*the transparency of the labour market*". The weaker x is, the clearer the labour market is. Note U, the number of unemployed workers and V, the number of vacancies. The "tightness" of the labour market is then given by $\theta = V/U$.

Hence, for $\lambda \leq x$, one can show that the probability of filling a vacancy, denoted by q, is determined by:

$$q = 1 - e^{-\frac{\lambda}{x\theta}} \tag{19}$$

To fill a vacant job, a firm only needs to meet one employable worker, that is a worker whose type is not further than the limit λ. We notice a higher selectivity (i.e. a decrease in λ) and either more vacancies or less unemployment (i.e. an increase in θ) imply the reduction of the probability of filling a vacant job. Moreover, for given values of the variables λ and θ, more transparency on labour market (i.e. a decrease in x) leads to a rise of the probability q. The total hiring, denoted by H, is given by:

$$H = (1 - e^{-\frac{\lambda}{x\theta}})V \tag{20}$$

The hiring probability p is obtained by dividing total hiring H by unemployment U:

$$p = (1 - e^{-\frac{\lambda}{x\theta}})\theta \tag{21}$$

This probability p is an increasing function in limit λ and a decreasing function in distance x. We establish that p is also an increasing function in labour market tightness θ. Therefore, an increase in limit λ raises both probabilities p and q. However, this growth that decreases the average production by firm $\bar{y}$ can reveal itself socially undesirable. At the contrary, an increase in distance x decreases these probabilities.

2.6. Flow equilibrium

In stationary equilibrium, the flow of workers who find a job (i.e. a proportion p of unemployed people) equals the flow of those who loose their job

(i.e. a proportion of the population with a job). Note L the level of employment, thus flow equilibrium forces:

$$pU = sL = s(N - U) \tag{22}$$

3 MODEL RESOLUTION

3.1. Selectivity ant tightness on labour market

Equation (2), writes:

$$W_E(\lambda) = w(\lambda) - t[w(\lambda)] + R^{-1}\left[sW_U + (1-s)W_E\right]$$

As $W_E = W_U$ and $w(\lambda) = y(\lambda)$, we obtain:

$$rW_U = R\left(y(\lambda) - \underline{t}\right) \tag{24}$$

Equation (3) allows us to write:

$$rW_U = p\left(W_E - W_U\right) \tag{25}$$

So we deduce:

$$y(\lambda) = \underline{t} + R^{-1} p\left(\overline{W}_E - W_U\right) \tag{26}$$

With equations (11),(12) and (13), we obtain:

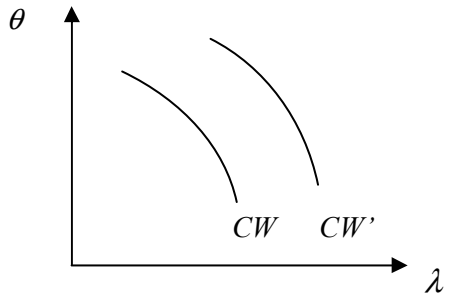
$$\overline{W}_E - W_U = \frac{\beta}{1-\beta}\overline{J}_F = \frac{\beta}{1-\beta}\frac{Rc}{q} \tag{27}$$

Therefore, (27) and (26) give :

$$y(\lambda) = \underline{t} + \frac{\beta}{1-\beta}c\theta \tag{28}$$

The limit λ decreases with θ (*CW* curve on *graph 2*) and we check that the creation of a negative tax induces, for a value of λ an increase of θ (CW' curve agrees with the situation after the creation of the negative tax).

Graph 2:Negative tax, selectivity and labour market tightness.



It is interesting to note that, with a constant value of θ, the tax leads to an increase of λ which means that the probability to be hired as to fill a vacant job tend to increase.

3.2. Jobs creation

Equations (12), (13) and (10), allow to determine the average "advantage" of an employee compared with an unemployed.

$$\overline{W_E} - W_U = \frac{\beta}{1-\beta}\overline{J_F} = \frac{\beta}{1-\beta}\frac{R(\overline{y}-\overline{w})}{r+s} \qquad (29)$$

This expression gives in some way a measure of the inequality among workers.

The expected intertemporal utility of a worker is:

$$\overline{W_E} = \overline{w} - t(\overline{w}) + R^{-1}\left[sW_U + (1-s)\overline{W_E}\right]$$

A worker can hope, if hired, an average wage $\overline{w}$, and to be, as provided for the taxation system, tax exempted, since $t(\overline{w})=0$.

Equations (2), (3), (27) and (29) allow us to write:

$$\overline{w} = \beta\overline{y} + \beta c\theta \qquad (30)$$

In terms of average variables, equation (30) is an usual relation of wage setting. Equation (27) and (29) allow to determine relation describing vacancy creation as an average wage function:

$$\overline{w} = \overline{y} - \frac{(r+s)c}{q} \tag{31}$$

With equation (28), we write wage setting equation (30):

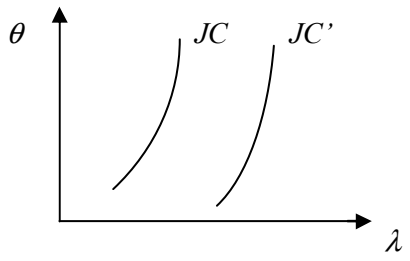
$$\overline{w} = \overline{y} - (1-\beta)\left[\overline{y} - y(\lambda) + \underline{t}\right] \tag{32}$$

In order to obtain a wage setting curve coherent with the new jobs creation (31), the couple $(\lambda\,;\theta)$ has to satisfy:

$$(1-\beta)q[\overline{y} - y(\lambda) + \underline{t}] = (r+s)c \tag{33}$$

As a result of concavity of $y(l)$, the difference $\overline{y} - y(\lambda)$ is an increasing function in limit λ. Consequently, with a certain level of tax credit $\underline{t}$, the increase in limit λ raises probability q of filling a vacant job and so the labour market tightness one (*JC* curve on *graph 3*). Moreover, with a certain level of θ, the introduction of a Negative Income Tax causes an increase in limit λ (*JC'* curve corresponds to the situation after the introduction of the tax).

Graph 3:Negative tax and job creation



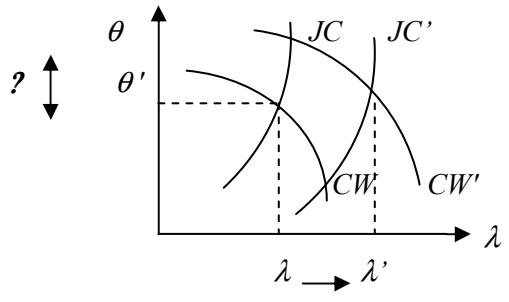
The increase in labour market tightness involves a diminution in probability to fill a job. Therefore, average wage that firm can afford is confirmed too low and, consequently, limit λ raises.

4. EQUILIBRIUM AND COMPARATIVE STATICS

4.1. Equilibrium

Equations (28) and (33) allow to determine equilibrium values in limit of mismatch and the tightness of the labour market. We check on *graph 4* equilibrium $(\lambda^*\,;\theta^*)$ and the effects of the reform on this.

Graph 4: Equilibrium and reform



4.2. Comparative static

4.2.1. The effect of this reform in limit λ.

It is obvious that the creation of a NIT implies an increase in limit λ. But, the effect on the tightness of the labour market remains undetermined. We note that the increase in λ (obvious in *graph 4*) is interesting in the perspective of a diminution of unemployment seeing that it leads to decrease the reservation wage of unemployed people and to raise the probabilities of filling a vacant job for firms and to find a job for workers.

4.2.2. The effects of the different variables' variations.

As we write before, the effect of the creation of such a tax scheme on the tightness in labour market and so on employment is undetermined. Nevertheless, concerning comparative static, we have, as in the article of Gavrel and Lebon (2000), following table:

Table 1. Comparative static

	θ	λ	$\overline{y}$	$\overline{w}$	p	q	L	Y
x	–	+	–	–	–	–	–	–
s	–	+	–	–	?	+	–	–
c	–	+	–	–	–	+	–	–

4.2.2.1. Transparency in labour market

A diminution in distance x which means a bigger transparency on labour market involves a decrease in limit λ and an increase in θ. The rise of information allows to create employee/employers associations more productive seeing that their

quality raises on average. Workers receive higher wages and since the probability of filling a vacant job raises (because of the rise of information) as the tightness in labour market does, the probability to be hired for workers raises too. The increase of the transparency in labour market (represented by the diminution of the variable x) has for consequence to increase the level of employment as the global production one**.**

4.2.2.2. Jobs destruction rate

The increase of the probability of separation between employer/employees has for direct effect to raise the number of unemployed people but also to decrease the number of vacant jobs making lower the tightness in labour market. Moreover, as it involves a diminution of the expected jobs' life duration, the increase of s has for effect to raise wage that workers claims leading to an increase in λ to keep implicitly jobs profitability. As a consequence, average productivity as average wage decrease. We have to note that the probability to fill a vacant job rises since λ increases but also because there are less vacant jobs for more applicants. However, even if it is not possible to determine the effect on the hiring probability, the evident increase of the term s/p involves, because of flow equilibrium condition, an increase of unemployment.

4.2.2.3. Vacant job cost.

The increase of the costs of creation and maintenance of vacant job has for consequence to decrease the number of these because they are less profitable. So it appears that it has a negative effect on the tightness in labour market. Concerning the effect on matching limit, λ, combining equation (28) and (33), we deduce that the diminution of θ induces a diminution of equilibrium value of less efficient job productivity $y(\lambda)$ and, as a consequence, means an increase in λ (remind that $y(\lambda)$ is decreasing in λ). This increase in limit λ has for direct effect to decrease the equilibrium average values of productivity and wage. Moreover, the probability of filling a vacant job raises seeing that the tightness on market is lower ant the investigation area is more important. However, taking into account equations (28) and (33), we show that the increase of the cost of a vacant job leads to a diminution of the probability p to be hired and consequently, an increase of the level of unemployment and a diminution of global production.

5. SIMULATIONS

5.1. Presentation

In this 5th part, we initiate simulations in order to specify the results we obtained with theoretical analysis but also and mainly in order to determine the effect of the measure on θ. Consequently, for these simulations, in addition to the hypothesises already held, we consider as an explicit function of workers productivity a simple linear function of the form:

$$y(l) = y_0 - dl$$

As we have already precised, the budget constraint imposes us:

$$\int_{w(\lambda)}^{w(0)} t(w)\, dw = 0$$

If we consider a tax function of the form $t(w) = -\alpha + \gamma w$ and given that $w(\lambda)<w(0)$, the financing of this measure imposes :

$$\frac{w(\lambda) + w(0)}{2} = \frac{\alpha}{\gamma}$$

These simulations, made with the software "*Matlab"*, permit us to study particularly the effects of the reform on unemployment rate, on production and on surplus.

5.2. The results

The simulations gave the results presented in *tables 2, 3 and 4*. Case 1 corresponds to the reference situation that is the reform's setting up. Consequently, cases 2, 3, 4 and 5 present the results of the implementation of a Negative Income Tax. In all the cases, we held the following parameters:

β=0,5 ; d=0,5 ; s=0,05 ; x=0,9 ; c=0,5 ; N=1 and y_0 = 0,5.

Besides, in addition to the other variables already defined, Y represents global production, SC, the collective surplus and $W_E(0{,}544)$, the utility of the worker initially the poorest.

Table 2. Selectivity, productivity et employment

	Case 1 $t = 0$	**Case 2** $t = -0,025$	**Case 3** $t = -0,05$	**Case 4** $t = -0,075$	**Case 5** $t = -0,1$
λ	**0,544**	**0,609**	**0,680**	**0,755**	**0,834**
θ	0,456	0,440	0,420	0,395	0,366
q	0,735	0,785	0,834	0,880	0,921
p	0,335	0,346	0,351	0,348	0,337
U	**0,130**	**0,126**	**0,124**	**0,126**	**0,129**
$\bar{y}$	0,364	0,348	0,330	0,311	0,291
Y	0,317	0,304	0,290	0,272	0,253

As the theoretical analysis shows, the setting up of the reform is expressed by a rise in limit λ. As already noted, this can signify an increase of employment if the tightness in labour market and, consequently, the probability of being hired increases. But this situation does not occur. The simulation allowed to determine the effect on the tightness on labour market and it appears that the introduction of a Negative Income Tax leads to the diminution of the latter. The consequence is a rise of q but not inevitably that of p (remind that $p=\theta q$, there are two opposed effects). Moreover, we check it on the results of the simulation.

Thus, until a maximum amount of tax credit in a value of 0.05, thanks to the widening of common ground between employers and potential employee allowed by the rise of λ, it appears that the hiring rate rises and that unemployment decreases significantly (-2.77% then -1.2%). However, for a greater tax credit level, this tendency reverses and the unemployment tends to increase. This is because the ratio λ/θ rises with the NIT and then, the effect (negative) of the diminution of θ on the hiring rate becomes more important than the one (positive) induced by the increase of λ. As a consequence, the probability p to be hired, as the level of employment, decreases. We note that, whatever the tax level is, the increase of λ creates jobs less productive in average and, despite the rise of employment, this leads to a decrease in global production. This diminution of average productivity, even if accompanied by a decrease of average wage induces a depreciation of the filled jobs.

Concerning incomes, it appears (table 3) that the highest gross incomes increase. This can be explained by the growth in requirements of workers. However, the implementation of the reform provokes a diminution of these incomes after taxation. That is not so surprising, considering the form of the tax scheme and so its redistribution effect. Concerning the lowest incomes (gross or net), these ones decrease.

Table 3. Workers' Incomes

	Case 1 $t = 0$	Case 2 $t = -0,025$	Case 3 $t = -0,05$	Case 4 $t = -0,075$	Case 5 $t = -0,1$
$\overline{w}$	0,296	0,284	0,270	0,255	0,237
$w(\lambda)brut$	0,228	0,195	0,160	0,123	0,083
$w(\lambda)net$	0,228	0,220	0,210	0,198	0,183
$w(0)brut$	0,364	0,373	0,380	0,387	0,392
$w(0)net$	0,364	0,348	0,330	0,311	0,291
$w(0,544)_{net}$	**0,228**	**0,239**	**0,255**	**0,251**	**0,290**

Indeed, the growth in limit λ leads to the diminution of the minimal productivity and so the less productive jobs after the reform are not the same anymore before its implementation. These jobs are less remunerated yet than those initially less productive. That is the reason why the lowest incomes decrease (as well for gross value as for net one) since the NIT cannot totally compensate this effect.

So it appears that the introduction of a NIT can generate new poor workers, unproductive hence little remunerated. As a consequence, they get poorer than previously. In turn, this decreases the average values of wage and the worker's surplus. However, even if the newly created jobs are not well-remunerated, we cannot miss the interest of the effect of the reform on the return to employment.

Table 4. Intertemporal utilities and profits

	Case 1 $t = 0$	Case 2 $t = -0,025$	Case 3 $t = -0,05$	Case 4 $t = -0,075$	Case 5 $t = -0,1$
$\overline{W}_E$	5,499	5,294	5,044	4,749	4,409
W_U	4,784	4,625	4,414	4,152	3,839
$W_E(0)$	6,213	5,963	5,673	5,343	4,978
$W_E(0,544)$	4,784	4,822	4,885	4,712	4,964
$\overline{J}_F$	0,715	0,669	0,630	0,597	0,570
SC	**6,028**	**5,794**	**5,516**	**5,195**	**4,832**

Moreover, it is important to note that the worker who was initially the poorest (before the reform) sees his situation getting better with the increase of his income and of his utility. This is shown in the table 3 and 4 by the evolution of net

wage and of the utility of the employee located at a distance equal to 0,544 from his employer. Despite the effect favouring employment, the diminution of the productivity and the evolution of incomes lead to a decrease of the expected surplus of workers and unemployed people. The poorest present at the beginning who are getting a tax credit see their surplus increasing to the detriment of the richest and of the new entering.

Finally, as well as the individual average surplus, it appears that the collective surplus also decreases. Thus, the question of the efficiency on labour market is raised. According to Hosios (1990) and Pissarides (2000), in a matching model, this imposes that the process of hiring respects the following condition: the elasticity of the matching function relatively to the tightness on market ($\eta(\theta)$) has to be equal to the bargaining power of workers (β).

In our simulation, this condition is never checked. So the market is not efficient and the degradation of the collective surplus can be a consequence of the situation of underemployment aggravated by the decrease of unemployment. We actually obtain values such as $\eta(\theta) < \beta$. As $\eta(\theta)$ is increasing in θ, we deduce that the tightness on labour market is too weak. Here, we analyse a situation of excessive unemployment with a diminution of this one seen as desirable. As a consequence, the depreciation of the collective surplus cannot be imputed to the decrease of unemployment but to the deterioration in productivity and so to the lesser efficiency of jobs.

6. CONCLUSION

This article aimed to study the effects of the introduction of the Negative Income Tax in employment as on the different surplus, individual and collective. To this purpose, we chose a matching model that, we think, offers a good representation of the labour market working and particularly of possible problems of frictions.

Thus, we could appreciate the arguments that some present to defend such a reform. First, the last discussions present the possibility of the NIT as an instrument of incentive to employment. Our model has permitted to confirm this possibility even if moderating the latter. The NIT presents a significant interest in terms of struggle against unemployment. The "incentive to employment" effect is real since the reform makes less-remunerated jobs more attractive for the workers and, even it means a decrease in average wages, firms are incited to hire less productive people. Nevertheless, we have to note that the tightness on labour market decreases with the diminution of the number of vacant jobs because of this loss of productivity. So, the positive effect on employment is reduced.

Moreover, some defend this reform in name of the reduction of inequalities and social justice. The introduction of a negative tax would represent a mean to lessen the perverted and unfair effects of the tax system, refining the progressiveness of taxation. Actually, things are not so simple. Indeed, in our framework, simulations show that the implementation of such a reform improves significantly the situation of those who were initially the poorest. There is indeed, in favour of a reduction of inequalities, a redistribution of the richest toward the poorest. Nevertheless, increasing the limit λ, the reform creates new poor workers who are poorer than the previous. Thus, we favour the recovery of activity allowing new people to find easily a job. But, these jobs are potentially less remunerated than previously because less productive. Consequently, if we add the diminution of the highest incomes, the average income and the surplus of workers decrease.

Besides, concerning the collective surplus, the supplementary jobs created, in average less productive, cannot generate enough benefits to compensate the diminution of the average individual surplus. Moreover, even in theory the NIT can seem very interesting, as much in terms of employment as in social justice (or in reduction of inequalities), we have to be careful. Indeed, our results raised concretely the question of the "***efficiency-equity***" arbitration.

REFERENCES

Blanchard O. J. and P. Diamond, (1989), *The Beveridge Curve*. Bookings Papers on Economic Activity, 1 : 1-76.

Bourguignon F. and P.-A. Chiappori, (1997), *Fiscalité et redistribution*. Revue Française d'Economie.

Gavrel F., (2001), *Differentiation of skills, firms' recruitment strategy and unemployment benefits in an efficiency wage model.* De Economist 149, 347-364.

Gavrel F. and I. Lebon, (2000), *A simple search matching model with micro foundations*. Working paper, CERENE (Université du Havre) and GEMMA (Université de Caen).

Godino R., (1999), *Pour la création d'une Allocation Compensatrice de Revenu*. Notes de la Fondation Saint-Simon.

Hall R.E., (1977), "An Aspect of the Economic Role of Unemployment*"*. G. C. Harcourt, The Microeconomic Foundations of Macroeconomics. Maclillan.

Hosios A. J., (1990), *On The Efficiency of Matching and Related Models of Search and Unemployment*. Review of Economic Studies, 57, 279-298.

Laroque G. and B. Salanié, (2000), *Une décomposition du non-emploi en France*. Economie et statistique, n°331, INSEE.

Marimon R. and F. Zilibotti, (april 1999), *Unemployment vs mismatch of talents : reconsidering unemployment benefits.* Economic Journal, 109 :266-291.

Mc Kenna C., (1985), *Uncertainty and the labour market.* Harvester Press.

Mortensen D. and C. Pissarides, (1994), *Job creation and destruction in the theory of unemployment*. Review of Economic Studies, 61, 397-415.

Petrongolo B. and C. Pissarides, (2001), "Looking into the Black Box, a Survey of the Matching Function", *Journal of Economic Literature*, n° 34.

Pisani-Ferry J., (2001), *Le retour au plein-emploi*. Rapport pour le Conseil d'Analyse Economique.

Pissarides C., (1990), *Equilibrium Unemployment Theory*. Basil Blackwell.

Salop S., (1979), *Monopolistic competition with outside goods*. Bell Journal of Economics.